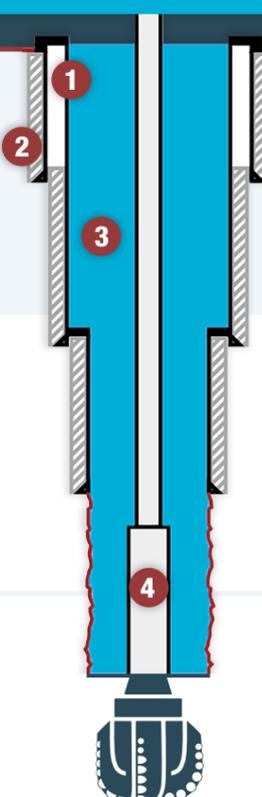


# OIL & GAS WELL INTEGRITY

## R&D CAPABILITIES

**FIRST**  
LET'S LOOK

AT A WELLBORE & BARRIER SYSTEM

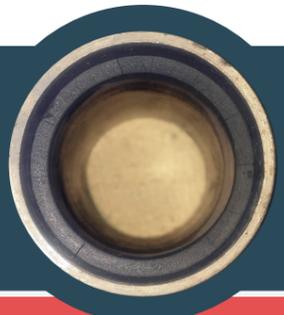
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- 1** A steel casing is the inside layer of separation between drilling fluid and rock.
  - 2** Cement comprises the outside separation layer.
  - 3** Drilling fluid is a mud-like mixture pumped into the wellbore in order to stabilize pressure.
  - 4** The drill string sits in the center, and consists of the drill pipe, drill collars, and a drill bit.

Wellbore Configuration Diagram  
by Cstricklan is licensed under CC BY-SA 4.0

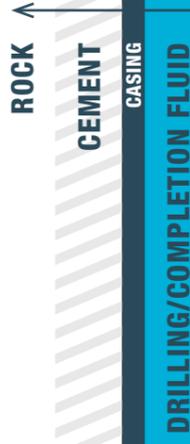
**WELL**  
**INTEGRITY**

ENSURES STRUCTURAL STABILITY FOR SAFE & LONG-TERM OPERATIONS

Maintained by the rock-cement-casing barrier systems



**BUT**  
SOMETIMES  
**THE BARRIER SYSTEM FAILS**



Hydrogen sulfide, carbon dioxide and fluid in the formation can degrade the cement. Mechanical stress induced by heat can cause the cement to fracture and the casing to buckle. The harsher the environment, the more likely the cement will fail.

Post-drilling pressure from the wellbore exerts stress on the steel casing, attacking from within.

**IN FACT,**  
cement and casing failure are the 1st and 3rd highest contributing factors to well blowouts.

Source: Izon et al 2007



**MAJORITY OF FEDERAL WATERS NOW OPEN FOR OFFSHORE DRILLING**

As more and more oil and gas drilling moves into extreme offshore environments, it is critical that barrier systems are designed to prevent failure and maintain near and long term control of the well.

**NETL'S**

**Unique Set of Lab Testing Equipment Can Help!**

NETL's unique set of lab testing equipment can test different casing and cement materials to predict what subsurface conditions allow for optimum performance and which conditions may lead to failure.



**PREDICTING CASING CORROSION**



**PREDICTING OVERALL BOREHOLE STABILITY**



**PREDICTING CEMENT DEGRADATION**

<https://edx.netl.doe.gov/offshore>



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