SP-20

Log M-302

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

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SAFETY RECOMMENDATION(S)

M-85-103 through -106

About 1230 on September 14, 1984, the U.S.-flag mobile offshore drilling unit (MODU) ZAPATA LEXINGTON suffered an explosion and fire while moored and conducting drilling operations in 1,465 feet of water in the Gulf of Mexico. The accident occurred while procedures were being employed to evacuate a gas bubble from the subsea blowout preventer stack on the sea floor. Instead, gas trapped in the blowout preventer entered the base of the marine riser, rose to the surface, and escaped into the atmosphere, expelling a large volume of drilling mud out of the riser. The gas infiltrated the areas above and below the drill floor at the base of the derrick and was ignited. The explosion and fire that followed resulted in the deaths of four persons and severe injuries to three persons. Sixty-four persons abandoned the MODU using two survival capsules and three inflatable liferafts. The gas fire burned itself out about 30 minutes after the rig was evacuated. The cost of repairs was estimated at $12 million. 1/

An electrically driven fire pump was located in each pumproom and was remotely controlled from the ballast control room. Each pump took suction from a low seachest in each pumproom through pneumatically operated valves. A motor-driven crossover valve, also controlled from the ballast control room, enabled each pump to take suction from a high seachest in each pumproom in the event of a loss of air pressure to the pneumatically operated valves.

The ballast control operator on duty in the ballast control room had sounded a fire signal on the general alarm. Using the controls on the ballast control board, he then opened the necessary valves and started the drill rig's two fire pumps located in the pump room of each pontoon to charge the fire hydrants. The barge engineer reported to the ballast control room, checked the ballast control panel, donned a fire suit, and attempted to fight the fire with a fire extinguisher.

Three firefighting parties were organized to fight the fire. Two parties manned the firehoses while the third group closed hatches and ventilators. After firefighting had been in progress about 10 minutes, water pressure on the fire main was lost. The investigation revealed that the compressed air supply to both pumprooms had been lost, causing the

1/ For more detailed information read Marine Accident Report--"Explosion and Fire Aboard the U.S. Mobile Offshore Drilling Unit ZAPATA LEXINGTON, Gulf of Mexico, September 14, 1984" (NTSB/MAR-85/11).

pneumatically operated suction valves for the fire pumps to close and thereby shutting off the water supply to the pumps. The ballast control operator noticed that the valves had closed, but because of his lack of knowledge of the system, he did not open the two motor-driven crossover valves that would have connected the fire pumps with the high seachests. The barge engineer, who was more knowledgeable about the firefighting system, did not react to the loss of water pressure in the fire mains.

When the water pressure in the fire mains was lost, the volunteers who remained aboard were unable to continue their firefighting efforts. When the ballast control operator noticed the valves close, he could have opened a motor-driven crossover valve to the high seachest and restored suction to the pumps. Each pumproom had an arrangement permitting actuation of the motor-driven valve from the control panel. Not only did the ballast control operator, because of his lack of knowledge, fail to open the two crossover valves, but also the barge engineer who knew the system failed to direct the use of the crossover valves when the loss of water pressure from the fire pumps became apparent. Although his actions of donning a fire suit and engaging in the firefighting activities are commendable, the fact remains that the barge engineer's fire station assignment, as stated on the station bill, was the ballast control room. Had he been there, it is possible that the damage to the drilling rig could have been reduced by action he might have taken to restore water pressure to the fire mains. Nevertheless, the Zapata Off-Shore Company (Zapata) should consider a modification of the valves in the lower sea suction of the ZAPATA LEXINGTON and other MODU's of this class so that operation of the fire pumps is dependent only on the availability of electric power, and not air pressure.

Because of the loss of the key personnel directly involved in the operation, the events that occurred on the drill floor during the minutes preceding the fire will never be known accurately, including any actions taken by the senior toolpusher to avert the accident. The Conoco representative had left the drill floor to observe the flow of drilling mud returns through the gumbo box located on a deck below, probably anticipating a gas release. He had been in communication with the personnel on the drill floor just before the increase in the return flow of mud, but since the excessive mud flow out of the gumbo box made the telephone inaccessible, he was no longer able to communicate with the drill floor personnel. If the diverter system, which could have redirected the flow of gas-cut mud returns overboard, had been activated at the control panel on the drill floor, the gas could have been dissipated into the atmosphere, clear of the rig. The inability of the Conoco representative at the gumbo box to communicate with the senior toolpusher on the drill floor probably led to the failure of the toolpusher to activate the diverter system. Zapata should relocate the telephone at the gumbo box aboard the ZAPATA LEXINGTON and any similar installation aboard other company drilling rigs to a more protected area so that any rapid flow of return drilling mud will not prevent use of the telephone.

The fact that two men were directing water hoses over the gumbo box to wet down and cool any gas accumulation indicates that the Conoco representative anticipated a gas release that when combined with air would form a flammable mixture. Instead of spraying water over an area where gas is present, a device should be developed to separate the gas from the drilling mud returns while filtering out the gumbo or heavy drill cuttings during drilling operations. The gas could then be vented safely to the atmosphere at some remote point. Such a device could eliminate the need of the gumbo box as found on the ZAPATA LEXINGTON. This enclosed gas/mud separator should be capable of receiving a large volume of return mud, as indicated by the experience aboard the ZAPATA LEXINGTON immediately before the fire.

When the well control problem developed and there was a possibility of a blowout from the well, personnel such as the floorhand and the cleaner/painter who were assigned to wash mud off the drill floor and stairs and who were not actively participating in the operation should have been instructed to remain out of such areas where gas may be present until the problem was remedied. The exposure of nonessential personnel to such risks as possible blowouts should not have been permitted under any circumstance. The person-in-charge in the situation was the senior toolpusher who, having the ultimate responsibility by reason of his authority on the rig, should have established a danger zone and kept nonessential persons out of the area. The driller who conducted the safety meeting before the beginning of each shift failed to instruct rig personnel as to the location of those danger areas during well control operations, and also failed to convey specific instructions as to who would be permitted in these areas. Zapata should include in its general safety rules a requirement that a danger area, similar to the classified or hazardous locations as defined in 46 CFR 108.170 and 46 CFR 111.105-33, be established during any well control problem and that the rig safety/training representative be instructed to monitor the personnel allowed in the danger area during well control operations.

Because such a large percentage of rig personnel failed to report to their assigned fire stations when the fire alarm sounded, a serious doubt exists as to the adequacy of the weekly fire and emergency drills. Although circumstances may not have permitted all fire stations to be manned when the fire alarm was sounded, the Safety Board found that many of the Zapata personnel reported directly to their abandon rig stations before the abandon rig signal was sounded without ever reporting to their fire stations. The response was not unlike that to a previous fire that occurred aboard the MODU during which, according to a toolpusher's statement to a U.S. Coast Guard inspector, 70 percent of the rig crew panicked. Stricter adherence to the emergency procedures should be insisted upon by the Zapata management. The safety of the rig and those aboard depends on the responsiveness of personnel in emergency situations. Emergency preparedness can be accomplished only through meaningful drills and practice.

Therefore, the National Transportation Safety Board recommends that the Zapata Off-Shore Company:

> Relocate the telephone at the gumbo box aboard the ZAPATA LEXINGTON and any similar installation aboard other company drilling rigs to a more protected area so that any rapid flow of return drilling fluids (mud) through the recovery system will not prevent access to the telephone. (Class II, Priority Action) (M-85-103)
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> Develop a device to separate and vent gas from return drilling fluids (mud) to the atmosphere at a remote area of company drilling rigs during drilling operations. (Class II, Priority Action) (M-85-104)
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> Establish a danger zone aboard company drilling rigs, during well control operations when flammable gas may be present, and prohibit all nonessential personnel from entering the zone. (Class II, Priority Action) (M-85-105)
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> Upgrade the quality of the fire drills and the instructions given in firefighting procedures aboard company drilling rigs, and establish a system to evaluate the drills regularly. (Class II, Priority Action) (M-85-106)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to recommendations M-85-103 through -106 in your response.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

Patricia A. Goldman for

By: Jim Burnett
Chairman