

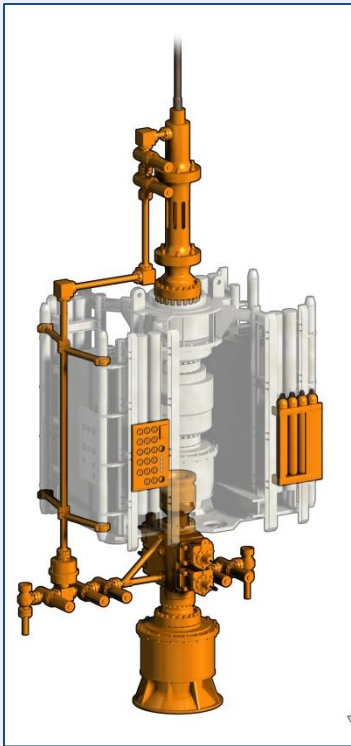


ALCS™

ABEL LMRP Capping System

Rev-3 31-March-2013

Subsea Intervention for Deepwater Blowout Incidents



ALCS (Abel LMRP Capping System)

- Design philosophy:
 - Keep it simple
 - Quick to deploy thus minimizing incident impact
 - Cost Effective (less than mob of other systems)
- Design:
 - Adapts to the Rigs existing LMRP system
 - Utilizes Rigs existing resources i.e., Personnel and ROV
 - Can be held at rig site
 - Can have only rig specific equipment on site

ALCS deployment use of existing rig BOP For capping operation and re-entry



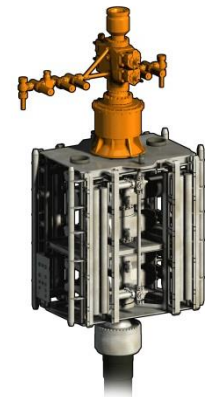
Normal



LMRP Disconnect

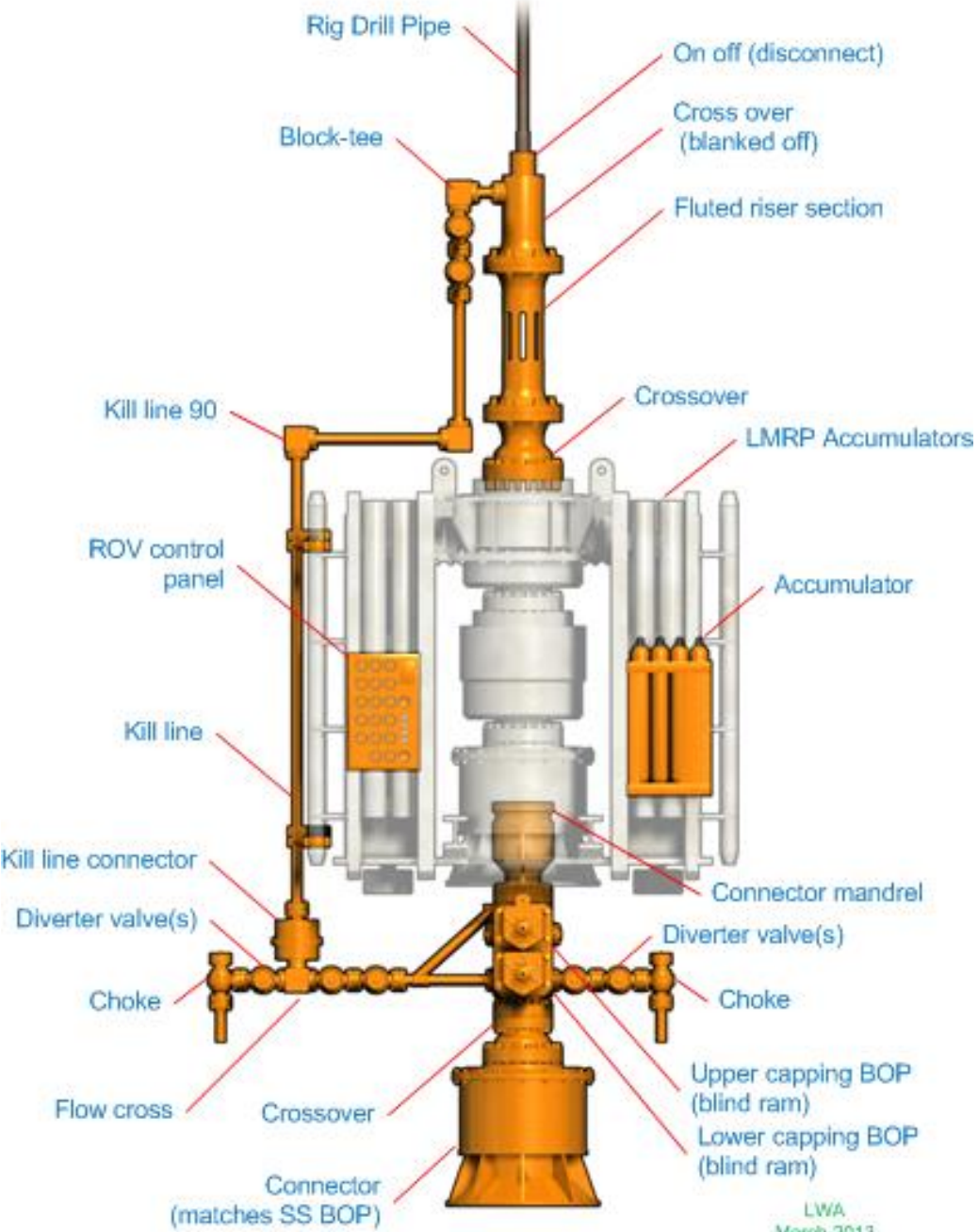


Well Capped Disconnect



Disconnect

ALCS ready for deployment
 (**orange** added equipment):



ABEL LMRP Capping System

LWA
 March-2013

Capping with ALCS™

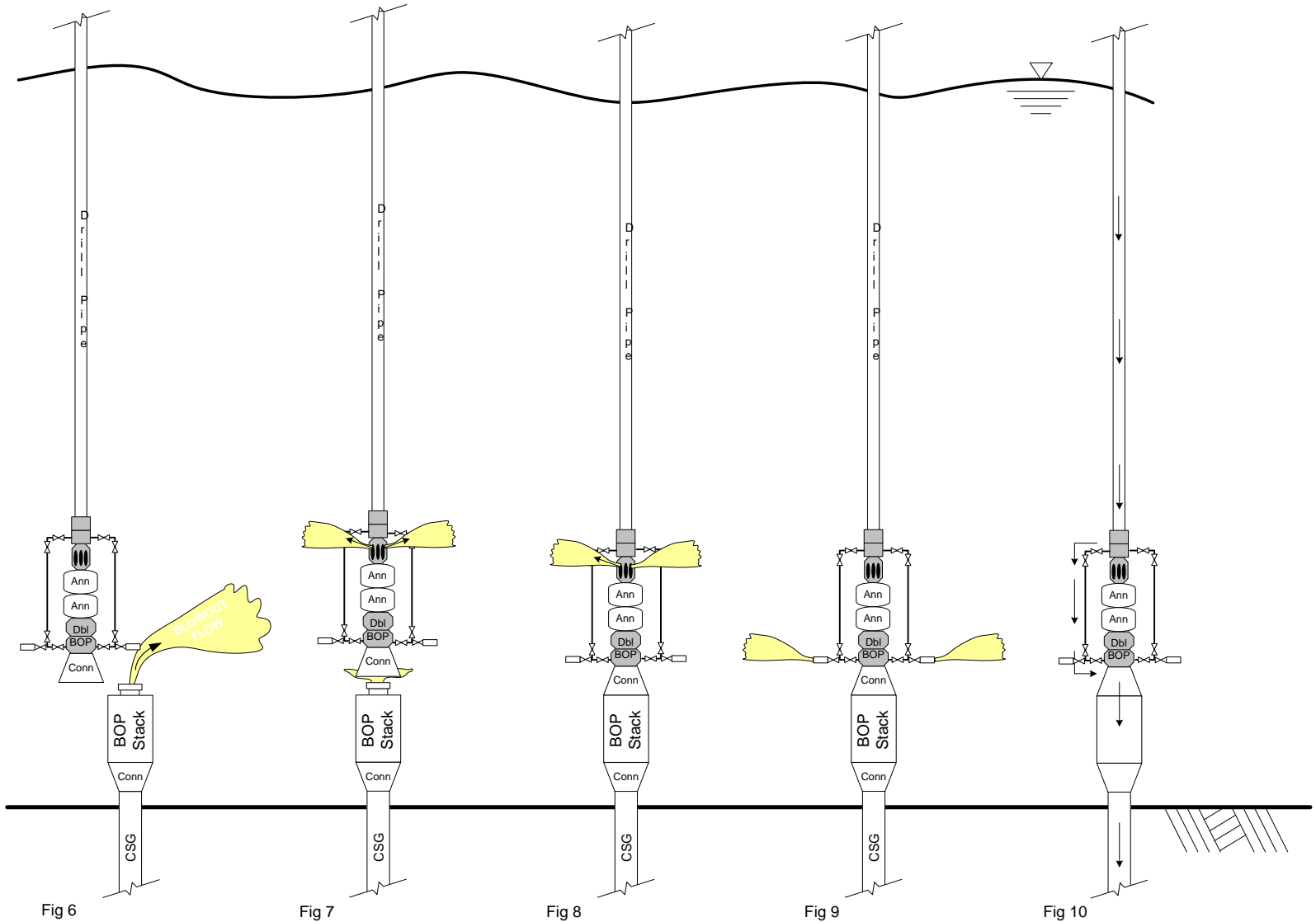


Fig 6

Fig 7

Fig 8

Fig 9

Fig 10

Capping Animation ALCS™



Comparison of Existing to ALCS

Conventional Systems

- Some are only available to the participants in the region (Operators)
- VERY heavy hard to transport and rig up offshore
- Best case for intervention is 21 days likely case is 40 days
- Very expensive
- Availability is first-come-first serve basis
- Controlled by others

ABEL LMRP Capping System

- Available to the rig quickly
- Onboard during operations (2x 20 foot containers)
- Can be deployed in time it takes to pull riser plus 10 hours to install onto LMRP
- No need for 747 or AN-124 lifts
- Cost is a fraction of the other systems
- Saves time – reduces exposure

Abel LMRP Capping System (**ALCS**)

Working Parameters

- Will solve 95% of deep water blowout scenarios
- Footprint is small (2x 20 foot containers)
- Cost is a fraction of other systems
- Lower cost justifies multiple systems in the field (not air freight from outside the region or country)
- Mobilization is one day (or less) by boat OR kept on ready on the rig itself

Abel LMRP Capping System (**ALCS**)

BENEFITS

- Will solve 95% of deepwater blowout scenarios
- Footprint is small (2x 20 foot containers)
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Abel LMRP Capping System (**ALCS**) **RATING**

- 15k shut-in
- 10,000 ft working water depth
- 200,000 std bbls oil flow rate
- 500mmscf/d gas rate

Abel LMRP Capping System (ALCS)

BASIC OPERATION

- Powered from pre-charged accumulators
- ROV operated
- Emergency disconnect by ROV or acoustic signal by hydra. Connector
- DP disconnect by on-off tool
- Accumulators can be re-charged with ROV
- Chemical injection for hydrate breaker (if needed)
- Visual read out of temp and pressure at critical points
- Acoustic readout of pressure and temp

OLGA-7 Hydraulic Simulations

- Forces during capping
- Pressure losses thru the bore of assembly
- Pressure losses on diversion
 - both lines open
 - one line open
- Flow thru blind ram during closing analyzed
- Hydrate injection study
- Erosional analysis

Potential Risks of Another Incident

- Damage to the vessel – can be covered by Insurance
- Human tragedy– can be covered in worker comp policies
- Environmental impact – max limit if available is about 500m USD and is extremely expensive.
(Lloyds reluctant to issue large policy limits post Macondo)
- Damage to the reservoir – not insurable – absorbed by operator

CONCLUSION

- Self insured – or at owner / operator's risk
- Macondo case: BP seeking \$53b from Transocean n Halliburton (received \$5b in settlements). Governmental fines in billions.
EXPOSURE IS HUGE and CANNOT BE MITIGATED WITH INSURANCE ALONE.

Mitigation of Risks

Means to mitigate pollution risk:

- Prevention - Don't let it happen in the first place
 - training of personnel
 - adopt best practices
- Contingency Plans and Equipment
 - training personnel for capping operations
 - **minimize intervention time line by having contingency equipment available at rigsite.**

Blowout Scenario

Most likely “next” case

- Well control operations occur
- Successful disconnect
- BOP leaks (for whatever reason)
- MODU, LMRP are unharmed
- BOP leaks cannot be stopped with conventional techniques
- DO NOT EXPECT Macondo to repeat with same circumstances

