



39th Gas-Lift Workshop
Houston, Texas, USA
May 16 – 20, 2016

Issues associated with Selection and Use of Gas-lift in Deep water, High Pressure and High Temperature Applications

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What Constitutes HP/HT and Deep Water

- **BSSE and API:**
 - Pressure greater than - 15,000 psi;
 - Temperature greater than - 350°F;
 - Water depth - not defined.
- **Departure from normal gas-lift:**
 - Pressure greater than - 5000 psi;
 - Supply gas greater than - 3000 psi;
 - Water depth greater than - 1000 ft.

Deep Water Issues

- **Type of wellhead tree:**
 - **Dry: direct access to well head**
 - **Wet: access through a bolt on system**
 - **Riser – deployed by a rig**
 - **Light intervention – deployed by a ship**
- **Intervention types**
 - **Slickline/wireline;**
 - **Stroker**
 - **Tractor**

Well Design Issues

- **Well design creating subsea gas-lift constraints:**
 - Available compression affecting rate and pressure;
 - Single point verse multiple gas-lift stations;
 - Maximum operating pressure of other well bore equipment;
 - Tubing/casing design issues;
 - Crater depth.

HPHT Issues

- **HPHT issues creating gas-lift constraints:**
 - **Gas injection phase conditions;**
 - **Gas-lift equipment limitations ;**
 - **Metallic materials;**
 - **Non-metallic materials;**
 - **TRO calculation/setting;**
 - **Barrier check;**
 - **Gas-lift design process**
 - **Software limitation**
 - **ROT limitations**

Flow Assurance Issues

- **Flow assurance issues creating gas-lift constraints:**
 - **Formation of organic/inorganic deposits;**
 - **System Stability;**
 - **Start-up/shut-in issues.**

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