SP-20
Log M-321B

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: October 14, 1986

In reply refer to: M-86-109 through -112

Mr. Marshall Ballard III
President
Penrod Drilling Company
2200 Thanksgiving Tower
Dallas, Texas 75201

On October 27, 1985, the U.S. mobile offshore drilling unit PENROD 61 was drilling for oil at an offshore drilling site about 25 nautical miles (nmi) south of the Louisiana coast in the Gulf of Mexico. The PENROD 61, a self-elevating type drilling unit, was in the jacked-up mode in about 246 feet of water and was elevated about 50 feet above the surface of the water on three bottom bearing legs. About 2330 c.s.t. in seas reported to be in excess of 30 feet high and in winds gusting to 80 knots, the PENROD 61 collapsed into the sea. The 43 persons on board abandoned the vessel and all but one were later rescued. After it fell into the sea the PENROD 61 drifted with the wind and sea, struck the nearby PENROD 60, and subsequently sank about 9 nmi northwest of its drilling site. As a result of this accident the PENROD 61, valued at $40 million, was destroyed and one man lost his life. 1/

Since the collapse of the PENROD 61 did not result from a failure of the leg jacking or braking system or from a "punch through," a catastrophic structural failure of the bow leg probably occurred. The PENROD 61's legs were designed to withstand wind and sea conditions more severe than those encountered at the time of the accident. The PENROD 60, which was identical in design, and slightly older than the PENROD 61, did not collapse, and it had been subjected to the same wind and sea conditions and to the significant additional forces which occurred when the drifting hull of the PENROD 61 struck it. The Safety Board, therefore, concludes that the wind and sea conditions alone did not cause the bow leg of the PENROD 61 to fail. The bow leg of the PENROD 61 could have been weakened sufficiently by corrosion, metal fatigue, previous structural damage, or construction defects to cause a structural failure of the bow leg. However, due to the prohibitive cost of such an operation, appropriate samples of the broken bow leg were not recovered for metallurgical analysis, and the Safety Board, therefore, is unable to determine the cause or precise manner of the failure of the bow leg.

1/ For more detailed information read, Marine Accident Report--"Collapse of the U.S. Mobile Offshore Drilling Unit PENROD 61, Gulf of Mexico, October 27, 1985 (NTSB/MAR-86/10).

4455/313

It is possible that the fact that the bow leg failed just as the jacking system was engaged was purely coincidental, but it is also possible that the operation of the leg jacking machinery was related to the failure. When the jacking system was engaged, an additional compressive force would have been applied to the bow leg by the jacking motors. If a structural defect existed in the bow leg, this additional force may have been sufficient to have caused the leg to fail in the area of the defect and precipitated the collapse of the MODU. The operations manual for the PENROD 61 states that the jacking system should be operated only during periods of good weather both when the MODU is first placed on station and when it is taken off station. There is no information in the manual on conducting leg jacking operations to re-level the rig during inclement weather after it has already been elevated on station. The Safety Board believes that toolpushers on MODUs should be given appropriate instructions to take the correct course of action in an emergency, and that MODU operation manuals should contain complete instructions concerning the operation of the leg jacking machinery in all forseeable situations.

When the bow of the PENROD 61 collapsed, the abandon rig alarm was not sounded. Since the toolpusher, who was in charge of the MODU, did not survive the accident, the Safety Board could not determine why he did not sound the alarm. However, the failure to sound the alarm had no effect upon the abandon rig operation since all the personnel on board the MODU reported to the abandon rig stations on their own initiative.

The crew of the PENROD 61 not only reported to abandon rig stations at their own initiative, but actually departed the vessel without first receiving orders from the toolpusher to do so. Both the inflatable liferaft and the No. 1 survival capsule were launched without the prior consent of the toolpusher. The abandon rig operation was not well organized and was not conducted under the direction of a central authority. The crew was not assembled so that a roll call could be taken, and the No. 1 capsule departed without anyone informing the toolpusher of the number of persons on board. If some of the crewmen had not been present to abandon the rig with the rest of the crew, their absence would not have been detected, and they would have been left behind when the survival capsules departed the rig. The Safety Board recognizes that the crew was faced with an emergency situation, and that the stress of the moment may have caused them to act rashly. However, the vessel remained afloat for an appreciable length of time after it entered the water, and there should have been sufficient time to have taken a roll call, or to have at least taken an accurate head count before the launching of any primary lifesaving devices took place. The fact that the crew reported to their embarkation stations and launched the lifesaving devices with no difficulty showed that the crew had a good familiarity with the equipment on board the MODU. At the same time, however, their precipitous launching of this equipment demonstrated a lack of discipline and a lack of the exercise of a central authority through a well established chain of command. It is clear that the toolpusher held the position of central authority on board the MODU, however, there was no one specifically designated as second in command nor any clear cut chain of command below the toolpusher. The toolpusher could not have been at the primary embarkation stations to control abandon rig operations and in the control room making necessary emergency radio broadcasts at the same time. If the MODU had an established chain of command for abandon-rig operations, the abandon-rig operation could have been conducted in an orderly and disciplined manner and there would have been no danger that some personnel might have been left stranded on the MODU when the capsules were launched.

The hurricane contingency plan developed by Chevron which was in effect at the time of this accident did not provide clear, step-by-step instructions for the evacuation of personnel from MODUs working offshore and Penrod had no formal hurricane evacuation plan at all. The testimony of the Chevron southeastern division manager, the Chevron

drilling representative, and the alternate Penrod toolpusher from the PENROD 61 indicates that there was confusion concerning who had the responsibility to order an evacuation of the MODU due to weather conditions. Areas of responsibility for evacuation of the rig appear to overlap since the oil company was responsible for providing transportation to and from the rig, and the drilling contractor was responsible for the safety of the rig and the safety of personnel on the rig. This division of responsibility has been a factor in previous MODU accidents which the Board has investigated, and the Board has repeatedly emphasized the importance of having one person designated as the decision-maker in an emergency. The Safety Board believes that this accident illustrates the need for severe weather evacuation plans for MODUs which designate the person responsible for ordering the evacuation. The plan should include step-by-step procedures to be followed in carrying out the evacuation, and should clearly delineate the roles of oil company and drilling contractor employees in the evacuation process.

In order for a severe weather evacuation plan to be effective, it must clearly define when evacuation procedures should be initiated. Adverse wind and sea conditions typically arrive at a location far in advance of the center of the storm system. An evacuation must be ordered before the operational limits of the evacuation vehicles are reached at the evacuation site. Often this will mean that an evacuation must be ordered before the storm system has intensified to hurricane proportions. Criteria should be developed to correlate the decision to initiate evacuation with weather forecast information, taking into account the available time and distance factors before severe weather and sea conditions preclude a safe evacuation. The timely evacuation of a MODU, therefore, involves many details that must be worked out well in advance of the need to evacuate. The Safety Board believes that each MODU should have a detailed severe weather evacuation plan developed for each offshore location at which the unit is engaged in drilling operations.

The GILBERT C had been contracted by Chevron to provide standby vessel services to the PENROD 60 and PENROD 61. The master maintained his vessel moored to an anchor buoy between the two MODUs until about 1630 on October 27, 1985. Throughout the day, the wind and sea conditions continued to deteriorate and when seas began breaking over his vessel's bow, the master became concerned for the safety of his vessel and crew. The Safety Board recognizes that, although the GILBERT C was placed on station to provide assistance to the MODUs, the master's primary responsibility was to the safety of his own vessel and crew. The Safety Board believes that the conditions were severe enough to pose a threat to this 100-foot vessel, and believes that the master was justified in his concern for the safety of his vessel and crew.

Despite his concern for the safety of his vessel, the master of the GILBERT C remained on station as long as possible and maintained radio contact with the PENROD 61. He asked about their evacuation plans and offered to take personnel off the MODU. Since his offer to take personnel off the MODU was refused, he requested and was granted permission to leave the area to seek a harbor of safe refuge from the storm. Considering the increasingly deteriorating weather conditions, the vessel's limited ability to withstand high wind and seas, and the refusal of the PENROD 61 personnel to accept the master's offer to take them off the MODU, the Safety Board believes that the master of the GILBERT C was justified in requesting permission to leave the area.

The master of the GILBERT C testified that he never knew the identity of the persons with whom he spoke on the radio when he communicated with the rigs, and that he would try to comply with any order that he received over the radio from anyone who identified themself as being from one of the rigs. Such a system of communication is too

casual for the passing of important messages between a MODU and a standby vessel. The Safety Board believes radio communications between standby vessels and the MODUs that they are assigned to support should follow a more formal procedure in which the communicating parties specifically identify themselves so that the master of a standby vessel knows that the orders he receives are from a person in an appropriate position of authority to issue them.

As a result of its investigation, the National Tranportation Safety Board recommends that the Penrod Drilling Company:

> Amend the instructions contained in the operation manuals of all company-owned self-elevating MODUs to provide the toolpushers on such MODUs with complete instructions concerning the operation of leg jacking machinery in all foreseeable situations. (Class II, Priority Action) (M-86-109)
>
> Amend emergency procedures for company-owned MODUs to establish a clear-cut chain of command below the toolpusher for the orderly and disciplined execution of abandon-rig operations in an emergency. (Class II, Priority Action) (M-86-110)
>
> Develop formal radio procedures which require persons originating or receiving radio messages on company-owned MODUs to identify themselves whenever communications are necessary between these MODUs and regularly assigned standby vessels. (Class II, Priority Action) (M-86-111)
>
> For each company-owned MODU, develop a detailed severe weather evacuation plan which sets forth the order in which personnel will be evacuated, identifies the transportation resources to be used in the evacuation, and includes time and distance factors for the initiation of evacuation before the onslaught of hazardous weather conditions at the location of each MODU. (Class II, Priority Action) (M-86-112)

Also as a result of its investigation, the Safety Board issued Safety Recommendations M-86-102 through -107 to the U.S. Coast Guard and M-86-108 to the International Association of Drilling Contractors.

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 recommendation(s) in this letter. Please refer to Safety Recommendation(s) M-86-109 through -112 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER and NALL, Members concurred in these recommendations.

By: Jim Burnett
Chairman