



STATS GROUP
Managing Pressure, Minimising Risk

**World First Pressurised Subsea Pipeline Repair
Facilitated By A Combination Of
Non-Piggable And Piggable Isolation Tools**

PPSA Seminar 2016

Presented by Ron James, Sales Director

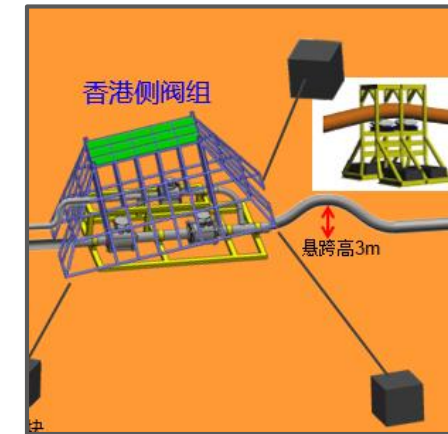
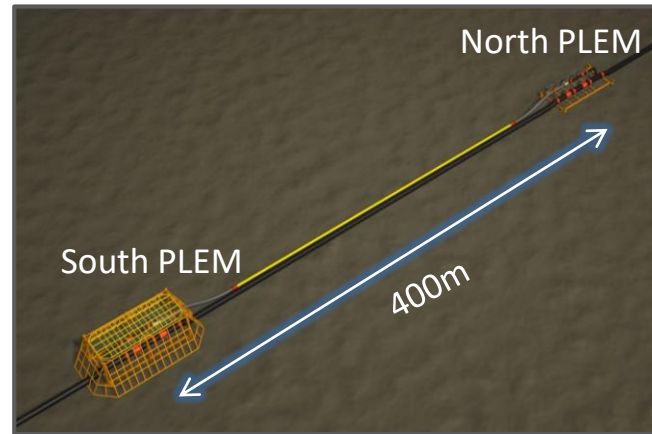
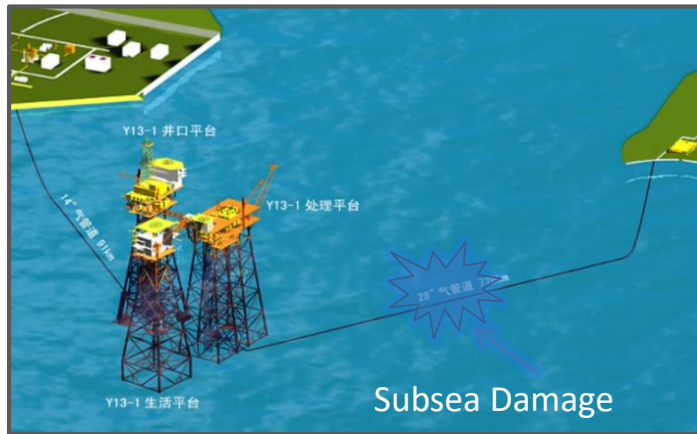
Yacheng Pipeline Repair Case Study



In October 2013 an anchor strike damaged a 780km 28" gas pipeline from Yacheng Platform to Hong Kong.

Damage occurred in a water depth of 90m at the future midline gas compression PLEMS.

This year (2016) COOEC Subsea, on behalf of CNOOC, performed a subsea repair on the Yacheng pipeline, located in the South China Sea.



Damage and Initial Temporary Repair Actions

- North PLEM overturned and offset by 3m.
- 28" Pipeline tie-in section at North PLEM severely buckled ~ secured and supported the damaged pipe section.
- 14" bypass (400m) installed between South PLEM and North PLEM ~ 28" valves closed.
- Two leaks from valves in the North PLEM sealed.

Permanent Repair

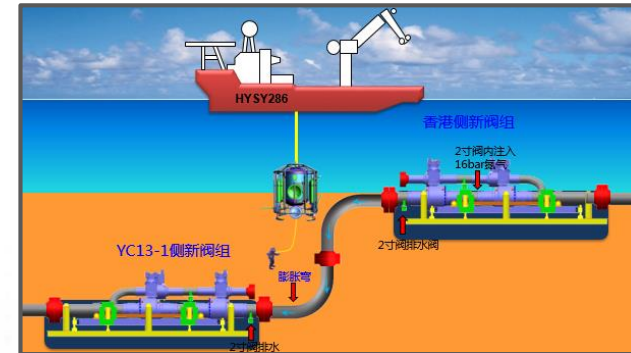


- Removal of existing PLEMs, the 400m pipeline section between them and the severely buckled pipeline section.
- Recovery of both pipeline ends onto a pipe-lay vessel.
- Installation of new pipeline sections and tie-in flanges onto existing pipeline and re-laid onto seabed.
- Installation of two new PLEMs, 25m apart as opposed to original 400m.
- Tie-in of both ends of the pipeline to the new PLEMs.
- Tie-in spool connected between the PLEMs.

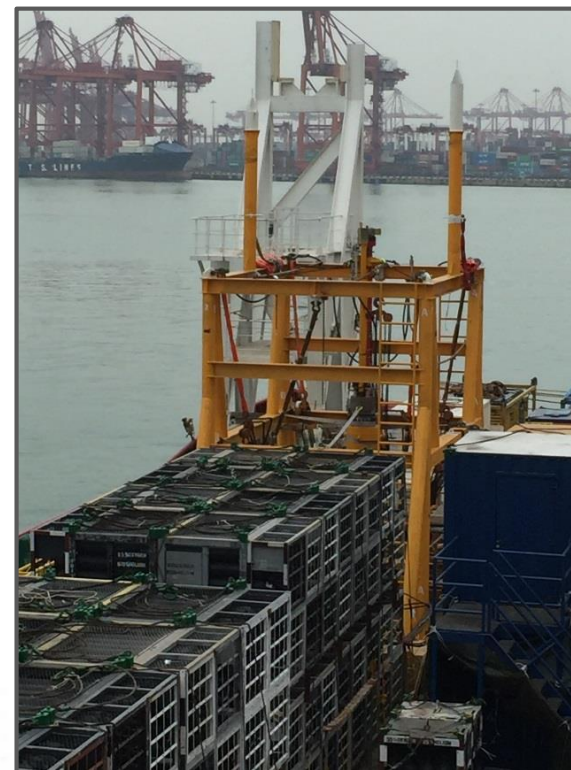


During permanent repair;

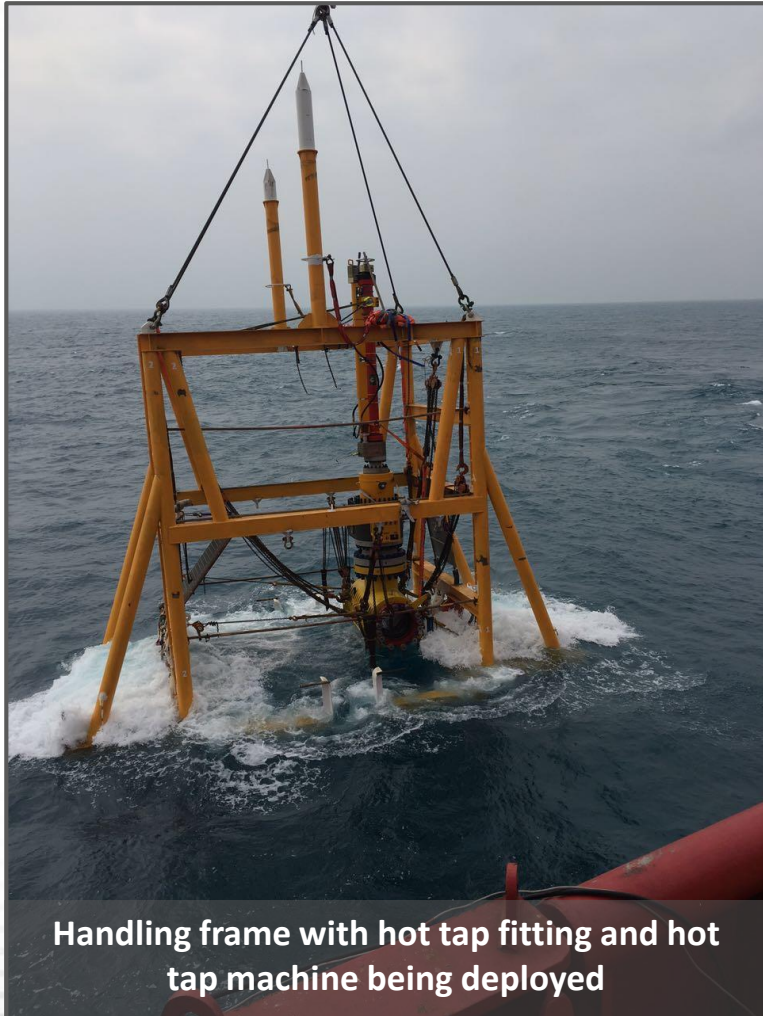
- 28" Pipeline **remained pressurised** (780km at 50bar / 725psi).
- No residual seawater was allowed to remain in the system.



MSV HYSY 286



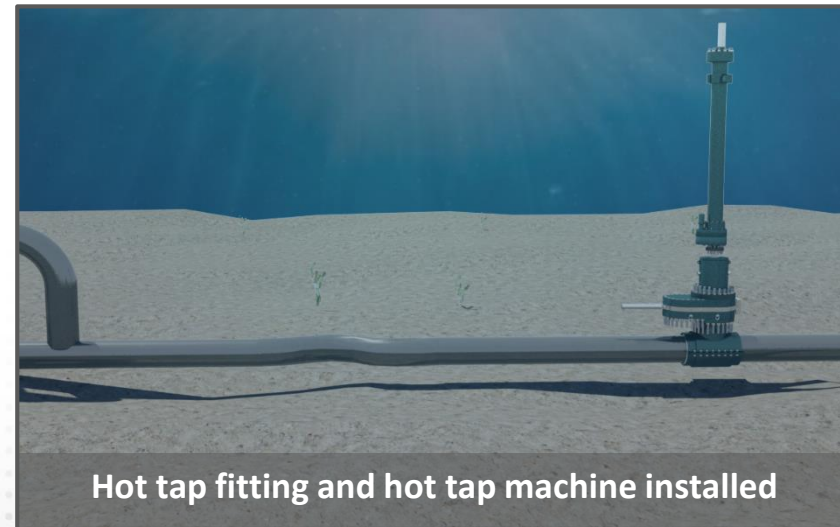
Hot Tap Fitting Deployed and Fitted to Pipeline



Handling frame with hot tap fitting and hot tap machine being deployed

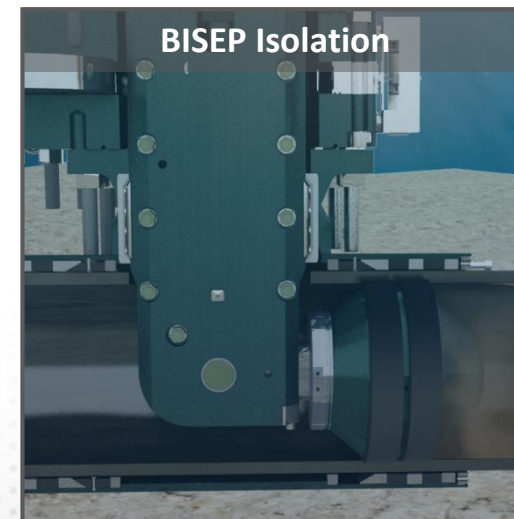
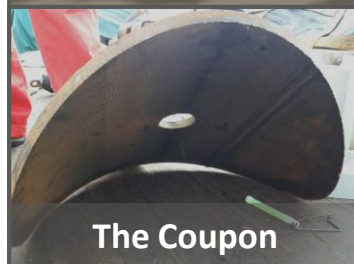
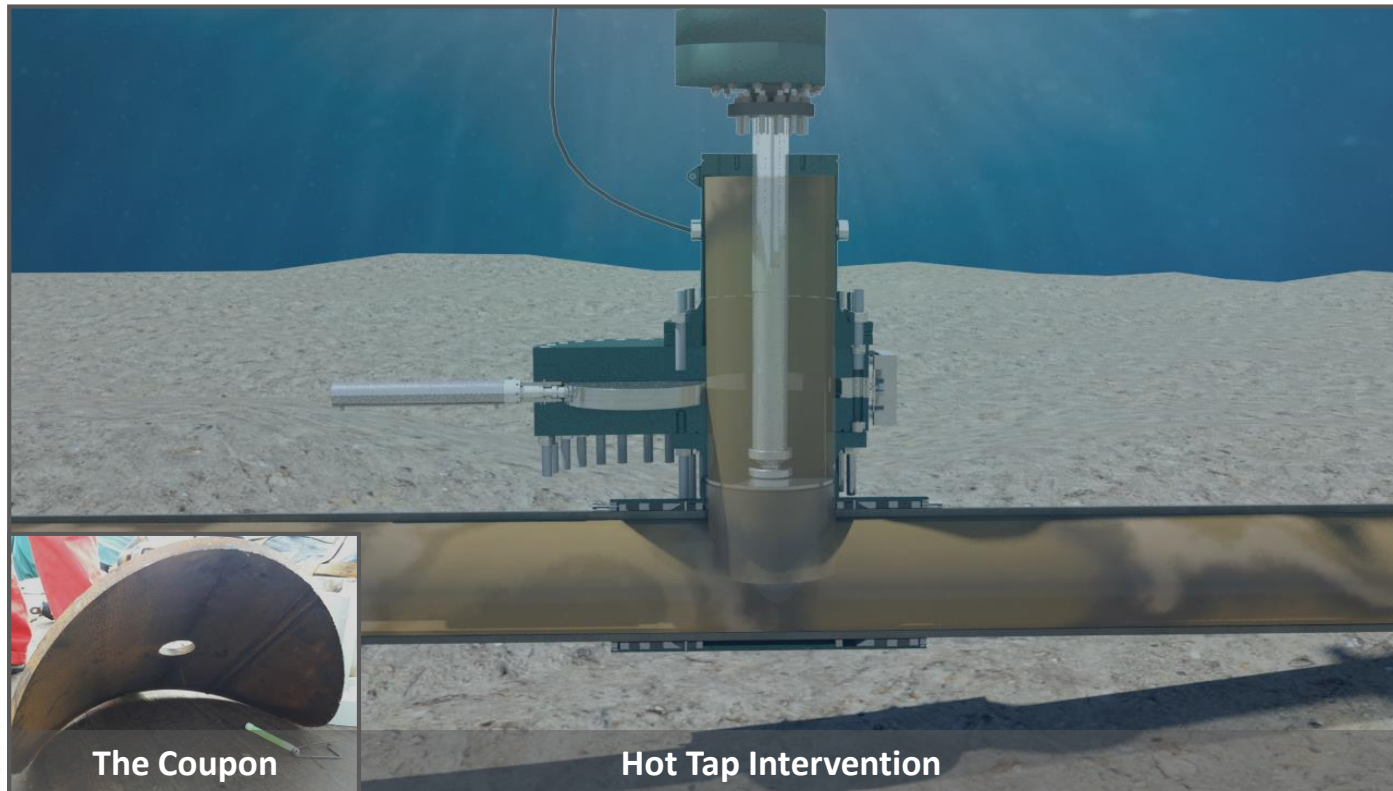


North PLEM showing damaged pipe section preventing deployment of piggable isolation tool

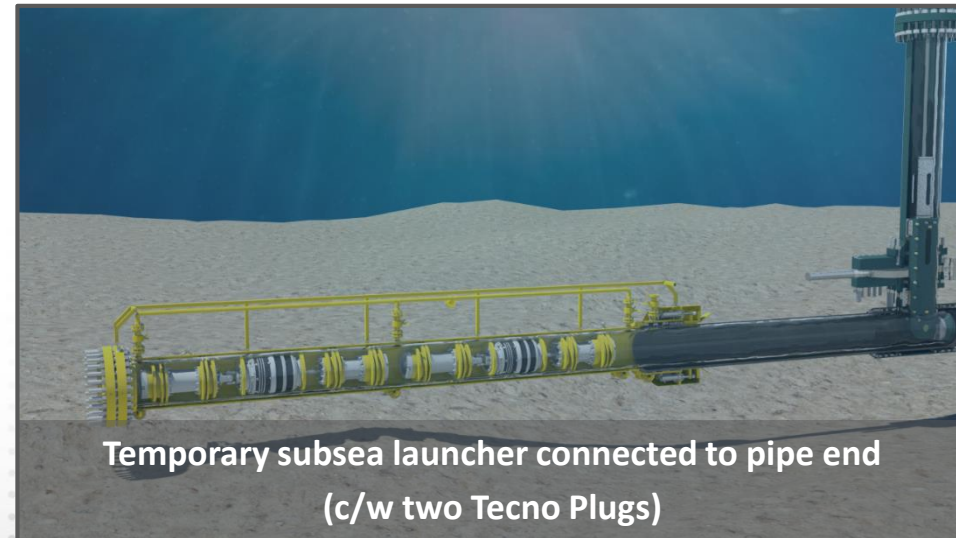
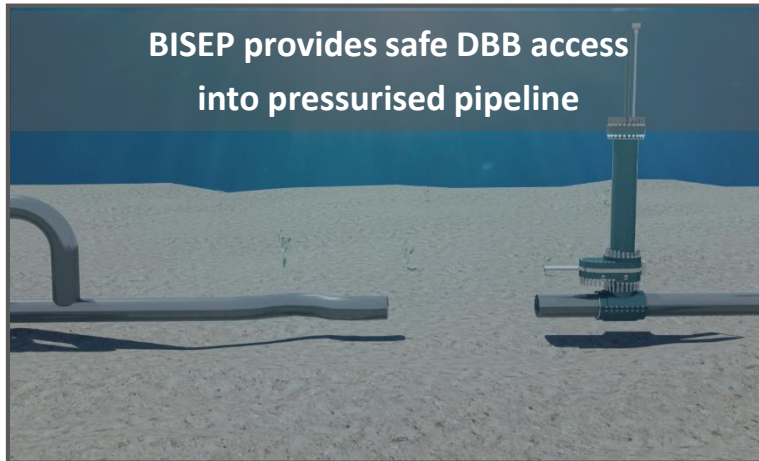


Hot tap fitting and hot tap machine installed

Intervention and Isolation



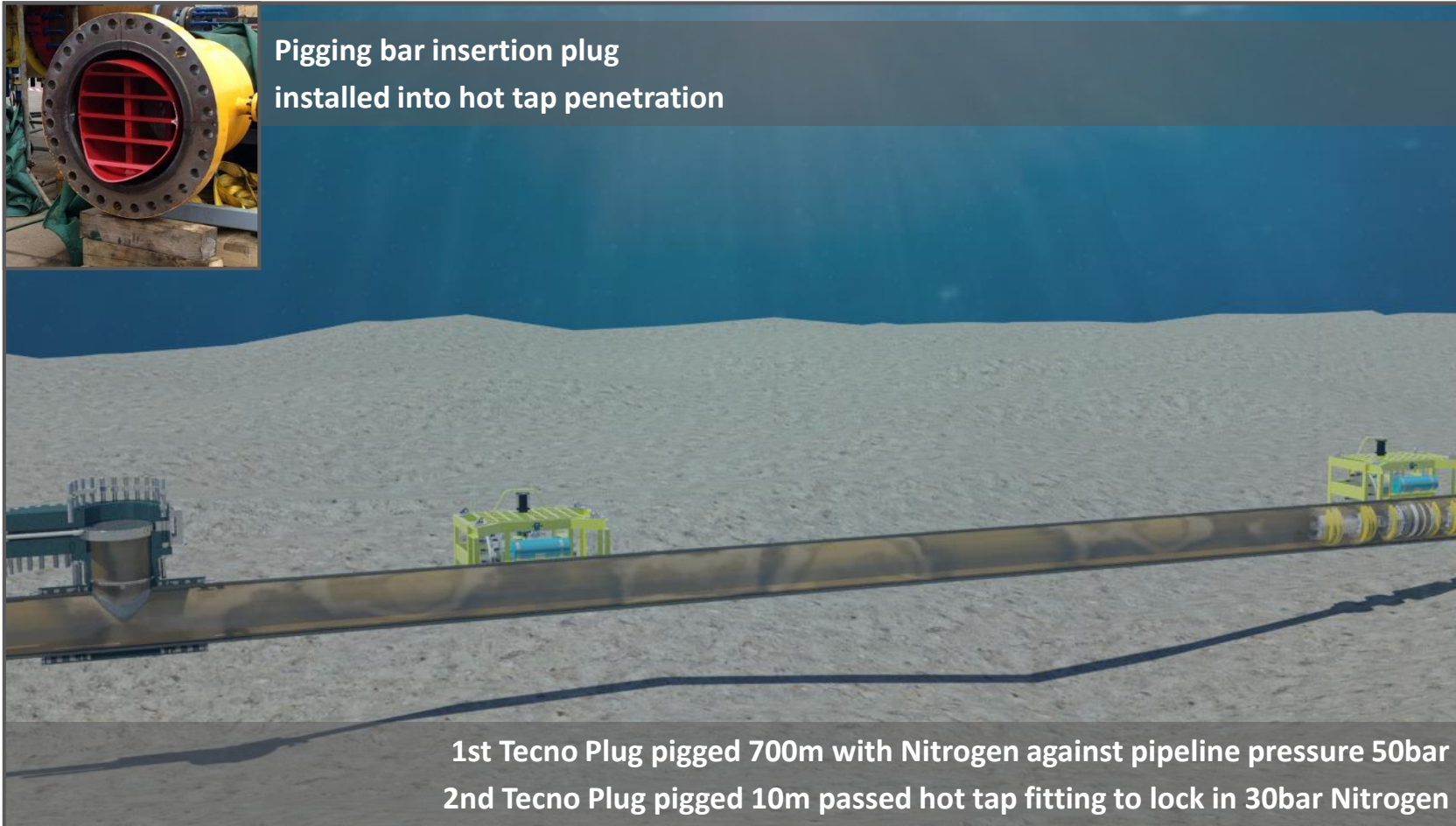
Subsea Launcher Installed - Once Safe Access Provided by BISEP



Pigging the Tecno Plugs into the Pipeline with Nitrogen

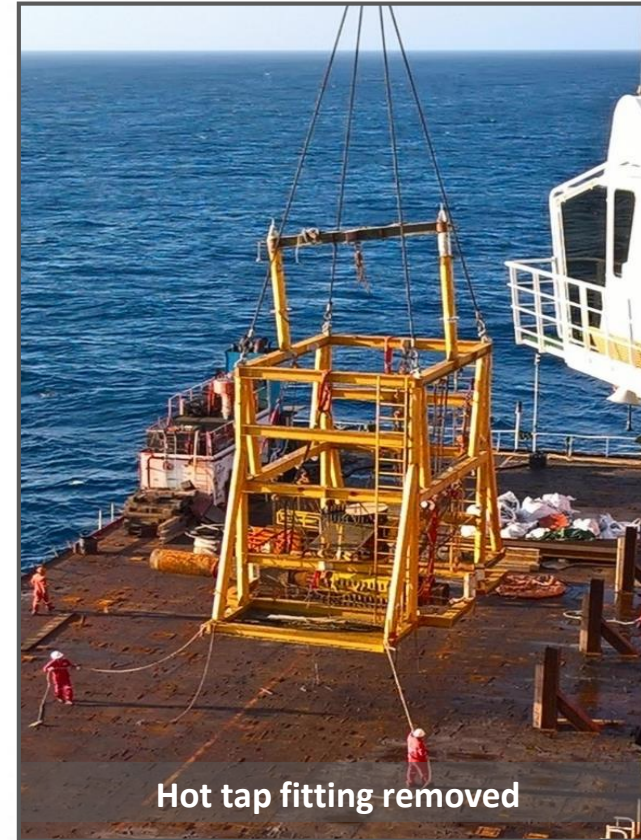
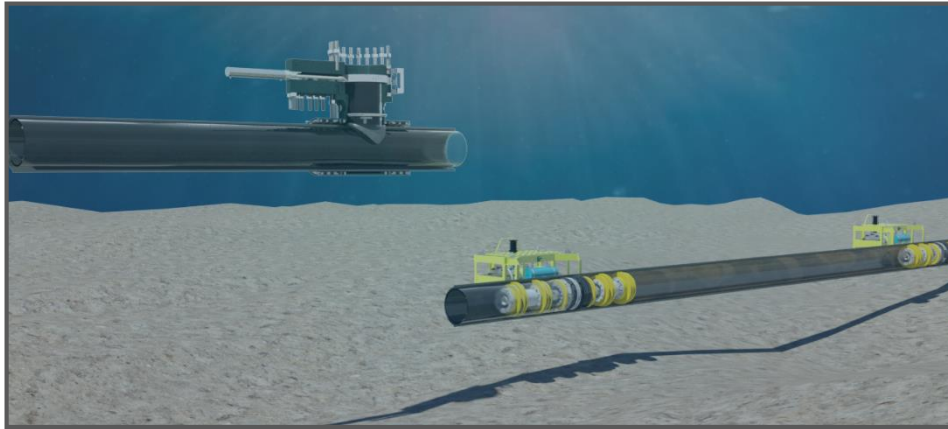


Pigging bar insertion plug installed into hot tap penetration

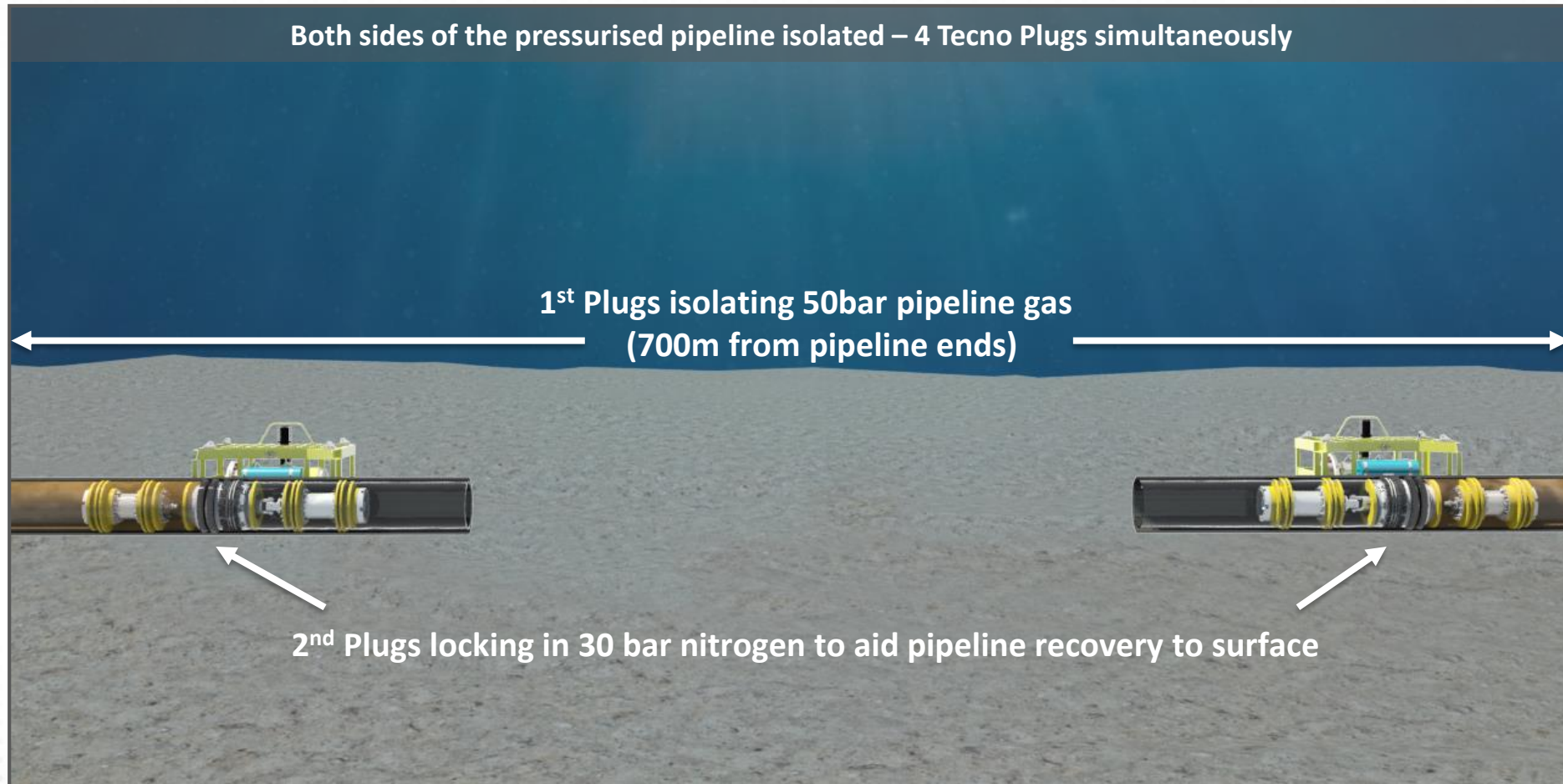


1st Tecno Plug pigged 700m with Nitrogen against pipeline pressure 50bar
2nd Tecno Plug pigged 10m passed hot tap fitting to lock in 30bar Nitrogen

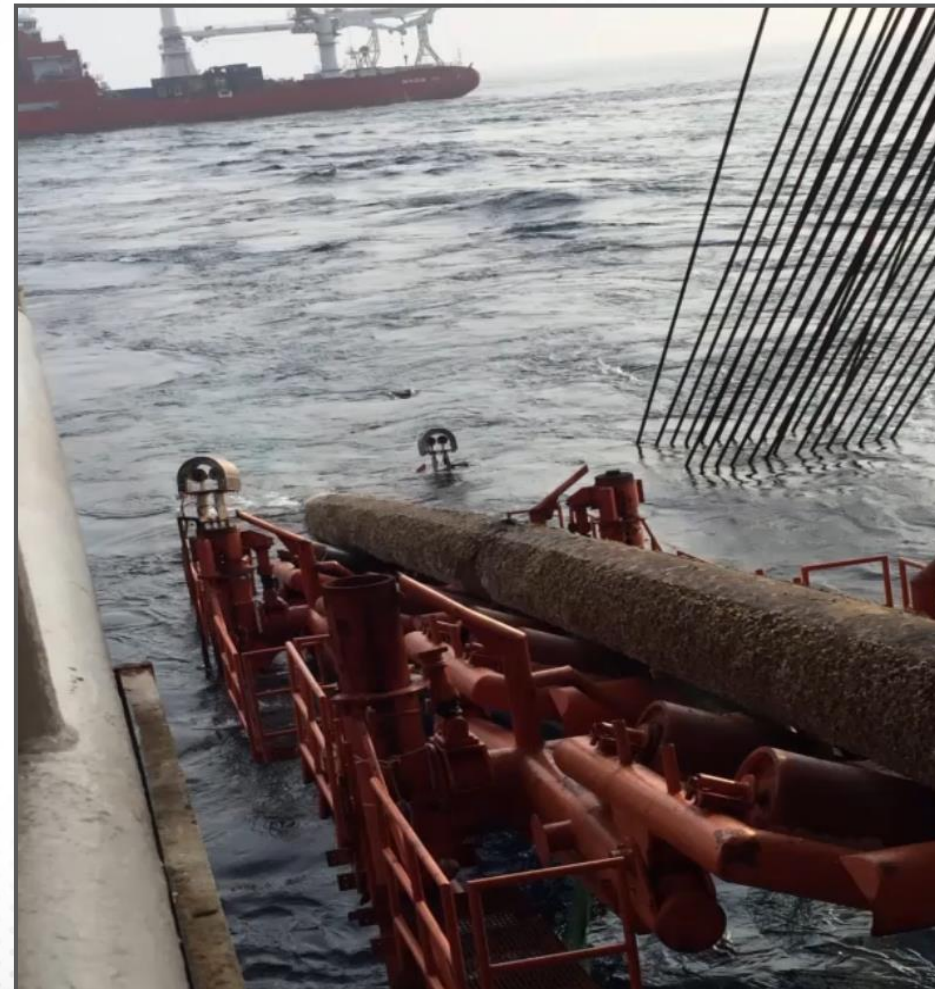
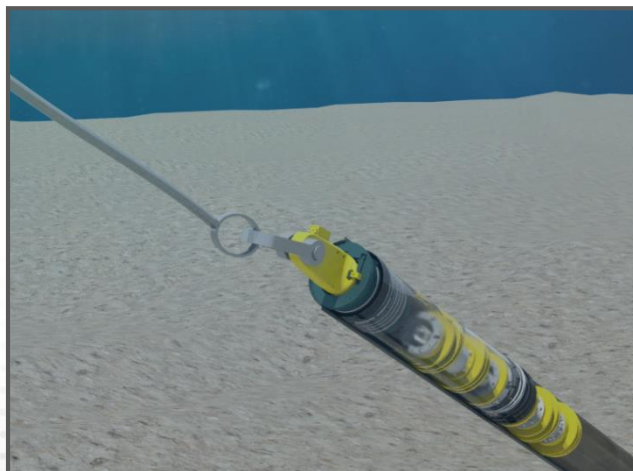
Tecno Plugs Pighed, Set and Proved



Pipeline Isolated with Tecno Plugs – 4 Plugs Simultaneously



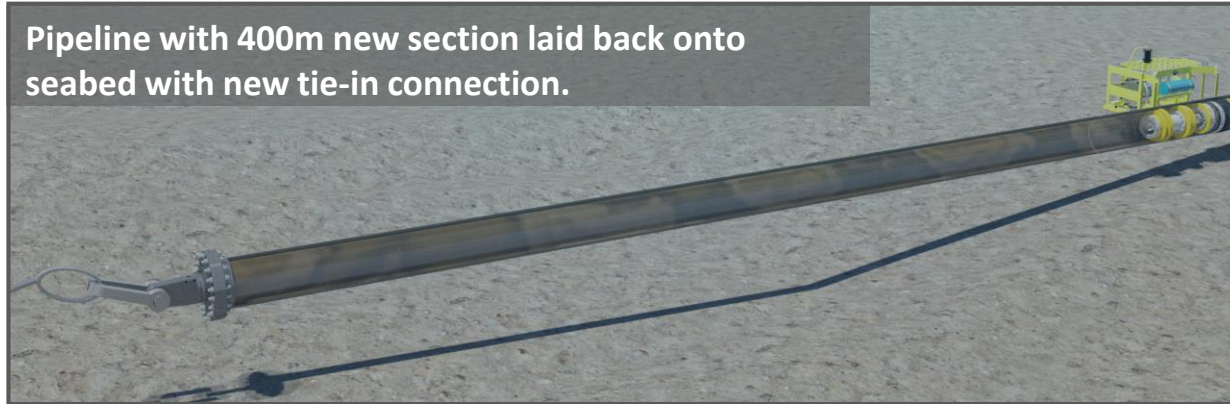
Pressurised Pipeline Recovery: PRT Recovering Pipeline Ends onto Pipelay Vessel



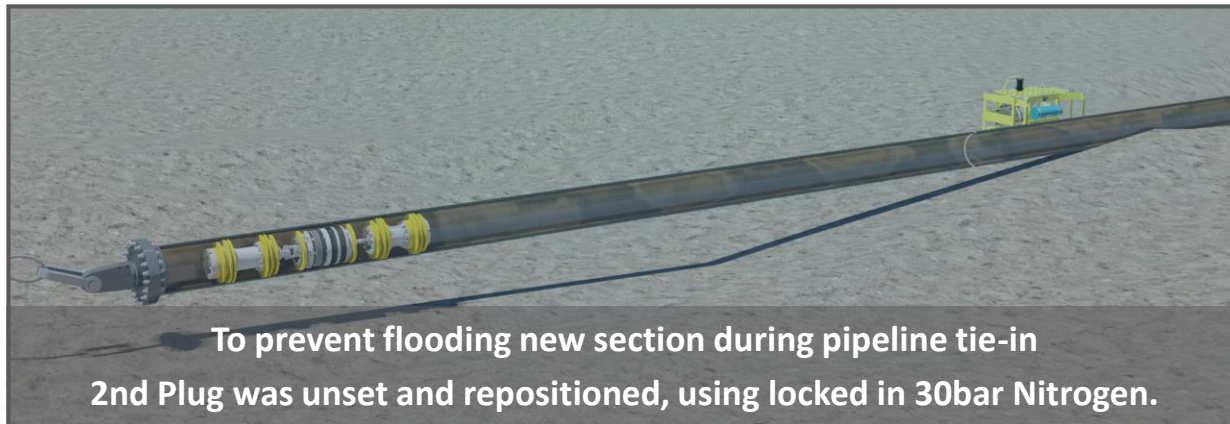
Pipeline Lay Down & Plug Repositioning



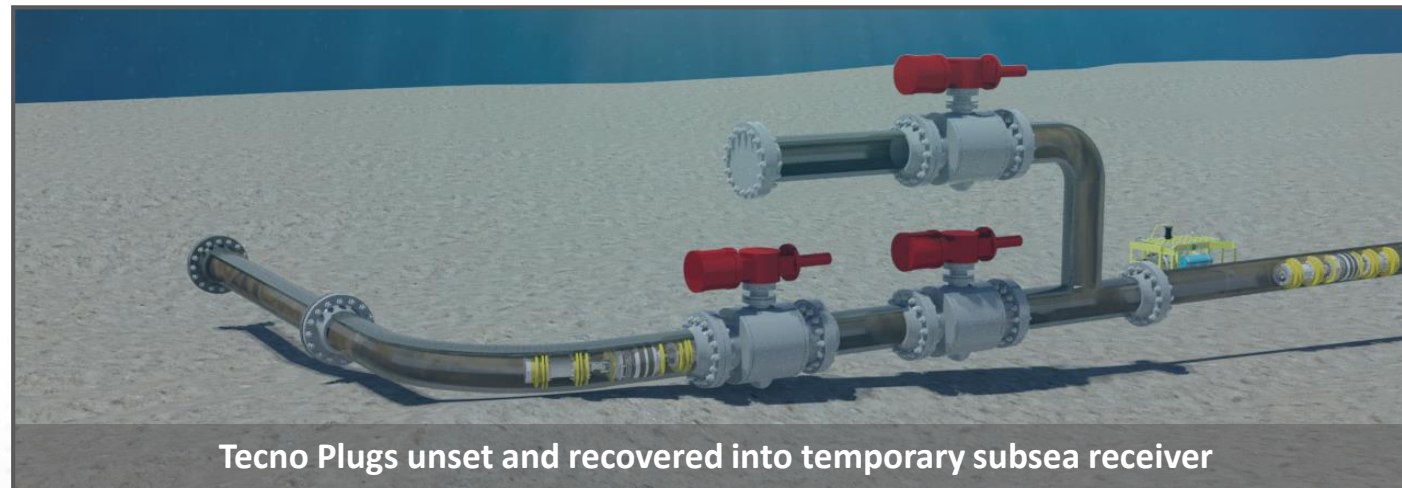
Pipeline with 400m new section laid back onto seabed with new tie-in connection.



To prevent flooding new section during pipeline tie-in
2nd Plug was unset and repositioned, using locked in 30bar Nitrogen.

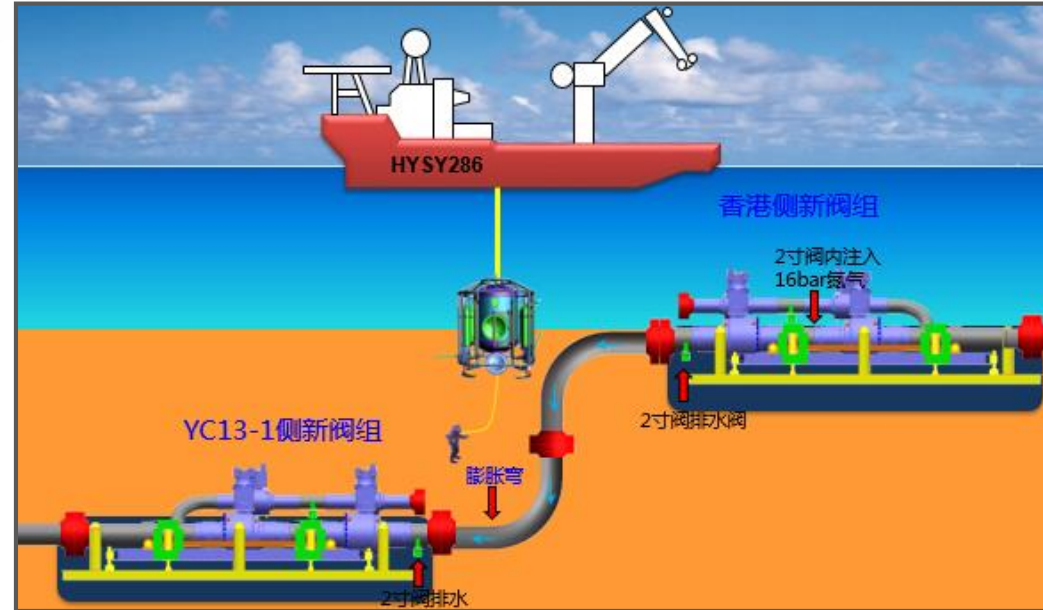


New PLEM's Installed

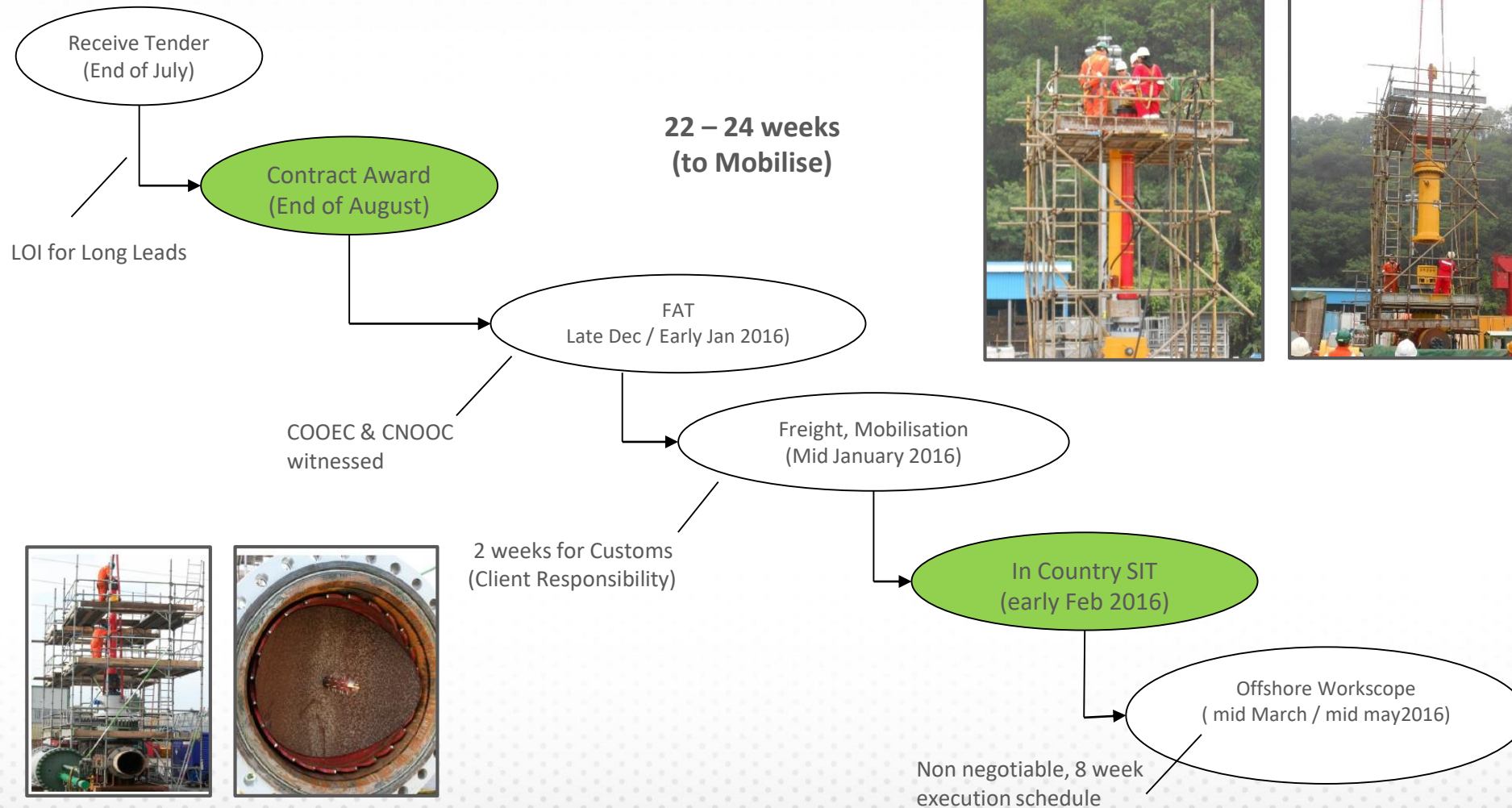


Tecno Plugs unset and recovered into temporary subsea receiver

New PLEM's (25m apart) Connected Together with Closure Spool



Schedule



Animation



Conclusion & Lessons Learnt



- Learning Curve: New Country, New Client, New Technology Application ...
- Culture
- Logistics
- Equipment worked flawlessly ...
- Very Happy Clients ... CNOOC & COOEC
- Milestone Project





**Thank You For Your Attention
Questions?**



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