



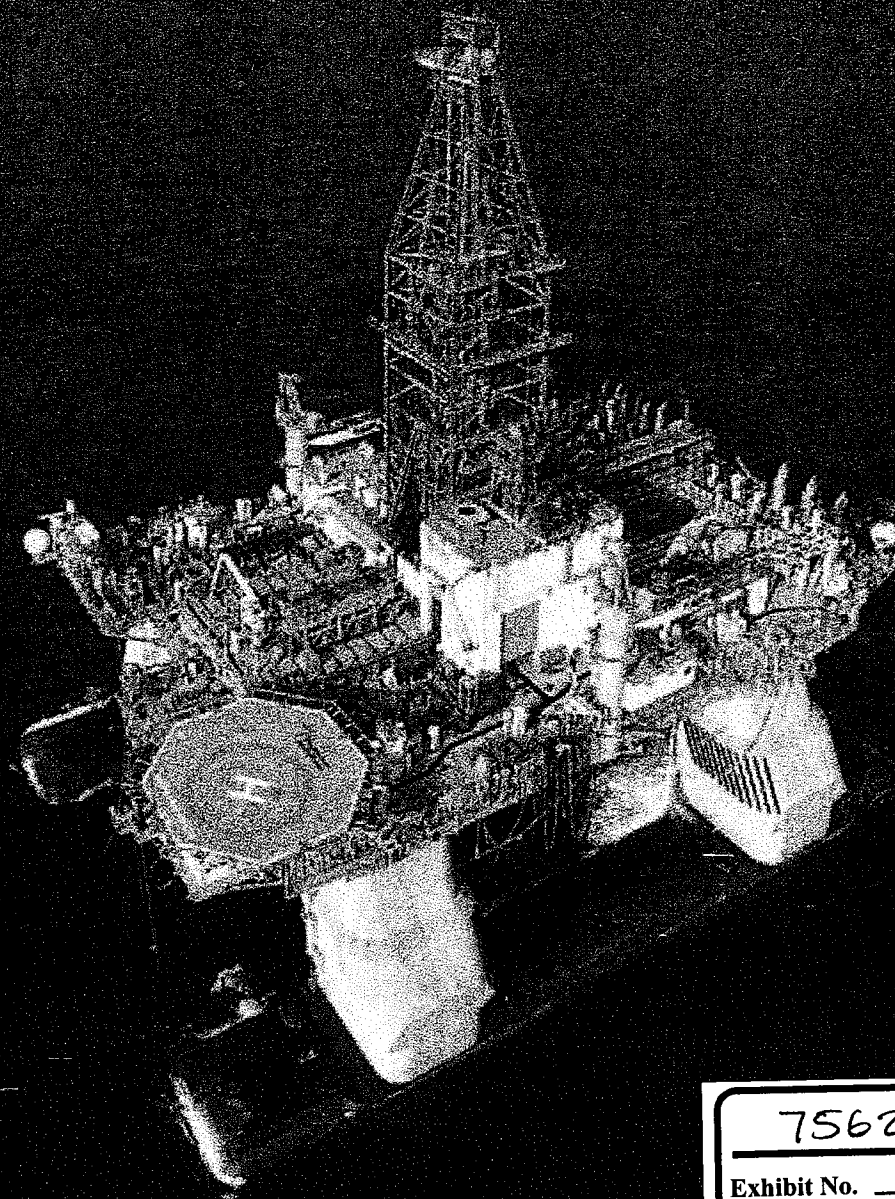
REPUBLIC OF THE MARSHALL ISLANDS

Office of the Maritime Administrator

DEEPWATER HORIZON MARINE CASUALTY INVESTIGATION REPORT

Official Number: 2213

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7562

Exhibit No. _____
Worldwide Court
Reporters, Inc.

location and severity of the gas alarm was presented as an alarm banner at the top of the control screens. All gas alarm events were automatically logged in the KIACS history.

- 1.37 Gas detector alarm response would have been in accordance with the established C&E Table of responses. Activation of a gas detector would result in immediate audible and visual alarms in the Engine Control Room and Drilling Work Station. Alarms were to be acknowledged from the Drilling Work Station or the alternate stations if the Drilling Work Station was inaccessible. Gas alarms would have been acknowledged by the Driller, who may direct other personnel to investigate and report, based on the location and severity of the gas alarm. Based on the reports received by the Driller, subsequent alarms, including the General Alarm would have been manually activated.

Ventilation Control

- 1.38 Ventilation shutdowns would have been affected by group or individual output points in the F&G System. These circuits would be normally de-energized 120 v AC output circuits (with line monitoring) connected to interposing relays in the applicable motor starter or control panel. All control power for these circuits would have been derived within the F&G System. Fire dampers were fail-safe, spring closed, and pneumatically opened. The fire dampers could be opened by unit air pressure, applied through normally energized solenoid valves with 120 v AC coils, which in turn were connected to normally energized output points in the F&G System. All control power for these circuits was derived within the F&G System.
- 1.39 For the accommodation spaces, the heating, ventilation, and air conditioning (HVAC) fresh air intakes and exhaust outlets were fitted with automatic fire dampers. The F&G System was designed to close these dampers, and turn off the fans and blowers in the event of fire or gas being detected.
- 1.40 For the engine spaces, supply fresh air intakes and exhaust outlets were fitted with fire dampers which could be actuated manually or automatically. Automatic actuation was controlled by a signal from the KIACS that closed the dampers based on the logic described in the C&E Table. Consistent with the dynamic positioning design philosophy, the dampers were not programmed to close on high gas conditions which could risk losing power to other vital systems.⁶³

Emergency Alarms

- 1.41 The Safety System and the Public Address/General Alarm system included provisions to periodically test the visual and audible alarms. Additionally, the systems included provisions to suppress all alarms during tests or system maintenance. Alarm suppression was controlled by a key-operated switch, and generated a recurring alarm in the KIACS system as long as the audible and visual alarms were suppressed.
- 1.42 The Unit had an integrated visual and audible alarm system to communicate emergency conditions to all appropriate personnel, regardless of background conditions. Visual and audible alarm enunciators were located in all machinery, shop, working, office, storage, and accommodations areas of the Unit.
- 1.43 Audible alarms were generated by the Unit's Public Address/General Alarm system, and consisted of separate sounds for Abandon Unit, Fire and General Alarm, Combustible Gas, and Toxic Gas. The Public

Emergency Drills

- 3.47 Although emergency drills were conducted at the same time each week and the on-duty drilling crew was excused from the drills to ensure that the well was properly monitored, there is no evidence on the record to support a conclusion that the regularity of such drills had any adverse impact on the ability of the crew to safely evacuate the Unit or contributed to the casualty. The routine fire and emergency drills, and the required safety orientation for visitors were effective in ensuring that personnel onboard were able to successfully evacuate the Unit.

Manning

- 3.48 The lack of a clear definition of "on location" versus "underway" with respect to dynamically positioned MODUs attached to the seabed created a difference of opinion between the drill crew, the marine crew, and the Master as to whether the Unit was on location, underway but not making way, or underway when attached to the seabed, but using dynamic positioning to maintain position.
- 3.49 At the time of the casualty, the DEEPWATER HORIZON was crewed in accordance with its Minimum Safe Manning Certificate.
- 3.50 All required marine crew positions were filled by mariners holding appropriate credentials demonstrating their qualifications and competence. Each officer onboard the DEEPWATER HORIZON held a license, certificate, or document issued by the USCG, and the Administrator issued Republic of the Marshall Islands officer endorsements based on the USCG license, certificate, or document.

Command, Control, and Organizational Structure

- 3.51 The leadership and management structure unique to MODU operations while in a drilling mode played a role in both the decision making concerning the actions prior to the loss of well control and the actions taken thereafter.
- 3.52 Pursuant to the Maritime Act, the ISM Code, and the DEEPWATER HORIZON Operations Manual, as well as being traditional marine practice, the Master is in command during normal operations while the MODU is underway and is in command during all emergency conditions.
- 3.53 As evidenced by testimony at the Joint Investigation hearings, there were instances of confusion regarding decision making authority during the casualty. Specifically, that there was uncertainty as to who had the authority to activate the EDS and that the lifeboat launching took place without following the Emergency Procedures of the Operations Manual. While such instances highlight the fact that the integration of drilling and marine operations presents challenges for maintaining a clear command hierarchy, especially in emergency situations, there is no indication that any confusion as to the chain of command was a causal factor in the casualty.

Fire Protection

F&G System

- 3.54 Methane or other gaseous hydrocarbons entered enclosed spaces on or below the main deck in sufficient quantities to activate the Unit's installed combustible gas alarms in multiple spaces. The installed gas detection system functioned properly to detect combustible gas at multiple locations

