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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Oil and Gas Management

Mechanical Integrity Assessment Training

Marcellus Shale Coalition

November 8, 2013

PADEP: Bureau of Oil and Gas Planning and Program Management
Division of Well Plugging and Subsurface Activities

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Presentation Outline

Introduction to MIA Program

- ❑ Overview and History

Module 1: Review of Form A Instructions

- ❑ Definitions
- ❑ Guidance/Best Practices
- ❑ Significant Updates
- ❑ Naming Conventions for Annular Spaces

Module 2: Form A

- ❑ Form A Overview
- ❑ Form A Use with Examples
- ❑ Form A 2-Year Example and Data Transfers

Module 3: Form B

- ❑ Form B Overview
- ❑ Form B Use with Examples
- ❑ Form B Data Transfers

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Introduction to MIA Program

Section Outline

- ❑ Introduction
- ❑ Regulatory background
- ❑ Input and revisions from industry and stakeholders
- ❑ Training sessions
- ❑ Website and other helpful tools and resources
- ❑ Implementation/MIA roll out
- ❑ Reporting form preparation

Introduction to MIA Program

Regulatory Background: 78.88

- Initial draft presented to TAB September 17, 2009
  - DEP met with TAB and subcommittee four additional times (10/28/09, 1/14/10, 1/21/10, 3/25/10)
- Advanced Notice of Proposed Rulemaking: Public comment period January 30, 2010 – March 2, 2010 (87 commentators)
- Notice of Final Rulemaking: Public comment period July 10, 2010 – August 9, 2010 (2000 commentators)
- Approval by EQB, IRRC, Attorney General's Office.
- Final Regulations approved on publication in the Pennsylvania Bulletin February 5, 2011

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Introduction to MIA Program

Input and Interaction with Industry

78.88(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.*

- ❑ DEP/industry consensus on collaborative effort to develop reporting form
- ❑ Requirement to submit annual report would be suspended until reporting form finalized
- ❑ Current MIA form represents significant input from industry

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Introduction to MIA Program

Input and Interaction with Industry

Casing and Cementing Workgroup Meetings:

- *March 2011, April 2011, August 2011, June 2012, October 2012, August 2013*

Technical Advisory Board Meetings:

- *April 2011, February 2012, May 2012, August 2012, February 2013, April 2013, June 2013*

Quarterly Meetings with Industry:

- *November 2012, February 2013, May 2013*

Operator Meetings

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Introduction to MIA Program

Training Sessions

- ❑ *September 11, 2013*: MSC (Pittsburgh)
- ❑ *September 12, 2013*: PIOGA (Canonsburg)
- ❑ *October 1, 2013*: PIOGA/PIPP (Oil City)
- ❑ *November 8, 2013*: MSC (Pittsburgh)
- ❑ *November 14, 2013*: PIOGA (Williamsport)
- ❑ Additional training sessions?

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Introduction to MIA Program

Website Resources/Recorded Training

- Well Construction Standards Frequently Asked Questions (FAQ) posted on Industry Resources link on DEP's Oil and Gas web page shortly after effective date of February 2011 regulations
- Training announcements and forms/instructions/tools currently posted on DEP website (Oil and Gas home page/Industry Resources)
- New MIA web page under Industry Resources link
- Additional training sessions can be scheduled as needed
- DEP has begun producing a series of video-recorded training sessions that will be available on the website in the near future

Introduction to MIA Program

Implementation/MIA Roll-out

- Well integrity assessment program begins 4th Quarter 2013 (October- December)- the results of these inspections do not need to be submitted to the Department
- First full year of quarterly well assessment will begin in 2014
- First "Annual" report due February 15th, 2015 (same schedule as production data submittal)- will only have information for inspections completed during the first full inspection year of 2014

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Oil and Gas Management

Thank You – Questions?

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Presentation Outline

Introduction to MIA Program

- ❑ Overview and History

<u>Module 1: Review of Form A Instructions</u>

- ❑ Definitions
- ❑ Guidance/Best Practices
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Module 2: Form A

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Module 1: Review of Form A Instructions

Definitions

Coal Protective Casing: A string or strings of casing which are 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.

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

Module 1: Review of Form A Instructions

Definitions

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

Hydrocarbon Production: Any hydrocarbons that are tied to a sales line, used for the generation of electricity/domestic gas, or used to operate pumps/other equipment in the vicinity of the well. Annular vent flows to the atmosphere are not considered produced gas.

Module 1: Review of Form A Instructions

Definitions

Annular Production Casing: A string of casing in the wellbore, outside of the primary production casing, which is run for the purposes designated under either coal protective, surface, or intermediate casing; and as a means of confining or conducting hydrocarbons and associated fluids from one or more producing horizons to the surface.

Primary Production Casing: The final string of pipe in the wellbore, not including tubing or liners, which is run for the purpose of confining or conducting hydrocarbons and associated fluids from one or more producing horizons to the surface.

Module 1: Review of Form A Instructions

Guidance/Best Practices

- Gas storage field wells, wells granted inactive status, and UIC wells are EXEMPT from this monitoring program
- With regard to well transfers, the Operator/Owner in possession of the well on January 1st of the year following the inspections is responsible for submitting ALL of the prior year's well integrity data to the Department
- Consistency is key for assessing trends
- Gauges and other devices should be scaled appropriately for anticipated measurements

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Module 1: Review of Form A Instructions

Guidance/Best Practices

- No retrofits required for older wells, but wells constructed post-February 5, 2011 should be capable of meeting the minimum requirements established – if annular spaces are inaccessible, they should be coded as such

- For future wells, maintaining safe access to annular spaces is critical: wells consist of multiple, concentric barrier elements and access is relevant for confirming the performance of these elements

- The cement top, if provided, may be based on design (volume calculation) or measured cement top; if measured, the highest section of the wellbore where cement was noted should be recorded, even if the bond was interpreted as incomplete

Module 1: Review of Form A Instructions

Guidance/Best Practices

- Consecutive quarterly inspections should be no closer than 45 days apart and quarterly inspection dates should be aligned with the appropriate quarterly indicators, e.g., an inspection on January 24th should be keyed in adjacent to "Q1"

- Missed inspections should be documented on the form and a date should be entered corresponding to the date the comment was entered – this date should fall within the quarter when the inspection was missed

- For wells that come on-line after the first quarter of the year, any quarterly inspection events not conducted should be left blank, but the annular spaces should still be designated in the yellow-shaded cell falling in the same row as the quarter indicator, Q1

Module 1: Review of Form A Instructions

Guidance/Best Practices

- If a water level measurement is required under Section 78.88(b)(1), but the production casing is not accessible, an operator may instead provide the average daily pumping time in hours since the last inspection or the produced water quality using a field meter – if the well does not co-produce water, NPW should be entered for "no produced water"

- For the purposes of this inspection, *non-freshwater* is defined as any water having a specific conductance in excess of 1,000 µS or µmhos/cm, OR background water quality

- For liquids discharges at the surface, some discretion must be applied when determining if the release is capable of "impacting environmental media"

Module 1: Review of Form A Instructions

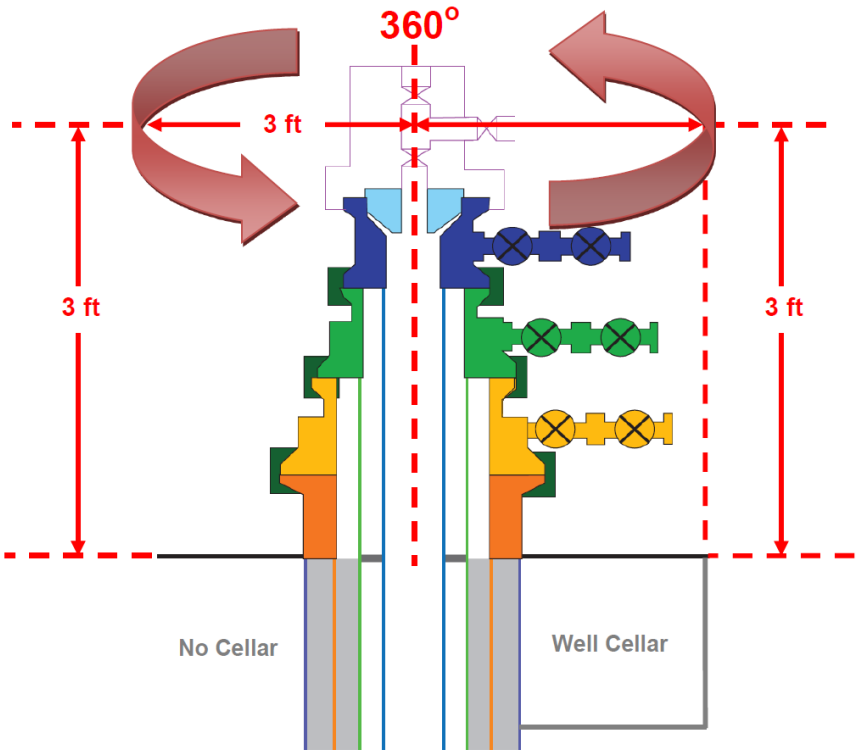
Guidance/Best Practices

- Corrosion Inspection:
  - "Visually inspect external above-ground well components, including the casing head, tubing head, studs and bolts, adapters, side outlet valves, tees and crosses on the Christmas tree, chokes, vent lines, stuffing box, conductor and other casing stumps accessible at the surface, and any other components designed to contain pressurized fluids or isolate any hydrocarbons or other non-freshwater fluids from environmental media, including soil, groundwater, or surface water. The above components shall be assessed for the presence of surface oxidation."

Module 1: Review of Form A Instructions

Guidance/Best Practices

- Safe Venting Inspection:
  - Use a properly maintained and calibrated gas meter to monitor 360^{O} around the edge of the well cellar/three (3) feet from the wellhead at a height of three (3) feet above the ground surface and REPORT THE HIGHEST H_2S AND % LEL DETECTED.
  - This assessment is only required if escaping gas is noted during the surface inspection or gas is routinely vented at the location



Module 1: Review of Form A Instructions

Guidance/Best Practices

- 24-hour notifications only required for two scenarios:
  - Exceedances of 80% x 0.433 psi/ft x surface or coal casing length (ft) when surface or coal casing is used as either primary or annular production casing
  - Wells at which corrosion problems are severe enough that they will result in the imminent failure of well components intended to contain pressure or produced fluids, unless repaired
- However…
  - "It is possible that the well inspection will reveal other potential problems related to environmental protection or health and safety. Operators should follow all existing polices, laws, and regulations with regard to reporting these other problems to the Department."

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Module 1: Review of Form A Instructions

Guidance/Best Practices

- Well integrity summary sheets for submittal to the Department may be used by operators/owners to create their own database – these are not write-protected

- When creating a new template to store the following year's well integrity data, only maintain the worksheet titled "Last_Years_Data" in the Microsoft Excel Workbook as long as it is needed to transfer inspection data from the fourth quarter of the previous year to the first quarter of the current year

- Operators/owners are responsible for updating construction details and adding new wells to or removing transferred or plugged wells from established templates

Module 1: Review of Form A Instructions

Significant Updates

- ❑ “Tubing” is NOT ALWAYS “Tubing”
- ❑ There are cases when well tubing is considered the primary production casing under the MIA Program and must be monitored as such
- ❑ Generally speaking, this is the case when the tubing completely isolates the next outer casing string in the well from production pressures/fluids through use of a packer or cement

Module 1: Review of Form A Instructions

Significant Updates

- Operators may “produce” annular gas that is flowing through cement – the flowing or shut-in pressure must be monitored quarterly in such scenarios

- For wells where drilling commenced prior to February 5, 2011 that are not equipped to measure the pressures specified in the regulation, a ‘0’ must be entered in the appropriate fields on the form

Module 1: Review of Form A Instructions

Significant Updates

- For wells where outer annular spaces are vented to tanks (annuli beyond the production annulus), the tank must be inspected for escaping gas and if any gas is noted, a “Y” must be entered in cell/box 15.m. – the flow rate should be entered in the comments field in addition to a note regarding the tank plumbing configuration

- Wells where escaping gas is directed away from the wellhead must still be surveyed to ensure safe venting

Reminder!

- ❑SAVE/CREATE BACKUPS
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Module 1: Review of Form A Instructions

Guidance/Best Practices

DO NOT COPY AND PASTE DATA INTO FORM A: IT MAY OVERWRITE CONDITIONAL FORMATTING AND DATA VALIDATION CHECKS!!!

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Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

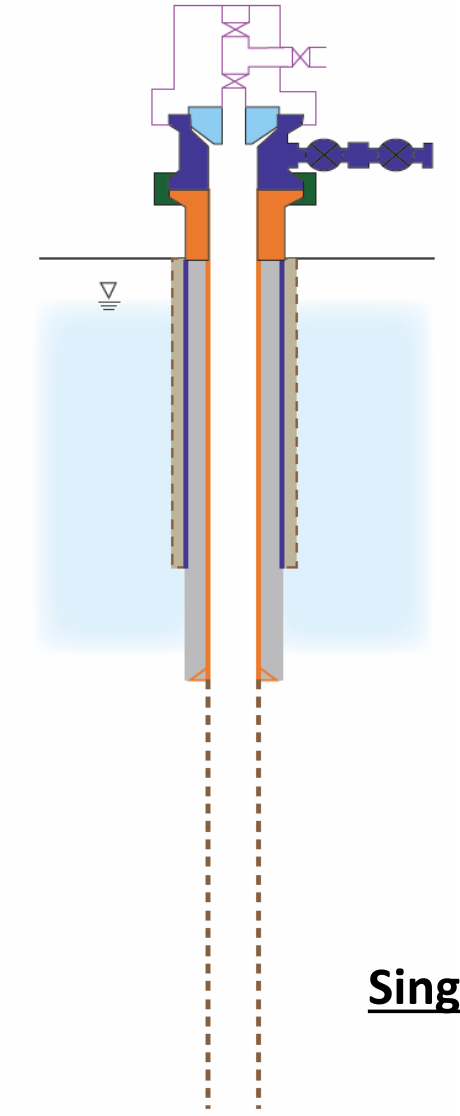
"The annulus defined by the intermediate casing and surface casing is designated "I." If multiple intermediate strings are utilized, the deepest is designated "I;" the second deepest, "I1;" and so forth."

"The annulus defined by the surface casing and conductor pipe is designated "S/C." If multiple surface or coal protective strings are utilized, the deepest is designated "S/C;" the second deepest, "S/C1;" and so forth."

The production annulus is designated "P," UNLESS gas or oil is produced inside of a surface or coal string, in which case this annulus is designated "S/C."

Module 1: Review of Form A Instructions

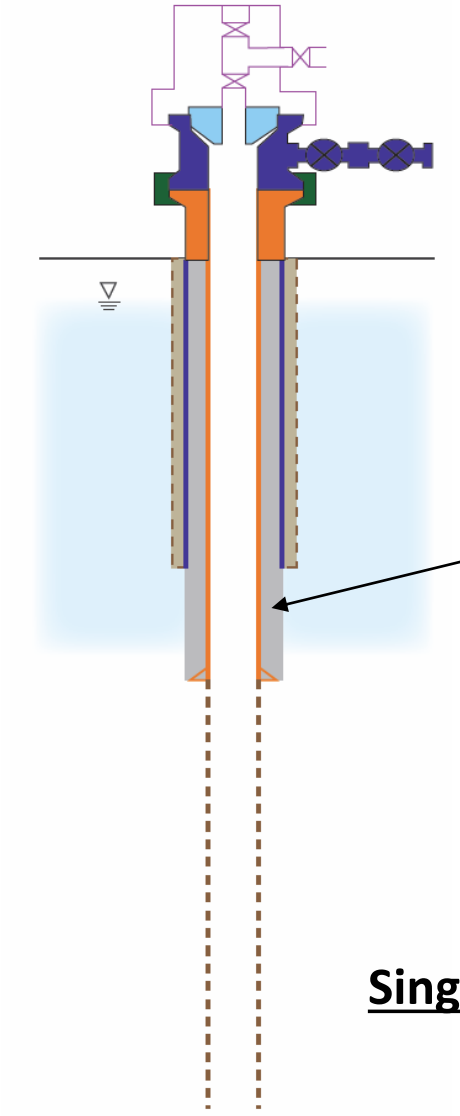
Naming Conventions for Annular Spaces



Single-String Oil, Gas, or Combo Well

Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces



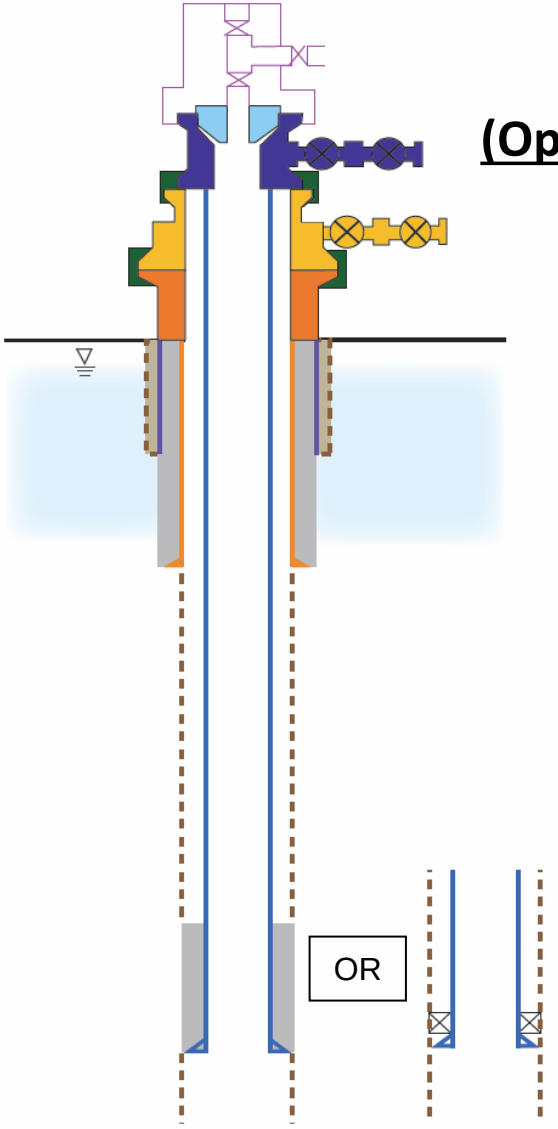
Primary Production Annulus **"S/C"** (**conductor** x **surface or coal casing**)

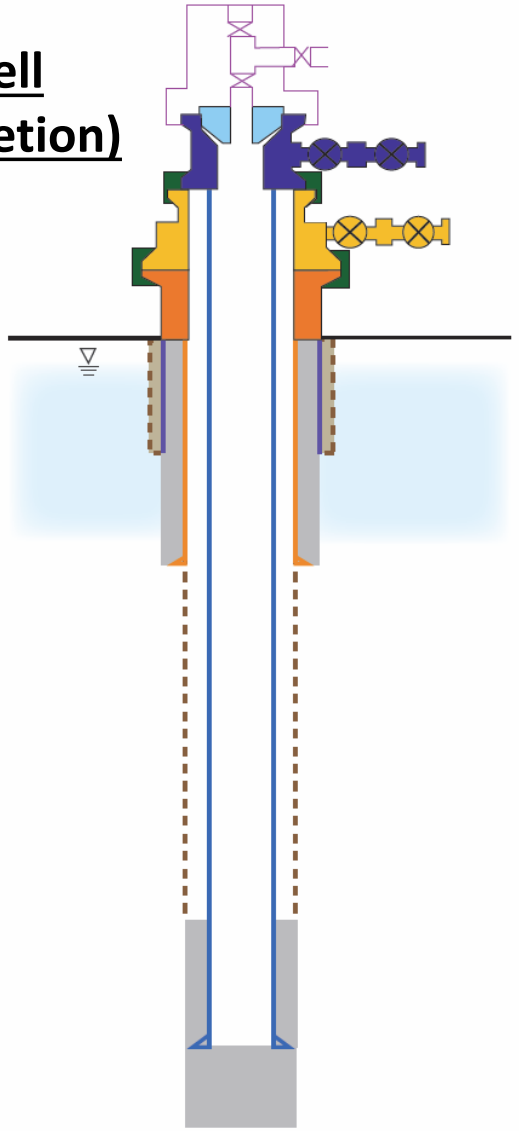
Single-String Oil, Gas, or Combo Well

Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

2-String Oil, Gas, or Combo Well
(Open-Hole or Cased-Hole Completion)





Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

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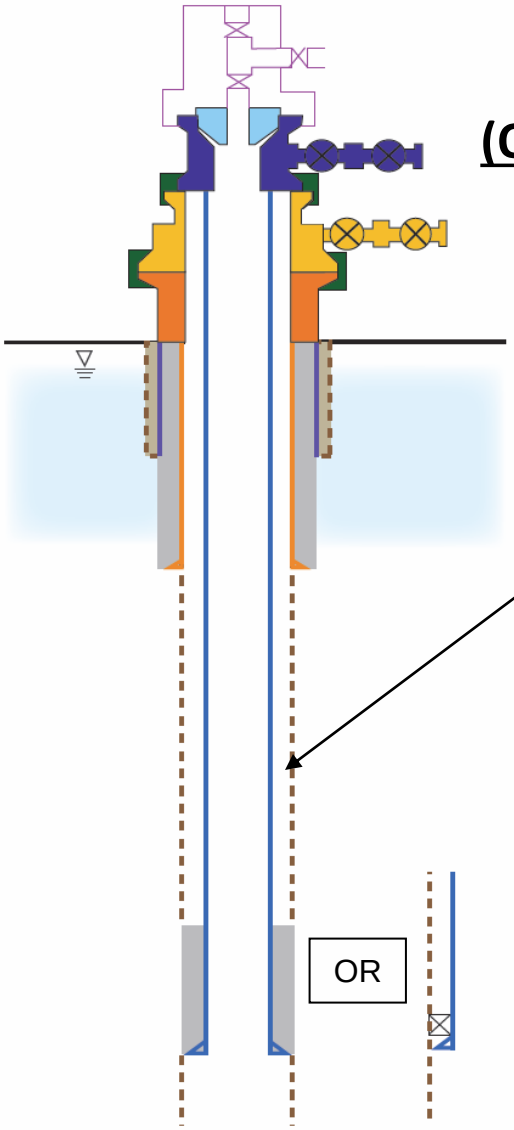
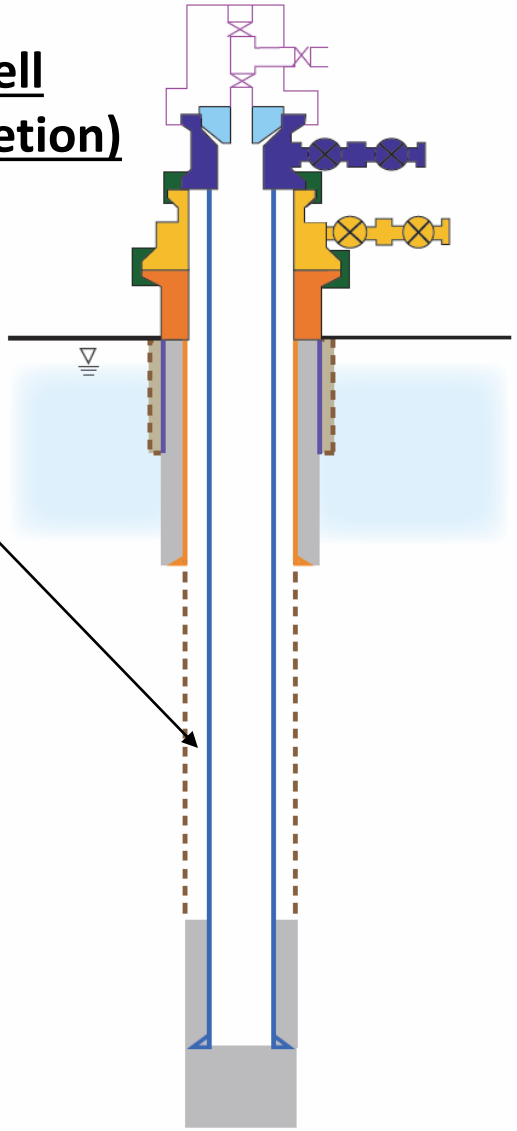


Primary Production Annulus **"P"** (**surface or coal casing** x **production casing**)

OR



Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

2-String Oil, Gas, or Combo Well
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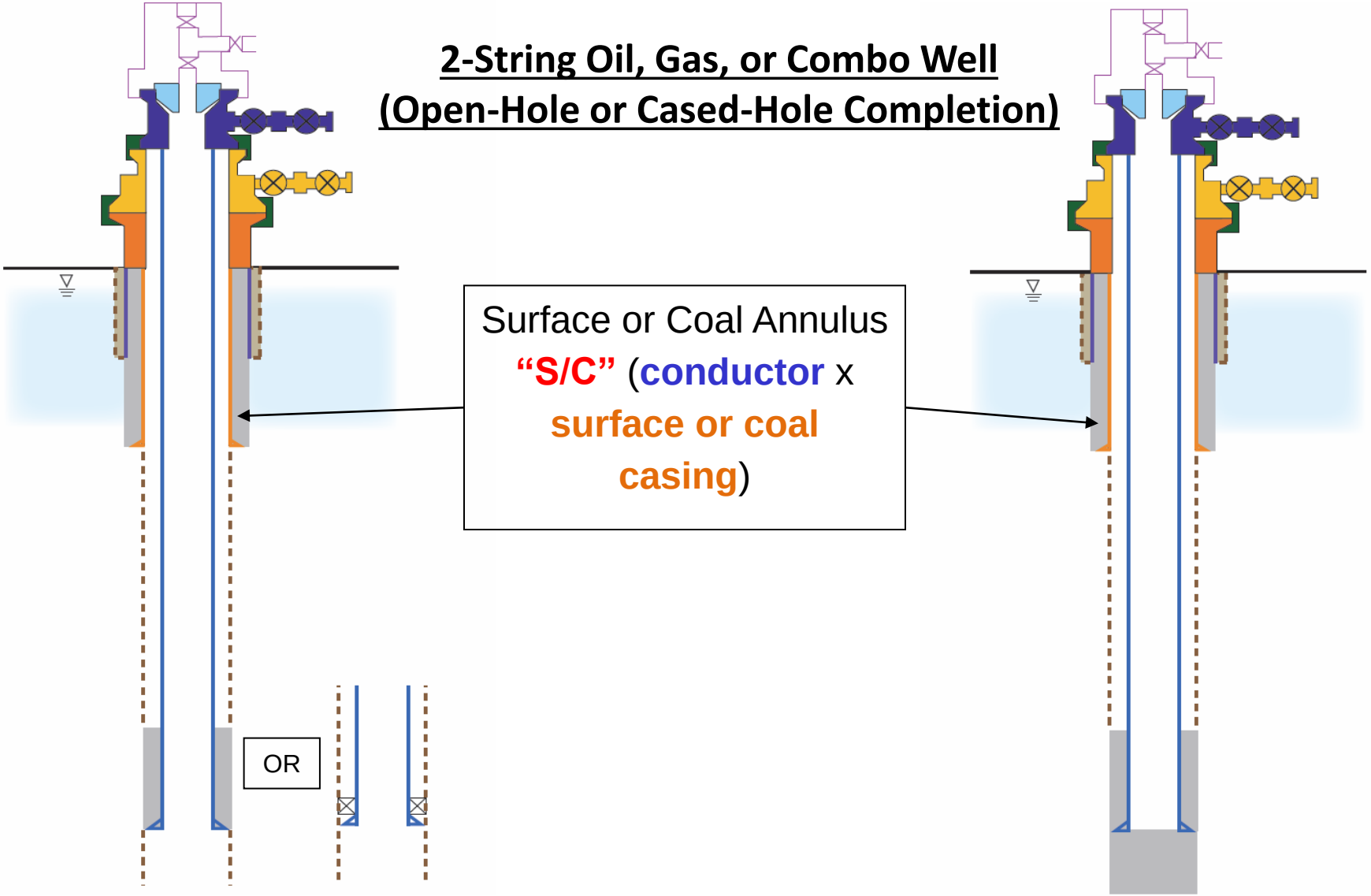
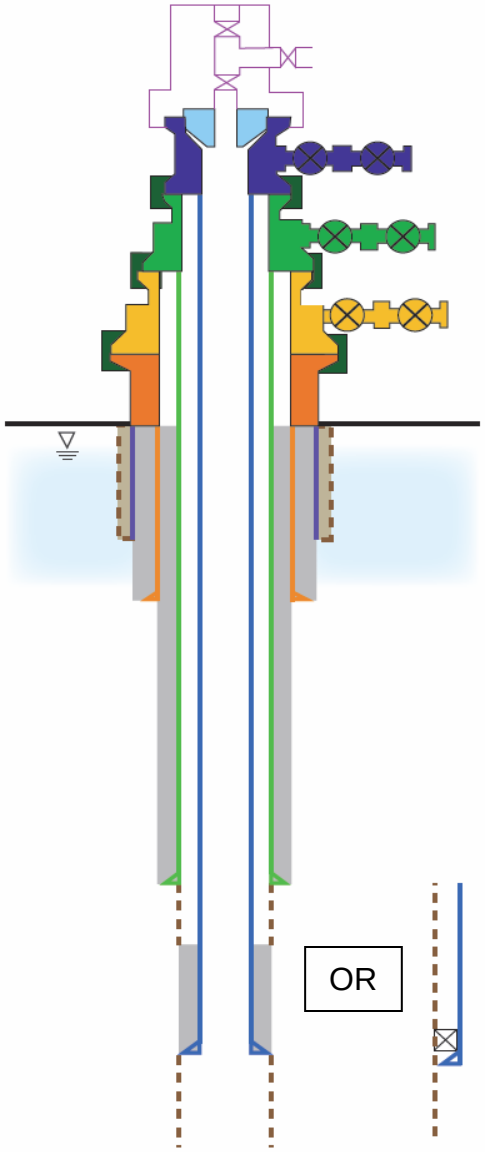
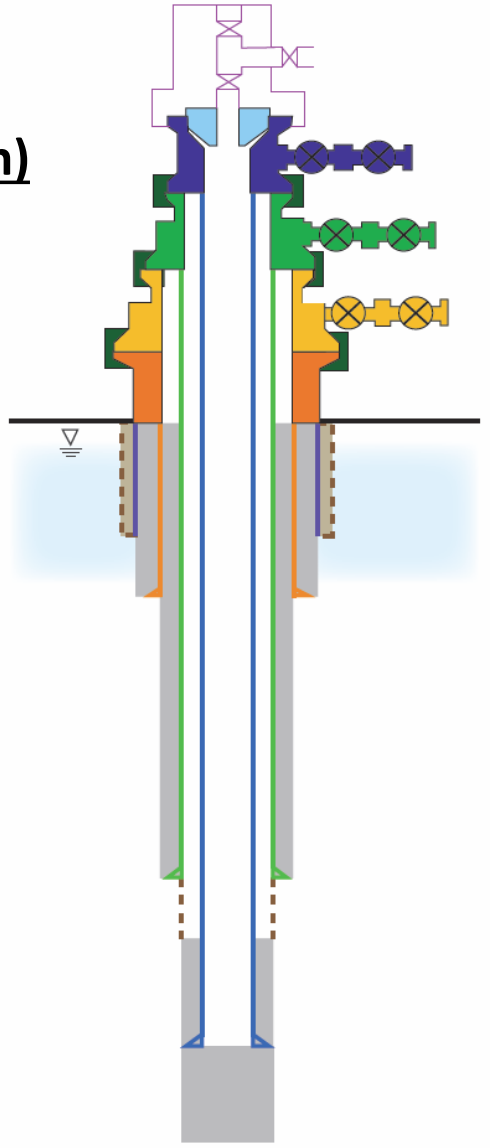


Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

3-String Oil, Gas, or Combo Well
(Open-Hole or Cased-Hole Completion)





Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

3-String Oil, Gas, or Combo Well
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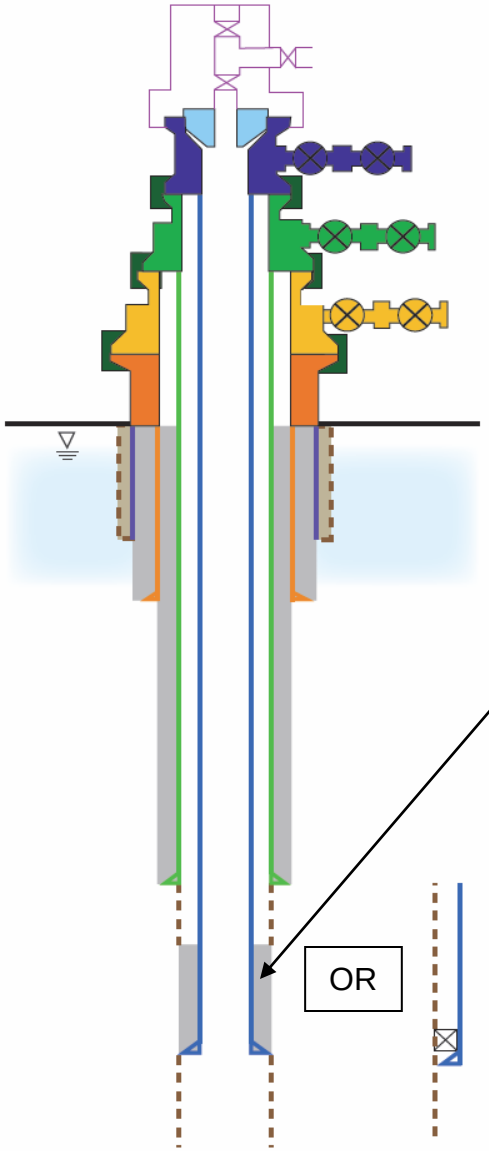
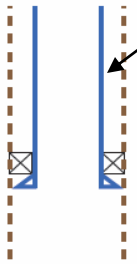
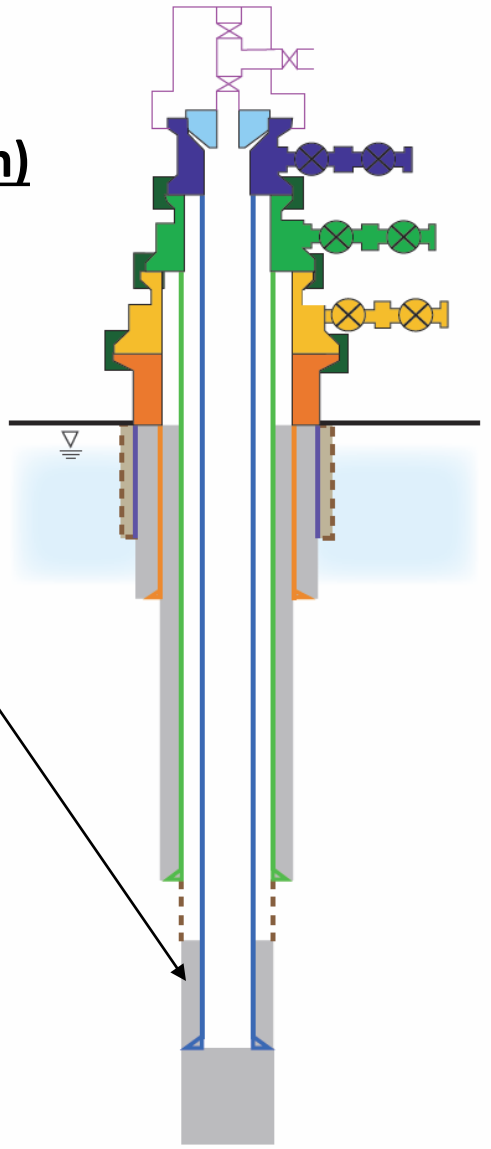


Primary Production Annulus **"P"** (**intermediate casing** x **production casing**)

OR





Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

3-String Oil, Gas, or Combo Well
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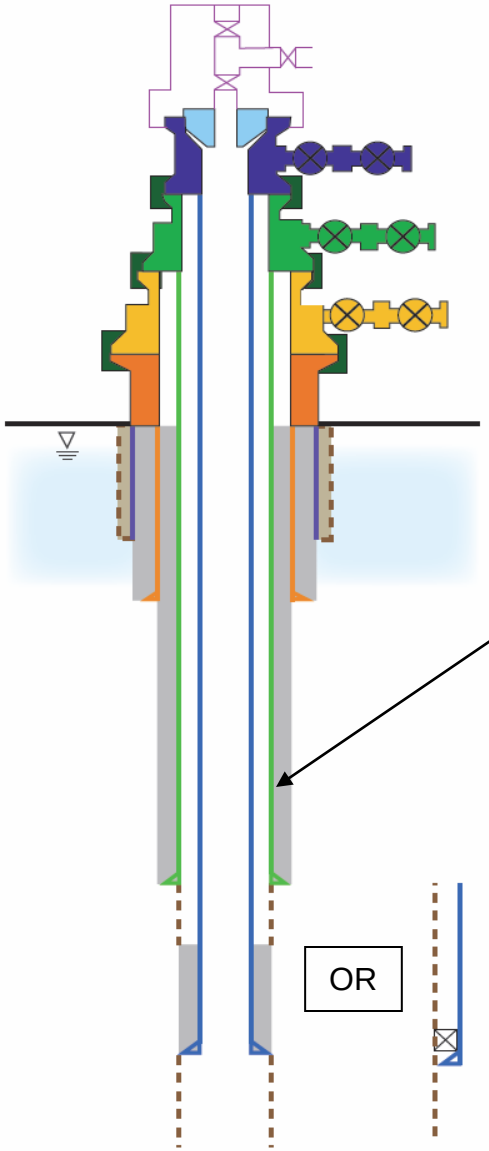
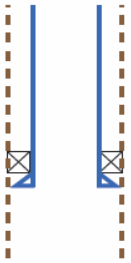
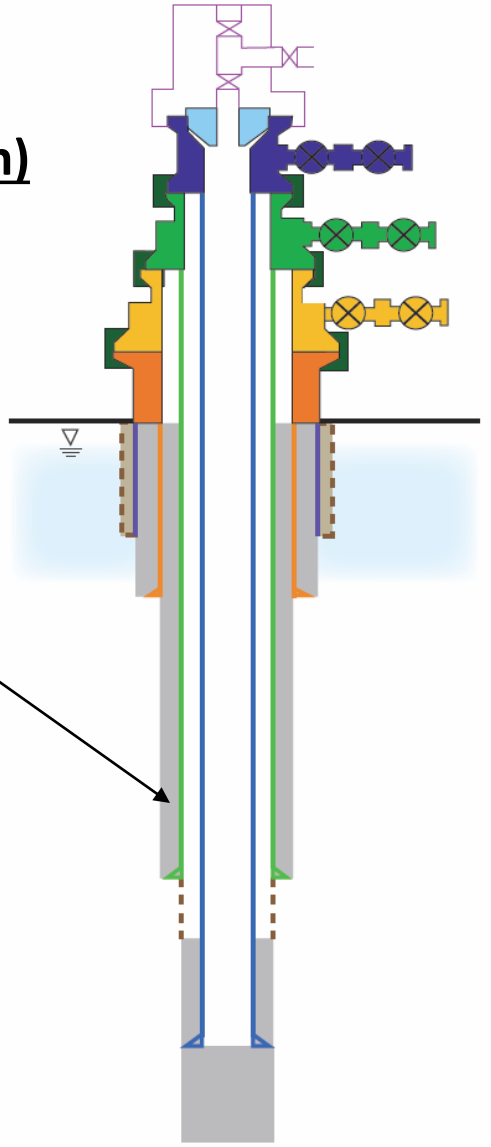


Intermediate Annulus
"I" (**surface or coal casing** x **intermediate casing**)

OR





Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

3-String Oil, Gas, or Combo Well
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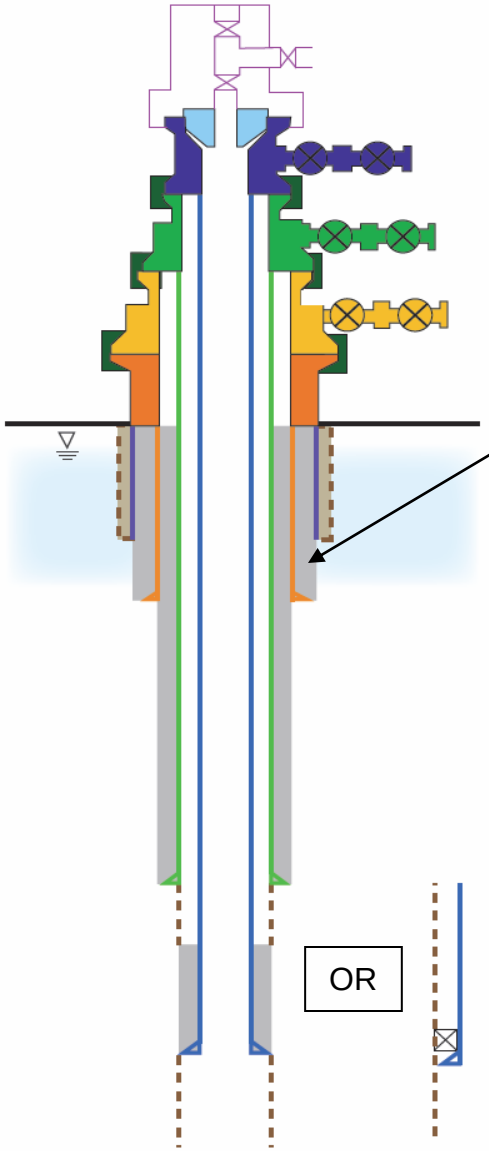
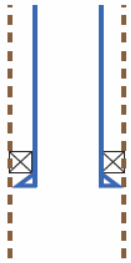
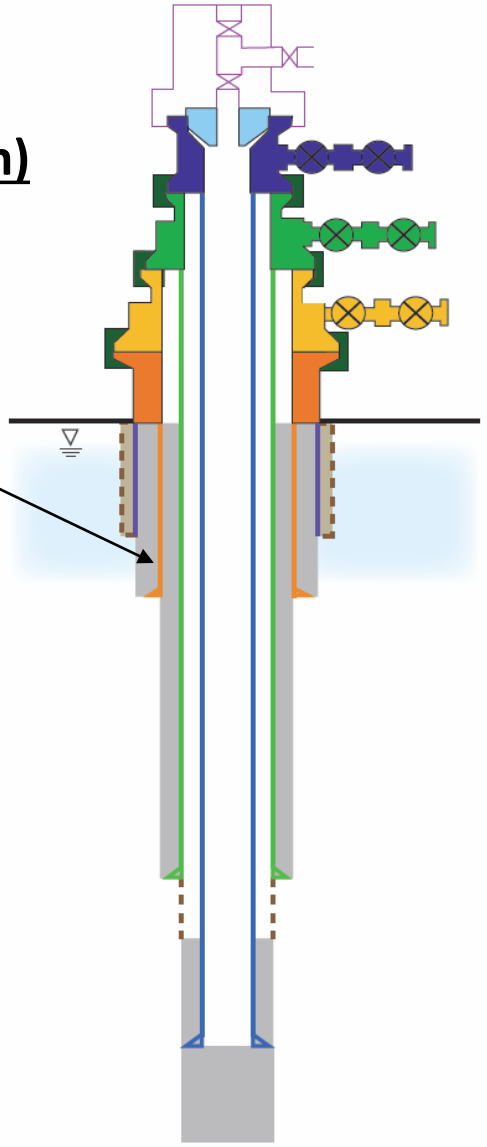


Surface or Coal Annulus **"S/C"** (**conductor** x **surface or coal casing**)

OR

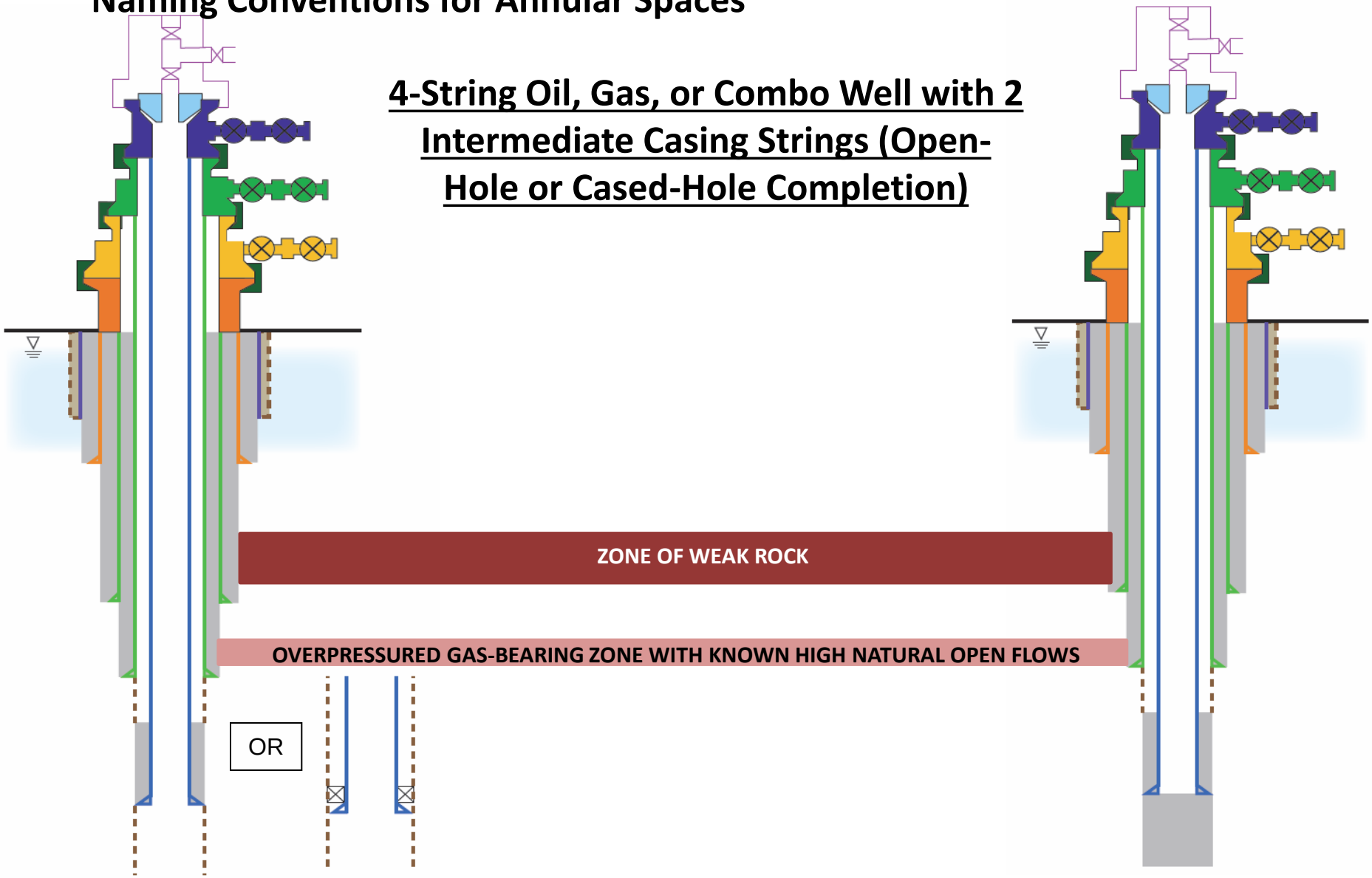




I. Review of MIA Program Process

Naming Conventions for Annular Spaces

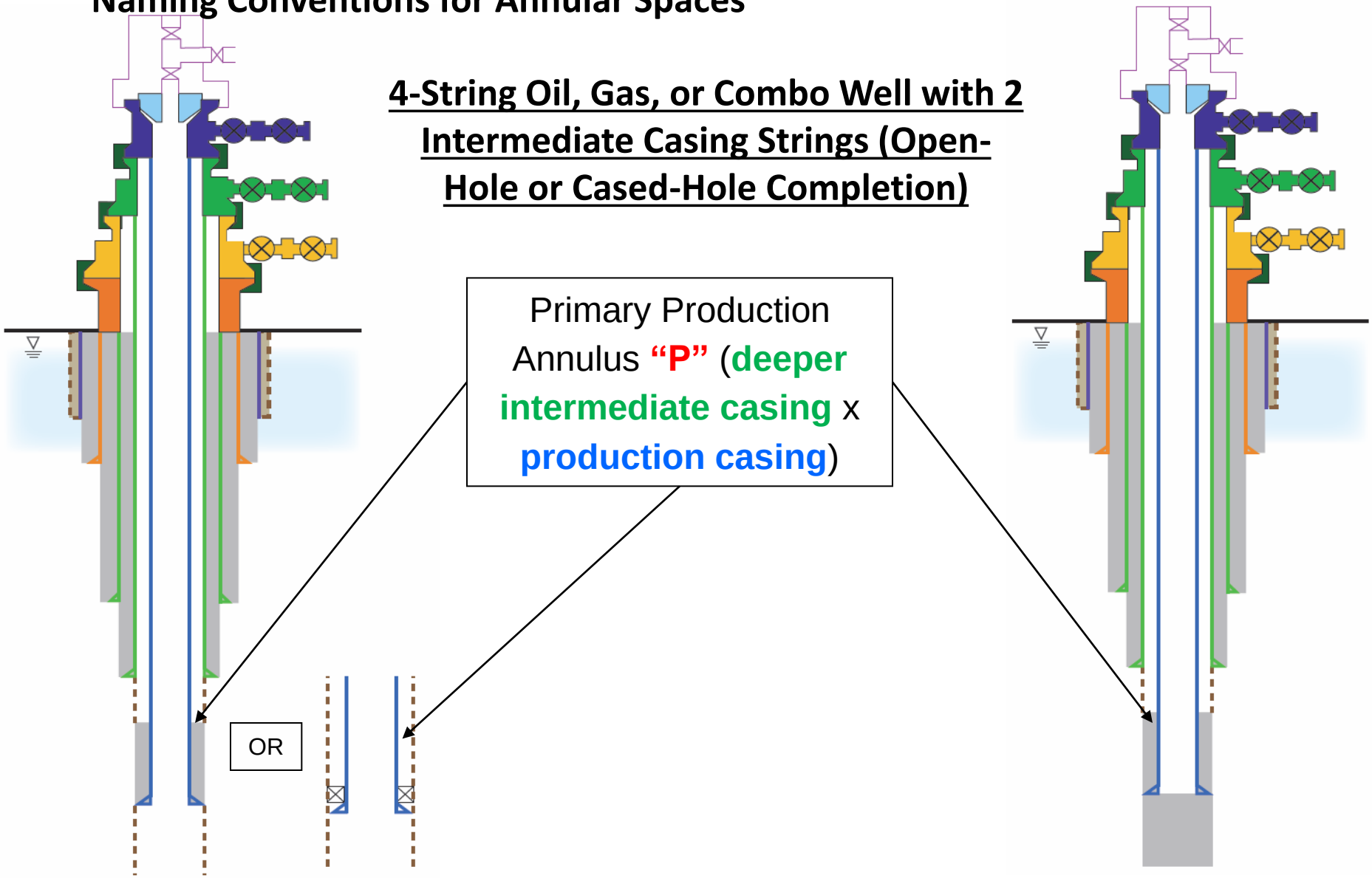
4-String Oil, Gas, or Combo Well with 2 Intermediate Casing Strings (Open-Hole or Cased-Hole Completion)



I. Review of MIA Program Process

Naming Conventions for Annular Spaces

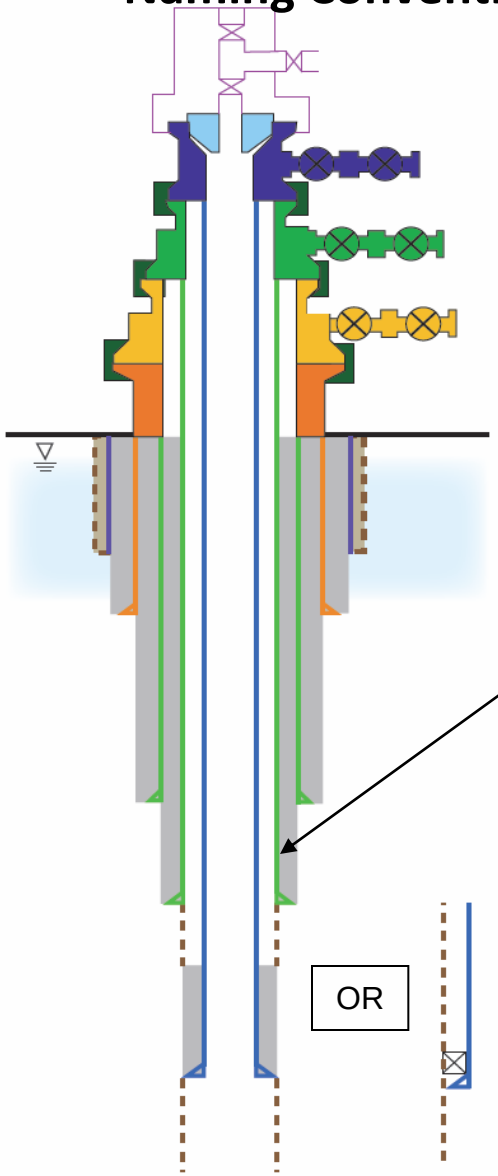
4-String Oil, Gas, or Combo Well with 2 Intermediate Casing Strings (Open-Hole or Cased-Hole Completion)



I. Review of MIA Program Process

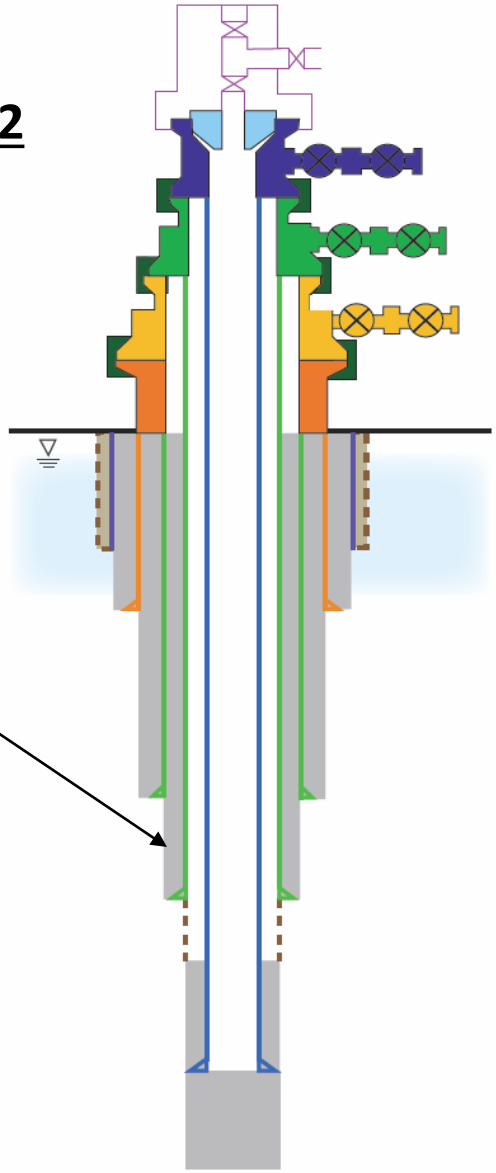
Naming Conventions for Annular Spaces

4-String Oil, Gas, or Combo Well with 2 Intermediate Casing Strings (Open-Hole or Cased-Hole Completion)



OR

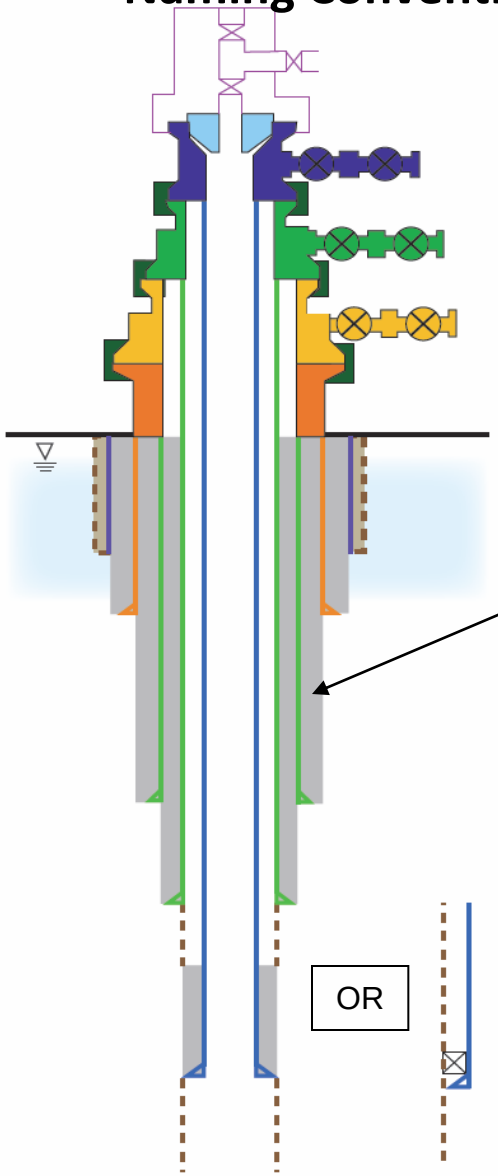
Intermediate Annulus **"I"** (**shallower intermediate casing** x **deeper intermediate casing**)



I. Review of MIA Program Process

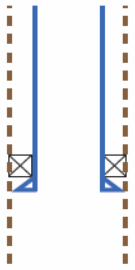
Naming Conventions for Annular Spaces

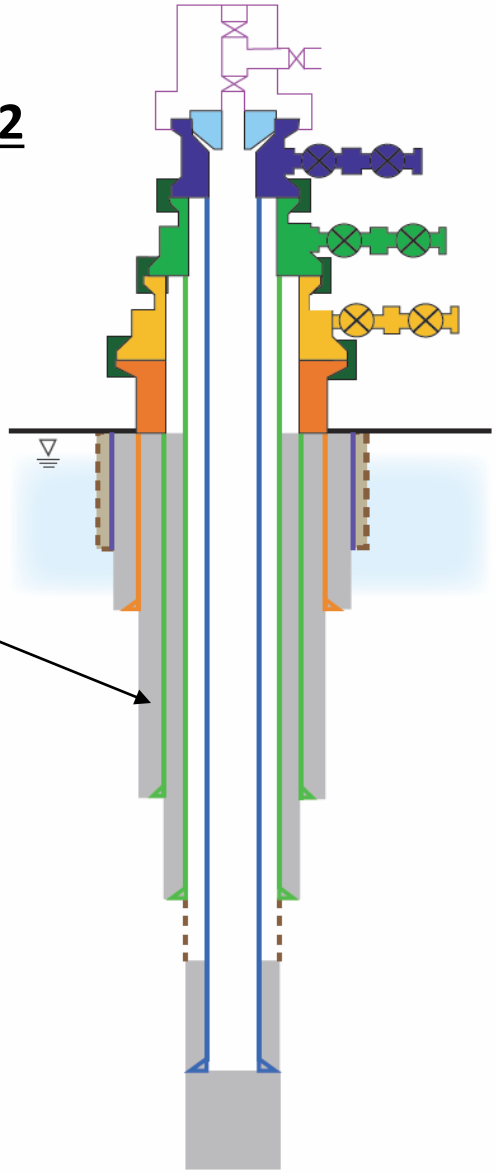
4-String Oil, Gas, or Combo Well with 2 Intermediate Casing Strings (Open-Hole or Cased-Hole Completion)



Intermediate Annulus **"I1"** (**surface or coal casing** x **shallower intermediate casing**)

OR



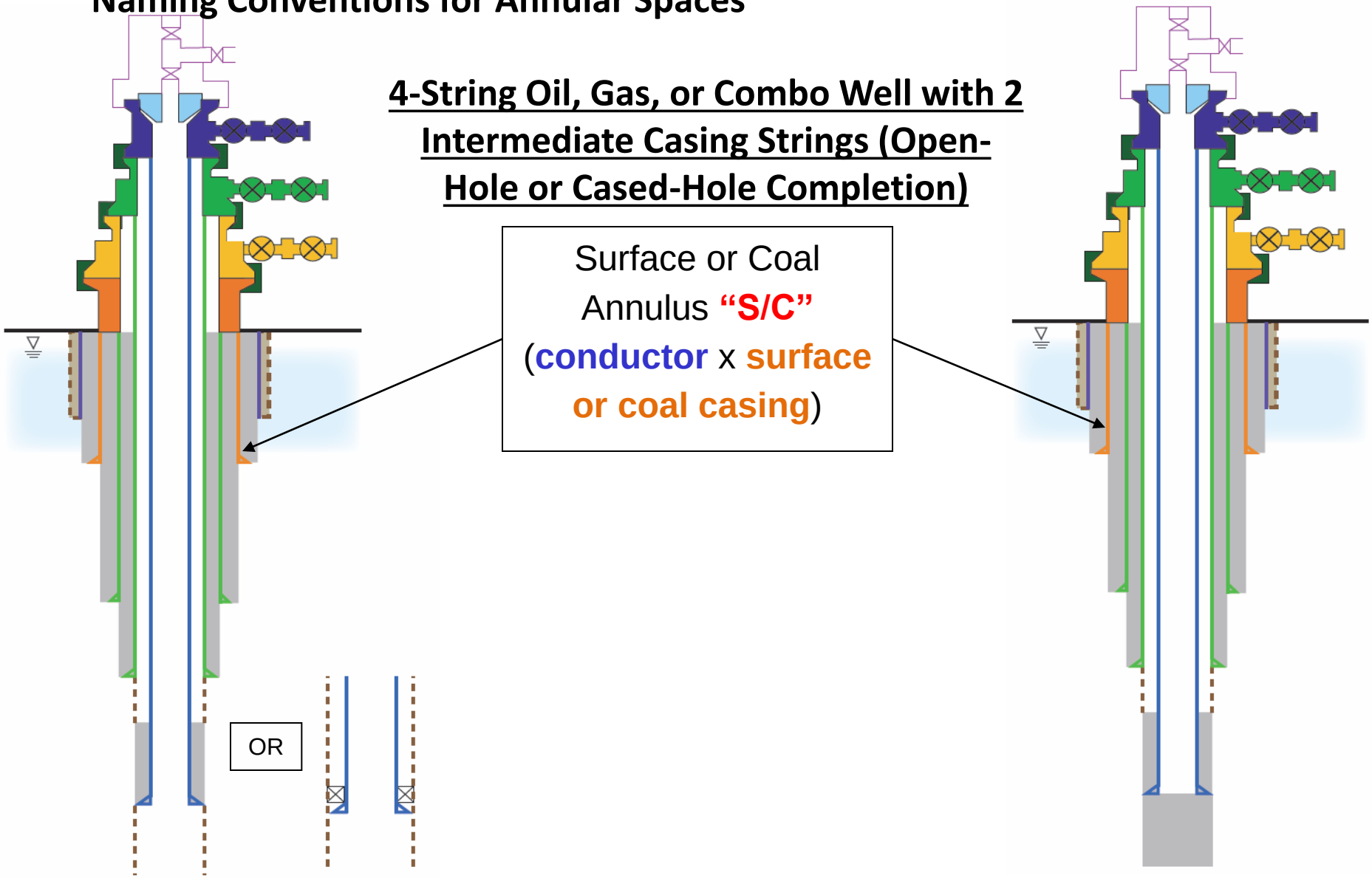


Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

4-String Oil, Gas, or Combo Well with 2 Intermediate Casing Strings (Open-Hole or Cased-Hole Completion)

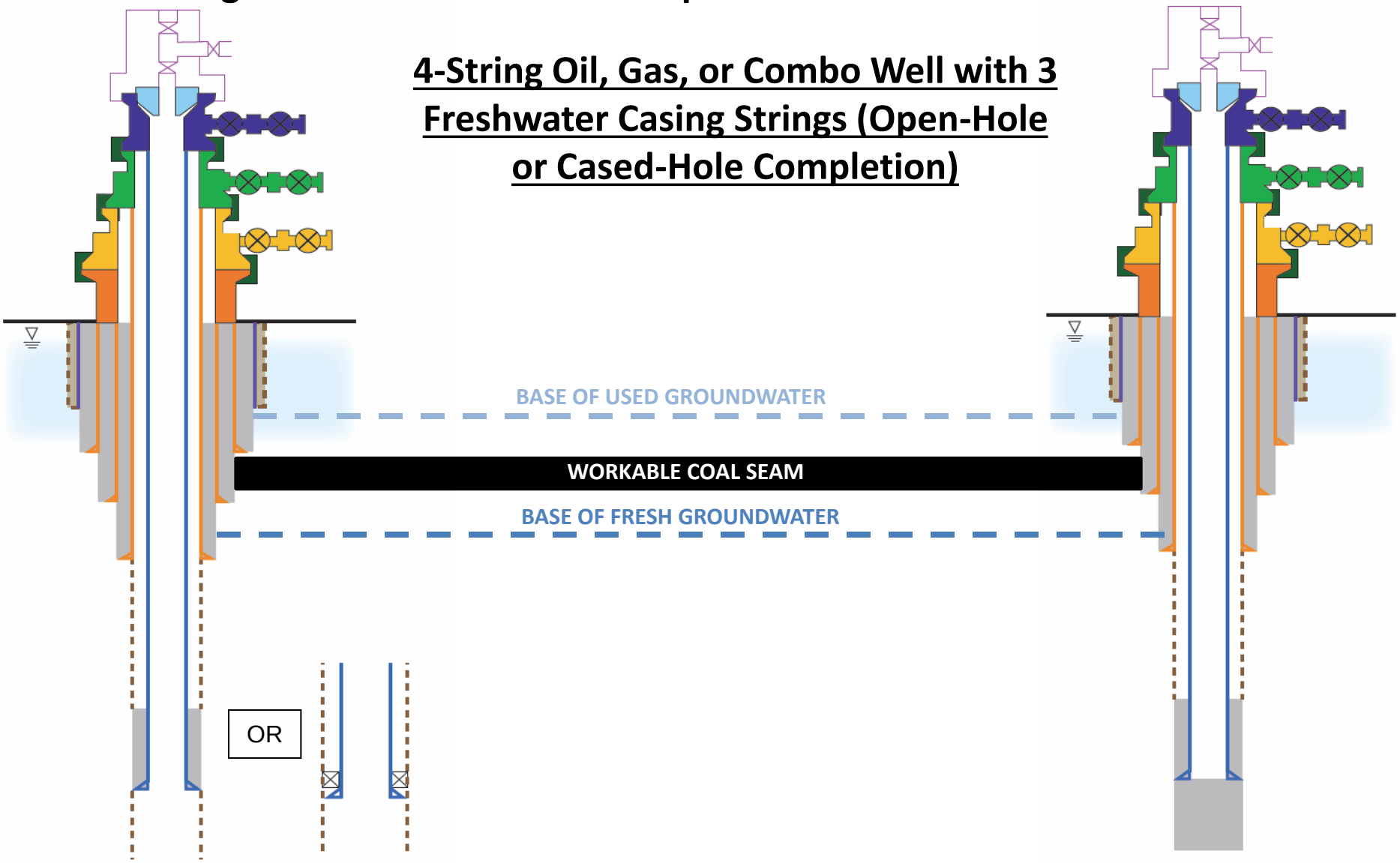
Surface or Coal Annulus **"S/C"** (**conductor** x **surface or coal casing**)



Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

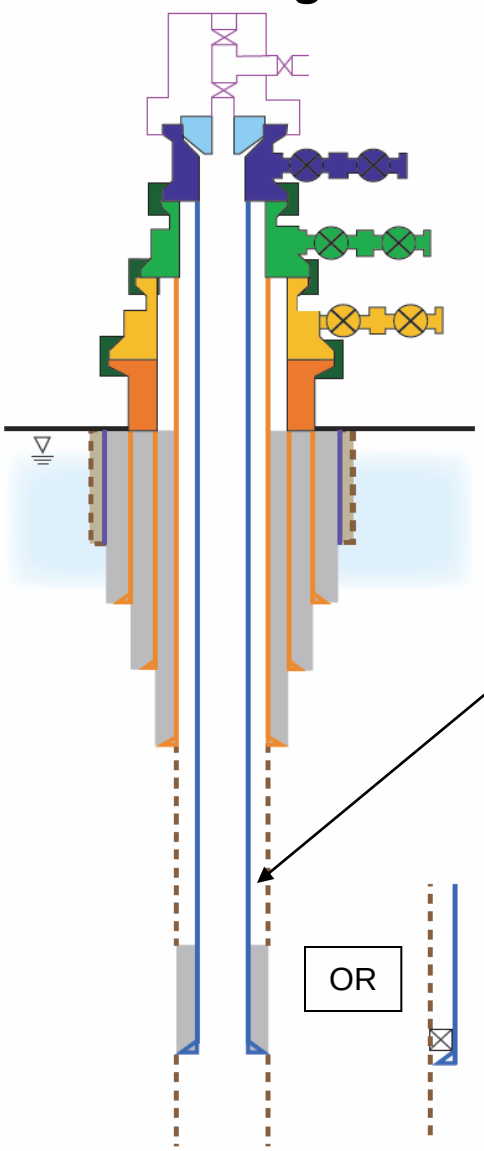
4-String Oil, Gas, or Combo Well with 3 Freshwater Casing Strings (Open-Hole or Cased-Hole Completion)



Module 1: Review of Form A Instructions

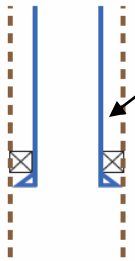
Naming Conventions for Annular Spaces

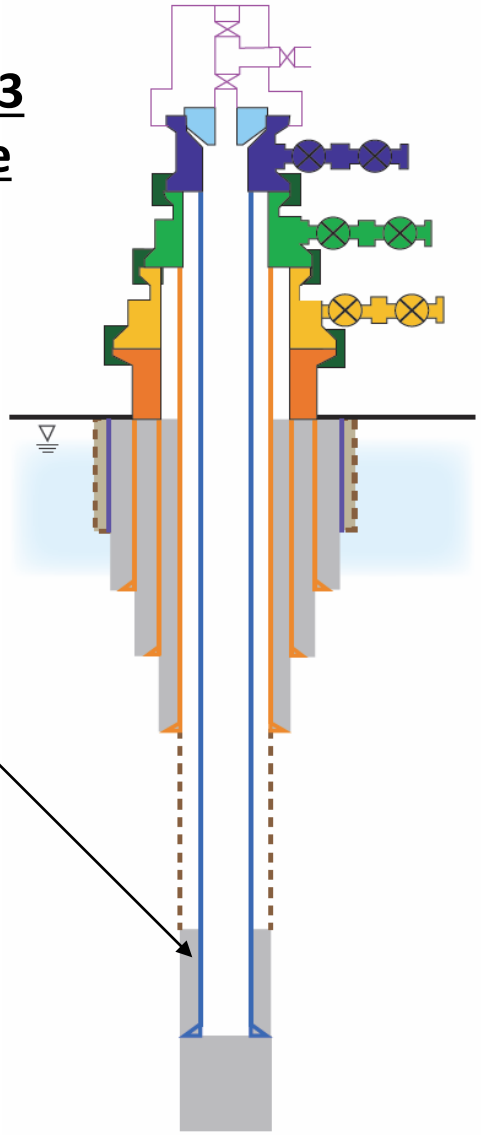
4-String Oil, Gas, or Combo Well with 3 Freshwater Casing Strings (Open-Hole or Cased-Hole Completion)



Primary Production Annulus **"P"** (**deeper surface casing** x **production casing**)

OR





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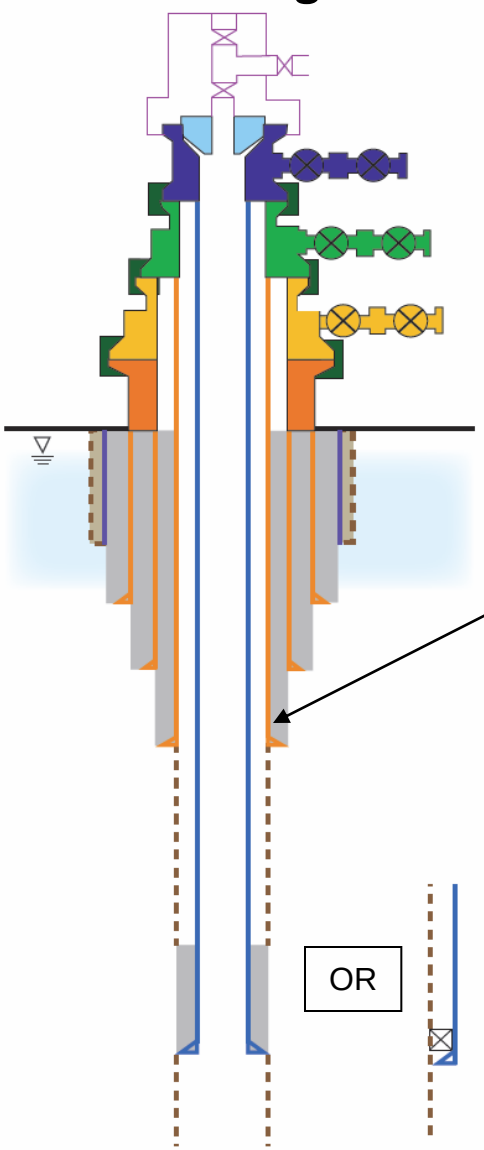
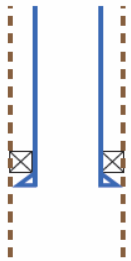
Naming Conventions for Annular Spaces

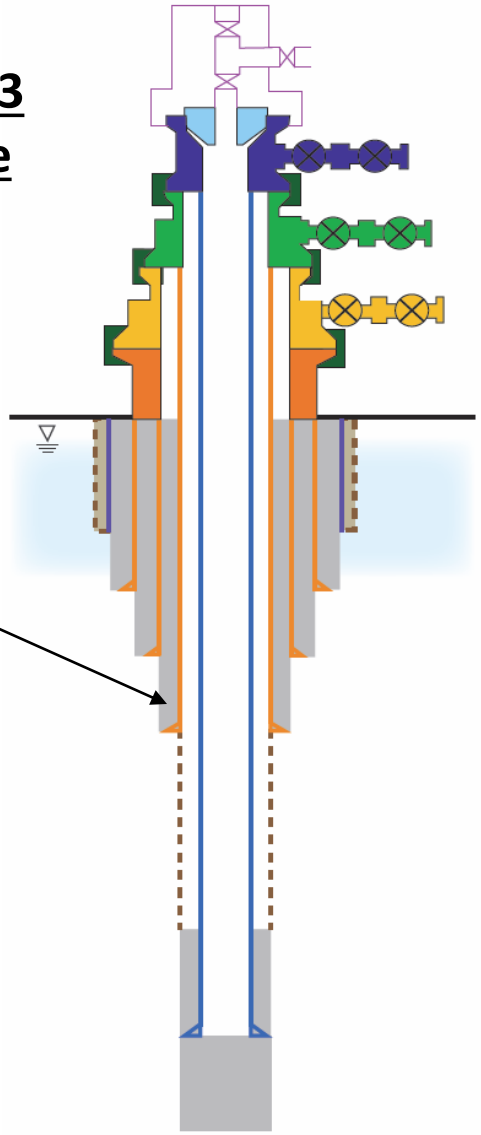
4-String Oil, Gas, or Combo Well with 3 Freshwater Casing Strings (Open-Hole or Cased-Hole Completion)



Surface or Coal Annulus **"S/C"** (**coal casing** x **deeper surface casing**)

OR

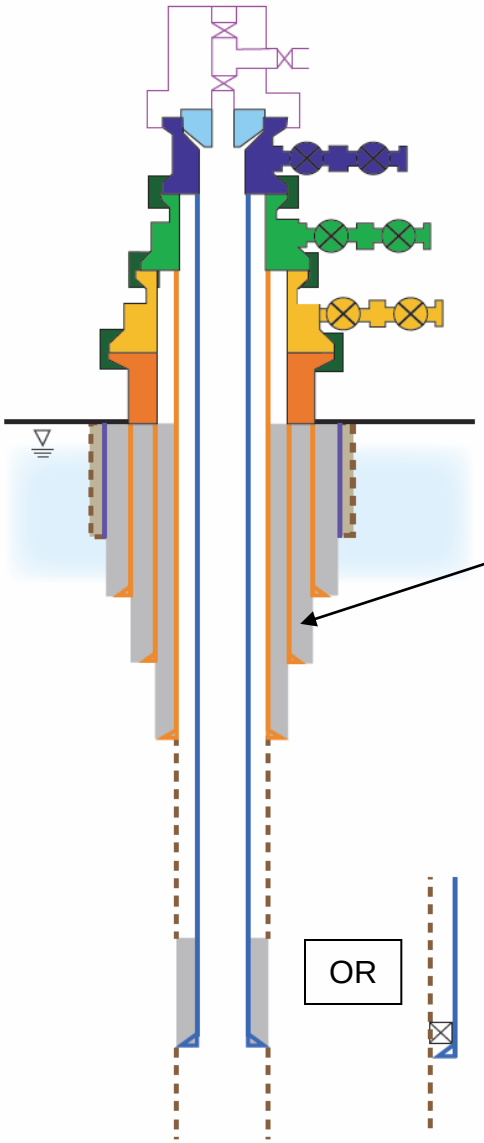




Module 1: Review of Form A Instructions

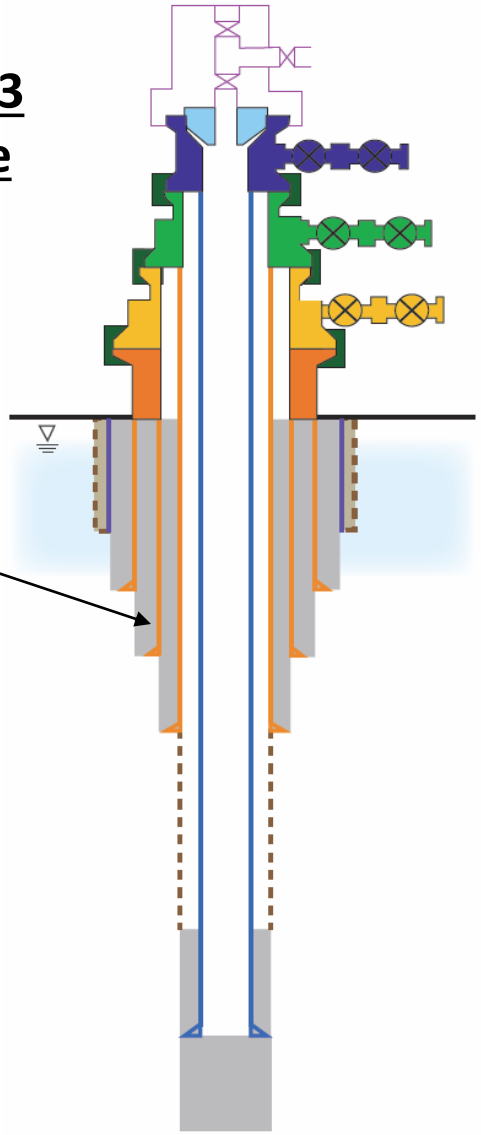
Naming Conventions for Annular Spaces

4-String Oil, Gas, or Combo Well with 3 Freshwater Casing Strings (Open-Hole or Cased-Hole Completion)



OR

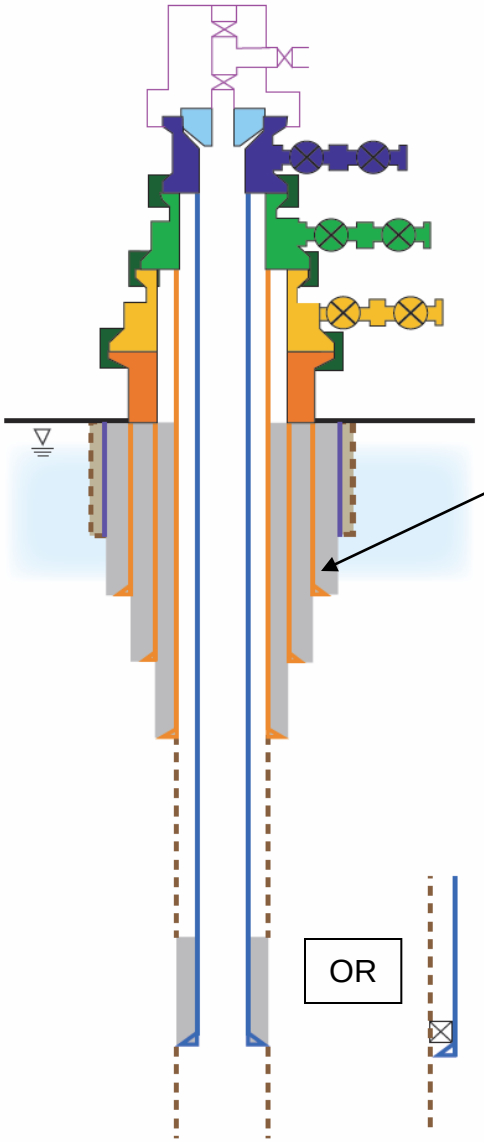
Surface or Coal Annulus **"S/C1"** (**shallower surface casing** x **coal casing**)



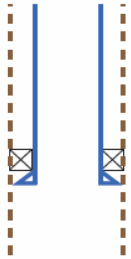
Module 1: Review of Form A Instructions

Naming Conventions for Annular Spaces

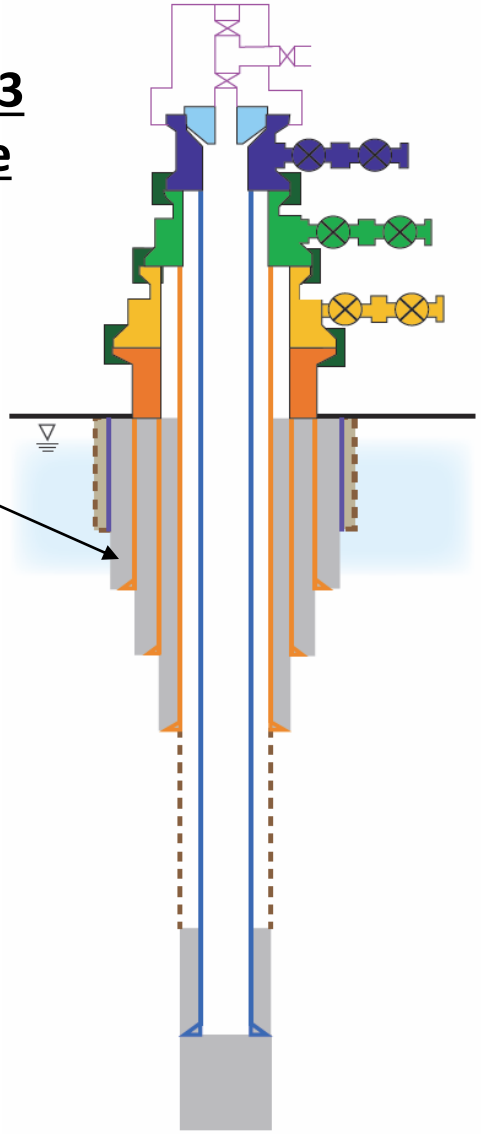
4-String Oil, Gas, or Combo Well with 3 Freshwater Casing Strings (Open-Hole or Cased-Hole Completion)



OR



Surface or Coal Annulus **"S/C2"** (**conductor** x **shallower surface casing**)



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Oil and Gas Management

Thank You – Questions?

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