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## MODU Performance in Hurricane Ivan

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### Abstract

Hurricane Ivan tracked through a high density corridor of MODUs in the Gulf of Mexico leading to loss of station keeping of 5 Semisubmersible MODUs, and collapse of 1 jackup MODU.

Semisubmersible MODUs in the Gulf of Mexico have changed their general usage since development of the API Standard RP2SK to which their moorings are designed for individual locations. With the development of deeper waterdepth highly productive platforms with their associated extensive subsea infrastructure, the consequences of MODUs drifting in an extreme Hurricane are potentially much greater than in the past.

In the aftermath of this hurricane which followed closely behind similar incidents in Hurricane Lili, and which was followed by Hurricanes Katrina and Rita, the industry is reflecting on the lessons learned and taking the opportunity to re-examine the industry standards. There was no loss of life and no major pollution resulting from the results of MODUs in Hurricane Ivan. An MMS commissioned study has been undertaken to chronicle the incidents of Hurricane Ivan to provide an independent report on the information available for use in future studies which may lead to a more robust criteria for MODU safety.

### INTRODUCTION

Hurricane Ivan in September, 2004 tracked through a high-density corridor of oil and gas infrastructure in the Gulf of Mexico. A study was commissioned by the Minerals Management Service of the Department of the Interior (MMS) to chronicle the incidents that affected the infrastructure of oil and gas equipment: the specific task was to gather information, examine and review Mobile Offshore Drilling Units (MODUs) loss of stationkeeping ability during

Hurricane Ivan. The study relies heavily upon the work of Oceanweather who carried out the meteorological hindcast (Ref. 1 & 2).

At the time of Hurricane Ivan there were approximately 112 jackups in the Gulf of Mexico (compared to 142 jackups during Hurricane Lili) and 32 semisubmersibles (compared to 39 semi-submersibles during Hurricane Lili). Of those only 3 jackups were impacted and only 1 of those became a constructive total loss. There was no loss of life or pollution associated with that event. Of the semisubmersibles in the Gulf of Mexico only 5 were impacted. Four left their general location and became adrift and 1 moved approximately 3000 ft, including distance moved within the mooring pattern and some anchor drag. A variety of sources were used to identify rigs that had potentially been impacted by the hurricane. Most of the information was obtained directly from drilling contractors, some information from oil companies involved, and some from the MMS files.

It should be noted that at the time of writing (February 2006) the study being undertaken under MMS sponsorship on Hurricane Ivan was not scheduled to be completed, nor is it complete. The information contained in this paper is both preliminary and subject to correction and change. A complete report will be delivered to the MMS during the course of 2006.

### OVERVIEW OF IVAN AND MMS ANNOUNCEMENT:

In September 2004, Hurricane Ivan, a full category-4 storm, moved through the U.S. Gulf of Mexico (GOM) with extreme winds and large waves exceeding the 100-year design criteria of the facilities in its path. Of the more than 4,000 offshore oil and gas facilities and 33,000 miles of pipelines in Federal waters of the GOM, approximately 150 facilities and 10,000 miles of pipelines were in the direct path of Hurricane Ivan. The oil and gas industry submitted numerous damage reports to MMS. The range of damaged facilities included mobile drilling rigs, offshore platforms, producing wells, topside systems including wellheads and production and processing equipment, risers, and pipeline systems that transport oil and gas ashore from offshore facilities. The MMS received industry reports indicating that seven platforms were destroyed, six platforms had major damage, five drilling rigs had major damage and a substantial amount of oil and gas production remained shut-in because of damage to pipelines.