

Safety Alert

BSEE

**U.S. Department of the Interior
Bureau of Safety and
Environmental Enforcement
Gulf of Mexico OCS Region**

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Unplanned Emergency Disconnect Sequence (EDS) of the Lower Marine Riser Package

While the rig employees were troubleshooting a network issue on the Driller's Blowout Preventer (BOP) control panel of an ultra-deepwater semisubmersible drilling rig, an unplanned EDS occurred. The EDS of the deepwater well resulted in: 1) closing of the casing shear rams on electric line being used for logging and 2) closing of the blind shear rams and a disconnect of the Lower Marine Riser Package (LMRP) from the BOPs. The wellbore was cased with no perforations and had been successfully positive and negative pressure tested. Subsequent to shear ram activation, a non-radioactive logging tool was dropped into the well, with approximately 849 bbl of 9.0 ppg calcium chloride completion fluid released into the Gulf waters from the riser and boost line valves that failed in the open position. The LMRP was re-latched to the BOP stack, a storm packer was installed and another negative test was successfully performed before the BOP stack was pulled back to the surface for diagnostics and repairs. No sheen was observed due to the loss of the completion fluid, and the electric line and tool will be recovered when the well is re-entered.

A BSEE investigation revealed the following:

- In the six (6) hours leading up to the unplanned event, there was an intermittent loss of communication between the Driller's BOP control panel Nodes 7 and 8 via both Network's 1 and 2 with the Central Computer (CCU). The visual red alarm/alerts in the background touch screen interface were very short in time spans; however, the visual alarms would display after the Driller's BOP control panel was off network for a continual duration of 30 seconds. In all cases, network errors and communication losses were intermittently cycling with an increasing frequency and did not result in the EDS occurrence.
- One unsuccessful attempt was made to recycle power to both Nodes 7 and 8 of the Driller's control panel in an effort to eliminate the communication losses. Subsequent to recycling, the Driller's BOP control panel was opened and entered by the drilling contractor's Senior Subsea Engineer, Chief and rig Electricians in order to determine the cause of the loss of communications. It was during this period when the EDS incident occurred from the Driller's panel.
- A Job Safety Analysis (JSA) was not performed prior to entering the Driller's panel, and the Offshore Installation Manager (OIM) was not aware of the troubleshooting operation inside the Driller's BOP control panel; he was only made aware that the power would be recycled.
- A GE/Hydril Bulletin EB11-011 dated 8 December 2011 indicates that the PCI Digital I/O 1930248-01 should have been replaced with board 3149494 to eliminate the nodes and networks from working offline; however, as outlined above, the nodes and networks did not directly contribute to the EDS. These boards should be changed out in the following panels: Processor Array Cabinet (Blue and Yellow), HPU Interface Panel, HPTU Interface Panel, Diverter Interface

Panel and the Driller's Panel with I/O boards; the Driller's panel is where the disconnect took place.

- A GE/Hydril Engineering Bulletin EB11-004 dated 3 August 2011 addresses that an accidental EDS activation can occur if the ribbon cable (P/N 1930050-01) was to become disconnected while the system is powered up or in the operating mode.
- On 13 December 2011 the drilling contractor received a copy of GE/Hydril Bulletin EB11-011 which cautioned that a voltage disruption to the digital board or disconnection of the ribbon cable and/or Molex connectors could result in actuation of the EDS. The Bulletin also states that if service is required to the panel, disconnection from the power source is required.
- The EDS occurred by the rig Electricians not disconnecting the power source before performing troubleshooting operations, resulting in a reduced voltage drop across the Solid State Relay (SSR) board when the power source line was disrupted or the communication ribbon cable was moved.
- Two Media Converter Switches located inside the Driller's BOP control panel caused the network disruptions leading to the alarms/red flashing background on the panel screen. The faulty switches and the Driller's BOP control panel being offline did not cause the EDS.
- Both Media Boards and faulty Media Converter Switches associated with Networks 1 and 2 were replaced during BOP stack retrieval, resulting in once again all Networks and Nodes working properly.
- It was determined from GE/Hydril that this is the third occurrence of this kind associated with this particular type of Solid State Relay board; the first occurrence was at a rig shipyard in October 2011, and the second in December 2011 while in the field overseas.

The BSEE recommends to the Lessees, Operators and their contractors that:

- All rigs adhere to the guidelines outlined in the GE/Hydril Engineering Bulletins EB11-011 and EB 11-004.
- A formal written JSA must be completed and discussed prior to performing work in the Driller's BOP control panel in order to provide an opportunity to perform the potential hazard analyses associated with the tasks; including present status of wellbore conditions and operations. Only then can the risks associated with the tasks be reduced to As Low as Reasonably Practicable (ALARP). It is not the JSA Form alone that enhances safety on the job, but rather the process the JSA represents.
- Chain of command must be implemented at all times and the OIM consulted prior to troubleshooting critical BOP control equipment.
- Troubleshooting of the Driller's BOP control panel must be performed while the panel is disconnected from the power source or according to the manufacturer's recommendations.
- The rig installation of a ribbon cable bracket to prevent any disconnection of the I/O board and resulting EDS activation.

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A Safety Alert is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding an accident or a near miss. It also contains recommendations that should help prevent the recurrence of such an incident on the Outer Continental Shelf.