Marine Safety Requirements for Well Intervention Vessels

11th Annual Deepwater Intervention Forum

CAPT Joshua Reynolds

USCG Eighth District OCS Officer in Charge, Marine Inspection

"Same risk of blowout to a vessel as traditional drilling operations?"

BSEE/CG PL 01-2015
[Date]

From: Bureau of Safety & Environmental Enforcement (BSEE) Gulf of Mexico Outer Continental Shelf (OCS) Region, and Coast Guard (CG) Eighth District

To: Distribution

Subj: INTERIM GUIDANCE ON VESSELS CONDUCTING WELL INTERVENTION OPERATIONS

d. The CG Eighth District believes WI operations that provide a fluid communication path for hydrocarbons to flow from a well to a vessel may present the same risk of blowout to that vessel that traditional drilling operations (e.g. Mobile Offshore Drilling Unit or MODU) present to a Mobile Offshore Drilling Unit (MODU). The CG Eighth District considers a fluid communication path to include any operation using a conduit that provides a flow path or potential flow path of fluid (liquid or gas) between the vessel and the well, regardless of the intended flow direction.

Do any of these riser based WI operations involve risk of blowout to the vessel comparable to “traditional drilling” ?

HELIX ENERGY SOLUTIONS GROUP

Intervention Today

		Vessel				
		Monohull			Semi	
		Smaller				Larger
		Intervention System				
		SIL	SIL/IRS	IRS	IRS	18 3/4 BOP
Well			<7"	>7"	>7"	21" IRS
Intervention		Smaller				
		Cat A	Cat A+	Cat A++	Cat B	Cat C
		Wireline	Wireline	Wireline	Wireline	Drilling
			<7" riser	<7" riser	<7" riser	
			Coiled tubing	Coiled tubing	Coiled tubing	
					Pull tubing	
		Wireline			Coiled Tubing	
		E-line reservoir/annulus			Cement plug placement-reservoir/	
		Well perforating-tubing/casing			intermediate/shallow	
		DHSV repair			Fishing	
		SSSV/sleeve insets/storm chokes			Gas lift valves	
		Fishing			Sand screen repair	
		Guage cutting			Tubing/seal failure-mechanical	
Well		P/T/F gauges			plugs/patches (well integrity)	
Services		Gas lift valves			Zone isolation/re-perforating	
		Sand screen repair			Scale squeeze/hydrates soak	
		Tubing/seal failure-mechanical			Scale mill-out	
		plugs/patches (well integrity)			Well stimulation	
		Downhole video/camera surveillance				
		Perforating				
		E-line plug setting/removal/sand removal				
		Pressure/temp flow monitoring				
		Downhole seismic calliper survey				
		Well logging				

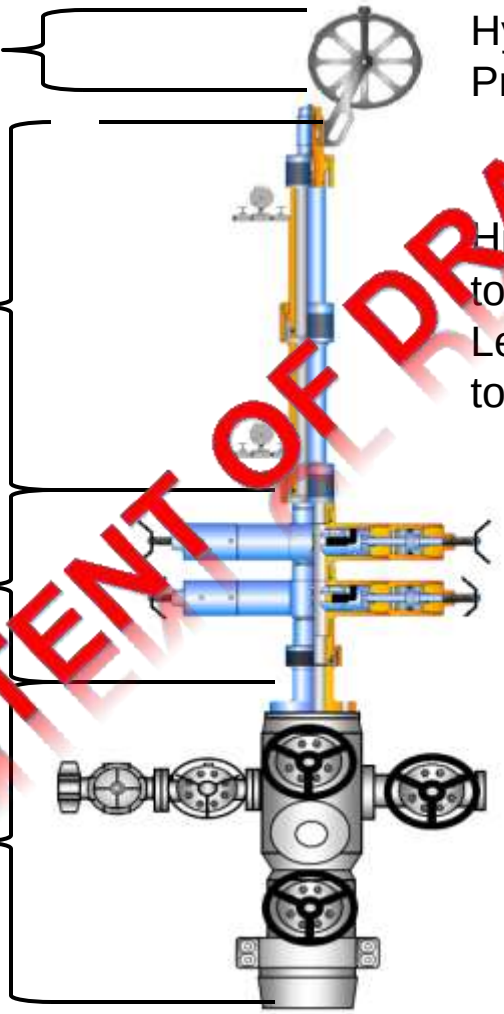
Riserless Light Well Intervention(RWLI)

Grease head

Hydraulic seal around wireline.
Primary well barrier

Lubricator

High pressure “housing” for wireline tool. Exposes tool to well pressures. Length varies dependent on length of tool application.



Wireline valve (BOP)

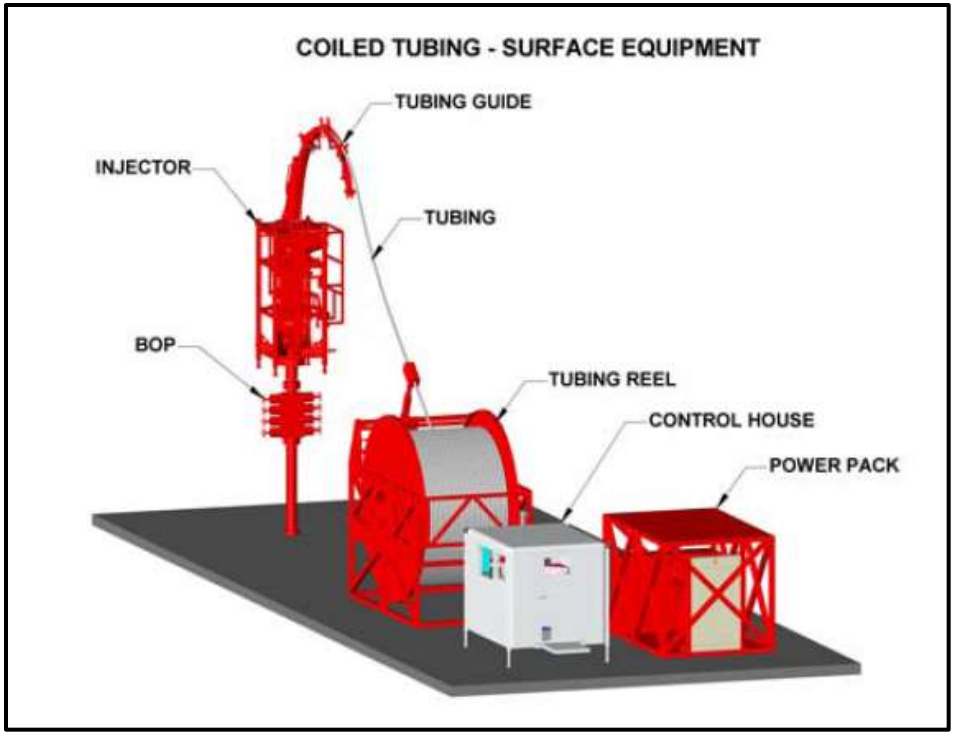
Wireline shearing capability when emergency condition experienced

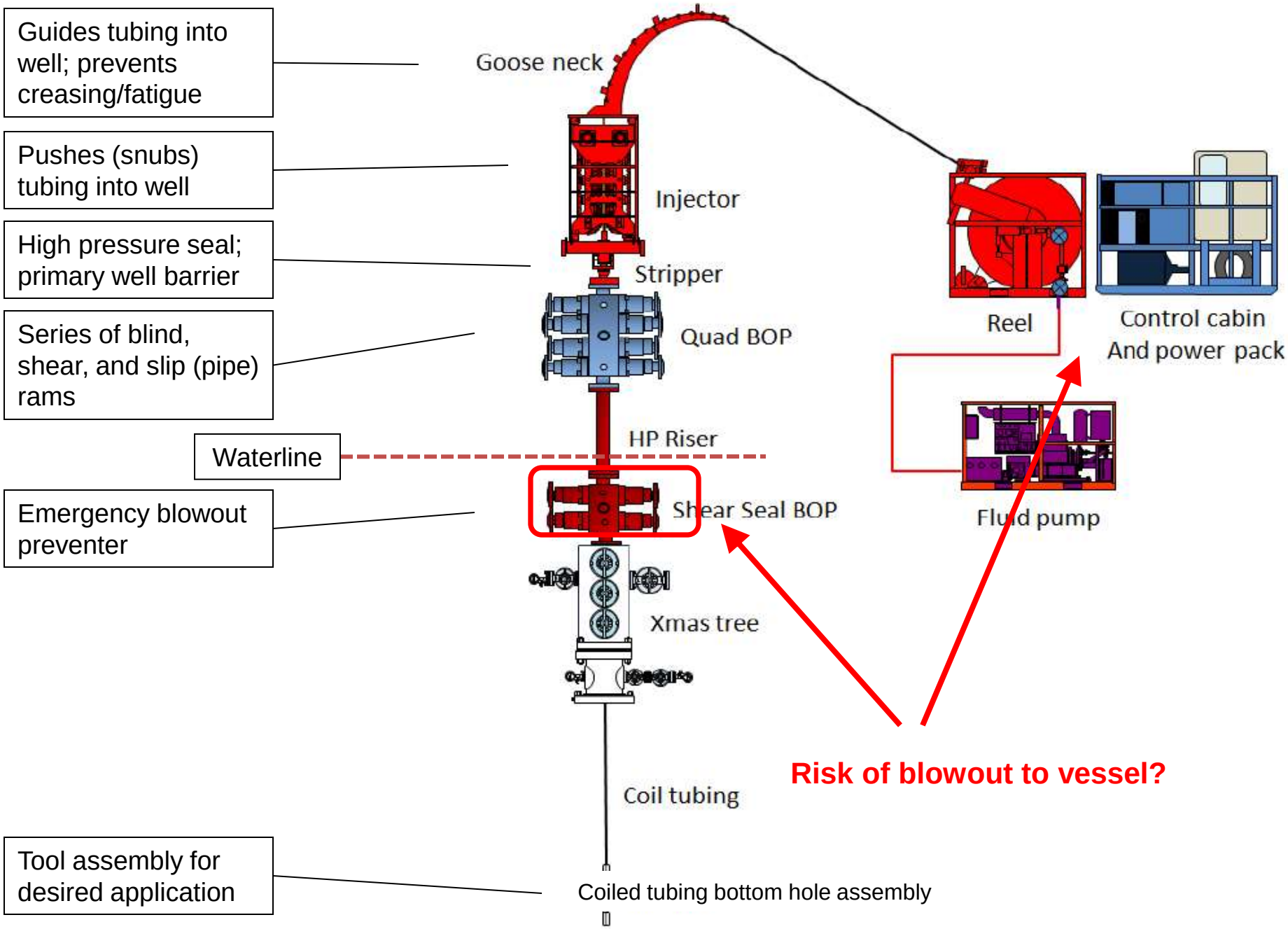
Christmas Tree valves

Well flow isolation and control valves.

Coiled Tubing (CT)

- Insertion of a spooled, continuous and flexible steel pipe into the well.
  - Drilling
  - Circulation
  - De-sanding
  - Acidization
  - Hydraulic fracturing
  - Cementing



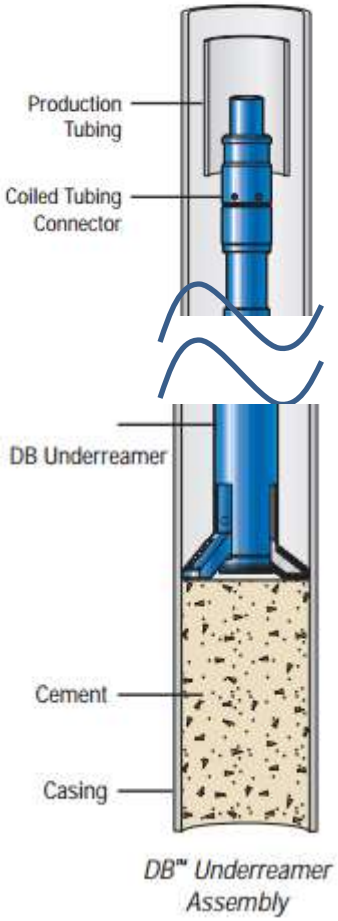

Guides tubing into well; prevents creasing/fatigue
Pushes (snubs) tubing into well
High pressure seal; primary well barrier
Series of blind, shear, and slip (pipe) rams
Waterline
Emergency blowout preventer
Tool assembly for desired application
Goose neck
Injector
Stripper
Quad BOP
HP Riser
Shear Seal BOP
Xmas tree
Coil tubing
Coiled tubing bottom hole assembly
Reel
Control cabin
And power pack
Fluid pump
Risk of blowout to vessel?

ENHANCING PRODUCTIVITY

Coiled Tubing Solutions

Solve Downhole Problems With Reliable, Cost-Effective Technology

BAKER HUGHES
Baker Oil Tools



DB™ Underreamer Assembly

Underreaming

An underreamer is designed to pass through a downhole restriction, open, clean the hole to full gauge, and close for retrieval back through the restriction. The restriction is typically in the production tubing string,

Well Cleaning

Baker Oil Tools Solutions

The DB™ Underreamer has proven highly successful in removing cement, packed sand, resin-coated sand, formation and other forms of obstructions.

Case History | North Sea

Objective: Remove cement from a 7 in. 29.00 lb/ft liner
CT Solution: A 3 in. OD DB™ Underreamer
Result: The underreamer successfully milled 1,118 ft of cement

CT Well Intervention – Loss of Well Control

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT
GULF OF MEXICO REGION

ACCIDENT INVESTIGATION REPORT

For Public Release

1. OCCURRED DATE: 07-JUL-2013

- [ ] STRUCTURAL DAMAGE
- [ ] CRANE
- [ ] OTHER LIFTING DEVICE
- [ ] DAMAGED/DISABLED SAFETY SYS.
- [ ] INCIDENT >$25K
- [ ] H2S/15MIN./20PPM
- [ ] REQUIRED MUSTER
- [ ] SHUTDOWN FROM GAS RELEASE
- [x] OTHER **Loss of Well Control**

During a Temporary Abandonment (TA) procedure on July 7, 2013, while attempting to pull a tubing plug hold down stop in the short string of the B002 well, unexpected pressure was encountered. Well control was lost due to leaks in the tubing, production casing, and surface casing to an unsealed annulus. There were no injuries but there was a loss of hydrocarbons to the waters of the Gulf of Mexico (GOM).

On July 6 and 7, a contracted Coiled Tubing Unit (CTU) company washed sand down to the plug. No attempt was made to pump through the plug or otherwise determine if there was pressure below the plug. The plug hold down stop was latched and pulled.

18. LIST THE PROBABLE CAUSE(S) OF ACCIDENT:

The probable cause of the loss of well control was pulling the short string plug at 2550 feet without confirming the existence of pressure below the plug.

"Temporary Abandonment…CT Unit…pulling plug without confirming pressure below"

Through Tubing Rotary Drilling (TTRD)

Production from new drainage points from subsea wells, by means of sidetracking through existing completions into new reservoirs, has traditionally been time consuming and costly. The development of a Through Tubing Rotary Drilling (TTRD) technology provides a more cost-effective method to increase the production from subsea wells, compared to drilling and completing new wells.

TTRD technology enables:

- Safer operation (no additional tree required and less tubular handling)
- No pulling of the tubing or subsea tree, saving time and cost
- Deeper kick-off point (saves drilling and completion costs)

TTRD benefits:

- Lower cost than conventional drilling operation
- Increases income from each well
- Extends the life of the well
- May enable production from marginal fields
- Maximizes production from mature fields
- Decreases operational time (typical operation three weeks, 1000–1500m horizontal reservoir drilling)

"Sidetracking through existing completions into new reservoirs"

Through tubing drilling and Completion

Through-tubing drilling and completion (TTDC) is a cost effective technology for increasing tail production and oil recovery from platform- and subsea-fields.

Having completed 29 TTDC operations up to Q1 2013, the last one combined with rig assisting snubbing and manage pressure drilling, Statoil is the leading player with this solution in the North Sea.

TTDC is a generic term for drilling sidetracks in existing producers and injectors, and covers both coiled tubing drilling (CTD) and through-tubing rotational drilling (TTRD), including installing the associated lower completion, typically liners or screens.

The main advantage of the technology is that new reservoir sections can be reached without having to remove the existing x-mas tree, the completion or the production casing, thereby reducing operational time significantly compared to a "standard" slot recovery or side-track.

TTDC- wells are particularly useful for accessing pockets of isolated oil and gas in mature fields.

Due to the deep side-tracks achieved with this technique it is possible to minimize borehole lengths and avoid drilling problems in overlying formations. The side-track is often performed in the reservoir itself.

However, if need be, experience and technical evaluations show that in some cases open (uncased) holes drilled when performing TTDC can be extended to more than 2,000 meters. The recent years Statoil has been pushing technology developments to further improve the TTDC-technology. Some of these are:

"Drilling Sidetracks"

"Access Reservoir"

"Open hole drilling"

Sidetrack- Loss of Well Control

Hercules 265 Jack-Up Rig Blowout

August 6, 2013

gCaptain

The rig crew had been conducting completion work on the sidetrack well to prepare it for production. A sidetrack well is a well that starts as part of a previously existing wellbore, but ends up getting diverted sideways through the existing casing and wellbore in order to allow the drill to enter a different formation.

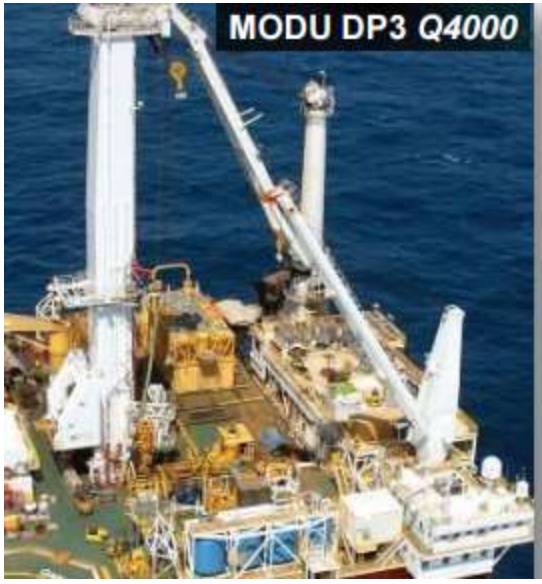
Growing Market

- As production goes to deeper water, subsea well count grows.
- As the number of subsea wells increase and they age, the demand and frequency of required servicing through intervention grows.

Determining which solution makes sense is a balance between small, low cost vessel with a complex high risk system. (Technology is not fully developed)

Or

Larger, high cost vessel with simpler low risk system.



Which Well Ops require MODU Class?

"Sidetrack = Drill"

APPLYING FOR A PERMIT TO DRILL

§ 250.410 How do I obtain approval to drill a well?

You must obtain written approval from the District Manager before you begin drilling any well or before you sidetrack, bypass, or deepen a well. To obtain approval, you must:

(a) Submit the information required by § 250.411 through 250.418;

(b) Include the well in your approved Exploration Plan (EP), Development and Production Plan (DPP), or Development Operations Coordination Document (DOCD);

…to protect the public, the environment and US economic interests in the Gulf and the Heartland.