

MACONDO  
Top Kill Procedures Manual  
for  
MC252-1

Re-run & Function Test Yellow Pod

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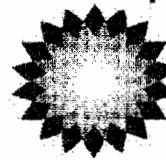
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**TABLE OF CONTENTS**

1	Re-run & Function Test Yellow Pod .....	4
1.1.	Introduction .....	4
2	Responsibilities .....	5
3	Safety .....	6
3.1.	Topics of Concern .....	6
3.2.	Risks/Regrets/Mitigations .....	8
4	Equipment List .....	9
5	Prerequisites .....	10
6	Overall Field Layouts & Summary .....	11
7	Detailed Procedures .....	12
8	Pertinent Equipment Data .....	22

**ATTACHMENTS**

- Attachment 1: OIE-LARS Equipment Overview
- Attachment 2: Rigging Drawing
- Attachment 3: Cameron Pod Procedures
- Attachment 4: Field and Vessel Layout Drawings

## 1 Re-run & Function Test Yellow Pod

### 1.1. Introduction

The well top kill procedure requires the ability to operate certain functions of the LMRP and BOP stack using one of its control PODs. The yellow POD was selected as the preferred POD and subsequently has been retrieved and refurbished on surface to provide control of the required LMRP/BOP functions. During retrieval of the yellow POD, all its normal hydraulic and electrical connections had to be disconnected in a manner that eliminated the normal means of re-connection. In addition, the MUX control cable has been destroyed since it is still connected to the damaged marine riser.

In order for the yellow POD to function properly, hydraulic and electrical communication with the LMRP and BOP stack must be re-established between the yellow POD, the LMRP/BOP stack and the replacement MUX control cable suspended from the surface.

This procedure details the installation procedures of the yellow POD onto the LMRP and details the means of connecting the replacement MUX control cable and hydraulic hot line hose that will connect the yellow POD with the Q4000 rig.

Once the yellow POD has been installed, the Q4000 will retrieve the drill pipe and move approximately 500-feet away while routing the MUX cable in a safe manner. The relocation of the Q4000 will allow the Q4000 to deploy the LDIS Riser, which will be used in the well kill pumping operations.

The POD was refurbished and modified to enable it to be rerun in the Horizon LMRP while the MUX cable and hydraulic hot line hose is being deployed by a separate winch deployment system. The refurbished POD will be re-installed onto the Horizon LMRP using the Q4000 rig with some possible support from other vessels. Most of the work will be completed with the Q4000.

This installation procedure was developed based upon the following key drivers:

- **Vessel deploying the POD will be the vessel controlling the BOP stack during well kill operations.** The BOP POD will be electrically powered and electrically communicated through a fixed MUX cable with a hydraulic hot line supplying the required hydraulic fluid. Both lines will be fixed to the yellow POD before the POD is deployed. This dictates that the vessel installing the yellow POD will be controlling the BOP stack
- **POD and MUX cable/hydraulic hot line must be simultaneously deployed on separate systems.** BOP POD weighs 30,000-lbs (In 5,000-ft water depth, a heavy duty deployment system is required). To minimize spinning of the POD while it is being deployed, the POD will be deployed on drill pipe. Drill pipe can only be deployed through the rig floor on the Q4000. The drill floor will also be used to deploy the well kill conduit; therefore, the MUX cable and hydraulic hot line are required to be deployed from another area of the vessel. The preferred position for the MUX cable and hydraulic hot line deployment system is over the side of the vessel, far side from well center, keeping the MUX cable and hydraulic hot line clear of subsequent drill pipe operations. The MUX cable and hydraulic hot line will be deployed using a conventional winch wire deployment system commonly used for subsea completion operations. Since the MUX cable and hydraulic hot line are fixed to the POD, they must be simultaneously deployed with the POD.

- **DP vessel requires a means for quick disconnect.** The well kill vessel (Q4000) is a DP rig; therefore, a means to disconnect the MUX cable and hydraulic hot line from the SCM must be provided to minimize risk of damage to the POD. Since the MUX cable and hydraulic hot line are fixed to the POD, a guillotine system will be incorporated and installed on the seafloor.

This procedure addresses:

- Placement of equipment on the Q4000 surface locations.
- Deploying the POD over the side of the vessel and performing a subsea transfer to the drill pipe string being run through the drill floor.
- Deploying the cable and hydraulic hot line on the side of the vessel while simultaneously deploying the POD on drill pipe.
- The subsea placement of required equipment such as the clump weight.

**The objectives of this procedure, in order of criticality, are to:**

- Avoid any contact with any of the critical pressure containing items on the Horizon BOP stack required for well kill operations.
- Prevent damage to any Horizon BOP stack hydraulic operation system for functions required for well kill operations, specifically the choke and kill isolation valves.
- Install the refurbished yellow POD onto the Horizon LMRP and re-establish hydraulic and electrical communication between the Horizon BOP stack and the Q4000 rig, which will be supporting the LDIS Riser.

## 2 Responsibilities

Safety is the responsibility of all personnel involved in any activities described in this document. Specific responsibilities of key personnel with respect to this procedure will be established and designated by each individual team.

Source Control Chief	
William Broman (Night)	
Paul Sullivan (Day)	

Single Point Accountability	
Activity	SPA
Vessel Operations:	Helix Q4000 OIM
Vessel SIMOPS: On Scene Commander	Helix Q4000 PIC
<b>Horizon</b> BOP Operations – TOI	Ray Picard
ROV Operations	Helix Q4000 ROV Superintendent

### 3 Safety

BP recognizes safety as a primary objective during work procedures. Therefore, the following safety instructions must be observed. During this work, if there is any doubt about the intent of this procedure, stop immediately and consult the designated manager.

**Note:** Individuals participating in the work described in this document must read and understand this document in its entirety prior to participating in the work.

Prior to the start of the job, the manager in-charge will hold a Pre-Job Safety Meeting with BP and other personnel (as necessary) involved in this operation to go through the entire job, following the step-by-step procedures in this document.

- All personnel must wear approved Personal Safety Equipment (PSE) such as a hard hat, eye/hearing protection, safety footwear, gloves, and so on at all times.
- Use approved safety harnesses for all elevated work. Use approved platforms, ladders, cages, scaffolding, and handrails.
- When working at heights, use safe practices for using hand tools to prevent dropped objects. For example, only use tools that are manufactured or adapted to provide tether attachment points, and make sure to tether the tool to the user or workplace. Tether attachments must still enable tool to be used effectively.

**Table 1 – Safety Issues**

Safety Issue	Prevention Tasks
Overhead Lifts	Soft slings are going to be used during subsea operations. Extreme caution shall be enforced when handling the assembly on deck, with cranes. Replace soft slings prior to handling the hoses on deck.
Sharp Objects	Be cautious of handling hoses, especially at the cut ends where sharp materials are exposed and may cause injury.
Pinch Points	Care should be handling the cut hoses onboard the vessel and during loading or unloading operations.

#### 3.1. Topics of Concern

**Table 2 – Tasks and Action Required**

Safety Issue	Prevention Tasks
Job Safety Analysis (JSA)	Prior to beginning the planned operation, complete a JSA. The JSA shall include a discussion of the entire operation, a review of all required manpower requirements, communication requirements and a detailed review of all required tooling and equipment.
Custodial	All equipment recovered shall be contained, identified, tagged, photographed and secured for USCG, BP and TOI.

Table 3 – Tasks and Action Required

<p><u>Strength</u></p> <ul style="list-style-type: none"> <li>• While potentially not a common operation by TOI or the rig, vendor design interfaces are robust and industry has experience performing this work</li> <li>• Adequate video investigation to conduct proper pre-planning and procedure writing</li> <li>• Run on drill pipe with heave compensated tower on Q-4000</li> <li>• Competent on site supervision by TOI and bp</li> </ul>	<p><u>Weakness</u></p> <ul style="list-style-type: none"> <li>• Plan A deployment does not have a quick turn around time if drive off or station keeping event occurs.</li> <li>• Deployment and verification of functionality on critical path timeline.</li> <li>• Damaging MUX and hydraulic lines during installation and/or construction activities</li> <li>• Will have to move the Q-4000 between working and deployment locations with the MUX and hotline system deployed</li> </ul>
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> <li>• Establish "on-demand" access to BOP functions required for top kill option</li> <li>• Implement Plan B for "planned" disconnect option to reduce exposure of duration conducting operation</li> </ul>	<p><u>Threats</u></p> <ul style="list-style-type: none"> <li>• Damage to equipment during recovery and deployment</li> <li>• If the pod stops working, the pumping operations will have to be suspended for repair.</li> <li>• Pod recovery during operation necessitates LDIS rig down</li> <li>• Emergency disconnect option will damage MUX and hydraulic lines</li> <li>• Top kill pumping options assumes that communication and control of the BOP with the yellow pod can be established.</li> </ul>




## 3.2. Risks/Regrets/Mitigations

Table 4: Risks and Mitigations

Risk	Regret	Mitigation
Vessel SIMOPS	Interference and potential interruption of operations	SIMOPS managed by On Scene Commander
Weather related issue	Difficulty in maintaining vessel station or deployment capabilities	Gather weather forecast information for activity period. Temporarily halt operations and resume when weather appropriate. Have sufficient length of extra MUX cable, hydraulic hot line, and winch wire available on reel to be paid out for minor vessel excursions outside of normal watch circle.
Equipment issues - Damaging Pod during installation - Damaging MUX cable and/or hydraulic hot line due to their deployment not being properly coordinated	possible shut down of well kill operation delay in operations	Good weather window for deployment operations Direct radio communication between all winch operators and driller Have ROV monitor slack in MUX cable and hydraulic hot line that span the drill pipe running string and the winch wire.
Station keeping (3)	Drive-off/drift-off requiring cutting of MUX cable and hydraulic hot line. Re-termination of these lines will require retrieval of yellow POD.	Maintenance of equipment. Vessels perform DP checks prior to entering field area.
Communications / Coordination	Damage to MUX cable and hydraulic hot line	Communication protocol, procedures reviewed by people performing tasks
ROV failure	Ops delay	2 ROVs on task
Clashing	Contact with bent riser can increase release rate	Maintain adequate boat position in relationship to subsea equipment and monitor with second ROV
Hydrocarbon issue - hydrocarbons-on-surface (1) - subsea release of hydrocarbons (2)	Oil / gas fumes into vessel intake	Constant monitoring of Volatile Organic Compounds (VOC) Additional monitoring by other vessel

1. This has been identified as the highest environmental risk to this operation.
2. This has been identified as the highest personnel safety risk in this operation.
3. This has been identified as the highest risk to the success of this operation.

Gulf of Mexico SPU	MC252-1 Top Kill Procedures Manual Re-run & Function Test Yellow Pod	bp 
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## 4 Equipment List

Equipment	Qty	Unit Dry Weight	Vendor	Owner	Where Used	Comments
OIE LARS	1	55,000	OIE	OIE	To deploy to MUX and hydraulic hot line for BOP POD	Refer to Oceanreering drawing no 0370206 for proposed system scope of supply
Hand off rigging assembly	1				Pod deployment rigging to facilitate subsea transfer	Refer to Appendix B for proposed make-up of tri-plate rigging
MUX reel assembly with 11,000-feet of 1.22-in O.D. MUX cable	1			TOI	On well kill vessel to supply electrical power to POD	
Hotline Reel with 11,000 feet of 1.72-in O.D. hydraulic hot line hose	1			TOI	On well kill vessel to supply hydraulic fluid to POD	
Yellow POD	1	30,000 lbs	Cameron	TOI	On Horizon BOP stack to control choke and kill line valves during well kill operation	
Drill pipe Lift sub	1		Rental		To deploy POD on drill pipe	Sourced from Q-4000
"hold back" clump weight	1		OIE	BP	MUX cable/hydraulic hot line attached during layaway from BOP	
Tellus 46 oil			OIE	OIE	For LARS HPU	
Monkey Fists	10				To assist with sea floor placement of the MUX/hydraulic hot line bundle	
Soft line cutters	1		OIE	OIE	contingency	
Wire rope cutters	1		OIE	OIE	contingency	
Suck/blow wand	1		OIE	OIE	For cleaning Pod receiver	
Buoyancy	?					OIE to evaluate
Radio set	10		OIE	bp	Q4000 control room & ROV, ROV boats, LARS operator, drill shack	All winch operators and ROV pilots during deployment of POD

## 5 Prerequisites

A pre job ROV survey is required to ensure the following risks are understood based upon the HAZID conducted for this operation. See table below:

Hazard	Pre-Job ROV/Deployment Survey Requirement
Poor visibility in the working area due to additional hydrocarbon release	Pre-job inspection at both cut points immediately before starting
LARS & clump weight location.	Need to survey equipment area for clump weight at the base of the Q4000 once at final position to operate the SCM. ROV needs to be cautious during deployment due to close location of the downlines from the LARS unit to the ROV deployment A-frame. ROV or umbilical could catch the LARS down-lines during deployment.
ROV Tether entanglement with seafloor debris or subsea structures such as manifold, accumulator skid, etc	Up to date field debris map, conduct ROV survey to verify, tether management, minimizing ROV operational requirements (i.e downline)
MUX & hyd hose line entanglements with subsea equipment and debris during installation.	Up to date field debris map, conduct ROV survey to verify, tether management, minimizing ROV operational requirements (i.e downline)
Not being able to secure hose to adequate anchor point	Pre job survey so ROV can identify best possible anchor points
Plume from leak creates hydrates in the bottom of the pod	Evaluate the direction of the plume prior to final move in.
Ensure ROV is consulted for preferential tie-off points on the MUX cable and hydraulic hot line.	Make tether points and monkey fists as long as necessary without creating any tether hazards
Mark off the cable so that the winch operator and ROV operator can see how much cable is payed out. Consider marking in increments matching the drill pipe stands.	Use high-vis tape every 10-feet. At the 100-foot mark use a thicker band, 200 use two thicker bands and so on so it is distinguishable. Once the MUX/hose reaches the point where it needs to be clamped to the winch wire, marking can discontinue.
Strain relief on the MUX / hotline	Ensure the hose bundle has adequate strain relief installed and tied off to the frame of the pod past the bend restrictor with a section of lanyard that is shorter than the section of hose.
Position of the clump weight in relationship to the drill pipe and ROV during deployment and operation	Put a beacon on the 6,500-lb clump weight to know its position subsea in relation to the q-4000
POD dropped during overboarding or descent - potential for people working with MUX / hotline	Personnel involved with lifting and transferring pod overboard should be aware of the stored energy potential in the wire

1. Go over JSA with crew – TOI Ray Picard to lead all operations
2. Confirm status of tools for job and their condition.
3. Perform ROV survey of BOP site. Determine the following:
  - Check condition of BOP stack, LMRP, and kinked riser
    - Need good visibility around yellow pod mounting base
    - Compare current status of BOP with photo log from 3 May 2010
  - ROV ingress vectors considering recovery means of a dead ROV, including cage. Recovery of dead ROV shall avoid the possibility of snagging the BOP stack, the kinked drilling riser, and the hydraulic hot line/MUX cable. Reference seafloor debris map, Fugro document number 10128601.
  - Identify potential tether snag obstacles that should be avoided
  - Inspect all valves in table below and confirm their failsafe positions (to be verified by a TOI rep). All valves on the PETU should be in the vent position before installing pod

Valve Name	Fail as position	Required Position
UIK	Close	Close
UOK	Close	Close
LIK	Close	Close
LOK	Close	Close
Kill Iso	Open	Close
Choke Iso	Open	Close
UIC	Close	Close
UOC	Close	Close
LIC	Close	Close
LOC	Close	Close
IGR	Close	Close
OGR	Close	Close

## 6 Overall Field Layouts & Summary

Some high level points regarding the Pod installation are:

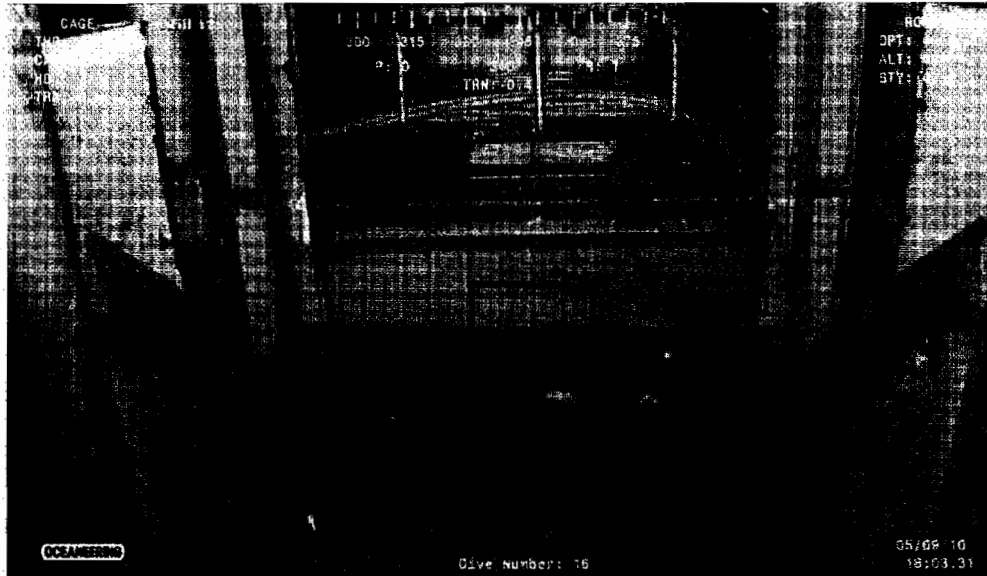
- Q4000 will deploy pod and retain control of the pod during well kill operations.
- The final position of the Q4000 drill center will be +/- 450-feet SE of Horizon BOP, in 5,000-ft water depth. The vessel hull should be +/- 350-feet SE of Horizon BOP.

- The Yellow POD will be deployed over the side of Q4000, and transferred subsea to a drill pipe running string. POD will be run on drill pipe through the drill floor.
- See Appendix D for more information.
- Reference BP drawing # MC252-SK-1001-01 for overall field layouts including the layaway direction of the Q4000.
- Reference BP drawing # MC252-SK-1004-01 for Q4000 deck layouts for the LARS package from OIE.
- Reference Attachment 1 for OIE LARS equipment scope for reference.
- Note the thruster locations of the Q4000. Due to the need for the MUX cables / hydraulic lines to be located underneath the rig, thruster fouling should be carefully considered.
- Review the procedures before deploying this kit to ensure that buoyancy, monkey fists, and/or reflective tape is applied in the correct equipment locations.
- Review the attached rigging drawing (see Attachment 2) for accuracy before running the pod.

## 7 Detailed Procedures

1. Check condition of POD per Cameron procedure. See Attachment 3 for procedures and complete pre-deployment checks.
2. Check that ROV has all required tooling, specifically its suck/blow tool for cleaning the pod receptacle.
3. Check that the landing string and space out for the drill pipe riser carrying the POD has been established.
4. Check that the MUX cable clamps have been tested and are available for fastening the MUX cable to the winch deployment wire.
5. Check that the swivel on the line holding the POD has been sized for the weight of the POD and is in working condition.
6. Check and inspect all ROV shackles and tri-plate connections.
7. Have ROV to review landout position of POD from previous photographs.
8. Check that buoyancy is attached to the D-ring and POD sling.
9. Ensure that the LMRP and BOP stingers are energized and retracted.
10. If used, deploy the small clump weight next to the Horizon BOP stack (200-lbs) and retrieve the POD receiver plate cover. Move Q-4000 to safe zone for recovery of this protector plate.
  - After the debris cap is removed, all work around this side of the stack not related to the yellow pod installation should stop to avoid the potential for dropped objects (no fly zone or no work zone)
  - The removal of the POD receiver plate and the cleaning of the POD receptacle can be performed by another vessel.
  - These operations can be performed by another vessel.

- POD receiver plate is approximately 45-in wide by 69-in long x 0.5-in inches thick and weighs approximately 450-lbs dry. It has 2 handles that a 2-leg sling is attached to and the 2-leg sling has a d-ring for ROV lifting operations.



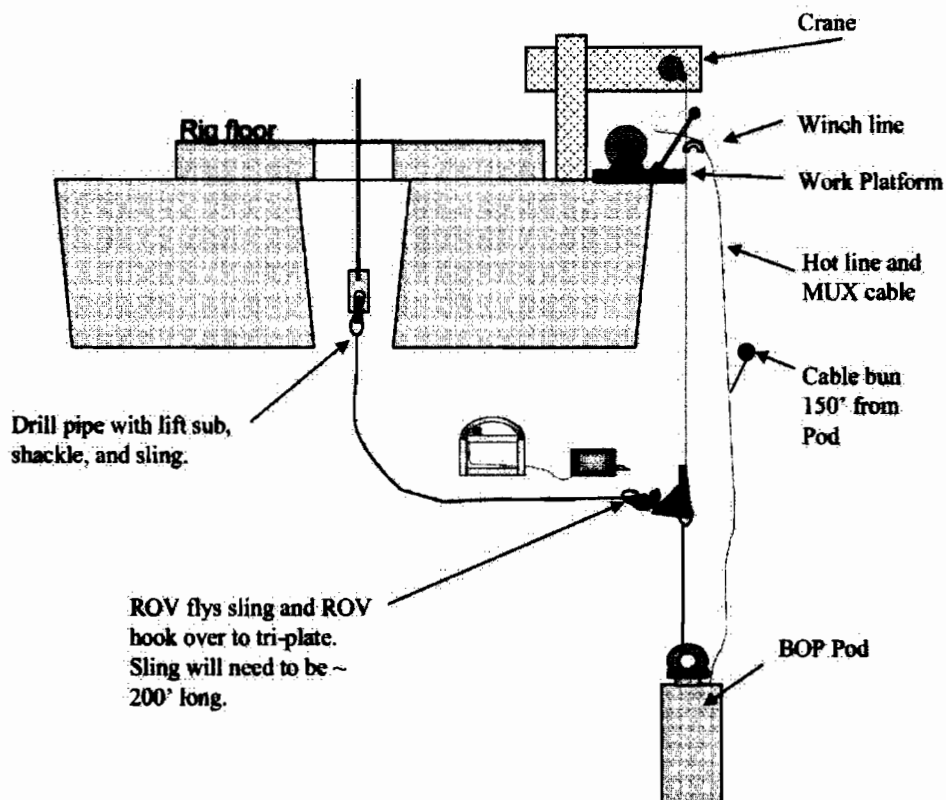
**Figure 1: POD Receiver Plate Cover installed**

11. Ensure that the Q4000 is at the 500-ft radius circle (safe lift zone)
12. Ensure that the MUX cable is attached to the yellow POD and secured.
13. Ensure all communication/ pre-deployment testing has been performed with the yellow POD.
14. Pick up the yellow pod with the MUX cable attached and secured and overboard off the port side of the Q4000 in preparation for a subsea transfer. The POD will have a sling attached to the padeye on the POD, which will connect to a D-ring. The tri-plate rigging assembly has an ROV hook to connect to the D-ring. ROV operators are to evaluate and include buoyancy on the D-ring depending on pilot preference. If buoyancy is not used, special care should be taken to ensure that the pod sling assembly is lowered carefully and does not damage any equipment on the stack.
15. Lower POD to a depth of 500-feet.
16. At the same time, lower the lift sub, tri-plate, and stinger with ROV hook or ROV shackle to desired depth for under water transfer (approximately 500-ft below the water line) on drill pipe. The MUX/hydraulic hot line bundle needs to be paid out at the same time to keep an adequate belly in the arrangement.
17. Record weight of drill pipe string with tri-plate and stinger at 500-ft depth.

18. Make sure the MUX/hotline hose bundle is marked every 10 feet and at each 100-foot mark for 750-feet. It is recommended that each 100-foot mark is larger and represents the actual distance, i.e., one mark for 100-feet, 2 marks for 200-feet, etc.

**WARNING:** All personnel involved with the deployment operation should ensure they have a clear egress route and are alert to the potential of parted rigging and its trajectory route.

19. The starboard ROV is the preferential ROV to do work while the MUX cable/hydraulic hot line are in the water since the port side ROV is next to the winch wire.
20. Have ROV retrieve shackle at the end of the drill pipe stinger and attach it to the tri-plate on the POD deployment wire.
21. Adjust POD or drill pipe stinger as necessary to allow ROV to make the connection.
22. Drill pipe and rigging space out should be finalized and checked to ensure they are at the correct elevation in the water column at the hand off point.

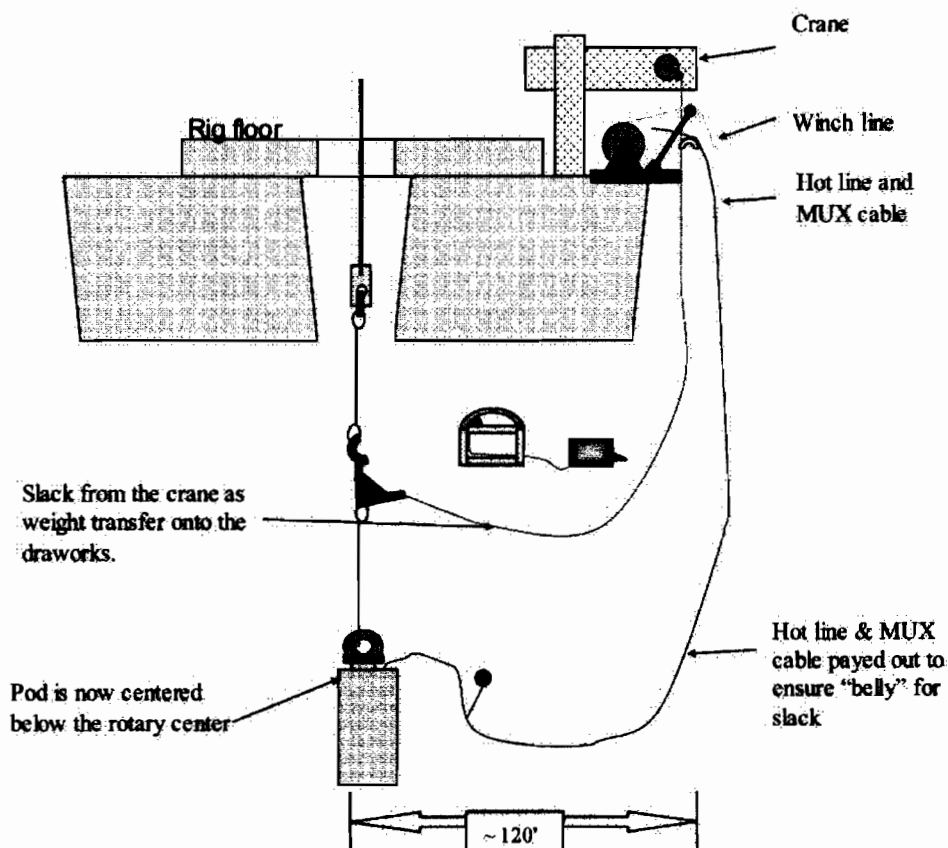


23. Pay-out another 200-ft of wire from crane. MUX cable and hydraulic hot line must be payed out simultaneously to ensure these lines stay slack.
24. Hold drill pipe steady and lower crane until the drill pipe fully supports the pod weight and the crane line goes slack.

**Note:** TRANSFER WEIGHT SLOWLY TO ALLOW SWIVELS IN RIGGING TO ADJUST TO TORQUE BUILD UP IN THE RIGGING SYSTEM. ROV TO MONITOR FOR POD ROTATION DURING VESSEL WEIGHT TRANSFER.

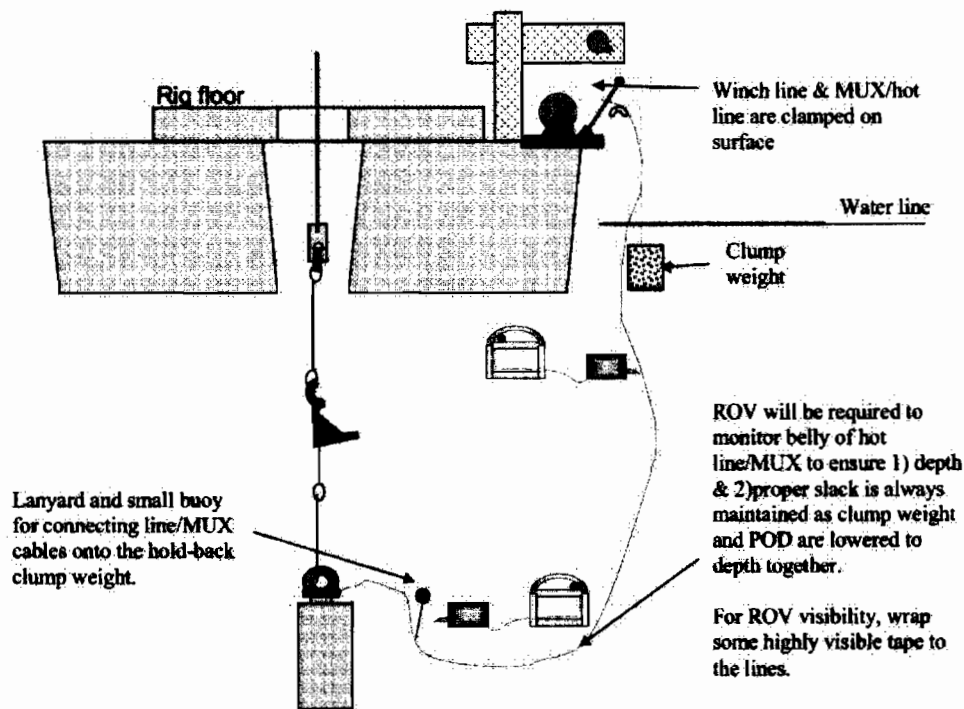
• **CONTINGENCY NOTES:**

- Swivels in the rigging list have been included to assist with pod rotation mitigation during transfer from crane to drill pipe. CAUTION: spinning of the rig Pod may cause damage to the MUX or hydraulic hot line terminations.
- Recommend that the 200-lb clump wt for holding back up to the MUX and Hydraulic hot lines be deployed by ROV and positioned to accommodate location of "cable bun".





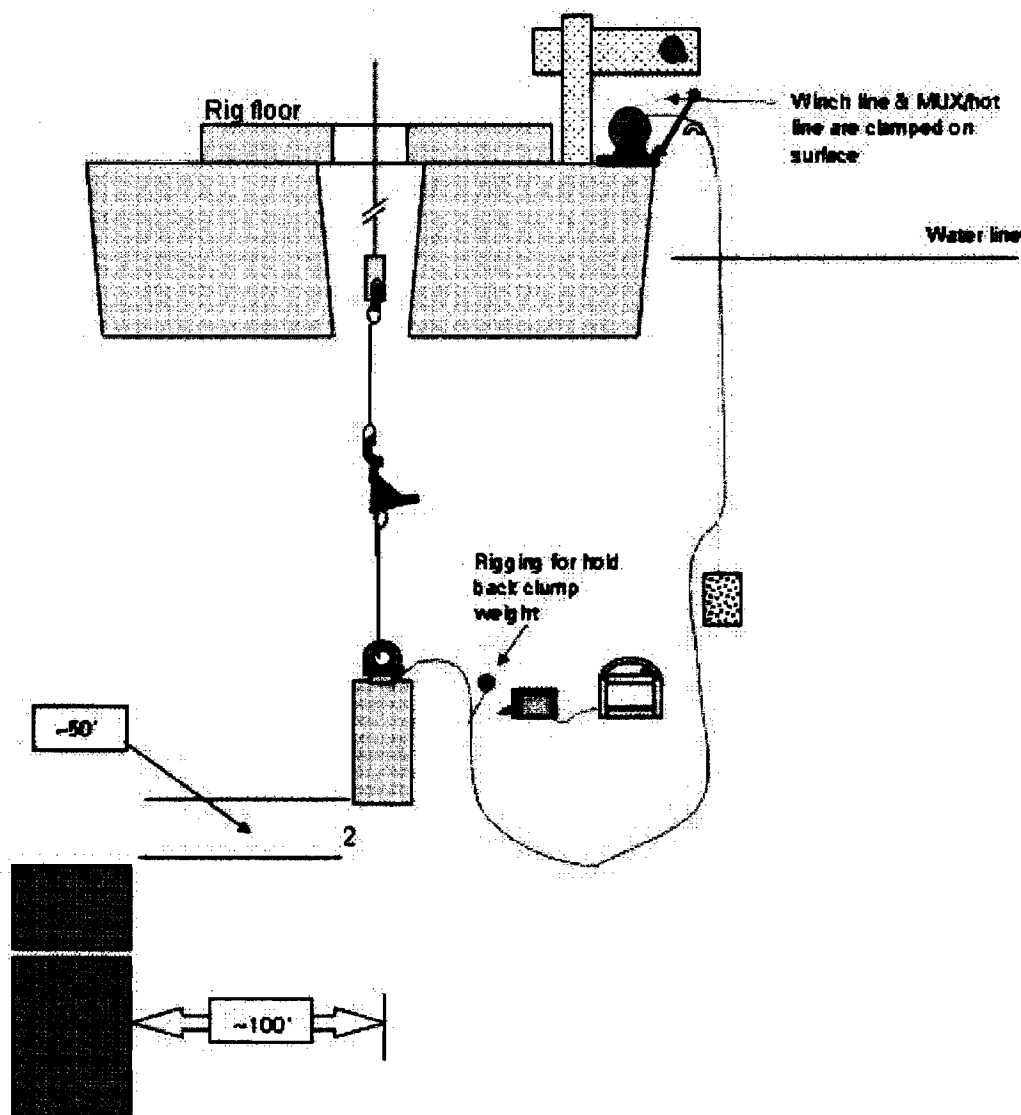
25. Once the weight of the Pod is on the drill pipe, ROV disconnects hook from the tri-plate and crane pulls hook back to surface.
26. Record weight of POD and drill pipe running string. Determine weight estimate for POD.
27. Deploy the clump weight using the LARS.
28. Lower the clump weight to approximately 10-ft below surface (assuming the clump weight is now connected to the wire winch). The clump weight weighs 6,500-lbs.
29. Once the clump weight is 10-ft below the water, make up the first MUX/hydraulic hot line clamp to the winch wire. The work platform will be used to make up the clamps.
30. Ideally there will be approximately 700-ft to 800-ft of MUX/hydraulic hot line cable between the yellow BOP pod and the first clamp point. It is permissible to have more than 700-ft **but not less than 700-ft**.



31. MUX cable and hydraulic hot line will be run on winch and downline, clamped together, every 50 to 100-feet. Every time the drill floor stops to make a drill pipe connection, a clamp should be installed. Both POD and MUX cable/hydraulic hot line will be run simultaneously. (POD on drill pipe through rotary, MUX cable/hydraulic hot line on winch wire over the side of the Q4000). Line of sight and communication between drill floor and winch operators is critical during deployment operations.



32. Lower the BOP Pod and the clump weight to 200-ft above the mudline. This should be done while still on the edge of the 500-ft R safe zone. ROV to check that the belly depth does not exceed the depth of the bottom of the pod.
33. Move the rig to within 100-ft of the Horizon BOP stack at approximately 0.5-knot speed (1-knot max) and at a heading that coincides with the corridor where the junk shot manifold is installed. ROV will monitor the hydraulic hot line / MUX cable belly to ensure proper slack, the clump weight and Yellow pod for potential subsea structure interference. Before making the final move into the BOP stack, the belly of the MUX cable/hydraulic hot line needs to be pulled in to reduce the possibility of entanglement and snagging.

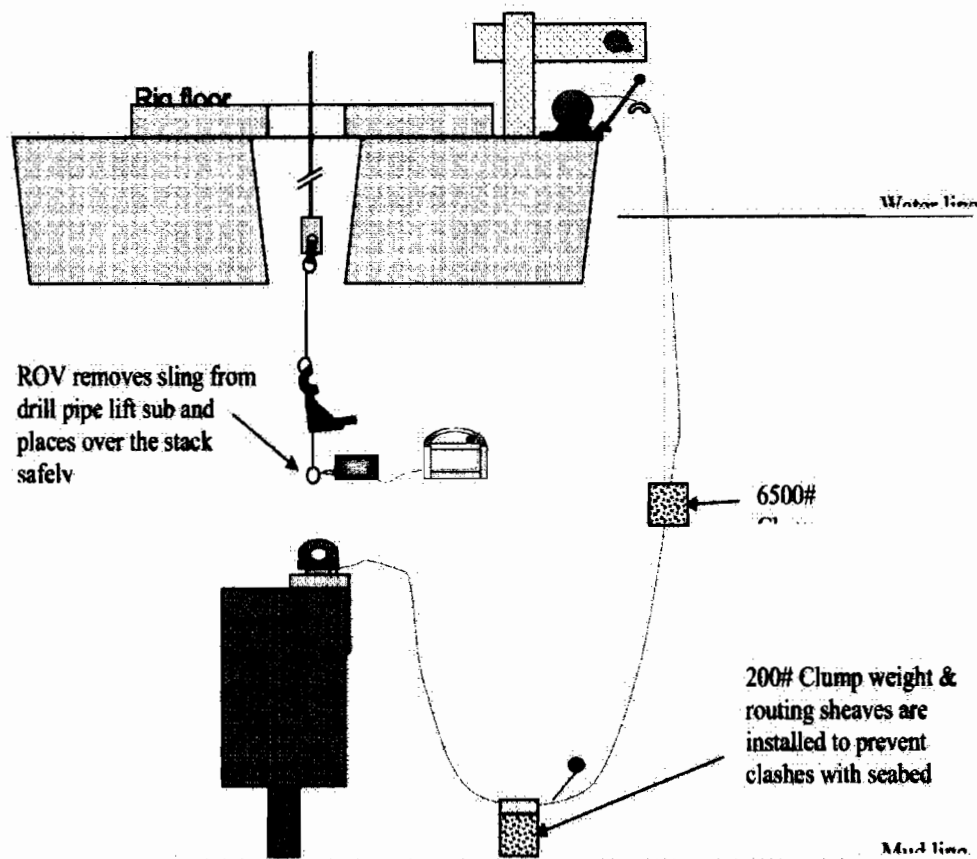


34. When the rig is within 100-ft of the Horizon stack, lower the Yellow pod and clump weight to within 50-ft of elevation of the yellow pod landing point on the Horizon BOP stack.

35. ROV should locate the side of the pod with the visible number "2" located on the panel. This side of the pod should be facing outward when pod is installed.
36. Before lowering the pod any further, activate the heave compensation system and ensure it is functioning properly.

**Note: If heave is more than 1-ft, all operations to STOP until conditions improve.**

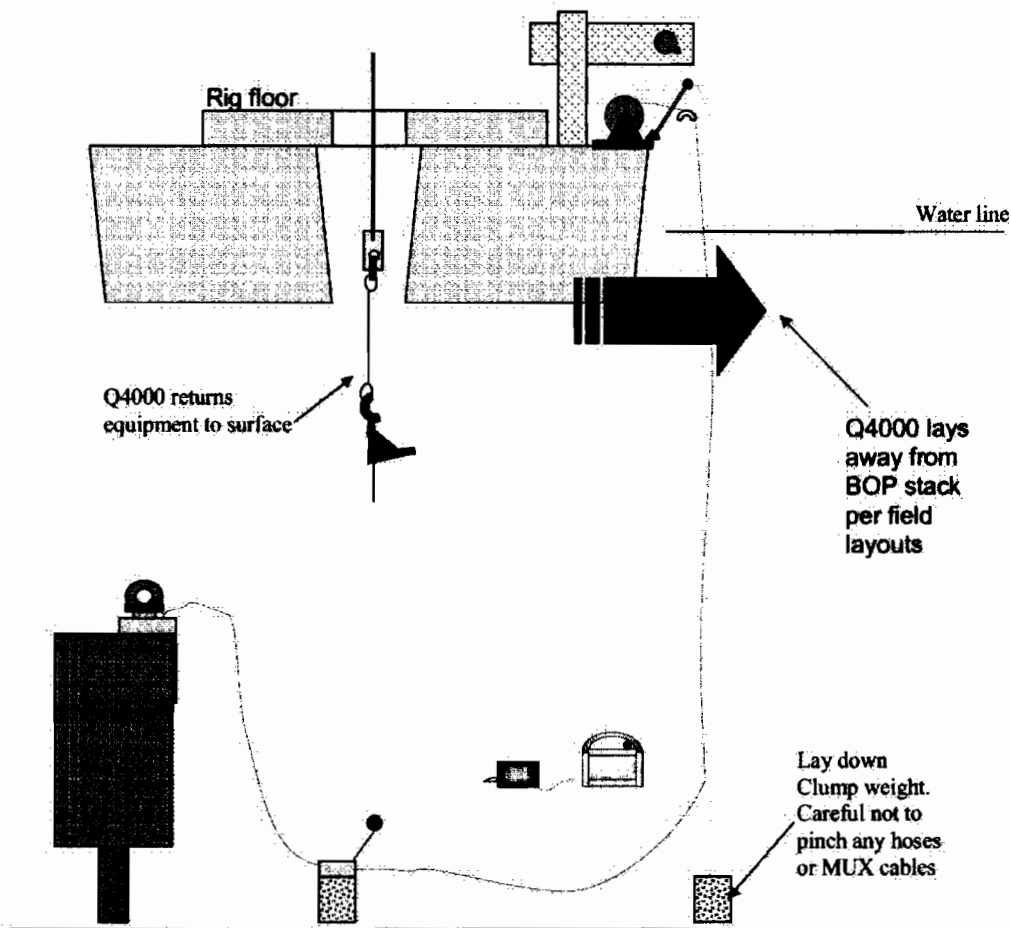
37. ROV should ensure that the LMRP & BOP stingers are retracted.
38. Move Q-4000 such that the pod travels horizontally above the stack by 50-ft. Once in position over the LMRP, lower the pod vertically into the capture system.
39. The LMRP stinger is the lowermost point on the POD and must be guided into its receiver plate first.
40. As the POD slips into the remaining guide frame and lands out, slack off weight of POD to land POD.
41. Land & Lock Yellow POD onto Horizon LMRP. Slack off slowly on the drill pipe to get all the weight off of D-ring Pod sling assembly and disconnect at the ROV hook. Drill pipe stinger should be disconnected from POD by ROV.
42. Ensure that the stinger on the drill pipe does not drop down to entangle with the D-ring and POD slings. When disconnected, the D-ring and POD sling should be extended by the buoyancy to allow easier reconnection to the POD, if needed.
43. Once the pod has successfully landed on the LMRP, verify all manifold regulators are still set at 1,500-psi.
44. De-energize LMRP Stinger.
45. Extend LMRP Stinger.
46. Energize LMRP Stinger.
47. De-Energize Stack Stinger.
48. Extend Stack Stinger.
49. Energize Stack Stinger.



50. Function the C/K isolation valve close function, valves should open. ROV to confirm valve movement (assuming the well kill lines have been connected and tested).
  51. Function test LMRP C & K isolation valves and leave in closed position.
  52. Lay MUX cable/hydraulic hot line away from BOP stack per Attachment 4.
- Note: Do not pull drill pipe until Q4000 is in the designated Safe Zone.**
53. Begin laying the downline/MUX cable/hydraulic hot line per Attachment 4 until the bundle can be attached to the clump weight at the base of the BOP. Once attached to the clump weight, begin laying in direction of the prescribed corridor routing until clump weight with guillotine on winch line is 500 to 600-feet away from BOP. Location of clump weight is determined by location of deployment winch mounted on Q4000, heading of Q4000, and offset of Q4000 from Horizon BOP.
  54. Continue to payout and clamp the MUX cable/hydraulic hot line to the winch cable until final vessel offset position is reached.
  55. Slack MUX cable/hydraulic hot line and winch wire. Deploy a minimum of 100-ft of slack once the clump weight is in position. ROV should attempt to lay the slack in a coil or pattern such that it will not get snagged on any subsea equipment if there is a disconnect.

56. When finished with the equipment installation, ROV arms the guillotine.

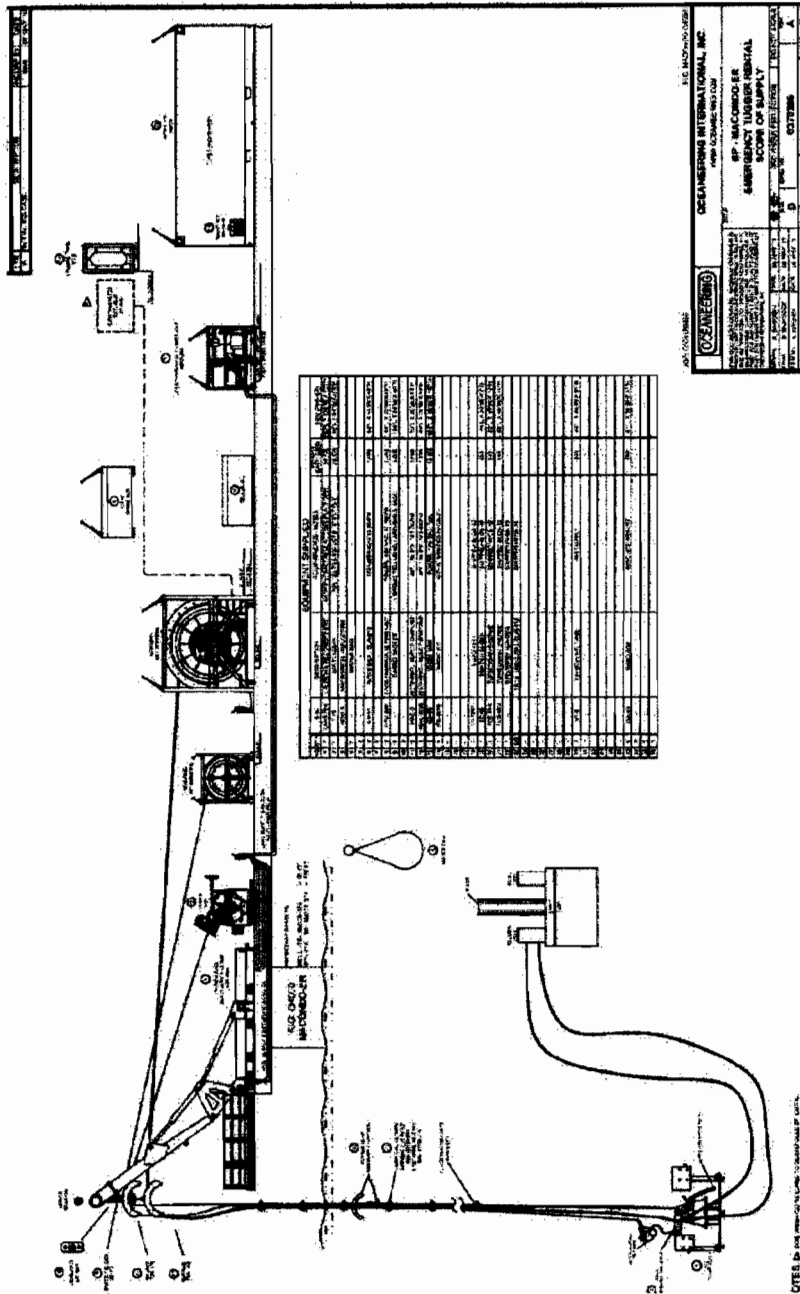
**CAUTION:** After this point, if there is a disconnect without any further action, the MUX cable and hydraulic hot line will shear and the BOP Pod will have to be retrieved. During planned moves, to prevent inadvertently cutting the MUX and hose lines, remove them from the guillotine.



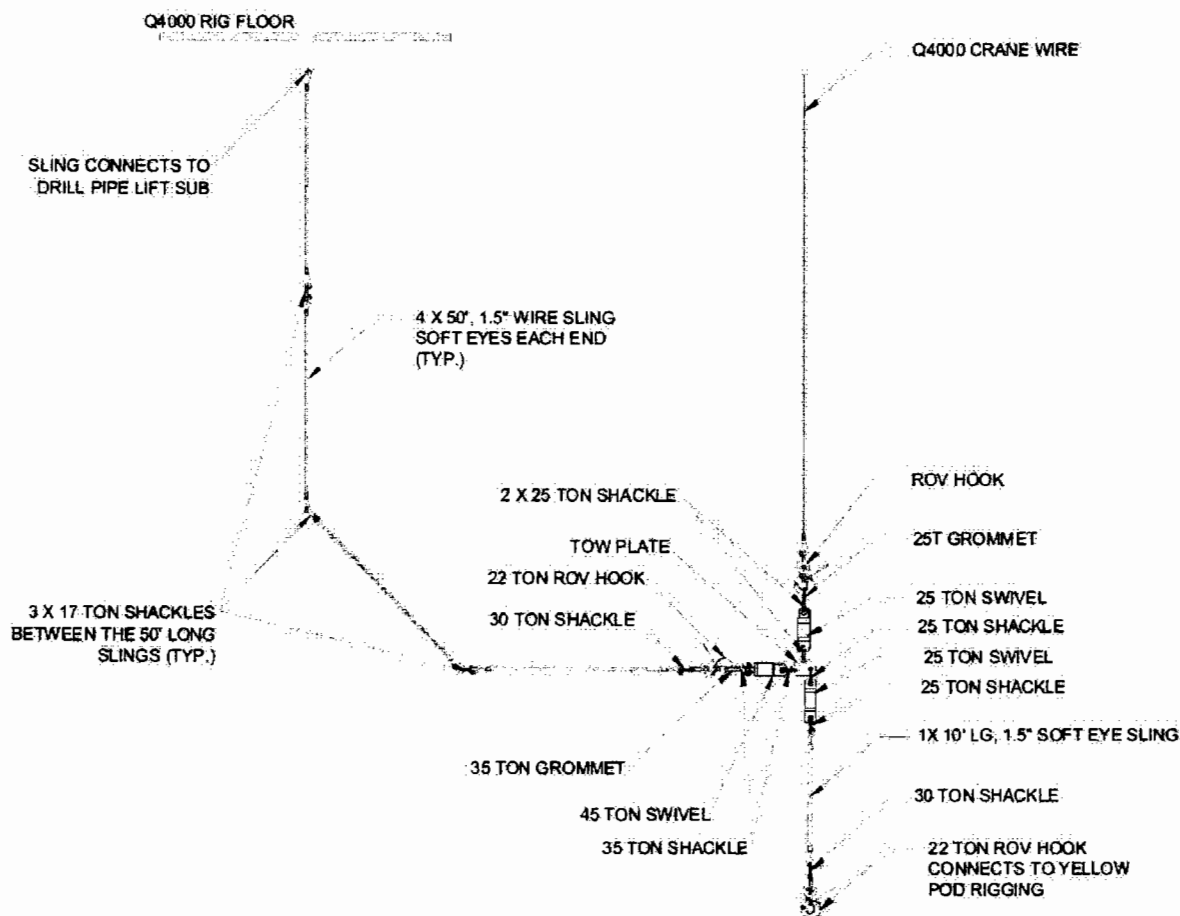
## 8 Pertinent Equipment Data

- Estimated weight of POD – 22,000-lbs
- Max layout distance = 9,500-ft based on
  - POD voltage – 230 AC
  - POD Amperage – 15-Amps normal, 30-Amps max.
  - POD power phase – single phase
- Number of wires allocated for power – 4 wires, 2 for primary power, 2 for backup power
- Number of wires allocated for comms – 4 wires, 2 wires (twisted pair) for primary comms, 2 wires (twisted pair) for back-up comms.
- MUX cable connection to POD – Seacon Roughneck drymate connector
- MUX cable is 11,000-feet long
- Hydraulic hot line is 5,600-feet long. Another 5,000-ft hydraulic hot line can be spliced onto it.


Attachment 1  
DIE-LANS Equipment Overview





Attachment 2  
Rigging Drawing

Attachment 3  
Cameron Pod Procedures

PROPERTY OF  CAMERON CONTROLS	DRAWN BY	REV	DOC. NO.
	DATE 08 May 2010	01	

**POD DEPLOYMENT AND INSTALLATION PROCEDURE  
FOR  
MARK-II CONTROL POD  
CAMERON P/N 2020708-21**

**R & B FALCON  
"Deepwater Horizon"**

PREPARED BY: \_\_\_\_\_ Date: \_\_\_\_\_


APPROVED BY: \_\_\_\_\_ Date: \_\_\_\_\_

CUSTOMER ORDER NO.: \_\_\_\_\_

SERIAL NO.: \_\_\_\_\_

1 of 5




<b>PROPERTY OF</b>  <b>CAMERON CONTROLS</b>	<b>DRAWN BY</b>	<b>REV</b>	<b>DOC. NO.</b>
	<b>DATE</b> 08 May 2010	01	

**Table of contents**

1.0	Scope	3
2.0	Reference Documents/Drawings	3
3.0	Visual Inspection	3
4.0	Accumulator Bottle Precharge	3
5.0	Pre-Deployment	3
6.0	Deployment	5
7.0	Installation	5

2 of 5

<b>PROPERTY OF</b>  <b>CAMERON CONTROLS</b>	<b>DRAWN BY</b>	<b>REV</b>	<b>DOC. NO.</b>
	<b>DATE</b> 08 May 2010	<b>01</b>	

**1.0 Scope**

This document outlines the procedure for deploying and installing Horizon's pod. It shall detail all the necessary steps and verifications before and during deployment and during installation.

**2.0 Reference Documents/Drawings**

Item	Description	CAMERON Doc. No.	CAM Rev.
1.	BOM, Mark II Control Pod Assembly	2020708-21	
2.	BOM, Mark II Control Pod Hydraulic Assembly	2020708-21-01	
3.	BOM, Mark II Control Pod MUX Assembly	2020708-21-02	
4.	Flow Diagram, Mark II Control Pod	SK-122108-21-05	
5.	Assembly Drawing, Mark II Control Pod	SK-122108-21-04	

**3.0 Visual Inspection**

Visually verify that the pod is completely assembled and ready for testing. All pipe, tubing, and hose fittings should be properly connected. Any disconnected fittings, loose fasteners, or other potential problems should be corrected before proceeding.

**4.0 Accumulator Bottle Precharge**

Precharge all the pod accumulator bottles per the Subsea Pilot Accumulator Precharge Table on sheet 1 of SK-122108-21-05.

Verify \_\_\_\_\_

**5.0 Pre-Deployment**

This procedure assumes the pod is already electrically and hydraulically connected.


- Power SEM up and verify communication has been established with both SEM A & B.

Verify \_\_\_\_\_

- Select SEM A

Verify \_\_\_\_\_

3 of 5

PROPERTY OF	DRAWN BY	REV	DOC. NO.
 <b>CAMERON CONTROLS</b>	DATE	01	
	08 May 2010		


- Verify that there are no solenoid breaks  
Verify: \_\_\_\_\_
- Using the Hotline supply, supply the pod with 5000 psi and verify the Main Pilot Supply Pressure reads 5000 psi  
Verify: \_\_\_\_\_
- Verify Solenoid Regulated Pilot Supply Readback Pressure is 3000 psi, if not adjust Solenoid Supply regulator  
Verify: \_\_\_\_\_
- Set Regulators to the below table

Regulator Description	Pressure Setting	Verify
Lower Annular	1500 psi	
Upper Annular	1500 psi	
LMRP Connector	1500 psi	
Wellhead Connector	1500 psi	
Pod Manifold	1500 psi	

- De-Energize Stack Stinger  
Verify: \_\_\_\_\_
- Retract Stack Stinger into Test Ring  
Verify: \_\_\_\_\_
- Energize Stack Stinger Seals  
Verify: \_\_\_\_\_
- De-Energize LMRP Stinger  
Verify: \_\_\_\_\_
- Retract LMRP Stinger into Test Ring  
Verify: \_\_\_\_\_
- Energize LMRP Stinger Seals  
Verify: \_\_\_\_\_

4 of 5

PROPERTY OF  <b>CAMERON CONTROLS</b>	DRAWN BY	REV	DOC. NO.
	DATE	01	
		08 May 2010	

**6.0 Deployment**

- During deployment leave SEM on A and ensure communication.

Verify: \_\_\_\_\_

**7.0 Installation**

- Once the pod has successfully landed on the stack, verify all regulators are still set at 1500 psi.

Verify: \_\_\_\_\_

- De-Energize LMRP Stinger Seals

Verify: \_\_\_\_\_

- Extend LMRP Stinger into the receptacle

Verify: \_\_\_\_\_

- Energize LMRP Stinger Seals

Verify: \_\_\_\_\_

- De-Energize Stack Stinger Seals

Verify: \_\_\_\_\_

- Extend Stack Stinger into the receptacle

Verify: \_\_\_\_\_

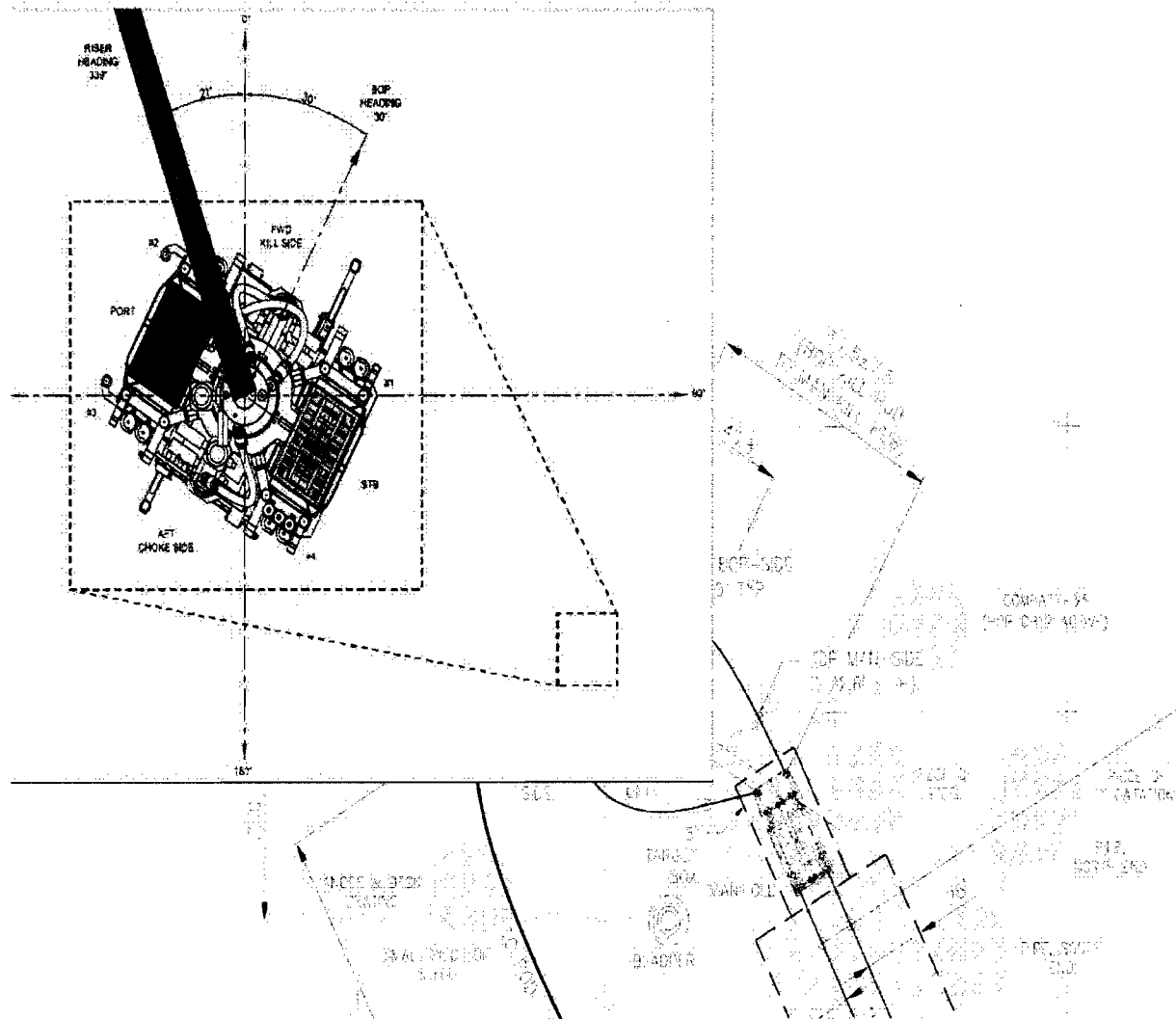
- Energize Stack Stinger Seals

Verify: \_\_\_\_\_

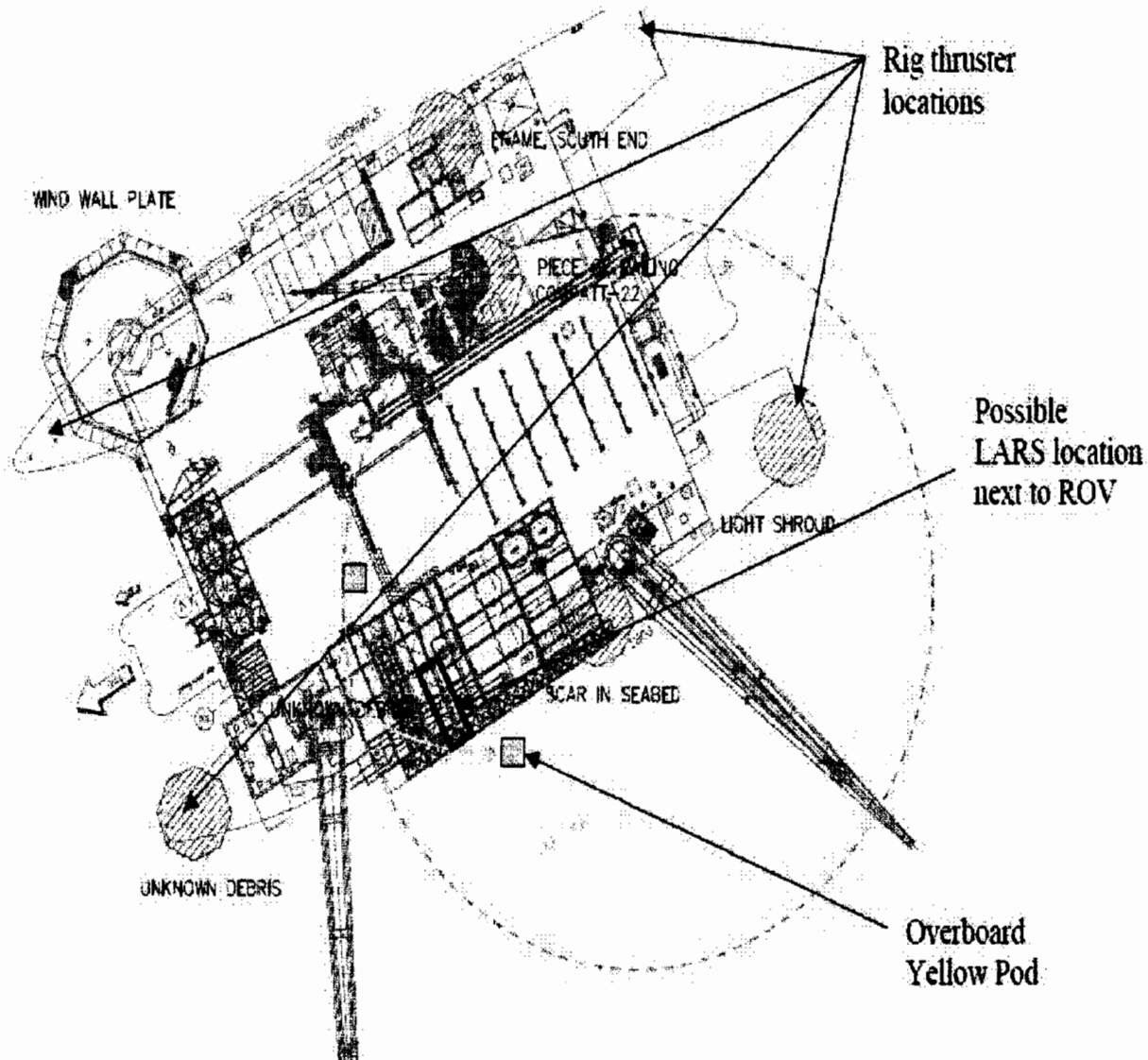
5 of 5

## Attachment 4

### Field and Vessel Layout Drawings









Category	Description	X-coordinate <sup>1</sup>	Y-coordinate <sup>1</sup>
Subsea Coordinates	Subsea Coordinate #1 (pod)	1,202,796	10,431,620
	Subsea Coordinate #2 (clump weight)	1,202,747	10,431,607
	Subsea Coordinate #3	1,202,794	10,431,469
	Subsea Coordinate #4	1,202,944	10,431,354
	Subsea Coordinate #5	TBD	TBD
	Subsea Coordinate #6	TBD	TBD
	Subsea Coordinate #7 (clump weight)	TBD	TBD
Topsides Coordinates	RKB centerline while rig at "top kill" pumping location	TBD	TBD
	Rough estimate of	TBD	TBD

1 - Note that the coordinates above are recommendations only. Field conditions will dictate the final coordinates. The information above is provided for guidance regarding the placement and routing of the mux/hot lines. Final rig locations will affect the x,y coordinates shown above.

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HAZID Worksheets

Yellow Pod Installation and Test Procedure					Pre-Risk				Risk	Mitigation Measures	Comments
Hazard Scenario	Causes	Consequences	Safeguards		Sa	Env	Fin	Prod			
Debris plate dropped on kinked riser, BOP, or junk-shot manifold	rigging failure current vortex large sail area of plate	Kinked riser leak increases Potential to damage BOP controls	Light load multiple ROVs			D		4		Include statement in procedure to take debris plate out to the safe lifting zone for recovery	
POD dropped during overboarding or descent - potential for people working with MUX / hotline	rigging failure	Significant delay of top kill project Sudden release of tension results in personnel injury / fatality	engineered rigging has a very high safety factor JSEA to address personnel hazards		E		F	3		Add a line to the hazards section of the procedure to mention release of tension on the MUX / hotline.	
MUX / hotline cable takes load of POD	poor communication between crane, ROV, and winch operators	Potential of damage or separate the MUX / hotline. Significant delay of top kill project Sudden release of tension results in personnel injury / fatality	clump weights on the MUX / hotlines JSEA to address personnel hazards		E		F	4		Investigate methods to prevent tangling ROV cable and MUX / hotline. Use the starboard ROV during overboarding	
MUX / hotline cable becomes entangled with ROV deployment cable.	ROV winch is very close to where the LARS is located.	Damage or separation of MUX or hotline Significant delay of top kill project	Operator awareness of problem				F	6		Add line to procedure to slowly transfer load between cranes to allow swivels time to account for cable twist.	
POD dropped during handover	Spinning of load rigging failure	Significant delay of top kill project Sudden release of tension results in personnel injury / fatality	Swivels in all three legs of transfer rigging. engineered rigging has a very high safety factor JSEA to address personnel hazards		E		F	3		Ensure soft slings are seized together so that this is only 1 eye for the ROV to string with hook. Modify procedure to hold the drill pipe static and payout with the crane during load transfer.	
Line entanglement with thrusters	Considered best managed offnote.		Captain has discretion to isolate DP thrusters on port side.							Add a line to the hazards section of the procedure to mention entangling lines with DP thrusters.	
POD contacts seafloor	Miscommunication during initial descent Heave compensation failure at lower depth	Significant delay of top kill project	ROV descending with equipment Seafloor is well mapped and relatively flat.				F	4			

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Yellow Pod Installation and Test Procedure					
Hazard Scenario	Causes	Consequences	Safeguards	Pre-Risk F D C B A	Risk F D C B A
	ROV is watching the POD rather than the line		Communication ROV monitoring both POD and line Measurement		
MUX / hotline "belly" drags across seafloor	Too much slack - poor coordination with operators	Snag the line - line break	Passive and active heave compensation available on the drill pipe. Space out with drill pipe prior to last move over BOP	F 4	Add to procedure to watch for belly contacting the seafloor as the POD approaches depth. Suck up belly prior to final move-in.
POD hits BOP	Heave Poor communication Dropped drill pipe Vessel movement overshoots BOP	Impact causes new or increased leaks Pull POD to inspect	Avoid plume Monitor POD with ROV ROVs in the plume have not experienced hydrate formation ROV will have wand for cleaning (per previous action).	D F 5	Add line to monitor effectiveness of heave compensation as POD approaches BOP. Heave should not exceed 1' of movement.
Hydrates form in the POD while passing through oil plume	Plume changes direction with current No one watching plume Vessel overshoot BOP	Visual inspection of POD NO SIGNIFICANT CONSEQUENCE IDENTIFIED.			
ROV tether catches MUX cable and drags it.	Failure to manage ROV tether Monkey fist or cable connectors to snag tether	Snag the line -line damage ROV gets tangled.	Operator has a sense of the ROV responding sluggishly. Minimize the number of monkey fists Multiple ROVs	F 4	Evaluate the minimum number of monkey fists required and ensure that adequate tape is used to keep lines together.

2200-T2-LC-RP-4039

TRN-MDL-00496184

TDR018-002123

