

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

### **78.83. Surface and coal protective casing and cementing procedures.**

#### **Introduction: Coal and Surface Casing FAQs**

The purpose of the following FAQs is to outline the casing and cementing requirements in the 2012 Oil and Gas Act (58 Pa. C.S. §§ 3201-3274) and 25 Pa. Code Chapter 78 for “coal protective casing” and “surface casing” installations in Pennsylvania. *These FAQs should not be used in lieu of reference to the law itself. The information in this guidance is solely advisory and does not represent a legal interpretation by the Department. Nothing in this summary shall affect any statutory or regulatory requirements.*

These FAQs are intended to provide assistance to all oil and gas operators. The primary target audience consists of operators with little or no familiarity with existing requirements, but is also inclusive of operators who have a previous history of operations in “coal” areas. Individual schematic diagrams have been developed to assist operators with the accompanying regulatory citations.

Please note that the Department recognizes that technological advances are continually being developed within the industry. These developments will sometimes assist operators with the ability to more effectively and efficiently meet the goals and objectives of the laws and regulations. Operators may request approval to use alternative methods or materials for the casing, plugging or equipping in accordance with Section 3221 of the 2012 Oil and Gas Act (58 Pa.C.S. § 3221) and 25 Pa. Code § 78.75 by submitting “Alternate Methods” (Form 8000-FM-OOGM0024).

Should additional assistance be required beyond the scope of the FAQs, please contact the appropriate [District Oil and Gas Operations Office](#) in which you anticipate operations.

#### **Question:**

What is considered ***coal protective casing*** in Pennsylvania?

#### **Response:**

***Coal protective casing*** is defined in **25 Pa. Code Section 78.1** as: “A string of pipe which is installed in the well for the purpose of coal segregation and protection. In some instances the coal protective casing and the surface casing may be the same.”

#### **Question:**

What are the primary regulatory and statutory requirements for casing and cementing of ***coal protective casings***?

**Response:**

There are two primary regulations addressing the installation of ***coal protective casing***: **25 Pa. Code Sections 78.83 (g) and (h)**. Subsection (g) relates to “intact” (never removed) coal seams, whereas subsection (h) relates to seams that have been mined (removed). Please see these provisions below:

**§78.83(g) (procedure when coal is intact):** “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.”

**§78.83(h) (procedure when coal has been removed):** “Unless an alternative method has been approved by the Department in accordance with 25 Pa. Code Chapter 78, Section 78.75 (relating to alternative methods), when a well is drilled through a coal seam at a location where the coal has been removed or when a well is drilled through a coal pillar, the operator shall drill to a depth of at least 30 feet, but no more than 50 feet, deeper than the bottom of the coal seam. The operator shall set and cement a ***coal protection string*** of casing to this depth. The operator shall equip the casing with a cement basket or other similar device above and as close to the top of the coal seam as practical. The bottom of the casing must be equipped with an appropriate device designed to prevent deformation of the bottom of the casing. The interval from the bottom of the casing to the bottom of the coal seam shall be filled with cement either by the balance method or by the displacement method. Cement shall be placed on top of the basket between the wall of the hole and the outside of the casing by pumping from the surface. If the operator penetrates more than one coal seam from which the coal has been removed, the operator shall protect each seam with a separate string of casing that is set and cemented or with a single string of casing which is stage cemented so that each coal seam is protected as described in this subsection. The operator shall cement the well to isolate workable coal seams from each other.”

The primary statutory requirements are addressed in **Section 3217 of the 2012 Oil and Gas Act (58 Pa. C.S. § 3217)** relating to protection of fresh groundwater and casing requirements. Section 3217(c) addresses scenarios where the coal has been removed, whereas subsection (d) focuses on intact seams.

**§3217(c) (procedure when coal has been removed):** “If a well is drilled at a location where coal has been removed from one or more coal seams, the well shall be drilled and cased to prevent migration of gas or fluids into the seam from which coal has been removed in a manner prescribed by regulation of the department. The department and the coal operator, owner or lessee shall be given at least 72 hours' notice prior to commencement of work protecting the mine.”

**§3217(d) (procedure when coal is intact):** “If a well is drilled at a location where the coal seam has not been removed, the well shall be drilled to a depth and of a size sufficient to permit placement of casing, packers in and vents on the hole at the points and in the manner prescribed by regulation to exclude gas or fluids from the coal seam, except gas or fluids found naturally in the seam itself, and to enable monitoring the integrity of the production casing.”

**Question:**

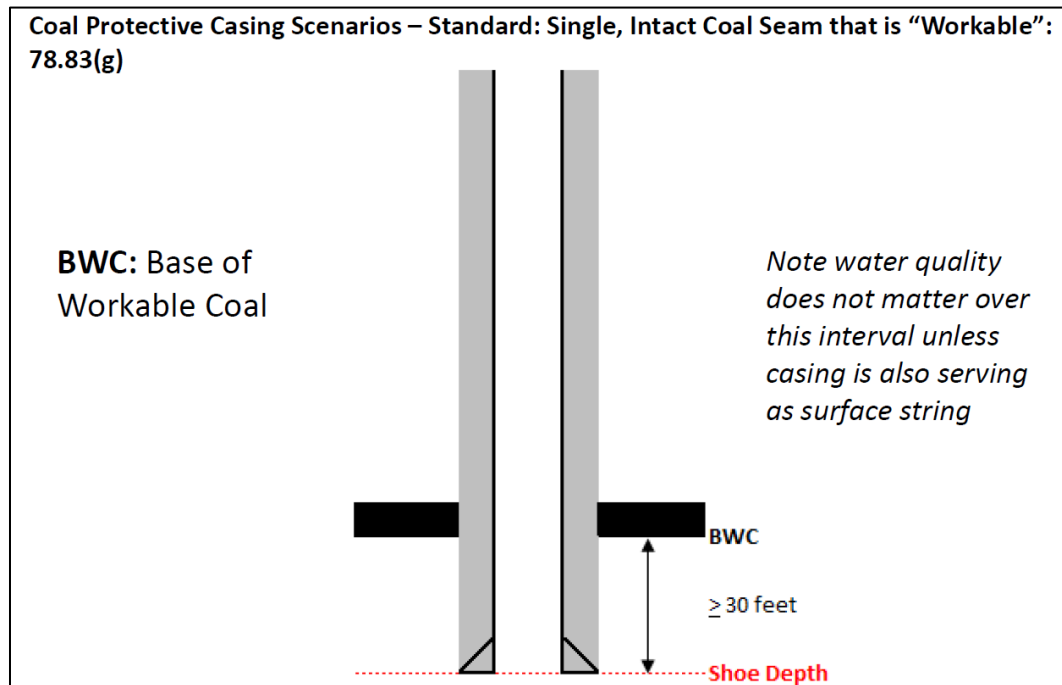
What are the construction requirements for casing and cementing of **coal protective casings** in areas underlain by “Workable Coal” seams?

**Response:**

**Coal protective casings** must be set at least 30 feet below a workable coal seam. These casings and the cement used must also meet the standards as set forth in **25 Pa. Code Sections 78.84 and 78.85**. If the **coal protective casing** is also protecting fresh groundwater, it may be set to the depth prescribed by 25 Pa. Code Section 78.83(c). This casing shall be **permanently cemented** by the displacement method, with the exception being locations where the coal has been removed or when the well is drilled through a coal pillar.

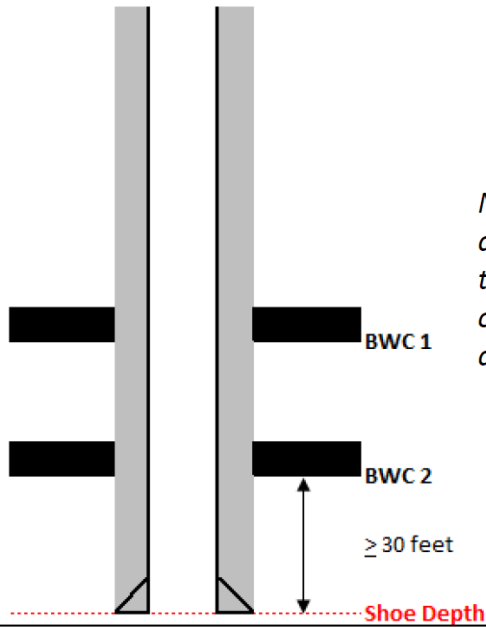
**\*Note:** If no cement returns to surface are realized after attempting to **permanently cement** the casing, one of the options outlined in **25 Pa. Code Section 78.83b**, must be followed.

Several schematics of **coal protective casing** run through **intact coal** seams follow:



**Coal Protective Casing Scenarios – Multiple, Intact Coal Seams that are “Workable”:  
78.83(g)**

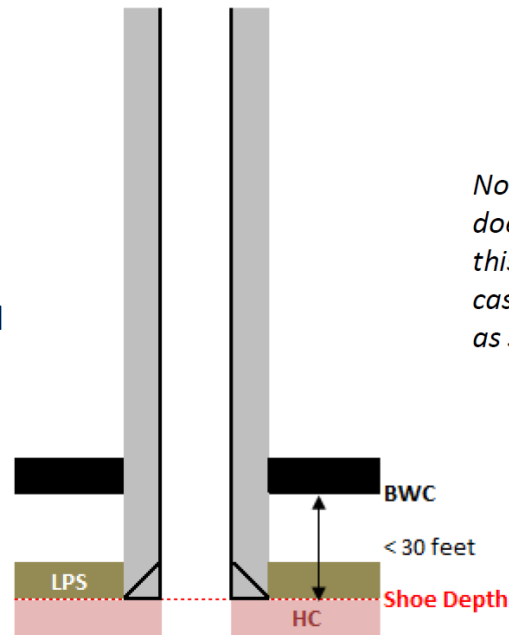
**BWC:** Base of Workable Coal



*Note water quality does not matter over this interval unless casing is also serving as surface string*

**Coal Protective Casing Scenarios – Single, Intact Coal Seam that is “Workable” with Shallow Gas Zone: 78.83(g) and Act 13, Section 3217(d)**

**BWC:** Base of Workable Coal  
**LPS:** Low Permeability Seal  
**HC:** Hydrocarbon



*Note water quality does not matter over this interval unless casing is also serving as surface string*

**Question:**

What are the construction requirements for casing and cementing of ***coal protective casings*** in areas where one or more seams have been removed (mined out)?

**Response:**

When a well is drilled at a location where the coal has been removed or when the well is drilled through a coal pillar, the ***coal protective string*** must be set to a depth of at least 30 feet but no more than 50 feet below the base of the coal seam. These casings and cement must meet the standards as set forth in **25 Pa. Code Sections 78.84 and 78.85**. This string of casing must be minimally equipped with two pieces of hardware:

- A cement basket or other similar device
- An appropriate device to prevent deformation to the bottom of the casing (usually a guide shoe)

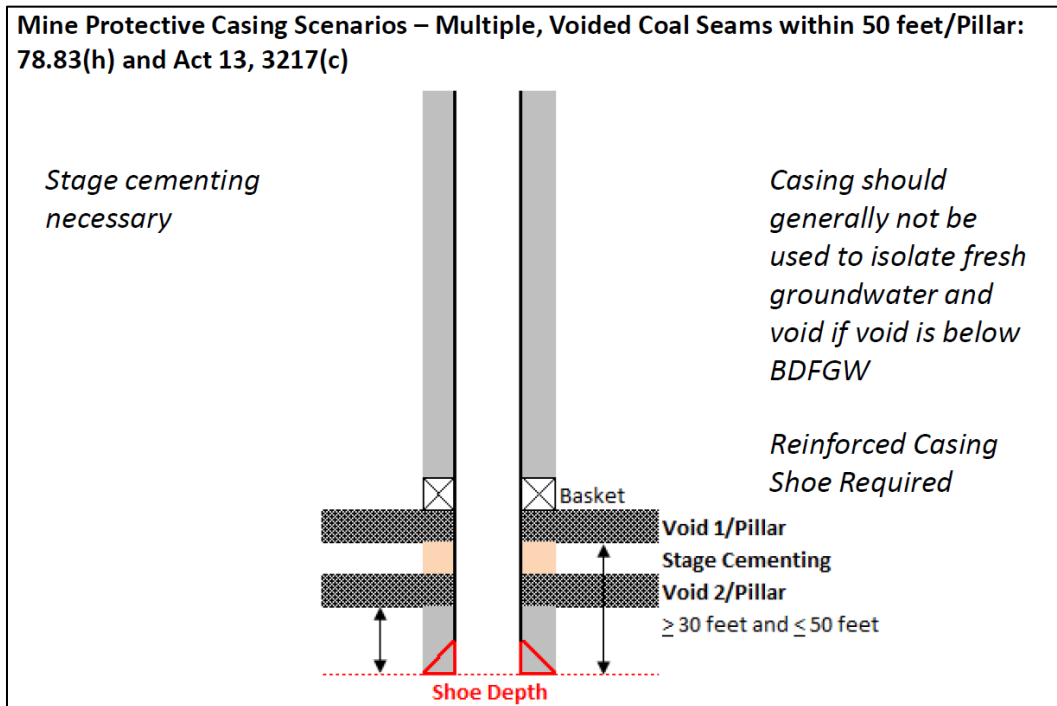
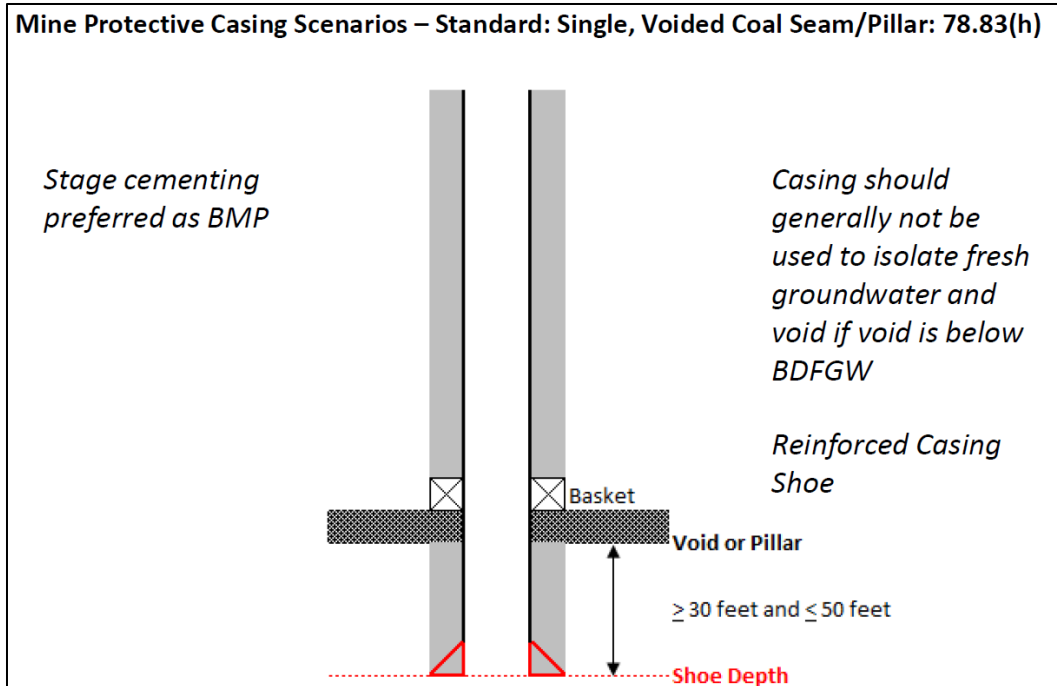
Typically, the interval from the bottom of the casing to the bottom of the coal seam is cemented by the "Balance Method"; however, cementing by displacement is also an acceptable method. In accordance with **25 Pa. Code Section 78.83(h)**, cement must be placed into the annular space and on top of the basket by emplacement from the surface, unless an alternative method has been authorized. If the operator anticipates penetrating two seams that have been mined within 20 feet of one another, a single coal protective string may be set. Because it is not possible to cement the intervening interval between seams using the "Balance Method," displacement is the only acceptable alternative under **25 Pa. Code Section 78.83 (h)**. Therefore, the single string must be equipped with a "Stage Cementing Tool" set between the top of the lowest seam and the bottom of the upper seam and a cement basket or similar device, above and as close to the top of the upper seam as practical. The operator shall cement the well to isolate the seams from each other. If the operator anticipates encountering the two mined seams with a depth between the seams greater than 20 feet, two separate strings must be installed.

\* **Note:** Careful consideration should be given when anticipating setting a single ***Coal protective casing*** through two separate mines.

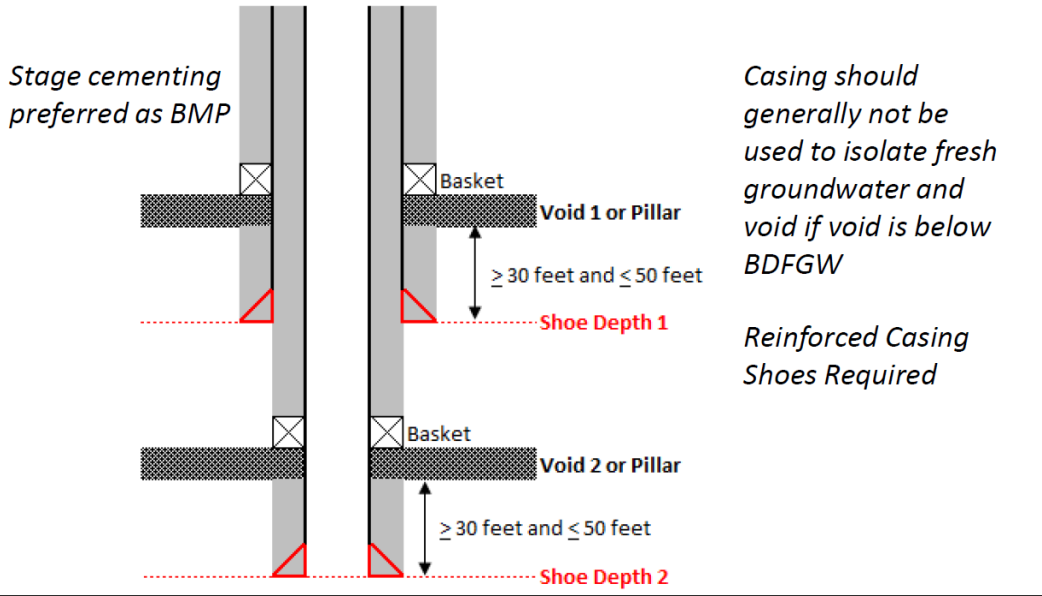
The following are site-specific conditions to consider:

- Hydraulic influence of each mine pool
- Ownership/Responsible party of quantity and quality of the mine pool
- The procedure that will ensure the isolation of the seams under existing conditions

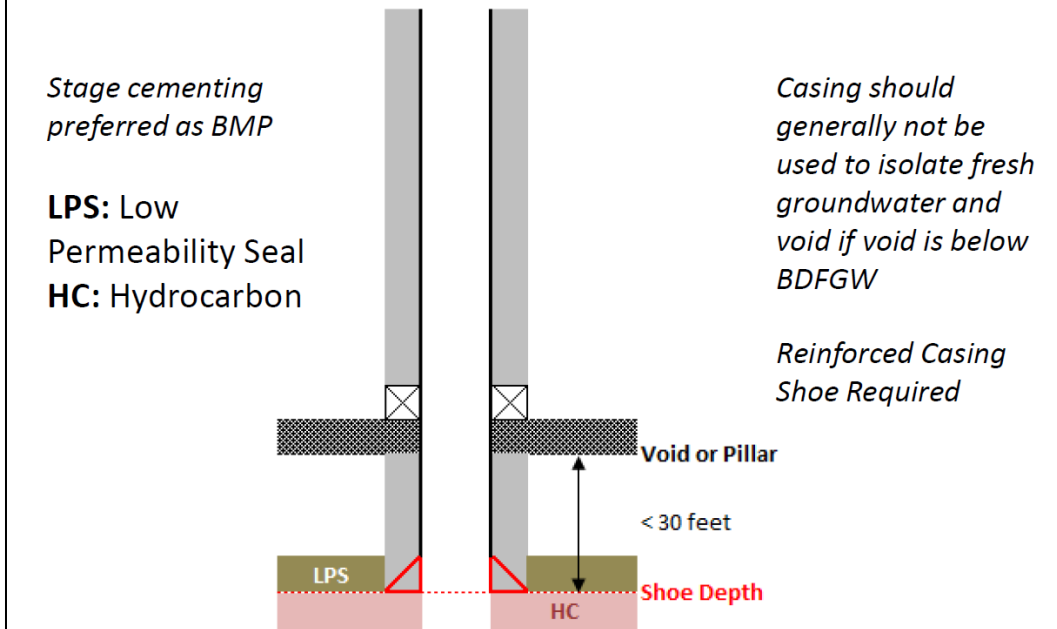
Several schematics of **coal protective casing** run through **mined out coal seams** follow:



**Mine Protective Casing Scenarios – Standard: Multiple, Voided Coal Seams Greater than 50 feet Apart/Pillar: 78.83(h)**



**Mine Protective Casing Scenarios – Single, Voided Coal Seam/Pillar and Hydrocarbon Zone Within 50 Feet of Shoe : 78.83(h) and Act 13, Section 3217(c)**



**Question:**

What is considered **Surface casing** in Pennsylvania?

**Response:**

**Surface casing** is defined in **25 Pa. Code Section 78.1** as: "A string or strings of casing used to isolate the wellbore from fresh groundwater and to prevent the escape or migration of gas, oil or other fluids from the wellbore into fresh groundwater. The surface casing is also commonly referred to as the water string or water casing."

**Question:**

What are the primary regulatory well construction requirements for casing and cementing of surface casing?

**Response:**

The primary regulations addressing the installation of **Surface casing** are **25 Pa. Code Sections 78.83 (c) and (f)**. **Please find these provisions below:**

**§78.83 (c):** "The operator shall drill to approximately 50 feet below the deepest fresh groundwater or at least 50 feet into consolidated rock, whichever is deeper, and immediately set and **permanently cement** a string of surface casing to that depth. Except as provided in subsection (f), the surface casing may not be set more than 200 feet below the deepest fresh groundwater except if necessary to set the casing in consolidated rock. The surface hole shall be drilled using air, freshwater, or freshwater-based drilling fluid. Prior to cementing, the wellbore shall be conditioned to ensure an adequate cement bond between the casing and the formation. The surface casing seat shall be set in consolidated rock. When drilling a new well or re-drilling an existing well, the operator shall install at least one centralizer within 50 feet of the casing seat and then install a centralizer in intervals no greater than every 150 feet above the first centralizer."

**\*Note:** If no cement returns to surface are realized after attempting to **permanently cement** the casing, one of the options outlined in **25 Pa. Code Section 78.83b**, must be followed.

**§78.83 (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 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."

§78.83(c) details the minimum and maximum depths to which **surface casing** can be installed, as well as the specific cementing requirement, whereas §78.83(f), describes the requirements when additional fresh groundwater is encountered below the casing seat of the initial **surface casing**.



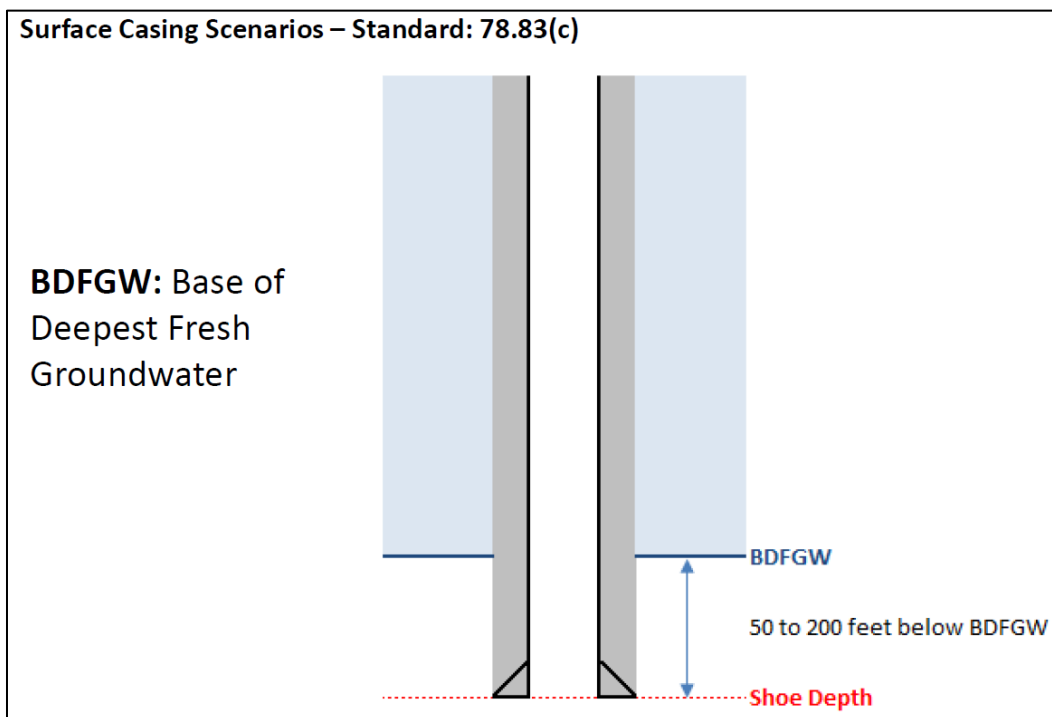
**Additional comments when surface casing is required below coal protective casings:**

In addition to the primary **surface casing** regulations of 25 Pa. CodeSection 78.83 (c) and (f), §78.83(i) describes the requirements for successive casing and cementing of **surface casing** where additional fresh groundwater is encountered below any **coal protective casings**.

**Subsection (i):** “If the operator sets and cements casing under subsections (g) or (h) and subsequently encounters additional fresh groundwater zones below the deepest cemented casing string installed, the operator shall protect the fresh groundwater by installing and cementing another string of casing or other method approved by the Department. Sufficient cement shall be used to cement the casing to the surface. The additional casing string may also penetrate zones bearing brackish or salt water, but shall be run and cemented 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. “

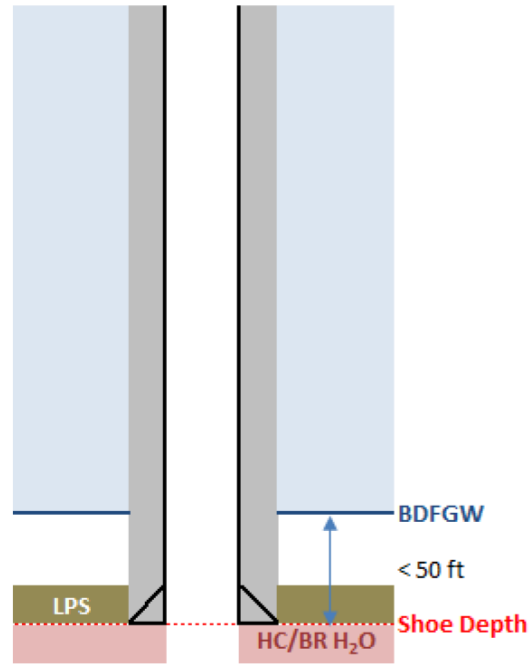
**\*Note:** For both subsections (f) and (i), the **surface** and **coal casing** is permitted to penetrate zones bearing brackish or salt water. However, the **surface casing** must be set and cemented to surface prior to penetrating a zone known to contain or likely containing oil or gas.

Several schematics of **surface casing** installation configurations follow:



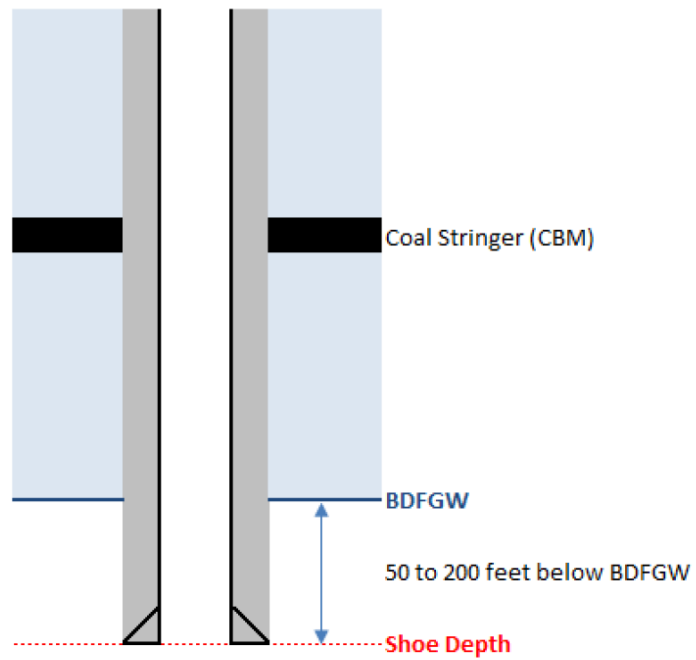
Surface Casing Scenarios – Hydrocarbon/Brine Zone Within 50 Feet of Shoe: 78.83(e)

**LPS:** Low Permeability Seal  
**HC:** Hydrocarbon  
**BR H<sub>2</sub>O:** Brine/ Brackish Water

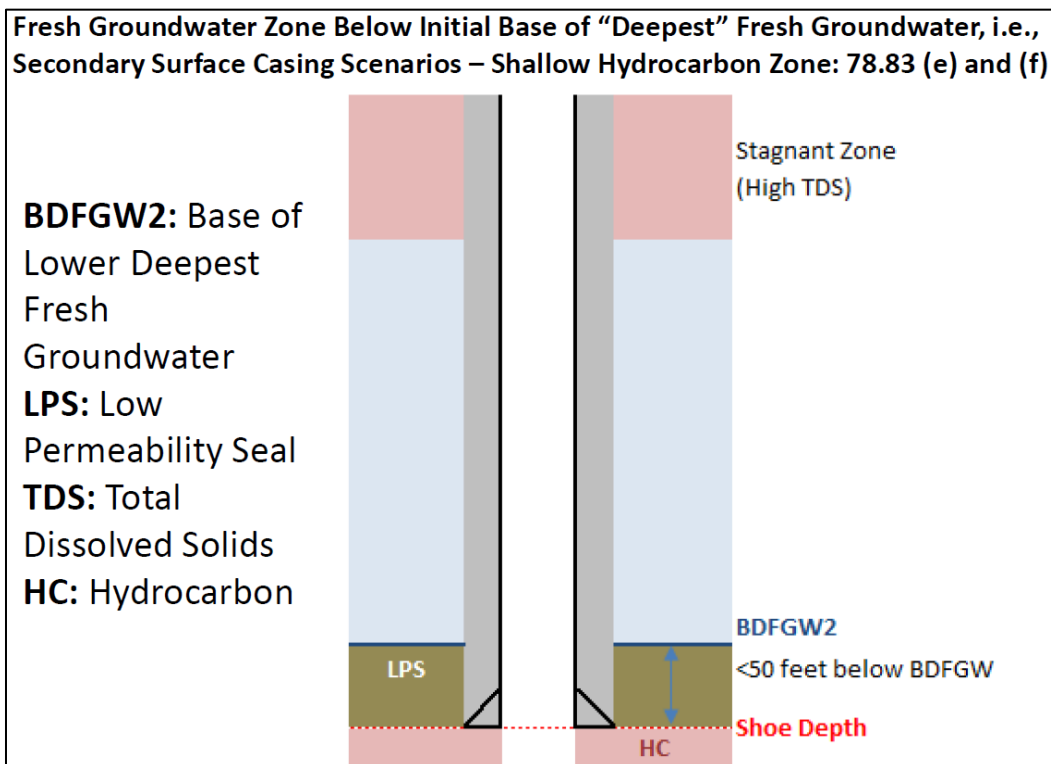
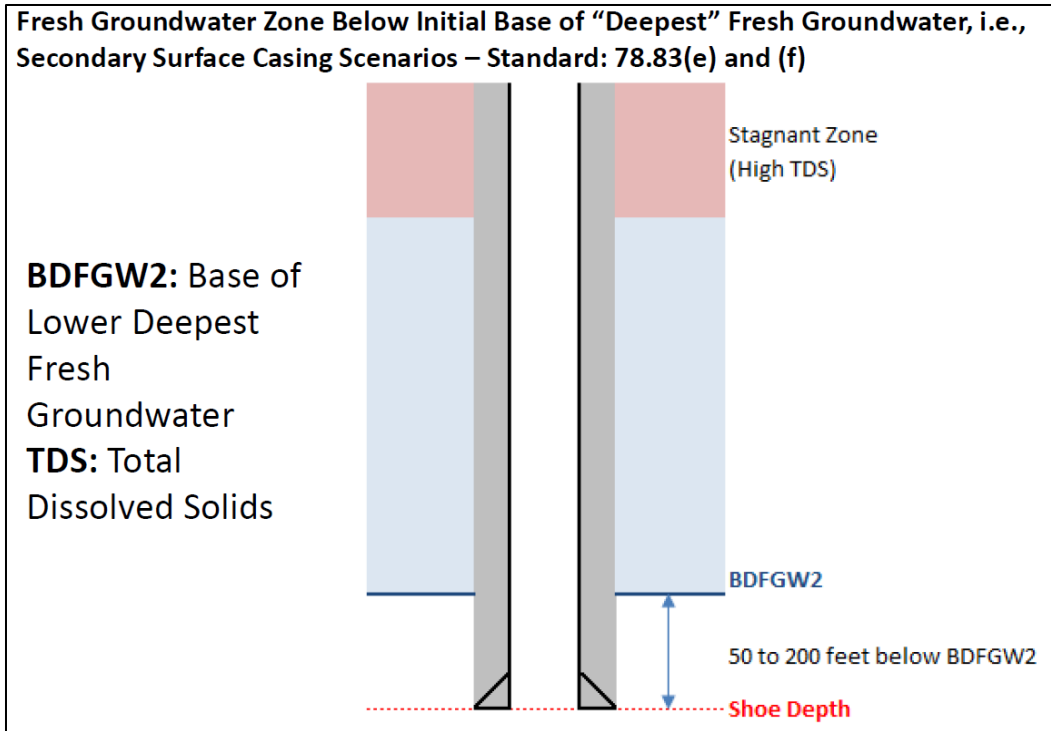


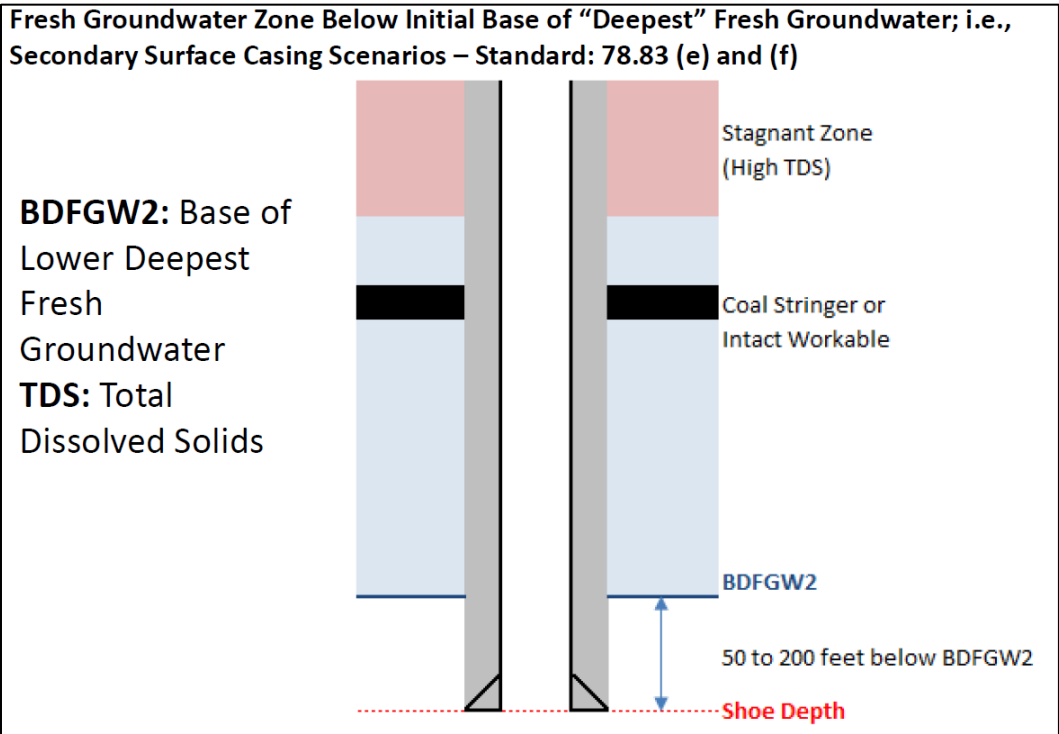
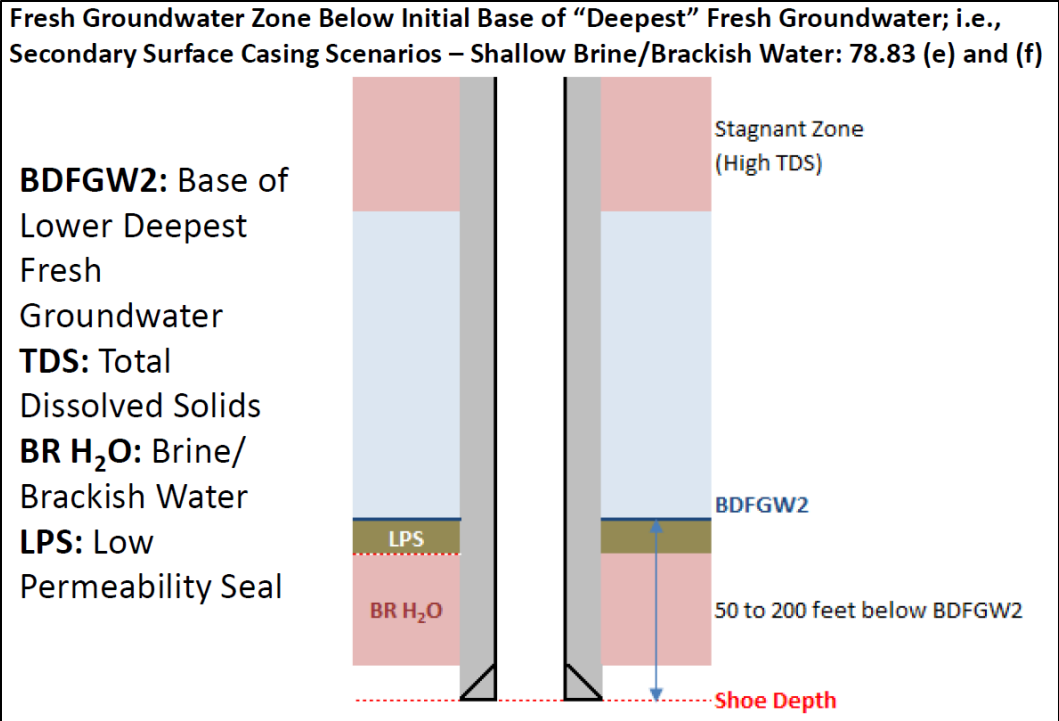
Surface Casing Scenarios – Hydrocarbon/Brine Zone Within 50 Feet of Shoe: 78.83(c)

**BDFGW:** Base of Deepest Fresh Groundwater  
**CBM:** Coalbed Methane



Several schematics of **surface casing** installation configurations when **additional fresh ground water** is encountered follow:





Please follow [this link](#) for a more comprehensive list of applicable Laws and Regulations, and accompanying schematics representing various casing scenarios and other information related to coal and fresh groundwater isolation.