Riserless Subsea P&A

Deepwater Decommissioning Workshop 2016
7 Series
7 Series

**Nominal Bore Size**
7.375”

**Vessel Requirements**
ROV / Heave-compensated
60t crane at depth
4,500 ft² deck space
(10,000 ft² including full P&A spread)

**Working Depth**
10,000 fsw (dependent on IWOC/S)

**Working Pressure**
10,000 psi

**Temperature**
32°-250° F

**Regulatory Compliance**
API / ISO / NACE / DNV

**Pumping operations**
Wireline
Slickline
Braided Line
E-Line
H₂S rated

**Advantages/Benefits**

- **Control** - DH or EH control systems
- **Capability** - 7.375” internal bore handles the largest horizontal tree crown plugs
- **Safety** - Shear & seal up to 3 1/2” 135 drill pipe with Triple BOP
- **Flexibility** - Modular construction for ease of transport, assembly and use
Well Intervention Control System (WICS)

- Subsea Electro/hydraulic controls provided by Oceaneering
- 3 HPUs, 2 GPUs
- Umbilical has three independent/redundant comms lines
- 10,000 ft working depth
- Direct hydraulic control system also available
7 Series Work History
Water Depth ~1800 ft.

Vertical Subsea Tree (FMC)

Lower Zonal Isolation Achieved

12 Days of Operation

Total of 10 Days of Mob & De-mob
2 Well Campaign in GOM (Q4 2013)

Water Depth ~2000 ft.

Vertical & Horizontal Subsea Tree (FMC)

Lower Zonal Isolation achieved

30 Days of Operation

Total of 10 Days of Mob & De-mob
8 Well Campaign in West Africa Q4

Water Depth 150 - 200ft

Horizontal Subsea Trees (Cameron)
(Crown Plugs Pulled through 7 Series)

Production and Injection Wells

Achieved Full P&A by Hot Tapping B annulus

82 Days of Operation

Total of 11 Days for Mob & De-
DeepRange Plug & Abandonment Tool

- Methodology
- Tooling
- Qualification Testing
  - Step 1: Perforation Qualification
  - Step 2: DeepRange Live Fire SIT
  - Step 3: Coil Tubing Flow Test
What is DeepRange?

- Highly cost effective **fully BSEE APM approved riserless P&A tooling and methodology**
- **Re-enter existing subsea wellbores post TA and fully P&A the well per BSEE requirements by isolating outer annuli**
- Perforates and **circulates plugging material into outer annuli...NOT a perf and squeeze tool.**
- DeepRange system is run in conjunction with the 7 Series and is unique to the industry
- United States Patent Application, UK granted, Brazil pending
DeepRange P&A Tooling Schematic

Tool Components

• **Isolation Bushing**
  (functions similarly to tubing hanger)

• **Tubing-Conveyed Perf Gun Assembly**
  (sliding sleeve activated TCP guns, pressure fired)

• **Polished Seal Bore**
  (stab and seals into packer)

• **Packer Assembly**
  (Superior Completions)
DeepRange Methodology

Note: TA completed and tubing hanger with approx. 1,500’ tubing removed open water

• Production Casing CIBP is run “open water” and set just below point of initial circulation perforations
• Packer is run “open water”
• Packer is set inside production casing
DeepRange Methodology

- Install 7 Series Intervention System and pressure test system before running perforation charges.
- 2 7/8” Tubing Assembly w/ 10’ polished seal bore receptacle assembly is run in hole.
- Isolation bushing is landed and locked into the 7 Series H4/HC connector inner profile.
DeepRange Methodology

- Run in hole w/ e-line and fire lower “B” annulus perforations (green) just above CIBP
- Pressure test shoe
DeepRange Methodology

- Slide “B” gun sleeve to open
- Pressure up 2-7/8” tubing annuli
- Fire upper “B” annulus perforating gun (Red)
Circulate from down line into 2-7/8” tubing, out bottom of packer assembly, into lower perforations, up the “B” annuli, back into the production annuli and diverted back to surface return line via isolation bushing

• Circulate until returns are clean and rates and volumes are known
• Pump dye marker if needed
DeepRange Methodology

- Pump “B” annulus binary plug with resin leading cement
- Plug lengths vary by well geometry
- Positively displace plug to just above lower perforations
- WOC then pressure test plug as required
Run in hole w/ e-line and fire “C” annulus perforations through the “B” annulus plug (Red) at point where regulatory compliant plugs lengths are above and below

“B” plug can be retested if required
DeepRange Methodology

- Slide “C” gun sleeve to open
- Pressure up 2-7/8” tubing annuli
- Fire upper “C” annulus perforating gun (Red)
DeepRange Methodology

• Circulate from down line into 2-7/8” tubing, out bottom of packer assembly, into lower perforations, up the “C” annuli, back into the production annuli and diverted back to surface return line via isolation bushing
• Circulate until returns are clean and rates and volumes are known
• Pump dye marker if needed
DeepRange Methodology

- Pump minimum 200’ binary plug and leave in balanced condition with production annulus
- WOC then pressure test plug as required
DeepRange Methodology

- Pull isolation bushing and lower assembly from packer using ROV running tool
DeepRange Methodology

- Remove 7 Series Intervention system
- Set CIBP into production casing and set above upper perforations
DeepRange Methodology

- ROV insert flexible jumper from down line into well and pump minimum 150’ surface plug
- Leave well head in place with trash cap or multistring cut and pull as required
## Isolation Bushing

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**Isolation Bushing**

**ROV Running Tool**
Perforating Assembly

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DeepRange P&A Tool

Current Project
Rig Option...

- Initial survey of semisubmersible rig was performed
  - Found high levels of efficiencies
  - SIMOPS capable
  - Reduction of weather related NPT
  - High MOB
  - High fluids/cement capacities

- Drilling system stays on board as conventional option
CCS (Concentric Circulating System)

- “Pipe in pipe” circulation system developed as alternative to utilizing coil tubing down lines in ultra-deepwater operations
- Functions as landing string for 7Series and well circulation system
- 6-5/8” drill pipe landing
- 2-7/8” internal tubing
- Flexible jumpers from bottom of CCS to well package
• Averaging 16 days for full P&A including annular isolation
Thanks for your consideration...