



OTC 18413

Shell Pipeline's Infrastructure Recovery After Hurricanes Katrina and Rita

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This paper was prepared for presentation at the 2006 Offshore Technology Conference held in Houston, Texas, U.S.A., 1-4 May 2006.

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Abstract

Hurricanes Katrina and Rita packed a devastating one-two punch to the Shell Pipeline Company (SPLC) operated infrastructure in the Gulf of Mexico. Katrina, which hit the Louisiana/Mississippi coast on August 29th devastated the eastern gulf pipelines/facilities with high water, wind and seas. Rita, following three weeks later, struck the western Gulf and produced havoc due in large part to the number of drilling rigs which were broken loose from their moorings.

Both storms had different characteristics but the destruction can be placed into the following categories:

- Flooded facilities with significant structural and electrical damage
- Topped platforms affecting boarding & departing pipelines
- Dented, cracked or separated pipelines caused by drill rigs dragging anchors

The Katrina and Rita storms were much different than Ivan (2004) with regards to pipeline movement due to mudslides. Ivan took a more easterly track than Katrina and its impact was very significant from a mudslide perspective. While there was some pipe movement associated with Katrina as it stretched into the eastern portion of the Mississippi River Delta, its impact due to slides was far less severe.

This paper describes the actions following the storms and the subsequent repair activities, which were required to return the SPLC systems to operation.

In essence, the entire Gulf of Mexico pipeline infrastructure operated by SPLC was impacted by the two storms. Katrina concentrated her destructive force on facilities east of Fourchon while Rita took her toll on the facilities west of

Fourchon. Repairs totaling more than \$100 million are in progress. Repair work commenced immediately following the storms and will continue well into 2006.

Inspection of the Infrastructure

Immediately following the passage of Katrina, survey vessels with side scan sonar and magnetometer equipment were employed to begin surveying pipelines for damage, pipe movement, spans and exposures. Work concentrated in the eastern Gulf in the Nakika and Odyssey pipeline corridors in Mississippi Canyon and Main Pass blocks. Simultaneous to the side scan surveys, ROV and diver surveys were being conducted of risers, platform structures and areas where anchor drags were suspected.

Damage to the Mars and Ursa export lines was discovered due to a Mobile Offshore Drilling Unit (MODU) which dragged an anchor across all four lines. A remotely operated vehicle (ROV) spread was engaged to excavate the lines which were pushed down into the mud five feet and displaced 15-30 feet to the east of their as-built coordinates. A significant dent was discovered in the Ursa 20" Gas line while a less severe dent was found in the Ursa 18" Oil line. Excavation of the Mars lines revealed a through wall thickness crack in each line with seawater being pulled into the gas line.

While the damage from Katrina was being evaluated, Rita struck on a more westerly track. Once the storm passed, additional side scan survey equipment was placed on hire and surveys of the Brutus, Boxer and Amberjack pipeline systems conducted. Due to the large amount of drilling rigs that were displaced due to Rita, the surveys were prioritized so that systems with little topsides damage could be evaluated for return to service.

In total, three ROV spreads, two diving spreads and three side scan survey spreads were utilized to inspect the entire pipeline infrastructure operated by SPLC in a two month period.

As a result of Rita, a number of drilling rigs broke loose from their moorings and crossed over the SPLC infrastructure in the Eugene Island, South Marsh Island, Garden Banks and Vermilion areas. Approximately four dozen unique suspect anchor drag crossing locations were investigated before pipeline systems were restarted. This effort required extensive coordination between the engineering and operations groups to clear suspect areas, perform standup tests and then return the lines to service.