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GP 10-60

Zonal Isolation Requirements during Drilling Operations and Well Abandonment and Suspension

Group Practice

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ENGINEERING TECHNICAL PRACTICES**



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Introduction

The introduction to this ETP mirrors section 26 of the revised DWOP.

All zonal isolation activity shall conform to Engineering Technical Practice GP 10-60 – Zonal Isolation and Abandonment During Drilling Operations.

1. Zonal Isolation

Minimum requirement for Zonal Isolation

1.1 During Well Construction Zonal Isolation shall be designed to prevent:

- The development of Sustained Casing Pressure (SCP) during well operations.
- Prevent contamination of any aquifers.
- Prevent communication between any distinct permeable zones.

Materials

1.2 Material selection should consider well service (and any likely changes) and the impact of well conditions on zonal isolation for the life of the well. If an alternative material (to cement) is used an evaluation should be conducted to ensure it meets criteria required to provide isolation until permanent abandonment.

Design Criteria

1.3 Zonal Isolation design criteria for cementing of primary casing strings to meet well integrity and future abandonment requirements, shall meet one of the following:

- 30 mTVD (100 ft TVD) above the top of the distinct permeable zone where the top of cement (TOC) is to be determined by a proven cement evaluation technique (Section 5.3).
- 300 m MD (1000 ft MD) above the distinct permeable zone where the hydraulic isolation is not proven except by estimates of TOC (Section 5.3).

For each well the actual TOC shall be recorded along with the method used for this determination. Where the actual TOC is below the plan, the TOC shall be reviewed with stakeholders for its impact on future well integrity, operability, suspension and abandonment operations.

2 Suspension and Temporary Abandonment

Suspension and temporary abandonment shall be designed to ensure zonal isolation for the duration of the suspension and permit safe re-entry of the well.

Number of Barriers

2.1 Two temporary barriers are required for isolation of moveable hydrocarbon bearing or overpressured permeable sections from surface/seabed.



Verification of Barriers

- 2.2 The first barrier shall be pressure and / or inflow tested and tagged (if plug is set in openhole (OH) tagging only required), the second barrier shall be tagged or pressure tested.

3 Permanent Abandonment

The decision to permanently abandon or temporarily suspend a well shall be approved by the relevant Performance Unit Leader or their delegate and by the regulatory authorities.

Permanent abandonment shall be designed to protect aquifers, ensure isolation between distinct permeable zones and to prevent flow from them to surface or seabed.

- For hydrocarbon bearing permeable zones two permanent barriers are required from surface or seabed

For water bearing permeable zones one permanent barrier required from surface or seabed

Acceptable Barriers

- 3.1 Cement shall be the material acceptable for permanent abandonment.

Selection and location of permanent barriers

- 3.2 Good cement verified to be 30 m TVD (100ft TVD) above a distinct permeable zone shall be considered an acceptable permanent barrier.

To constitute a permanent barrier the annular cement around the plug setting depth should meet annular isolation requirements positioned to provide full lateral coverage of the well. Cement plugs shall be set at a point where formation strength is capable of controlling the pressure from the formations it is isolating.

Barrier Verification

- 3.3 Barriers can be verified by weight testing and/or pressure testing (positive and/or inflow). All primary barriers should be weight tested and pressure tested except:
- In OH where only weight testing is permitted (OH cement plugs cannot be accepted as the only barrier)
 - When the plug has been set on a permanent mechanical barrier (when pressure testing is only required).

Weight testing should be up to at least 15K lb (6.8 Tonne). Pressure testing shall be 0.1psi/ft (2.26 KPa/m) above the leak off test (LOT) (or predicted fracture gradient at the shoe) or 500 psi (3.45 MPa) whichever is the greater. The pressure test is acceptable where pressure drop is <10% over 15 mins.

4 Special Considerations

Permafrost Cementing

- 4.1 The plugging material shall develop the required properties before freezing and not impact permafrost during setting.



Aquifers

- 4.2 Fresh water aquifer should have annulus barriers extending a minimum of 30 m (100ft) TVD beneath the base of permeable interval containing the fresh water and 30 m (100ft) TVD above the top of the permeable fresh water interval or to surface. Plugs set inside pipe should extend 30m (100ft)TVD above the aquifer and provide a seal extending laterally across the entire well.

Control Lines

- 4.3 An abandonment cement plug with open control line through it shall not be accepted as a permanent barrier

Corrosive Environments

- 4.4 The potential for casing corrosion shall be accounted in the plugging plan



Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GP 10-60 dealing with Zonal Isolation and Well Abandonment and Suspension. This Group Practice (GP) replaces the relevant parts of the Drilling and Well Operations Policy BPA-D-01.

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