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MACONDO

Containment and Disposal Project

for

MC252-1

Install Capping Stack on DWH Flex Joint Flange on Aft Rotary

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AMENDMENT RECORD

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1 Install Capping Stack on DWH Flex Joint Flange on Aft Rotary with Flange Overshot on Forward Rotary Contingency

1.1. Objective

The objective of this procedure is to install a 3-ram Capping Stack with side outlets to allow shutting-in the well with Blind/Shear rams and/or diverting flow to the side-outlet valves. This procedure addresses the mobilization, running, alignment, and connection of the Three Ram Capping Stack to the HC hub that has been mounted on the Deepwater Horizon (DWH) BOP flex joint with a flanged connection at a water depth of 4,992-ft.

1.2. High Level Procedure

The Flange assembly has been run and mounted on the Horizon Flex Joint leaving an HC hub looking up. There is an HC connector between the flange and Capping Stack sub-assemblies. The flex joint mandrel has been stabilized. The Capping Stack assembly will be run and connected on the HC hub.

- Deck test and QC the Capping Stack on the rig prior to running
- Make up and run the Capping Stack assembly on the aft rotary of the Discoverer Inspiration (DIN). The current running assembly includes a method for glycol injection into the base of the Capping Stack and a perforated riser joint above for venting (Figure 1)
- Run riser pin flange overshot BHA to depth on the forward rotary as a contingency for removing the riser pin flange from the flex joint mandrel flange. A separate procedure exists for this activity
- RIH, align, land, and make up the Capping Stack to the HC hub mounted on the DWH flex joint
- Pull test the system and prepare for future operations
- Close Rams and/or divert flow until production system is installed. A separate procedure will follow for this operation

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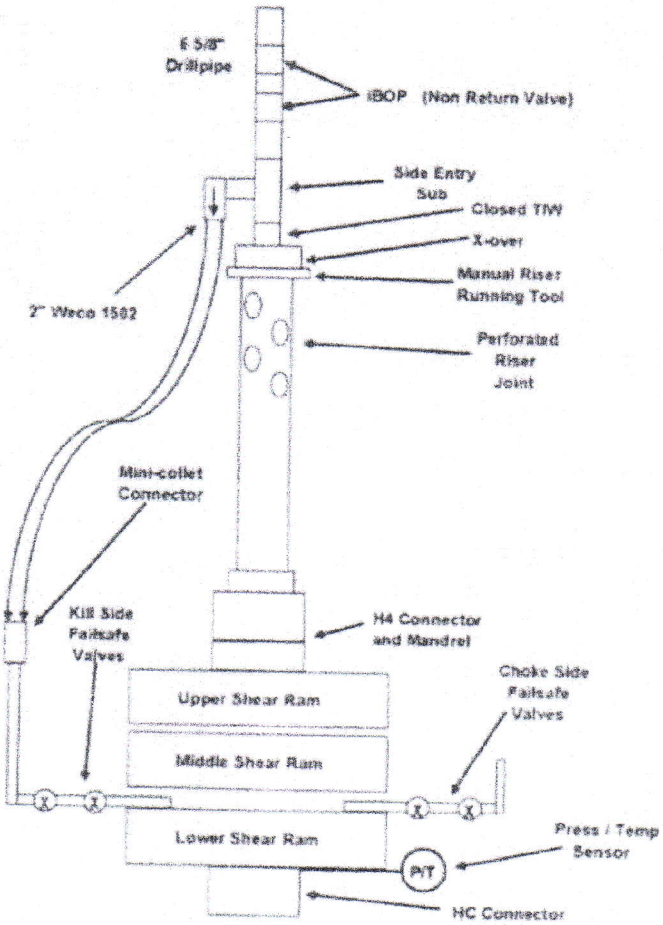

Figure 1: Capping Stack Running Diagram

1.3 SIMOPS and Compliance

1. The DIN position and movement will be in compliance at all times with an approved SIMOPS Plan as communicated by the Field SIMOPS Coordinator while on location.
2. Check with Field SIMOPS Coordinator on board the DD-III to locate DIN staging area and ingress/egress lane to the DWH BOP stack. Maintain awareness of surface expression of oil plume to avoid having Capping Stack prematurely enter plume at depth.
3. Before commencing glycol pumping operations, **engineering team representative must contact the Houston IMT Environmental Unit Leader (281.849.4167)** and communicate that these operations will discharge a reportable quantity (RQ) of

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glycol. The RQ of glycol is ~20 bbls which is planned to be exceeded and has to be reported with in 15 minutes of exceeding the RQ discharged. No special permit is needed for this fluid but it must be reported.

4. Establish coordination with ROVs. The Boa Deep C or other ROV vessel will be required to work with the ROV from the DIN. Review the attached ROV roles and responsibilities. The ROVs will be used extensively for the following operations:
   - Guiding and stabbing the 3-ram Capping Stack onto HC hub mounted on the DWH flex joint mandrel
   - Operating the HC connector to Latch the connector to the DWH BOP
   - Operating the Capping Stack Valves
   - Monitoring the venting from the perforated riser joint
   - Disconnecting and guiding the Mini-Collet Connector when installation is finished
5. Check with SIMOPS coordinator to verify that the ROV supporting the Capping Stack land-out has the Oceaneering External Gasket Insertion Tool and two (2) extra double resilient seal AX gaskets onboard before diving.

1.4. Major Risks

When the Discoverer Enterprise (DEN) moves the Top Hat, containment will be lost and oil at surface can pose a hazard. Coordinate all activity with Top Hat containment and Flange Removal procedures to minimize time that flow is unrestricted to the environment. Volatile Organic Compounds (VOC) may surface in the moonpool. This poses a health risk to personnel and may lead to high Lower Explosive Limits (LEL). The LEL must be monitored to insure safety of personnel. Insure that the Discoverer Inspiration (DIN) has the necessary equipment installed to monitor LEL and disperse vapors from the moonpool if necessary. For vapor buildup external to the DIN, dispersant vessels are available by contacting the Field SIMOPS Coordinator.

The hub on the Flex Joint Flange may be at some angle away from vertical. An oil plume will be flowing from the hub assembly during alignment. Be sure that good communication between all parties (e.g. Bridge, Driller, ROV shack, SIMOPS Coordinator and ROV vessel) is used throughout the procedure.

Hydrates are always a concern when working near/in the oil/gas plume. Glycol will be used for hydrate mitigation when aligning and landing the stack.

Visibility during the alignment and subsea make-up operations will be limited. Alignment and guiding the connections must take into account the lack of visibility in the plume. Lessons learned while stabbing the Top Hat are incorporated in this Capping Stack stabbing procedure.

When the Capping Stack assembly is made up and run on the Hydrate Mitigation assembly the hose joining the Side-outlet Sub to the Side outlet valves on the Capping Stack is pressure rated to 5,000-psi working pressure. **THIS IS THE WEAK LINK IN THE CAPPING STACK ASSEMBLY!**

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Caution:	**Do not exceed 5,000-psi back-pressure on the hydrate mitigation hose to avoid rupturing the hose.**

1.5. Well Status / Assumptions

- The well is under blowout conditions. The flow of oil and gas are coming out of the Horizon BOP stack through the top of the hub on the flex joint. Oil and gas are being produced from the choke and kill lines of the Horizon BOP to other vessels. When the Enterprise breaks containment the interruption of production could increase the surface plume of oil.
- The LMRP Top Hat is deployed from the DEN and is available to provide containment if any interruptions in this procedure occur.
- The Flex Joint Flange has been prepared prior to this procedure. The damaged riser pin flange has been removed and a Transition Spool has been landed and bolted in place. That spool has a HC hub looking up.

1.6. Pre-Job Testing and Preparation

1. Load Capping Stack onto work boat on starboard mid-ship (Attachment 1). This location minimizes crane radius when offloading stack. Stack will be offloaded with the Port Aft Crane on the DIN. Perform a Hazard Hunt for potential dropped objects before lifting the stack on the dock. The Capping Stack will be loaded aboard the DIN at its current location in Ship Shoal Block 214. Transport the Capping Stack to the DIN at the offshore location.

Note: **Communicate with Lifting Specialist at dockside to insure Hazard Hunt for potential dropped objects is performed before loading out the Capping Stack.**

2. A Vetco ExF High Angle Release (HAR) connector (H-4 connector) will be shipped to the rig made up to the 18 3/4-in 15-ksi x HMF-F box adaptor (Attachment 4). Place the shipping basket in a convenient part of the moonpool area.
3. An Emergency Disconnect Sequence (EDS) Panel/Accumulator Bottle set will be shipped to the rig on a mandrel attached to a specially constructed shipping skid. A single padeye lift point is attached for lifting the skid. This assembly will later be mounted on the perforated riser joint. Offload the EDS Panel/Accumulator Bottle set using the port aft crane and place on a cart in the moonpool area.
4. A 75-ft perforated riser joint will be shipped to the rig. Offload the riser joint to the aft deck in preparation for making up the stack running assembly.
5. Prepare a moonpool cart for landing out Capping Stack assembly and locking the HC connector.
6. Load one thousand barrels (1,000-bbl) of Glycol (MEG) in a clean, prepared rig pit ready to be pumped downhole.
7. To prepare for offloading the Capping Stack move the prepared moonpool cart into the Port Aft area to receive the stack.

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- The stack and shipping skid together weigh approximately 175,201-lbs. The Capping Stack weighs approximately 142,201-lbs.
- The Discoverer Inspiration cranes have a lifting capacity of 100-metric tons (220,400 lbs) at a 20.5-m (67 1/4-ft) boom radius.
- Review certs for the Port Aft Crane and insure that critical Preventative Maintenance is done prior to the critical lift.
- Review TOI TSTP for Critical Lifts
- Complete Chevron's Heavy Lift Job Safety Analysis worksheet with lifting crew

8. To lift the Capping Stack from the work boat:
   - Before proceeding, ensure that there is sufficient weather window to complete offloading the Capping Stack. Review TOI Marine Ops Manual (MOM) to insure sea state complies with criteria for wind and waves. The criteria for Critical Lifts includes a 1-meter significant wave height limitation.
   - Note that if the Chouest work boat needs to be closer than 10-meters (steel to steel distance to the DIN) to make the lift an MOC will need to be generated based on Chouest policy. Chevron policy mandates crane recertification before a lift of this magnitude. Based on actual vessel to vessel distance, assure maximum crane capacity is understood prior to undertaking lift.
   - Hook up the Port Aft crane to the lifting rigging on the Capping Stack and lift Capping Stack onboard the DIN. Place at a convenient spot in the moonpool.
9. Install and secure the BP 9-line Surface Umbilical reel in starboard aft moonpool area. Purge lines 205, 206 and 209 of the Surface Umbilical with control fluid compatible with the control fluid in the H-4 connector (Houghton Stack-Magic ECO-F). Purge line 201 and 202 with Glycol. (Attachment 8)
10. One utility flying lead with 30-ft, ½" line with Breech Lock connection by 17-D High Flow hot stab will be installed. This line will be plugged into the EDS panel pass through 'Flying Lead' function. The other end can be plugged into any function on the stack (Rams, valves or HC connector). (Attachment 8)
11. Ensure that sufficient 'SubSea' tape is available to secure the surface umbilical to the perforated riser joint and Landing String.
12. Verify space out and stack up for all assemblies in moonpool.

1.7. Pressure and Function Test the Capping Stack

Note: **The Capping Stack is shipped to the rig with an AX gasket installed in the HC connector on the stump. This gasket will be used for stump testing the stack. Insure two new double resilient seal AX gaskets are available on the rig to replace the shipping gaskets before running the stack to depth.**

1. Function and pressure test the Capping Stack on its shipping skid in the moonpool area. **All testing and functions to be done by Transocean Subsea personnel and to be witnessed by BP and Chevron representatives and the MMS.**

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2. The rams and valves will be function tested using the rig surface hot line and 17-D ROV stab as power. Verify valve and connector functions by noting position of indicator(s). Ram functions can be verified visually by looking through the bore of the Capping Stack. The following table lists the fluid volume requirements for each of the critical Stack functions:

Component	Open/Close Volume (gallons)	Close Volume (gallons)
Upper Ram	36.6	39.3
Middle Ram	36.6	39.3
Lower Ram	16.8	19.5
Inner/Outer Choke Valves (each)	1	1
Inner/Outer Kill Valves (each)	1	1
HC Connector	25	20
H4 Connector	5.16	4.14

Table 1: Control Fluid Volume Requirements

3. Fill the stack with drillwater, purge the air from the system. Use the rig hotline and a 17-D hotstab connected to the Upper Ram panel (Figure 2) to close upper blind/shear rams.

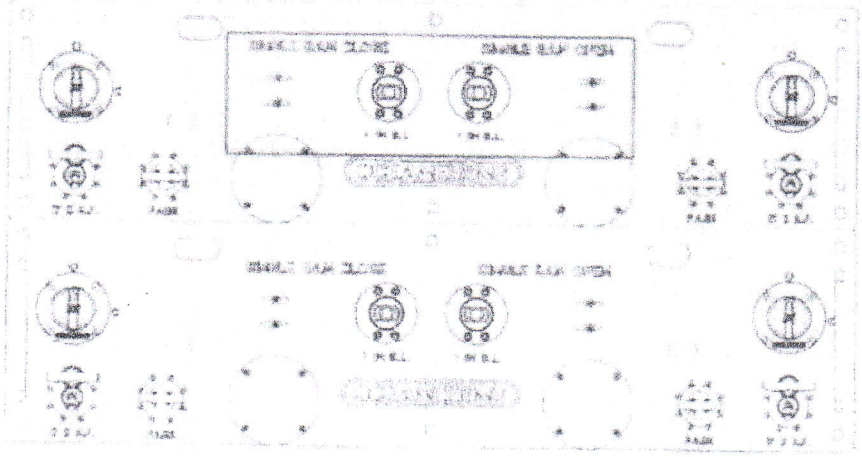

Figure 2: Upper Ram Open / Close Function

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4. Use the rig hotline and a 17-D hotstab connected to the Kill side valve panel (Figure 3) to close the **Inner** Kill side valve. Remove the 17-D hotstab and insert it in the Choke side valve panel (Figure 4). Close the **Inner** Choke side valve.

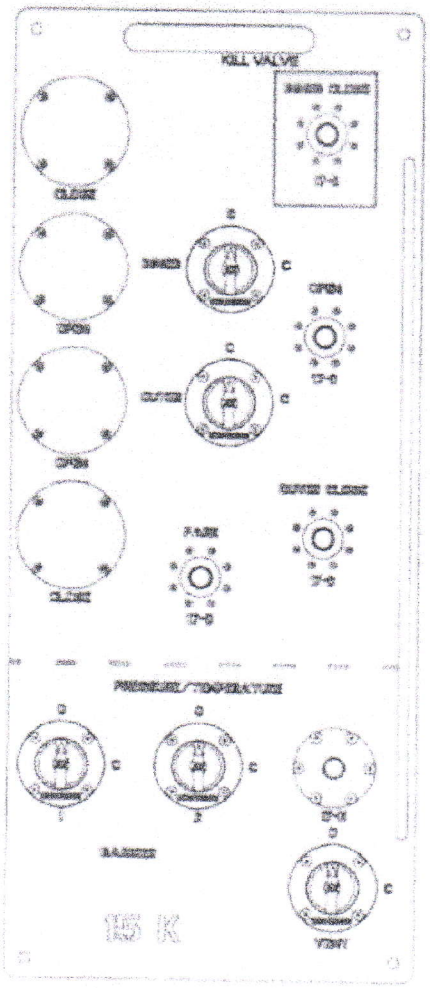

Figure 3: Kill Side Valve Panel

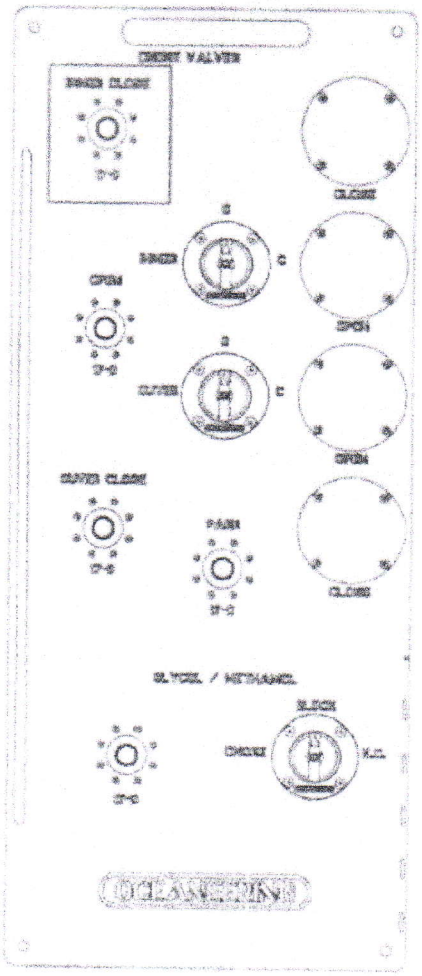

Figure 4: Choke Side Valve Panel

5. Hook up a ROV spider to the pressure receptacle and verify pressure reading. Use the Capping Stack body test pressure as additional verification of the pressure gauge proper function.

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6. Perform a body test on the Capping Stack on the stump to 250-psi low and 10,000-psi high for 5-minutes each. Chart the test and note results in Wellview and IADC reports. Retain charts and transmit to BP Houston. Check and record the dual pressure/temperature gauge.

7. Bleed off pressure and use the hotstab to open the upper blind/shear ram. Drain the drillwater from the stack. Use the hotstab to open the inner Kill side valves.

8. Use the rig hotline and a 17-D hotstab connected to the Middle Ram panel (Figure) to close and then open the middle blind/shear rams. Visually confirm that the rams close and open, and note in Wellview and IADC reports.

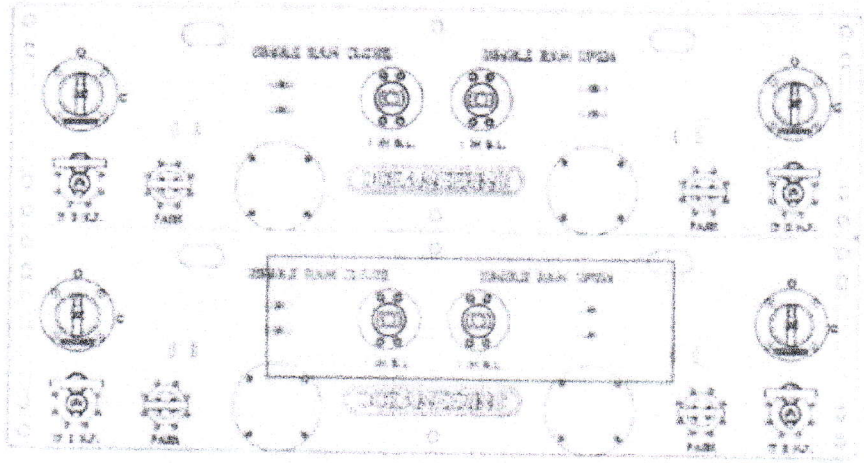

Figure 5: Middle Ram Open / Close Function

9. Use the rig hotline and a 17-D hotstab connected to the Lower Ram panel (Figure) to close and then open the lower blind/shear rams. Visually confirm that the rams close and open, and note in Wellview and IADC reports. When testing is finished, leave all rams and Choke and Kill side valves "Open" for running the stack to depth.

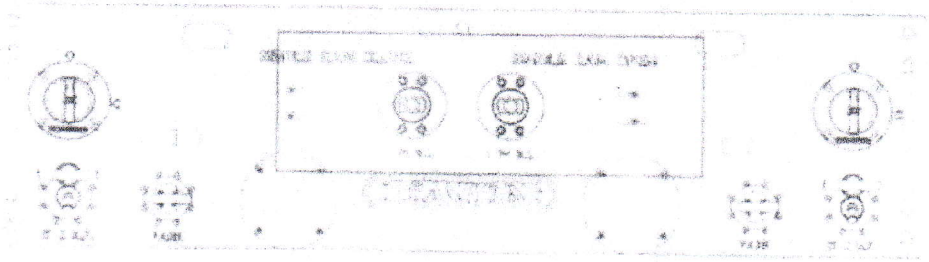

Figure 6 Single Ram Open / Close Function

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1.8. Transfer and Prepare the Stack for Deployment

1. If the Capping Stack Guide Funnel was not installed in Berwick, place the Stack Guide Funnel over the previously prepared moonpool cart HC mandrel. Block the funnel up with wood to a working height of 34-inches.
2. Install a new double resilient seal AX gasket on top of the moonpool cart stump. Insure the gasket is painted with chevrons for easy ROV visibility at deployed depth (paint the ID only).
3. Use the rig hotline to pressure up the 'AX Release' function on the HC connector panel (Figure 7). This insures the gasket retention pins will clear the AX gasket when the stack is lifted.

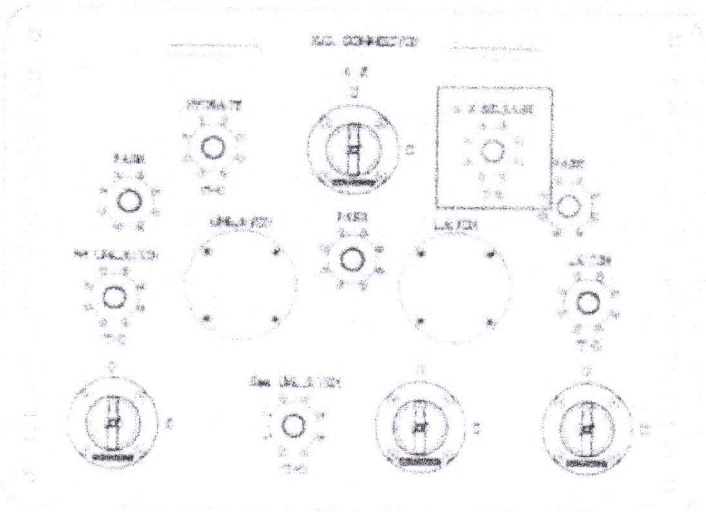

Figure 7: HC Connector Panel AX Release Function

4. Use the port aft deck crane to pick up the weight of the Capping Stack and place the HC connector in neutral.
5. Insert the 17-D hotstab into the 'Primary Unlatch' function on the Capping Stack HC Connector panel (Figure). Pressure up the Capping Stack HC Connector 'Primary Unlatch' function to 3,000-psi. Verify indicator rod is fully in the unlatch position.

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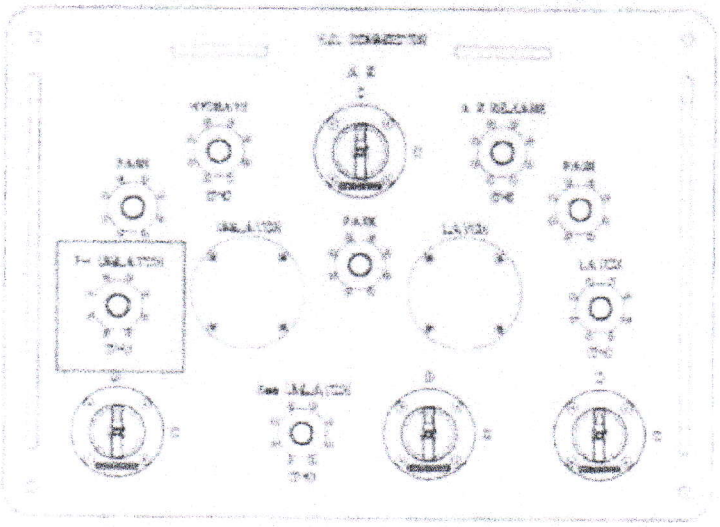

Figure 8 HC Connector Primary Unlatch Function

6. With all personnel clear of the stack lift the Capping Stack clear of the test stump and move it to the HC hub on the moonpool cart. Slowly lower the Capping Stack onto the HC mandrel to seat the AX gasket.

7. Insert the hotstab into the 'Latch' function of the HC Connector control panel (Figure 9). Pressure up the 'Latch' function to 3,000-psi. Verify indicator rod is fully in the latch position. Lock in the pressure.

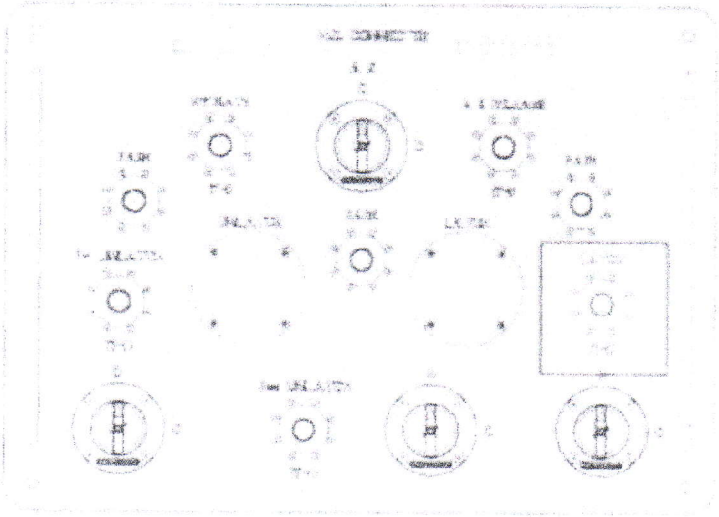

Figure 9 HC Connector Latch Function

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8. Bleed the pressure off the 'AX Release' function to release the pins and secure the double resilient seal AX gasket into place. Remove rig hotline and hotstab from HC Connector control panel.

9. If not previously installed, bolt the funnel to the bottom of the HC connector. Support the weight of the stack to provide additional stabilization to the stack while bolting up the funnel.

Note: **When installed subsea, the primary hydraulic supply for the Vetco H4 Connector will be from the accumulators mounted on the perforated marine riser joint, particularly in an Emergency Disconnect Sequence (EDS). This will be controlled from surface by surface umbilical with a secondary supply from the ROV hot stab. The function of this accumulator bank is to power the Emergency Disconnect function at the H-4 connector on top of the stack.**

Primary hydraulic supply for the CIW HC Connector at the bottom of the stack and the Capping Stack Rams when installed will be from the seabed mounted accumulator bank with flying lead to ROV stab-in on the EDS panel. Secondary hydraulic supply will be from an umbilical flying lead. Another power source is from the ROV pump and stab-in on the EDS panel.

Primary hydraulic supply for the Capping Stack side outlet valves will be from the ROV.

10. Install a 3-in 15K Mini-Collet Connector with companion flange crossed over to Weco 1502 female half-union on the hub outlet attached to the Kill Side outlet valves on the Capping Stack. Stab a 17-D hotstab into the mini-panel on the 'Latch' function and latch the Mini-Collet Connector in place with 1,500-psi (Figure 2).

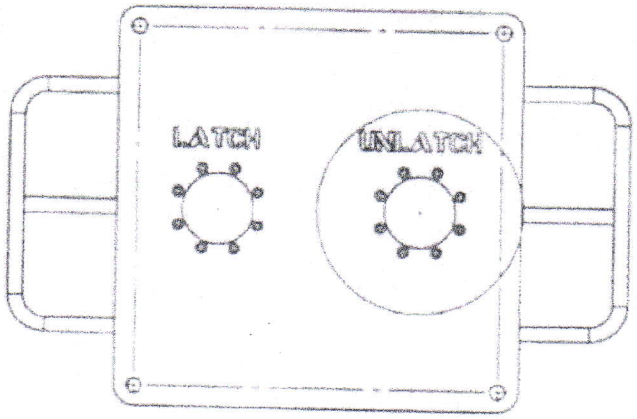

Figure 2: Mini-Collet Connector Control Panel

11. Install a choke assembly with Mini-Collet connector on the choke side outlet hub. Align choke assembly so the choke body is parallel to the valve actuators with exhaust pointing to the left when facing the kill side. Leave choke in the open position.

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1.9. Prebuild Running Tool & Hydrate Mitigation Sub-Assemblies

1. Make up and torque up 10-ft 6 5/8-in 50-ppf S-135 FH handling pup and crossover (6 5/8-in FH box x 7 5/8-in FH pin) to the Manual Riser Running tool
2. Move the perforated riser joint to the skate and place in a convenient location. Make up the Riser Running Tool assembly to the perforated riser joint (Attachment 3). Torque bolts to 14,000-ft-lb.
3. Prepare spaceout tally sheet for running the Capping Stack to top of the DWH flex joint with 6 5/8-in Landing String. Ensure that a variety of 6 5/8-in (50-ppf) FH space out pups are available
4. Make up hydrate mitigation assembly as determined by derrick management plan:
   - One joint 6 5/8-in 50-ppf FH drill pipe
   - One 6 5/8-in 50-ppf FH Double Dutch sub
   - One Side Outlet Sub 6 5/8-in 50-ppf FH with tee outlet bullplug and tee side outlet looking down with Weco 1502 side union. (BP Provided).
   - Two 6 5/8-in (50-ppf) FH drill pipe IBOPs (Gray valves)
   - One joint 6 5/8-in 50-ppf FH drill pipe
5. While making up the Hydrate Mitigation Assembly pressure test each IBOP from the bottom to 250-psi low / 10,000-psi high pressure for five (5) minutes. Chart the test and note in Wellview and the IADC report.
6. Verify following equipment is available to hookup hydrate mitigation assembly to the capping stack.
   - One 125-ft section of 2-in rubber cement hose with 1502 hammer unions (5,000-psi working pressure).
   - Support rigging for the 3-in 15K Mini-Collet Connector.

Note: **It is important to get dry air weights for all of these assemblies as they are being picked up. These weights will be used to figure out overpull before disconnecting on bottom.**

7. Pick up the 75-ft long perforated marine riser joint using the 6 5/8-in handling pup and lower through the aft rotary. Record the hanging weight of the riser joint. Set the handling pup on slips.
8. If overhead allows, pick up and make up the hydrate mitigation assembly that was previously racked back in the rotary. Pick up off slips.
9. RIH to place the bottom of the riser at a convenient working height in the moonpool. Skid moonpool cart with EDS panel/accumulator bank (Figure 3) to aft rotary center. Transocean Subsea Engineer will install the EDS panel / accumulator bank to the perforated riser joint as per the attached drawing (Attachment 1). Use lanyards to attach the EDS panel halves to secure points on the rig during installation.

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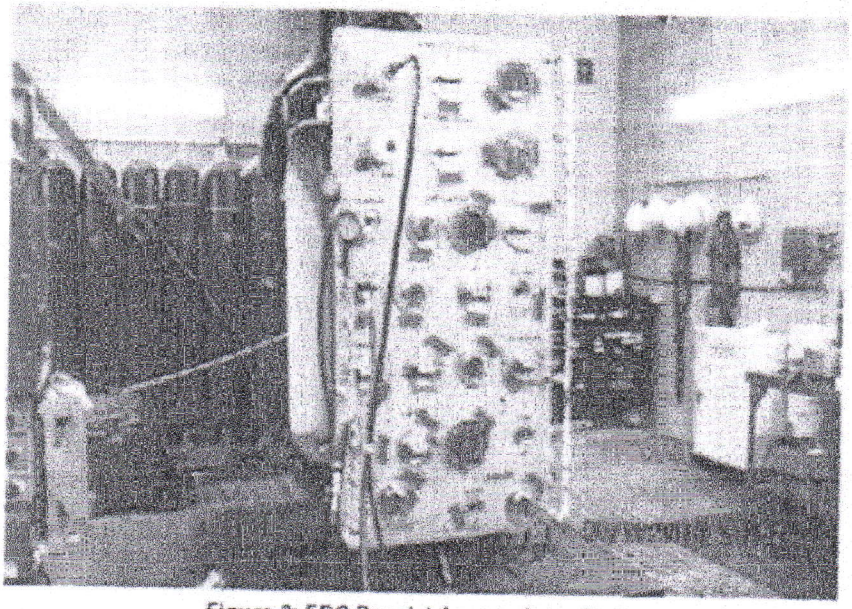

Figure 3: EDS Panel / Accumulator Bank

10. Pick up the joint clear of moonpool cart on completion of fitting the accumulator bank. Skid cart out of the way and place the basket containing the H4 Connector and 18 3/4-in 15-ksi flange x HMF-F riser box adapter on cart.

11. Move the cart to aft well center. Make up the perforated riser joint to the riser adapter on top of the H4 connector and torque the HMF-F flange bolts to 14,000-ft-lbs torque. When the connector is picked up visually confirm that the H-4 connector VX gasket is in place.

12. Lower the assembly and hook up Surface Umbilical to the Emergency Disconnect Sequence (EDS) Panel as follows:

    - (1) ¼-in line (umbilical line 209) ported to a 17-D Hi-Flo hotstab inserted in the EDS Surface Unlatch function.
    - (2) 3/8-in lines (umbilical lines 205 & 206) ported to a Breechlock hotstab inserted into the EDS Surface Supply function.
    - (2) 3/8-in lines (umbilical lines 201 & 202) ported to a 30-ft, 1/2-in hose terminated with a 17-D Hi-Flo hotstab. This hose will later supply glycol to the HC connector. Coil up the hose and stow it. It will be routed to the HC connector later.
    - Install the utility flying lead in the Breech-Lock on the EDS panel. This flying lead will be terminated with a 17-D High-Flo hotstab. Coil up with wire-ties and stow it. hose will be deployed subsea with ROV.

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13. Pre-charge the EDS accumulator bottles with nitrogen to 3,200-psi using hotline from the rig. (Exact nitrogen pre-charge pressure to be determined by TOI sub-sea engineer).
14. Charge the accumulator bottles with their usable fluid load. Observe five (5) minutes to visually check for leaks. Monitor pressure in accumulator bottles to determine if leaks are present.
15. Hook up the hydraulic hoses from the EDS panel to the H4 connector. Purge the system to insure all air is removed from all lines.
16. Purge a rig hot line with control fluid compatible with fluid in Capping Stack connectors. This will be used to activate the Capping Stack connector functions in the moonpool.
17. Plug in rig hot line to H-4 connector functions on the EDS control panel (Figure 4) and function test the Latch / Primary Unlatch / Secondary Unlatch functions.

Note: **The Unlatch functions are activated via paddle valves.**

Chevron, BP and MMS representatives to witness this test.

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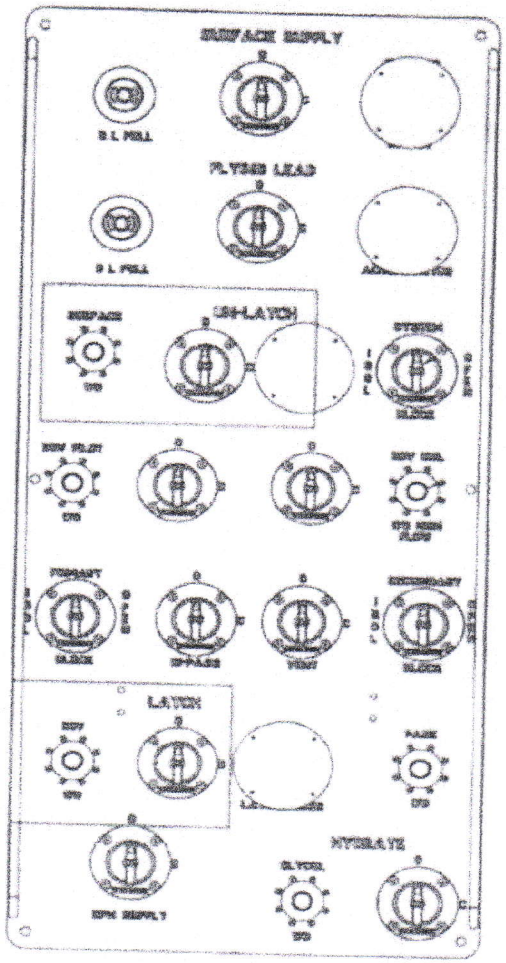

Figure 4: EDS Panel H-4 Control Function(s)

1.10 Make Up and Run the Capping Stack Assembly

1. Pressure up 'Primary Unlatch' function on H4 Connector to 1,500-psi. Verify indicator rod is in unlatch position. Lock in pressure.
2. Lower and land the H4 connector on the top of the Capping Stack mandrel. Vent the pressure from the 'Unlatch' function. Insert the hotstab in the 'Latch' function on the EDS panel (Figure 12) and activate the function with 3,000-psi. Confirm indicator rod moves to fully latched position. Block in the pressure.
3. Ensure that Surface Pilot Function on Surface Umbilical reel is vented. Lockout/Tag out the Surface Pilot Function on the Surface Umbilical control panel to ensure the

function stays vented while RIH. Remove the T-handle and label the valve "**DO NOT OPERATE**" **Refer to the TOI EDS protocol** (Attachment 7).

NOTE: Pressure build up in the Surface Pilot Function could cause the H4 connector to prematurely Unlatch. Ensure the Surface Pilot Function stays vented until ready to arm the EDS.

4. Hook up the rig hot line 17-D High Flo hot stab to the 'Primary Unlatch' function of the HC Connector on bottom of Capping Stack (Figure 13).

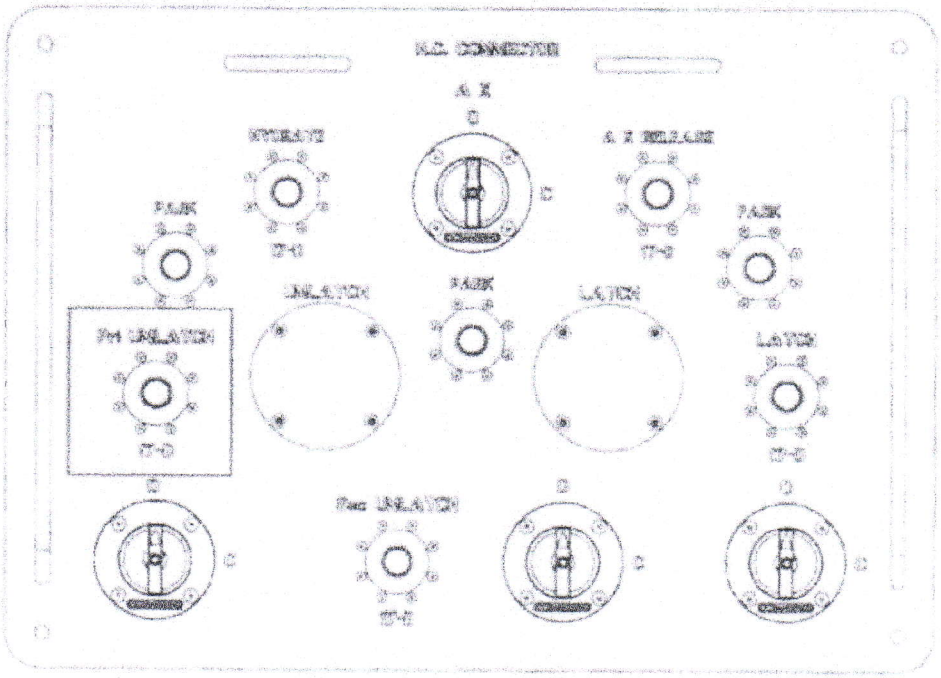

Figure 5: H-C Connector Function Panel

5. Pick up weight of assembly so that there is no weight on the HC connector.
6. Route the 1/2-in hydrate mitigation hose down the outside of the stack securing it in several places with wire-ties that can be removed later by the ROV. Insert the 17-D Hi-Flo hotstab into the "Hydrate" function on the HC control panel.
7. Pick up Capping Stack clear of the test stump. Verify that the AX gasket has been picked up off the moonpool cart mandrel.

Note: The assembly weight in air and record in Wellview and IADC forms.

8. Skid the cart clear of aft rotary in the moonpool.

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9. Perform a TSTP and hook up the bottom of the hydrate mitigation hose to the Mini-Collet Connector on the kill side of the Capping Stack (Attachment 1). Hold the top end of the hose while the stack is RIH.

10. Attach the Mini-Collet Connector supporting cable to the Mini-Collet Connector secondary release pins. Hold the loose cable end while RIH.

11. Pick up the Capping Stack assembly off slips and begin RIH. Note weight in air. At this point the HC connector will splash in the moonpool.

12. RIH to the mid-point of the perforated riser joint. Attach clamping assembly to the riser joint and clamp off the 2-in hydrate mitigation hose. Attach the free end of the Mini-Collet Connector supporting cable to the clamp assembly.

13. Use tape to support the surface umbilical on the perforated riser joint. Put at least 5 wraps of tape around the pipe first, then 10 to 15 wraps of tape around the pipe and umbilical.

14. Continue RIH until the side outlet sub is at a convenient working height in the moonpool. Attach the upper end of the 2-in hydrate mitigation hose to the Weco 1502 on the side outlet sub.

15. Commence running first stand of Landing String, simultaneously reeling out surface umbilical. Land drillpipe in slips. Secure surface umbilical with subsea tape applied every other joint along the pipe body just above the tool joint. Put at least 5 wraps of tape around the pipe first, then 10 to 15 wraps of tape around the pipe and umbilical.

Note: Count the number of tape pieces used when RIH and compare to the number of pieces recovered when POOH to insure that all tape is recovered.

16. Splash the DIN ROV. Have the ROV follow the stack to depth to monitor for interference and to avoid the stack entering the oil plume.

17. With entire assembly submerged below water line, screw in top drive and break circulation down drill pipe with seawater. Pump 20-bbl to ensure 2-in hydration mitigation hose is full.

Note: Ensure clear communication between surface umbilical reel operator and the Driller while RIH.

Note: Driller to ensure that the string does not rotate during make up and running of 6 5/8-in Drillpipe.

Note: Secure Surface umbilical to DP with subsea tape when DP is in the slips.

18. Continue RIH on 6 5/8-in Landing String as per space-out tally. Surface fill the pipe with seawater every 10 stands, screw in top drive, and break circulation through the IBOPs and 2-in hydrate mitigation hose.

19. Maintain 3,200-psi (as determined by TOI subsea engineer) charge on accumulators using the surface umbilical while RIH.

20. Stop RIH with connector 50-ft above DWH flex joint mandrel depth. Record pick-up weight. Review landing string tally sheet to confirm finally spaceout requirements and locate spaceout pups as needed.

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Note: If the riser pin flange overshot assembly is still deployed at depth on the forward rotary it should be at least 100-ft shallower depth than the Capping Stack to avoid subsea clashing.

21. Make up last stand to Topdrive and engage Active Heave Drawworks (AHD). Record the pick up weight.
22. Use ROV to verify that the H-4 connector has a minimum of 500-psi on the EDS panel 'Lock' function. Use ROV to pressure up the 'Lock' function if required. Verify that the HC connector has a minimum of 500-psi on the HC control panel 'Unlock' function . Verify that the Mini-Collet Connector is securely attached to the kill side outlet. Perform a general survey of the Capping Stack to ensure it is ready to enter the oil plume prior to land out
23. Fly ROV under stack and visually verify that the AX gasket is in place.
24. Use ROV to close the Choke valves on the Capping Stack. Lock in the pressure on the close function; the valves are 'fail open'. The Kill-Line valves will remain open to allow pumping glycol into the stack while stabbing

1.11. Align and Land Capping Stack Assembly

1. Move the rig in to within 50-ft of well center. With the rig on its final heading use the top drive, rotate the assembly so that the stack side outlets are aligned on a 310-deg heading as observed by the ROV. This will be the final orientation of the stack assembly. Monitor Surface umbilical while rotating to prevent damage
2. Check the elevations of Flex Joint and the Capping Stack using the ROV. Note the elevation of landed-out position on the HC connector mandrel. Lower the stack until the bottom of the connector guide funnel is at landed out height. Mark the pipe at the rotary as a space-out reference for land-out. Make a vertical mark on the pipe as an orientation reference to insure the stack does not rotate when landed
3. Pick up until the bottom of the Capping Stack Guide Funnel is approximately 2-ft above the height of the HC mandrel installed on the Horizon flex joint. Mark the pipe at the rotary as a reference mark
4. Line up to pump undiluted Glycol through the drillpipe. Commence pumping glycol at 3-bpm to prevent hydrate formation during final alignment of Capping Stack over the Flex Joint. Be sure to pump an entire landing string volume plus 20-bbl prior to moving over the flow. The drillstring volume is ~121-bbl
5. Begin pumping glycol into the HC connector through the surface umbilical at 12-gpm. Record the pump pressure at 12-gpm. Pump sufficient volume to completely fill the HC connector chambers with glycol. Continue to pump glycol through the HC connector during Capping Stack land out sequence
6. Clear communication link is required between Driller, Bridge, all ROVs and EDS dedicated operator during the next critical alignment stages. Ensure communication with umbilical reel operator

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7. Position two ROVs to observe final landout of capping stack. The two ROVs should be positioned at 90-deg angle to each other, to get an X-axis and Y-axis view of the land-out.

Note: **Lessons Learned indicate it is best if DIN ROV is one of the observers to avoid lag in video feed.**

8. Move the rig in to position the Capping Stack in the oil plume above the well. This should be done in a smooth and continuous motion with an ROV assisting to guide the stack. The oil plume will begin flowing up through the bore of the capping stack and venting out of the perforated riser joint. **Activate the TOI EDS procedure** (Attachment 7)

Note: **Lessons Learned from landing the Top Hat on the DWH stack indicate that ROV manipulation is the optimum stabbing/landing method. DIN team should decide the best method of stabbing the Capping Stack on the flex joint mandrel hub based on ROV observations and previous experience.**

9. Slack off to land out the Capping Stack on the HC mandrel. When landed slack off 50k-lbs. Have ROV confirm final land-out using horizontal mark previously painted on transition spool flange

Note: **There could be some additional movement of the assembly as the Capping Assembly passes into the discharge plume from the wellbore.**

10. Fly an ROV to the flying lead of the subsea accumulator bank. Attach a 17-D hotstab on the flying lead and fly over to the HC connector panel on the Capping Stack. Insert the 17-D hotstab into the 'Latch' function on the HC connector control panel (Figure 14)

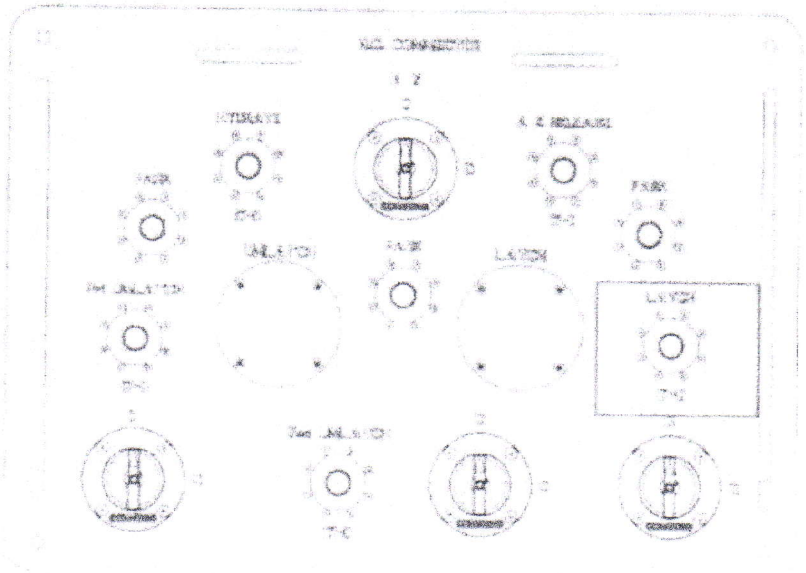

Figure 6. H-C Connector Control Panel Latch Function

11. Have a second ROV open the accumulator valve to charge the flying lead from the subsea accumulator bank. Pressure up the Latch function to 3,000-psi to latch the connector. Verify that the indicator rod is fully in the 'Latch' position. Lock in the pressure. Remove the hotstab and park in a convenient location. **EDS watch is now live per the TOI EDS protocol** (Attachment 7).
12. Fly an ROV to the subsea accumulator bank and retrieve a flying lead with Breechlock connector. Attach flying lead to the close function on the Middle Ram control panel. **DO NOT CLOSE THE RAM AT THIS TIME**. Leave the flying lead stabbed in to allow future ram operations.
13. Pick-up and perform overpull to 50k-lbs over landing weight to confirm connection. Adjust overpull according to TOI watch circle analysis. Maintain overpull throughout the following operations as per TOI recommended watch circle analysis.
14. Monitor flex joint and determine if flex joint angle improves towards vertical under tension (if not previously braced to vertical position).

1.12. Monitor Flow and Prepare for Future Operations

1. Once Capping Stack is fully connected to the flex joint, monitor flow out of the perforated riser joint with an ROV to check for hydrate blockage.
2. There will be an approved diagnostic shut-in procedure that will be followed at this time.
3. Shutdown pumping glycol. Continue to monitor flow to determine if hydrates begin to form in the perforated riser joint. If hydrates begin to form, start pumping glycol down the Landing String and into the Capping Stack Side Outlet valves to prevent hydrate blockage in the perforated riser joint.
4. Verify that a system is in place to support the flex joint when the perforated riser joint is pulled and the full weight of the Capping Stack is placed on the flex joint.
5. Contact SIMOPS coordinator on DD-III and determine DIN egress lane after Perforated Riser Joint H-4 connector is released. DIN rig team to review Capping Stack Emergency Disconnect Sequence (EDS) and ready rig to move back to Staging Area.
6. Stand-by. Wait On Orders.
7. If it is decided to pull the perforated riser assembly, continue to next section.

Note: **This procedure does not include any procedures to rig up the Capping Stack to the subsea manifold or equipment.**

1.13. Configure Capping Stack and Disconnect Mini-Collet Connector

1. Ensure that glycol pumping has been shut down. Use ROV to Close the Kill side valves on the Capping Stack and lock closed with 1,500-psi on the 'Lock' function (Figure 15). Verify that the Choke side valves are closed and locked with 1,500-psi by inserting the ROV hotstab in the Kill Valve Panel (Figure 16).

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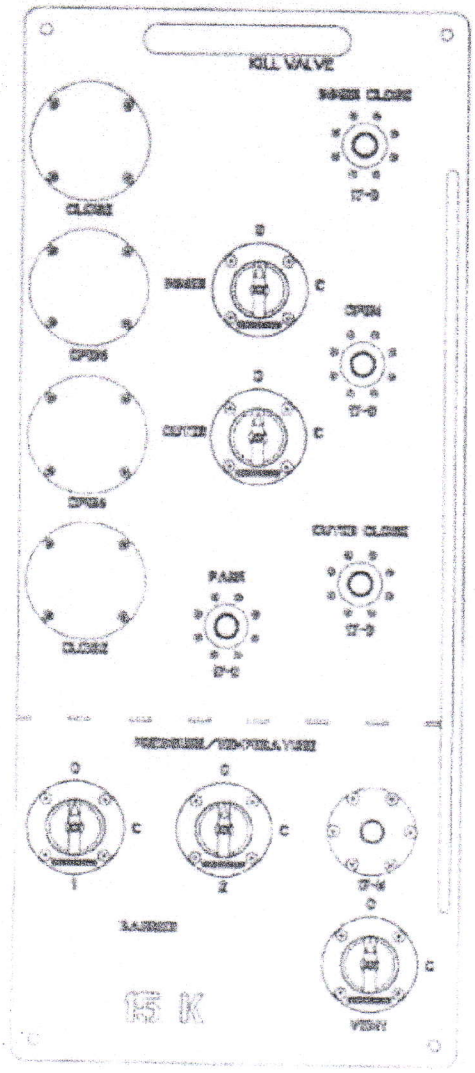
KILL VALVE
CLOSE
OPEN
PARK
OUTER CLOSE
OUTER
OPEN
CLOSE

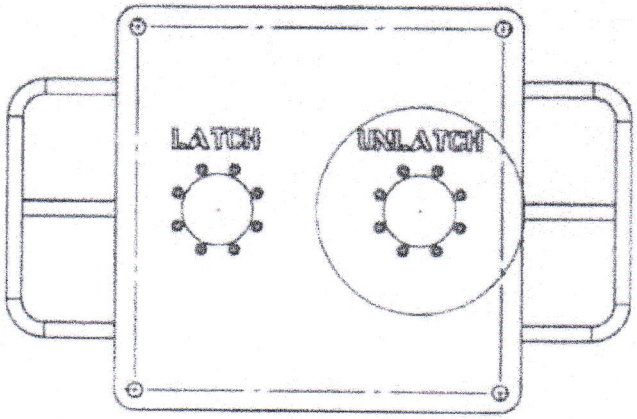

Figure 9: Mini-Collet Connector ROV Panel

3. Verify that all rams and valves and Capping Stack panel are set as desired (Valves closed / Rams open).

1.14. Disconnect and POOH with Perforated Riser Joint Assembly

1. Verify with ROV that the hydraulic locking pressure to the HC Connector is a minimum of 500-psi.
2. Set down weight so that the H4 Connector is at neutral weight (no overpull or weight down). This will set the entire weight of the Capping Stack on the flex joint. Monitor the flex joint angle during this operation. Confirm with BP Houston (Chevron Drilling Superintendent) that the flex joint angle is acceptable for releasing the Capping Stack.
3. Depending on final angle of the Capping Stack, position rig as necessary to prepare for unlatching the Perforated Riser joint from the Capping Stack.
4. Unlock the H-4 Connector with a minimum of 1,500-psi on the 'Unlock' function using the surface umbilical and EDS panel. Verify indicator rod is in fully unlocked position.
5. Pick up the H-4 connector and when connector pulls free of hub, the flex joint will be allowed to move under full weight of the Capping Stack.
6. Continue to pull up slowly. The Mini-Collet Connector will pull free from the Capping Stack side outlets when the supporting cable pulls tight.
7. Continue to slowly pull up on the assembly while using an ROV to keep the mini connector free of the Capping Stack. Once Mini-Collet Connector is above the stack, the ROV can let go and let it swing free.
8. Bleed off the accumulators with the surface umbilical prior to POOH.

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9. Flush the drill pipe with seawater.
10. Begin moving DIN to safe zone as directed by Field SIMOPS Coordinator.
11. POOH with the 6 5/8-in Landing String assembly until the hydrate mitigation assembly side outlet sub is at surface / moonpool level. Layout the 2-in hydrate mitigation hose from the Weco 1502 connection.

Note: Ensure clear communication between surface umbilical reel operator and the Driller while POOH with drillpipe.

Note: Drillpipe may pull 'wet' during POOH due to IBOPs at base of string.

12. Continue to POOH. Place the riser mid-joint clamp high enough to lay-out the Mini-Collet Connector.
13. RIH to place the riser mid-joint clamp at a convenient working height in the moonpool. Disconnect the riser clamp and lay-out the 2-in hydrate mitigation hose.
14. With hydrate mitigation assembly above the rotary set the perforated riser joint on slips using the 5-ft handling sub on the crossover.
15. Break out the hydrate mitigation assembly and rack back in the derrick.
16. Pick up the 'perforated' marine riser joint until the accumulator bank can be removed from the riser joint in moonpool.
17. Disconnect the surface umbilical hydraulic control hose bundle from the EDS panel.
18. Lay out the accumulator bottles and EDS panel.
19. Set down and place the H4 Connector on a cart in the moonpool.
20. Break out the bolts connecting the H4 Connector to the perforated riser.
21. POOH with the perforated riser joint and lay out same on the skate.
22. Remove the riser running tool / crossover / pup joint from the perforated riser joint. Do not break out this assembly until it is determined whether another riser joint will be run in hole.
23. Stand-by in safe zone and await further orders.

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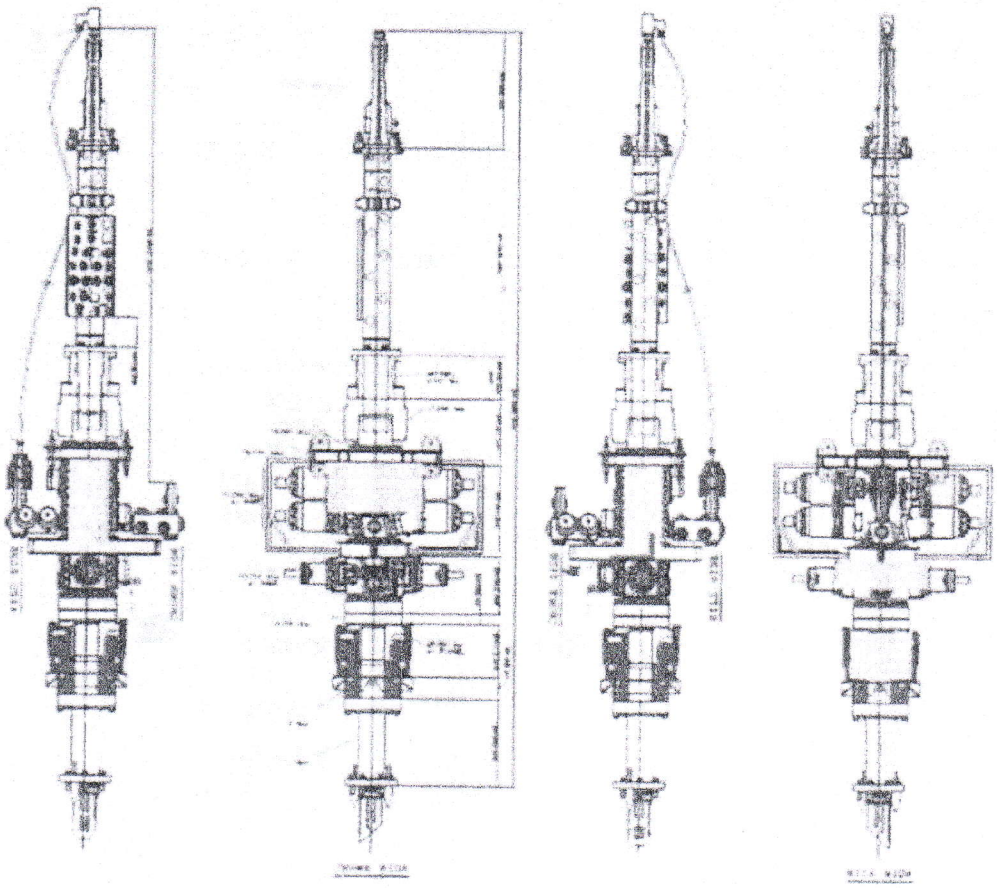
Attachment 1: Capping Stack Assembly Schematic



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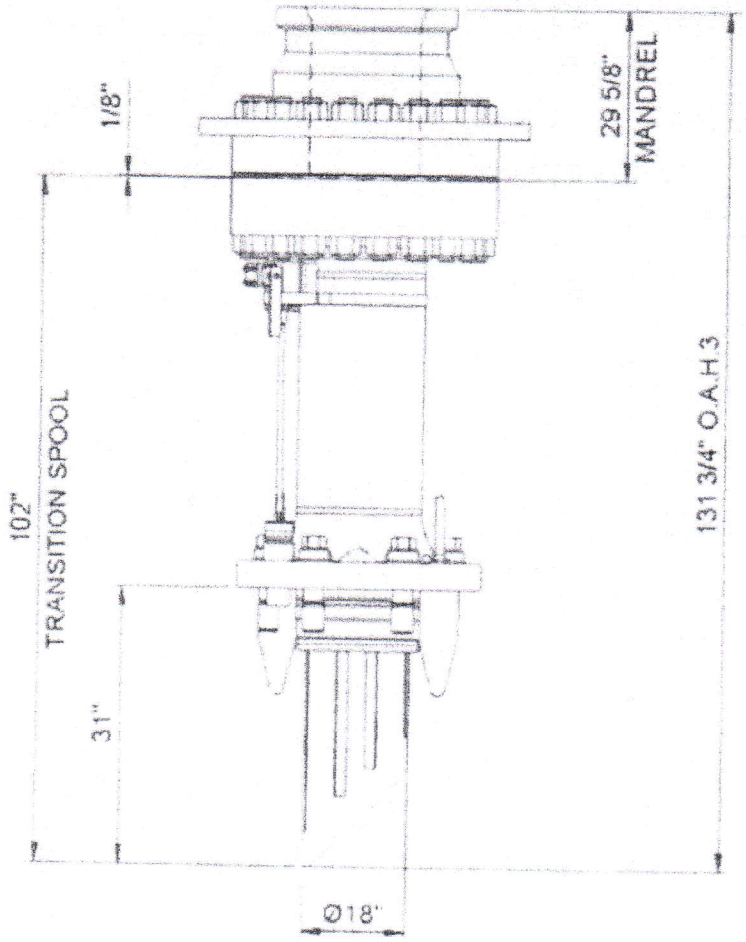
Attachment 2: Riser Flange w/ Muleshoe Assembly Schematic



TRANSITION SPOOL WITH M/D ADAPTER SPOOL (MANDREL)

(15,530 lbs)

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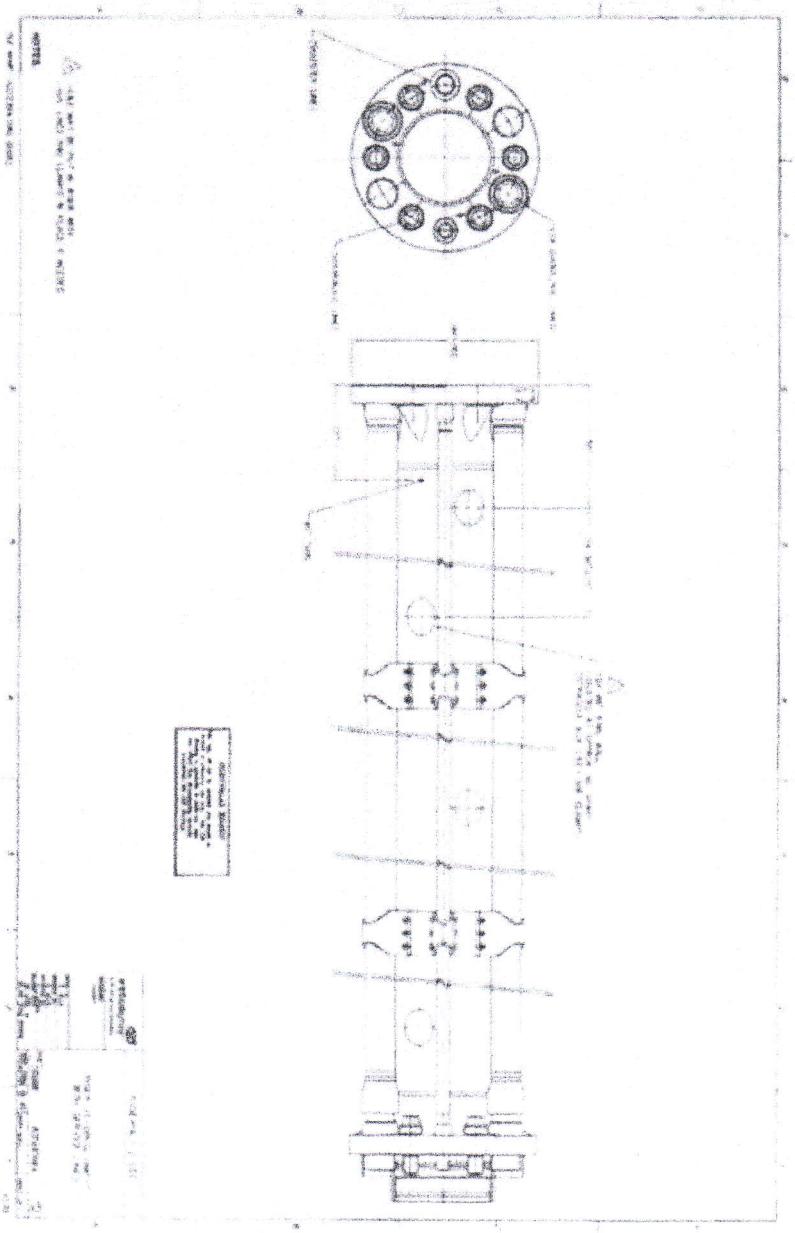
Attachment 3: Perforated Riser Assembly Schematic



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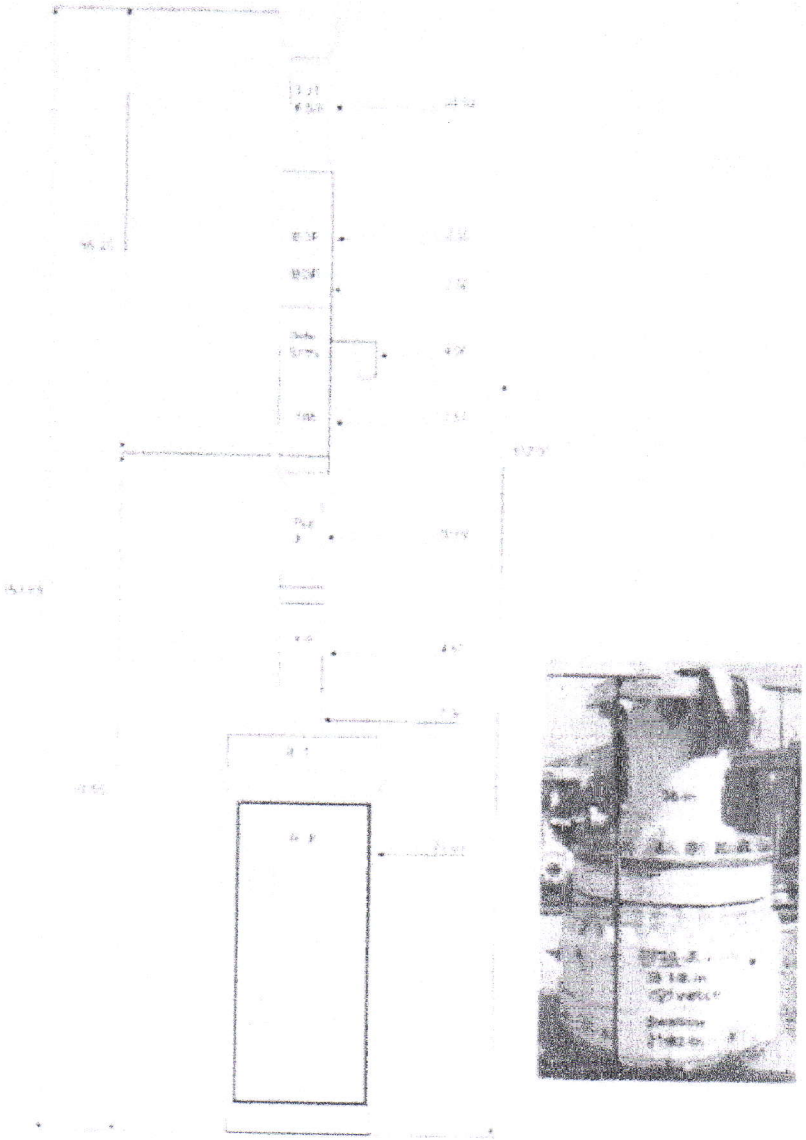
Attachment 4: Hydrate Mitigation Assembly Schematic

Hydrate Mitigation Assembly

Attachment 4

Measurements in feet except where noted



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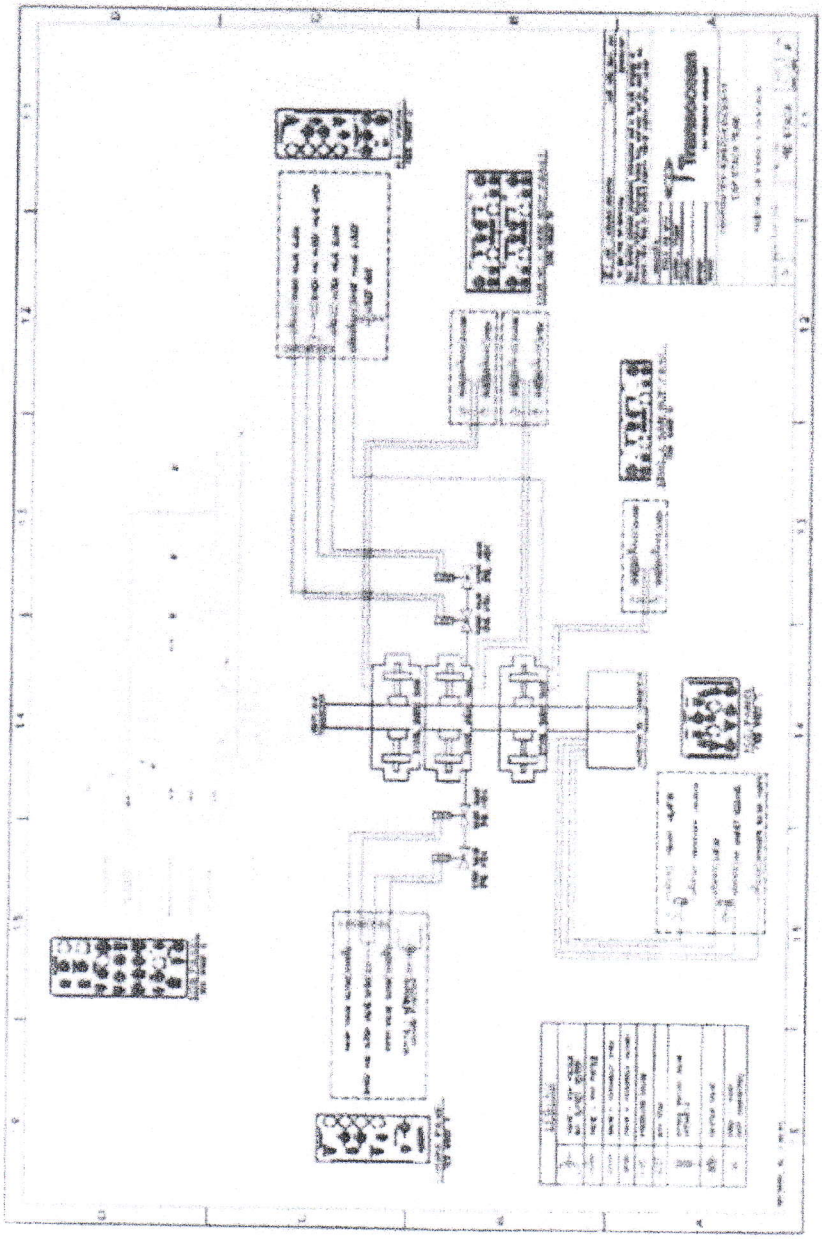
Attachment 5: Capping Stack Control System P&ID



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Attachment 6: ROV Roles and Responsibilities

ATTACHMENT 6

DIN Installing Capping Stack On DWH Flex Joint
ROV Roles and Responsibilities

Boa Deep C ROVs		DIN ROV
	[illegible]	Function BOP at Deck
Position ROV Vessel	[illegible]	Monitor Capping Stack
#1 Deploy Foot Basket Close and Lock chokes #2 Fine Manver	[illegible]	Monitor Capping Stack
#1 Station Aft DWH FJ Check HC/HA/Grin/Donut #2 Lock Pressures	[illegible]	Monitor CappingStack
#1 Stab Capping Stack Grab flying lead from SS #2 Manifold Align Capping Stack	[illegible]	Hold Capping Stack
#1 Operate SS Accum Install Rainbow Flying #2 Lead	[illegible]	Monitor Flex [illegible] Joint
#1 Standby #2 Standby	[illegible]	Monitor Flex
Close inner and outer valves and lock in #1 pressure #2 Standby	[illegible]	Monitor Flex
#1 Release DIN ROV HPU #2 Move to HC	[illegible]	Monitor Flex
#1 Move Flying Lead To HC Check pressure #2 Indicator rod	[illegible]	Monitor Flex
#1 Monitor #2 Monitor	[illegible]	Monitor Flex
#1 Operate SS Accum #2 Pressure up to release	[illegible]	Monitor Hx Connector
#1 Standby for Orders #2 Standby for Orders	[illegible]	Monitor Hx Connector
	[illegible]	To Deck

Attachment 7: EDS Prodical and Procedure

EDS Procedure when attached to Transition Spool with Capping Stack

This procedure will become effect once the capping stack HC connector is over the transition spool hub - and before the capping stack HC connector is locked in place.

Pre deployment

- The dedicated needle valve on the IWOCs reel to open pilot pressure to the accumulator / unlock function on the Vetco H4 E x F connector – will have been identified and checked for operation.
- The valve handle will be marked – DO NOT OPERATE – and the handle removed.
- Pre determined disconnect parameters will be known between Bridge, Drill Floor & Moonpool
- These will be based on weather conditions (as per Discoverer Inspiration Marine Operations Manual) – watch circle based on maximum unlocking angle on the H4 connector and the drill pipe properties - and an emergency response scenario which places the Installation and people in harms way (DIN-HSE-PR-001)
- There will be clear communications between Bridge, Driller and operator on IWOCs panel – pre tested radios on a suitable channel (channel will be decided once we know the volume of radio traffic communications in the area)
- There will be 1 dedicated operator on the IWOCs panel – that person can only be relieved by another dedicated operator

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EDS Mode

- Once the Cameron Connector has started to swallow the hub on the transition spool, and before we lock the connector in place, we will activate the EDS procedure.
- Well Site Supervisor will instruct the IWOCs reel operator to remove all DO NOT OPERATE signs from the appropriate EDS needle valve – and re install the valve handle if this was removed.
- IWOCs reel operator will contact both Bridge and Driller using radio communication, to state that the EDS is now live.
- IWOC's reel operator will stand by reel and will await a clear instruction from either the Bridge, Drill Floor or somebody in the moonpool.
- If instructed to activate the EDS, the reel operator will re affirm "confirm that you want me to activate the EDS". If the answer is positive, the IWOC's operator will open up the EDS pilot signal valve and repeat on the radio – 'EDS has been activated at the IWOCs reel".
- This pilot signal will unlock the H4 E x F connector using the 4 x 15 gallon accumulators mounted on the 75' riser joint – it is also plumbed in to unlock the mini collet connector on the kill side of the capping stack.