

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**Office of Oil and Gas Management**

**DOCUMENT NUMBER:** 800-0810-003

**TITLE:** Guidelines for Development of Operator Pressure Barrier Policy for Unconventional Wells

**EFFECTIVE DATE:** Upon publication of notice as final in the *Pennsylvania Bulletin*

**AUTHORITY:** The Oil and Gas Act of 2012 (58 Pa.C.S. § 3201 *et seq.*)  
The Clean Streams Law (35 P.S. § 691.1 *et seq.*)  
The Solid Waste Management Act (35 P.S. § 6018.101 *et seq.*)  
The Oil and Gas Conservation Law (58 P.S. § 401 *et seq.*)  
25 Pa. Code §§ 78a.54-78a.58 and 78a.60-78a.61, 78a.71, 78a.72, 78a.74, 78a.76, 78a.84, 78a.87, 79.12

**POLICY:** Unconventional well operators conducting drilling, hydraulic fracturing, alteration or plugging activities should follow this policy to develop a method for controlling fluids during operations requiring blow-out prevention in order to ensure protection of people and the environment.

**PURPOSE:** The purpose of these guidelines is to inform unconventional operators engaged in drilling, hydraulic fracturing, alteration or plugging activities of items to consider when developing the **Pressure Barrier Policy (PBP) component** of a Preparedness, Prevention and Contingency (PPC) plan. Recommendations relevant to maintaining compliance with the requirements of Chapter 78a and any additional requirements set forth in The Clean Streams Law, The Solid Waste Management Act, the 2012 Oil and Gas Act and other applicable laws are summarized. These guidelines have been developed to facilitate appropriate well control incident risk mitigation.

**APPLICABILITY:** This guidance document applies to unconventional operations conducting drilling, hydraulic fracturing, alteration or plugging activities at unconventional wells in the Commonwealth of Pennsylvania.

**DISCLAIMER:** The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures will affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. The Department of Environmental Protection (DEP) does not intend to give these rules that weight or deference. This document establishes the framework, within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

**PAGE LENGTH:** 15 pages

## I. BACKGROUND

Section 78a.55 (Control and disposal planning; emergency response for unconventional wells) of Title 25 of the Pennsylvania Code outlines the requirements for the development and maintenance of Preparedness, Prevention and Contingency (PPC) plans for unconventional well sites. 25 Pa. Code § 78a.55. DEP developed this guidance document and accompanying worksheet procedure, set forth below, to address certain requirements of this section relating to the maintenance of well control. Specifically, subsection 78a.55(d) requires unconventional well operators to develop a **Pressure Barrier Policy (PBP) component** of the PPC plan. 25 Pa. Code § 78a.55(d). The PBP component must identify mechanical barriers to be used during certain enumerated operations. *Id.* Additionally, related requirements can be found in Sections 78a.71 (relating to use of safety devices – well casing), 78a.72 (relating to use of safety devices – blow-out prevention equipment), 78a.74 (relating to venting of gas), 78a.84 (relating to casing standards), and, for operations associated with a gas storage reservoirs, 78a.76. (relating to drilling within a gas storage reservoir area), and 78a.87 (relating to gas storage reservoir protective casing and cementing procedures).

An operator may find that a PBP prepared for one well is applicable to another well. Subsurface conditions, as evaluated by the operator, dictate whether or not that is the case. When applicable, the operator may use one PBP for more than one well. The PBP may also exist under a separate cover and be referenced in the PPC plan. Finally, the guidelines that follow should be considered by the operator when developing a PBP, but they need not be addressed in the specific format presented in the worksheet procedure. Further, in some cases DEP has recommended that other information be assembled in the PBP for clarifying purposes, but it is not required that such information be included if no specific regulatory or statutory provision exists, or if the regulatory or statutory provision that is referenced is not directly applicable to the corresponding unconventional well or well operation.

## II. DEFINITIONS

This section of the document provides DEP’s interpretations of terms referenced in 25 Pa. Code §§ 78a.54-78a.58, 78a.60-78a.61, 78a.71-78a.72, 78a.74, 78a.76, 78a.84 and 78a.87 and utilized throughout this document, as well as a definition of “well control emergency” from the 2012 Oil and Gas Act. The terms defined in this section are italicized throughout the document.

*Mechanical Pressure Barriers* – A subset of physical barriers that feature mechanical equipment which are capable of being tested; this does not include cement or a hydrostatic fluid column, which would also be considered pressure barriers. Examples of mechanical barriers include well heads, ram-type blow-out preventers (BOPs) and annular-type BOPs (adapted from API RP 65-2, 3.1.34, 2010).

*Pressure Barrier Policy* – Combination of Well Barrier Elements that together constitute a method of containment of fluids within a well that prevents uncontrolled flow of fluids, i.e., gas, oil, and brine, into another formation, or to escape at surface (adapted from International Well Control Forum (IWCF) Well Control and Barrier Definitions).

*Well Barrier Element* – Mechanical barrier component of a well designed to prevent fluids from flowing unintentionally from a formation, into another formation or to escape at surface (adapted from IWCF Well Control and Barrier Definitions).

*Well control emergency* – An incident during drilling, operation, work-over or completion that, as determined by DEP, poses a threat to public health, welfare or safety, including a loss of circulation fluids, kick, casing failure, blowout, fire and explosion. 58 Pa.C.S. § 3203.

*Well control incident/loss of well control* – A scenario where the treatment pressure, producing pressure, and/or annular pressure of the well being treated deviates from anticipated pressures in a manner that indicates mechanical integrity has been compromised and continued operations pose a risk to personnel safety, equipment integrity, or the environment (adapted from API RP 100-1, 9.4.5, 2015).

### **III. APPLICABILITY**

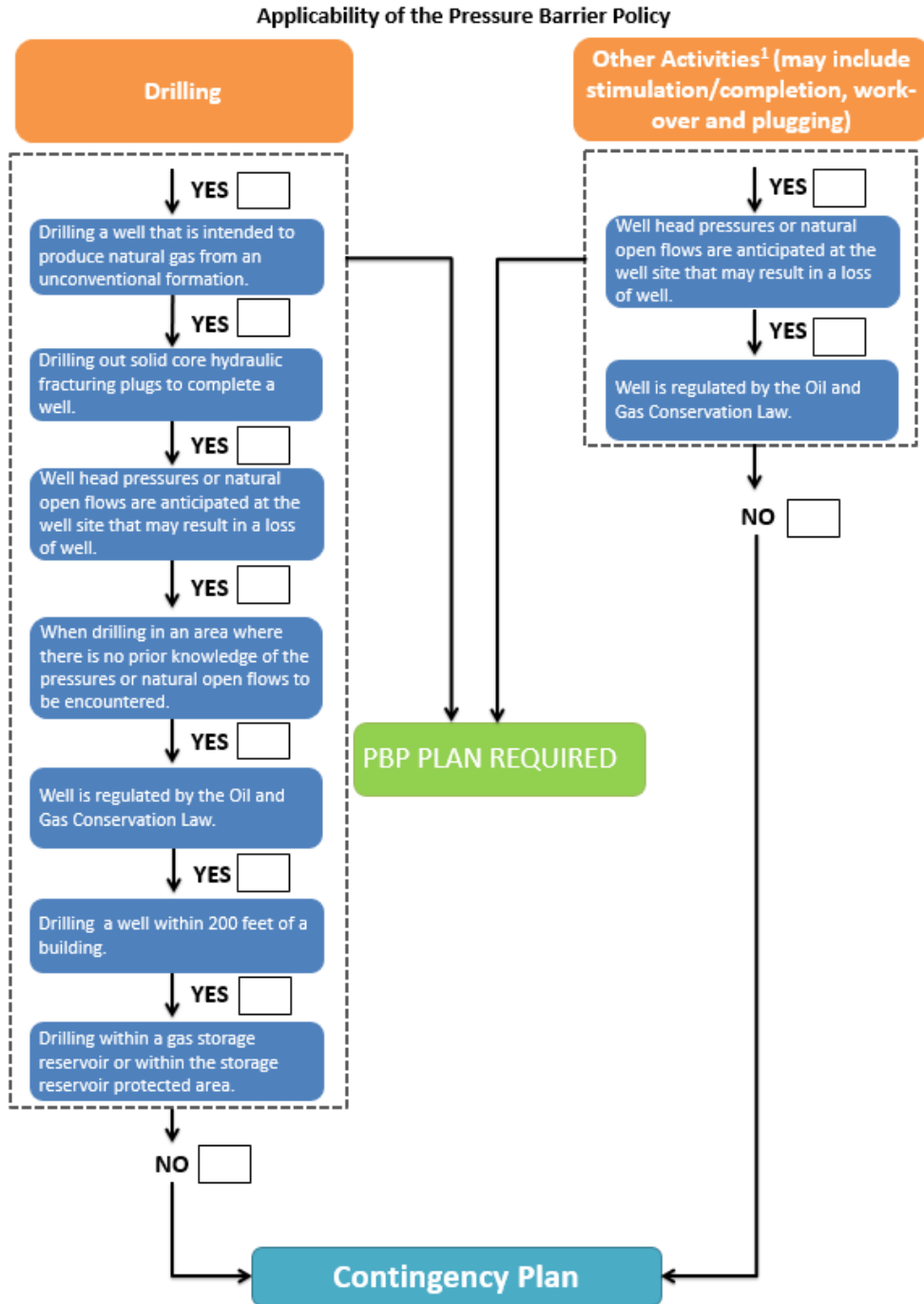
This policy, which addresses components of an operator’s PBP, applies under the following scenarios where a BOP and/or ancillary equipment is required by regulation:

- (1) When drilling a well that is intended to produce natural gas from an unconventional formation.
- (2) When drilling out solid core hydraulic fracturing plugs to complete a well.
- (3) When well head pressures or natural open flows are anticipated at the well site that may result in a loss of well control.
- (4) When the operator is drilling in an area where there is no prior knowledge of the pressures or natural open flows to be encountered.
- (5) On wells regulated by the Oil and Gas Conservation Law (58 P.S. §§ 401-419).
- (6) When drilling within 200 feet of a building. It is recommended that a BOP and/or ancillary equipment be used within 500 feet of a building when operators anticipate the potential for open flows.
- (7) When drilling within a gas storage reservoir or within the reservoir protective area.

In circumstances when one or more of the conditions above apply, the operator should reference all information contained in this document to develop the required PBP. If none of these criteria apply at a well, an operator should reference only the Contingency Plan portion of the worksheet to develop the PBP. While an operator should address all worksheet items in the applicable sections of this document associated with relevant, specific regulatory citations in its PBP; DEP may determine, on a case-by-case basis, that other items are necessary during well site activities to safely drill, complete, alter, or plug a well.

**IV. PROCESS CHART FOR DETERMINING APPLICABILITY**

The following decision tree is meant only to serve as guidance to aid in determining if a detailed PBP or a contingency plan is required for well operations. If an operator responds affirmatively to any of the items, development of a PBP is required.



**Figure 1. Process chart for applicability of guidance.**

**Footnotes:**

<sup>1</sup>Other activities when a BOP may be recommended.

## V. WORKSHEET PROCEDURE

The following worksheet serves only as one model for assembling a PBP and does not take the place of a complete PPC plan under a separate title and heading which is prepared for the site and kept at the well site during well site activities. DEP recommends that operators complete the worksheet(s) or develop a suitable alternative in the PPC plan. Operators may maintain these under a separate cover and make them available to DEP at the well site in order to provide clarity for DEP inspectors assessing PBPs for compliance with all applicable rules, regulations, and laws. If the model below is used, a separate worksheet should be completed for each operation requiring BOP use, provided the mechanism for maintaining well control is different for the operation. The operator should also consider the use of separate worksheets on a hole-section basis, as equipment ratings and functionality may change with respect to the depth interval of the well.

## VI. WORKSHEET QUESTIONS

### I. Applicability (see Figure 1):

- I.1. Is a BOP required under §§ 78a.72 or 78a.87(a)(1)-(2)?
  - I.1a. If no, please proceed to Section IV - Contingency Plan.
  - I.1b. If yes, please proceed to Section II - Equipment.

### II. Equipment (for any applicable worksheet item specifically referenced in Chapter 78a as a requirement, "Yes" should be checked or an explanation provided in the PBP):

- II.1. Are there at least two *mechanical pressure barriers* during specified operations, as required under § 78a.55(d) and § 78a.72(i)?
  - II.1a. If yes, please **briefly** describe.
- II.2. Will any fluid barriers be used during this operation?
  - II.2a. If yes, please provide a **brief** description (including type, i.e., oil-based mud (OBM) or water-based mud (WBM), and anticipated pounds per gallon (ppg) weight) of the fluids and how they will be used.
- II.3. Identify all operations during which a BOP must be used under §§ 78a.72 or 78a.87(a)(2).
  - II.3a. Please provide a **brief** description of BOP and ancillary equipment, casing and well head configurations that will be available and may be utilized during drilling, stimulation/completion, work-over and plugging of the well, if required. Please include BOP inspection sheets as part of the description or have them available on-site.

- II.4a. What is the maximum anticipated pressure (MAP) (psi) for the relevant operations that BOP and ancillary equipment, casing and well head could be subjected to? If the casing must be pressure tested in accordance with § 78a.84(d) or (f), this information is required.
- II.4b. Please provide a **brief** description of how the maximum anticipated pressure was determined.
- II.4c. What is the pressure rating (PR) (psi) of the BOP?
- II.5. For a BOP with a pressure rating greater than 3,000 psi, are controls accessible for actuation and additional controls present, not associated with the hydraulic system of the rig, at a minimum distance of 50 feet, per § 78a.72(c)?
- II.6a. Has/Will a comprehensive test of the ram type BOP and related equipment been/be completed for both pressure and ram operation prior to placing it into service per § 78a.72(e)?
- II.6b. Is there a procedure in place to have the annular type BOP tested per the manufacturer's published instructions, or the instructions of a professional engineer, prior to the device being placed in service per § 78a.72(e)?
- II.7a. Has/Will a shoe test been/be performed? Note a shoe test may include a Formation Integrity Test (FIT) or Leak Off Test (LOT). If gas will be produced inside of the intermediate casing, a shoe test is required per § 78a.83c(b).
- II.7b. If yes, what was the FIT/LOT test pressure (psi)?
- II.7c. If no, how has the competency of the casing seat been determined per § 78a.72(a)?
- II.7d. Based on the competency of the casing seat and MAP, is a hard shut-in permissible?
- II.8. Do the casing, pipe fittings, valves and unions placed on or connected to the BOP system have working pressure ratings in excess of the MAP, per § 78a.72(d)?
- II.9. Is there a procedure in place to visually inspect the equipment during drilling operations per § 78a.72(f)? (Note: please see Appendix A for citation clarification)
- II.10a. Have all ram testing procedures in place been developed in accordance with API RP 53 or approved by DEP, per § 78a.72(f)?
- II.10b. Have/Will the pipe rams been/be tested daily for closure during drilling operations per § 78a.72(f), or has an alternate method been approved by DEP (See Appendix A)?

- II.10c. Have/Will the blind rams been/be tested for closure on each round trip, or least once per day on days with more than one round trip, during drilling operations, per § 78a.72(f)?
- II.10d. Have/Will all inspection and closure test results been/be recorded in the driller's log before the end of the tour per § 78a.72(f), or has an alternate method been approved by DEP?
- II.11. Are all lines, valves, and fittings between the closing unit and the BOP stack flame resistant and characterized by working pressures that meet or exceed those of the BOP system, per § 78a.72(g)?
- II.12. Does/Will the minimum cemented intermediate casing meet the requirements set forth in § 78a.72(k), or has an alternative method been approved?
- II.13. Have/Will all welded or used casing strings used to anchor BOPs, or any new casing used to anchor BOPs with pressure ratings greater than 3,000 psi been/be pressure tested after cementing, per § 78a.84(d) or (f)?
- II.14. Is the pressure test procedure compliant with § 78a.84(d) or (f), i.e., no more than 10% decrease in pressure over a 30-minute period, or has an alternative test method been approved by DEP?
- II.15. Has/Will the certification of the pressure test been/be confirmed by entry and signature of the person performing the test on the driller's log, per § 78a.84(f)?
- II.16. Please provide a **brief** description and schematic of the well head assembly that clearly indicates which string of casing the "A" section of the well head will be attached to upon completion of drilling and construction.
- II.17. Are there other completed wells on the pad adjacent to the well that is the subject of the PBP?
- II.17a. If yes, please **briefly** describe how they have been/will be secured and/or monitored during the current operation. At a minimum, the relevant regulatory requirements of § 78a.52a and § 78a.73(c) must be satisfied when the operation is hydraulic fracturing.

**III. Training/Certification (for any applicable worksheet item specifically referenced in Chapter 78a as a requirement, "Yes" should be checked or an explanation provided in the PBP):**

- III.1. Is there/Will there be an International Association of Drilling Contractors (IADC) or other DEP approved organization certified individual present on site during operations requiring a BOP, per § 78a.72(h)?
- III.1a. If so, is the certification available for review on site, per § 78a.72(h)?

**IV. Contingency Plan (Items IV.1., IV.1a., and IV.2. must be answered in the PBP):**

- IV.1. If excess gas is encountered during drilling, completion or stimulation, can it be flared, captured or diverted in a manner that does not create a hazard to the public health or safety, per § 78a.74?
- IV.1a. If yes, document that § 78a.74 will be met by providing a description of the size, construction and length of the equipment used to manage any excess gas encountered. If a flare line will be used, include a **brief** description of the method used to anchor it and any igniters that will be used; and indicate if redundant igniters are present.
- IV.2. If BOP equipment will not be utilized during drilling, completion, work-over or plugging of the well per the applicable requirements of § 78a.72, please **briefly** explain why or describe what type of pressure barriers are in place, and provide the details of a contingency plan for managing unanticipated kicks or a *loss of well control*.
- IV.3. Is there an IADC or equivalent methodology in place to kill the well or control a kick, if required?
- IV.3a. If yes, please **briefly** explain the methodology to be employed.
- IV.4. Is the operator drilling within a gas storage reservoir per § 78a.87?
- IV.4a. If yes, has the drilling as well as the casing and cementing plan been approved by the DEP and provided to the storage operator in accordance with § 78a.76(a)?
- IV.4b. If yes, **briefly** summarize the procedure for controlling anticipated gas storage reservoir pressures and flows at all times when drilling from 200 feet above a gas storage reservoir horizon to the depth at which the gas storage protective casing will be installed, per § 78a.87(a)(2).

**VII. INCIDENT REPORTING**

An unconventional operator should report all well control incidents/losses of well control and well control emergencies within 2 hours of confirmation. In addition, potential related issues, such as lost circulation (25 Pa. Code § 78a.83b) and defective casing and cementing, should be reported per the respective regulatory requirements.

The Oil and Gas Inspector and Supervisor are the appropriate contacts in the Oil and Gas Program. After normal business hours, the operator should reference Appendix B to determine the appropriate DEP Emergency Response point of contact. Nothing in this guidance should be interpreted to prevent the operator from coordinating with local emergency responders, as needed, or abiding by all other relevant DEP rules, regulations, statutes, and policies.

**VIII. WORKSHEET**



Section	Question	Response (Circle Appropriate Response or Provide Requested Information)	Additional Notes or Information: Provide, As Needed:	Regulatory Citation	Page in O Pressure Pol
I.	1.	Y or N		§ 78a.72 or § 78a.87(a)(2)	
II.	1.	Y or N or NA		§ 78a.55(d) and § 78a.72(i)	
II.	1a.	Narrative or NA			
II.	2.	Y or N or NA			
II.	2a.	Narrative or NA			
II.	3.	BOP to be used during: Circle One: Drilling; Stimulation; Work-over; Plugging	May include Hole Section:	§ 78a.72 and § 78a.87(a)(2)	
II.	3a.	Narrative or NA			
II.	4a.	MAP: _____ or NA		§ 78a.84(d) or (f)	
II.	4b.	Narrative or NA			
II.	4c.	PR: _____ or NA			
II.	5.	Y or N or NA		§ 78a.72(c)	
II.	6a.	Y or N or NA		§ 78a.72(e)	
II.	6b.	Y or N or NA		§ 78a.72(e)	
II.	7a.	Y or N or NA		§ 78a.83c.(b)	
II.	7b.	LOT/FIT: _____ or NA			
II.	7c.	Narrative or NA		§ 78a.72(a)	
II.	7d.	Y or N or NA			
II.	8.	Y or N or NA		§ 78a.72(d)	
II.	9.	Y or N or NA		§ 78a.72(f)	
II.	10a.	Y or N or NA		§ 78a.72(f)	
II.	10b.	Y or N or NA		§ 78a.72(f)	
II.	10c.	Y or N or NA		§ 78a.72(f)	
II.	10d.	Y or N or NA		§ 78a.72(f)	
II.	11.	Y or N or NA		§ 78a.72(g)	
II.	12.	Y or N or NA		§ 78a.72(k)	

Section	Question	Response (Circle Appropriate Response or Provide Requested Information)	Additional Notes or Information: Provide, As Needed:	Regulatory Citation	Page in O Pressure Pol
II.	13.	Y or N or NA		§ 78a.84(d) or (f)	
II.	14.	Y or N or Alternate or NA		§ 78a.84(d) or (f)	
II.	15.	Y or N or NA		§ 78a.84(f)	
II.	16.	Narrative or NA			
II.	17.	Y or N or NA			
II.	17a.	Narrative or NA			
III.	1.	Y or N or NA		§ 78a.72(h)	
III.	1a.	Y or N or NA		§ 78a.72(h)	
IV.	1.	Y or N		§ 78a.74	
IV.	1a.	Narrative		§ 78a.74	
IV.	2.	Narrative		§ 78a.72	
IV.	3.	Y or N or NA			
IV.	3a.	Narrative or NA			
IV.	4.	Y or N or NA		§ 78a.87	
IV.	4a.	Y or N or NA		§ 78a.76(a)	
IV.	4b.	Narrative or NA		§ 78a.87(a)(2)	

## APPENDIX A

### **Regulatory Citation(s):**

#### **78a.72. Use of safety devices – blow-out prevention equipment.**

(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 for blind rams is sufficient. Testing shall be conducted in accordance with American Petroleum Institute publication API RP53...

### **Question:**

API RP53 only requires function testing of rams once per week. Some operators have expressed concern that more frequent function testing will cause excessive equipment wear.

### **Response:**

DEP's testing program for rams is more rigorous than API's in terms of testing frequency. By stating that testing should be conducted in accordance with API RP53, the regulations indicate that operators should follow the procedural aspects of API RP53 that are relevant to function testing of rams, BUT NOT the testing frequency recommendation.

DEP will evaluate the concern that daily testing may cause premature wear on ram-type BOP equipment and consider such evidence, if any, in future regulation changes.

## APPENDIX B

DEP Emergency Contact Numbers		
Region	Emergency Phone	Counties Supervised
Southeast	484-250-5900	Bucks, Chester, Delaware, Montgomery, Philadelphia
Northeast	570-826-2511	Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, Wyoming
South-central	866-825-0208	Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, York
North-central	570-327-3636	Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, Union
Southwest	412-442-4000	Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington, Westmoreland
Northwest	814-332-6945 After Hours: 800-373-3398	Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, Warren
RCSOB	1-800-541-2050	Statewide and Interstate