Bureau of Safety and Environmental Enforcement

MPD Application Process

Fred Brink
Chief, District Operations Support (DOS)
September 19, 2017

"To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement."

BSEE Mission Statement

"To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement."

What is “New Technology”

- As defined in CFR 250.200:
  - *New or unusual technology* means equipment or procedures that:
  - (1) Have not been used previously or extensively in a BSEE OCS Region;
  - (2) Have not been used previously under the anticipated operating conditions; or
  - (3) Have operating characteristics that are outside the performance parameters established by this part.
    - Consideration of a new technology must begin long before it may be employed on a specific project. Certain new technologies may trigger environmental or other additional reviews. The leaseholder considering an unproven technology can mitigate approval uncertainties by engaging in discussion with the DOS early in the design process.

What a “typical” application should include

The new technology submittal should be tailored to the specific application.

1. A thorough description of the technology and specific conditions of use, including the following if applicable:
   a. Demonstration of shut-in philosophy and procedures
   b. Demonstration of dual mechanical barriers to prevent hydrocarbon flow during abnormal conditions
   c. Discussion of inspection and testing capabilities
2. Risk assessment and/or failure mode assessment. (detail should be proportional to the level of risk involved)
3. Operating procedures
4. History of development and testing
5. Detailed schematics
6. Justification for use
7. Additional information necessary for the review process
8. For technically complex new technology evaluations, where a high degree of specialized knowledge is required, BSEE will generally mandate the operator to provide an independent third party analysis.

Approval of New Technology

- All new technology approvals will be based on the following principles:
  - Protection of people and the environment.
  - Redundant mechanical barriers.
  - Barriers must be verified by testing.
  - Failure mode assessment/risk assessment. These assessments must address what can go wrong or fail. Additionally, the mitigations for such failures must be well developed and understood.
  - The new technology must be based on verified engineering principles.

Regulations

- 250.414 (c)
  - (c) Planned safe drilling margin that is between the estimated pore pressure and the lesser of estimated fracture gradients or casing shoe pressure integrity test and that is based on a risk assessment consistent with expected well conditions and operations.
  - (1) Your safe drilling margin must also include use of equivalent downhole mud weight that is:
  - (i) Greater than the estimated pore pressure; and
  - (ii) Except as provided in paragraph (c)(2) of this section, a minimum of 0.5 pound per gallon below the lower of the casing shoe pressure integrity test or the lowest estimated fracture gradient.
  - (2) In lieu of meeting the criteria in paragraph (c)(1)(ii) of this section, you may use an equivalent downhole mud weight as specified in your APD, provided that you submit adequate documentation (such as risk modeling data, off-set well data, analog data, seismic data) to justify the alternative equivalent downhole mud weight.
  - (3) When determining the pore pressure and lowest estimated fracture gradient for a specific interval, you must consider related off-set well behavior observations.

Regulations

- 250.738 (m)
  - A third party approval is needed
- 30CFR250 does not capture MPD equipment or MPD drilling practices
  - However 250.408 does allow for the District Manager to approve the use of alternative procedures or equipment during drilling operations
- NTL 2008-G07 **Managed Pressure Drilling Projects**
  - Provide guidance for MPD operations based upon regulatory allowance in 250.408.

NTL 2008-G07

- 1. MPD process employs a collection of tools and techniques which may **mitigate the risks** and costs associated with drilling wells that have **narrow downhole environmental limits**, by proactively **managing the annular hydraulic pressure** profile.
- 2. MPD may include **control** of back pressure, fluid density, fluid rheology, annular fluid level, circulating friction, and hole geometry, or combinations thereof.
- 3. MPD may **allow faster corrective action** to deal with observed pressure variations. The ability to control annular pressures dynamically facilitates drilling of what might otherwise be economically unattainable prospects.

NTL 2008-G07

- MPD is intended to avoid continuous influx of formation fluids to the surface. Any flow incidental to the operation will be safely contained using an appropriate process.

- Translation => MPD is not to be used in a continuous underbalanced situation.

NTL 2008-G07

Operations Matrix

MPD Drilling Matrix		Surface Pressure Indicator (See Chart 2 Below)			
		At Planned Drilling Back Pressure	**At Planned Connection Back Pressure**	**> Planned Back Pressure & < Back Pressure Limit**	**≥ Back pressure Limit**
Influx Indicator (See Chart 1 Below)	**No Influx**	Continue Drilling	Continue Drilling	Increase pump rate, mud weight, or both AND reduce surface pressure to planned or contingency levels	Pick up, shut in, evaluate next action
	Operating Limit	Increase back pressure, pump rate, mud weight, or a combination of all	Increase back pressure, pump rate, mud weight, or a combination of all	Increase pump rate, mud weight, or both AND reduce surface pressure to planned or contingency levels	Pick up, shut in, evaluate next action
	< Planned Limit	Cease Drilling. Increase back pressure, pump rate, mud weight or a combination of all	Cease Drilling. Increase back pressure, pump rate, mud weight or a combination of all	Pick up, shut in, evaluate next action	Pick up, shut in, evaluate next action
	≥ Planned Limit	Pick up, shut in, evaluate next action	Pick up, shut in, evaluate next action	Pick up, shut in, evaluate next action	Pick up, shut in, evaluate next action

NTL 2008-G07

- Defined Limits
  - HC Zones, Flow limitations, Influx Rate, Influx Time, Influx Volume, Surface Pressure Indicators

Chart 1				
Influx Indicator	Defined Limits for		Interval	ft to ft TVD
	Influx State	No Influx	None	
		Operating Limit	Low	
		< Planned Limit	Medium	
		≥ Planned Limit	High	
	Influx Rate	No Influx	None	
		Operating Limit	Light	
		< Planned Limit	Moderate	
		≥ Planned Limit	High	
	Influx Duration	No Influx	None	
		Operating Limit	Low	
		< Planned Limit	Medium	
		≥ Planned Limit	High	
	Volume Gain	No Influx	None	
		Operating Limit	Low	
		< Planned Limit	Medium	
		> Planned Limit	High	

Industry Guidance

- API Spec 16RCD - **Specification for Drill Through Equipment-Rotating Control Devices** (2005).
- API RP-92M - **Managed Pressure Drilling Operations with Surface Back-pressure** is currently being developed to provide guidance for MPD operations.

Conditions of Approval

- District Contact Required for:
  - PWD failure
  - Failure of Flowmeter (primary and backup)
  - MPD pump failure
  - Well control event
  - Reduction of MW
- Contingencies:
  - Flowmeter Failure – Stop drilling, circulate, isolate manifold, change to backup flowmeter
  - RCD element Change
  - Re-Test of failed component following component repair.
  - MPD Software Failure – Stop drilling, circulate, repair software or drill ahead conventionally.

Enforcement

- While MPD as a drilling practice is approved for use in the GOM, each operation should be thoroughly reviewed and onsite inspection performed.
- HAZOPs/HAZIDs should be attended by BSEE personnel especially for Subsea operations.
- MPD training of rig personnel must be verified

Restrictions

- At no time should the bottom hole pressure be reduced below PP (no underbalanced drilling).
- MPD NTL does allow for the combination of statically underbalanced as long as casing backpressure is trapped to ensure overbalance to the formation.

When is it considered non-New Technology?

- The first approval letter does not grant "blanket" approvals
  - Each project must be verified separately to determine if it can be applied to the specific application
- Requests must be made until either a NTL or regulation is written, or it is deemed non-new technology by the DOS Section.

BSEE Website: www.bsee.gov

@BSEEgov

BSEEgov

Bureau of Safety and Environmental Enforcement

“To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement.”