



Damage to offshore infrastructure in the Gulf of Mexico by hurricanes Katrina and Rita

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The damage inflicted by hurricanes Katrina and Rita to the Gulf-of-Mexico's (GoM) oil and gas production, both onshore and offshore, has shown the proneness of industry to Natech accidents (natural hazard-triggered hazardous-materials releases). In order to contribute towards a better understanding of Natech events, we assessed the damage to and hazardous-materials releases from offshore oil and natural-gas platforms and pipelines induced by hurricanes Katrina and Rita. Data was obtained through a review of published literature and interviews with government officials and industry representatives from the affected region. We also reviewed over 60,000 records of reported hazardous-materials releases from the National Response Center's (NRC) database to identify and analyze the hazardous-materials releases directly attributed to offshore oil and gas platforms and pipelines affected by the two hurricanes.

Our results show that hurricanes Katrina and Rita destroyed at least 113 platforms, and severely damaged at least 53 others. Sixty percent of the facilities destroyed were built 30 years ago or more prior to the adoption of the more stringent design standards that went into effect after 1977. The storms also destroyed 5 drilling rigs and severely damaged 19 mobile offshore drilling units (MODUs). Some 19 MODUs lost their moorings and became adrift during the storms which not only posed a danger to existing facilities but the dragging anchors also damaged pipelines and other infrastructure. Structural damage to platforms included toppling of sections, and tilting or leaning of platforms. Possible causes for failure of structural and non-structural components of platforms included loading caused by wave inundation of the deck. Failure of rigs attached to platforms was also observed resulting in significant damage to the platform or adjacent infrastructure, as well as damage to equipment, living quarters and helipads. The failures are attributable to tie-down components and occurred on both fixed and floating platforms. The total number of pipelines damaged by Hurricanes Katrina and Rita as of May 1, 2006, was 457. Pipeline damage was mostly caused by damage or failure of the host platform or its development and production piping, the impact of dragging and displaced objects, and pipeline interaction at a crossing. Damage to pipelines was a major contributing factor in delaying start up of offshore oil and gas production.

During our analysis of the NRC database we identified 611 reported hazardous-materials releases directly attributed to offshore platforms and pipelines affected by the two hurricanes. There were twice as many releases during Hurricane Katrina than during Rita; 80% or more of the releases reported in the NRC database occurred from platforms. Our analysis suggests that the majority of releases were petroleum products, such as crude oil and condensate, followed by natural gas. In both Katrina and Rita, releases were more likely in the front, right quadrant of the storm. Storm-surge values were highest closer to the coastline. This may help explain the higher number of releases in shallow waters. The higher number of hazardous-materials releases from platforms during Katrina may partly be attributed to the higher wind speeds for this storm as it approached land.