



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

SP-20
Ray M-311

Date: MAR 28 1986
In reply refer to: M-86-18 and -19

Admiral James S. Gracey
Commandant
U.S. Coast Guard
Washington, D.C. 20593

On January 15, 1985, the U.S. semi-submersible mobile offshore drilling unit (MODU) GLOMAR ARCTIC II was conducting well testing operations 130 nautical miles east-southeast of Aberdeen, Scotland, in the North Sea. About 2030, an explosion occurred in the port pontoon pumphouse. The chief engineer and the third assistant engineer were killed in the blast. Damage to the drilling vessel was estimated to be \$2.3 million. ^{1/}

At 1950 on January 15, 1985, a member of the Otis Pressure Control Company (Otis) well testing crew opened the adjustable choke valve and allowed crude oil from the well to flow through well testing and sampling equipment to the Otis crude oil burner on the port burner boom. Hydrocarbons from the well contaminated the rig compressed air system through a fracture in the No. 3 burner tip on the port side crude oil burner. The rig compressed air system then furnished contaminated compressed air to the purge air system. The automatic methane gas alarm, which was installed in the exhaust vent duct in the overhead of the drillers house, sensed methane gas in a mixture of explosive hydrocarbon gas that was expelled from equipment enclosures pressurized by the contaminated purge air. At 2010, the automatic methane gas alarm sounded at the drillers house. The Safety Board believes that sometime between 1950, when the adjustable choke valve was opened, and 2010, when the automatic methane gas alarm sounded, the No. 3 burner tip fractured.

The point of interconnection of the industrial crude oil piping system and the marine rig compressed air system was at the crude oil burner. To prevent the possible hydrocarbon contamination of a MODU's rig compressed air system, atomizing compressed air supplied to the crude oil burners should be furnished from a dedicated, separate, compressed air source. Furthermore, steps should be taken to prohibit the backflow of high pressure hydrocarbons that may enter the dedicated, separate, atomizing compressed air piping system. This could be accomplished by installing a device, such as a nonreturn (check) valve, in the atomizing compressed air piping.

^{1/} For more detailed information, read Marine Accident Report—"Explosion and Fire Onboard the U.S. Mobile Offshore Drilling Unit GLOMAR ARCTIC II in the North Sea, 130 Nautical Miles East-Southeast of Aberdeen, Scotland, January 15, 1985" (NTSB/MAR-86/03).

At the time of the accident, the required United States inspections, examinations, and operational tests of the GLOMAR ARCTIC II addressed the vessel's shipboard and industrial permanent equipment and systems. Crude oil burners are not a part of the MODU's permanent equipment. They are portable, temporary pieces of equipment brought onboard the MODU and installed by a well testing company. In this case, Otis, operating under the provisions of a contract to Phillips Petroleum U.K., Limited, installed two Otis CB-12A crude oil burners on the GLOMAR ARCTIC II. One burner was installed on the port side burner boom, and the other was installed on the starboard burner boom. At installation, the crude oil burners were connected to the vessel's permanent shipboard and industrial piping systems of compressed atomizing air, water, and crude oil/gas.

According to the drilling supervisor, there were no user manuals onboard the GLOMAR ARCTIC II concerning the burners or nozzle assemblies. The Otis maintenance procedures for the crude oil burners and nozzle assemblies were inadequate and permitted the reinstallation of a compression gasket that essentially loses its sealing effectiveness after the initial installation and compression. Onboard Otis inspection procedures for the crude oil burners and nozzle assemblies were nonexistent. Furthermore, at the time of the accident, there were no existing United States or United Kingdom regulatory requirements, and there were no classification society rules concerning the inspection, certification, or approval of portable, temporary industrial equipment, such as crude oil burners and their component parts. The inspection, maintenance, and proper assembly of the Otis crude oil burner and its component parts were left to the discretion and were the sole responsibility of the owner and operator of the equipment, Otis and its employees. In addition, during the manufacturing of the nitrolloy 135M burned tips, Otis failed to establish or require quality control procedures to ensure strict adherence to specifications for the manufacture of the burner tips.

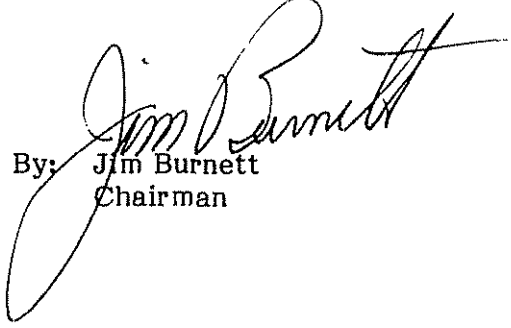
On March 25, 1985, the U.S. Coast Guard (USCG) published CGD-80-071a, an Advance Notice of Proposed Rulemaking (ANPRM), concerning the proposed revisions of the USCG MODU regulations. Paragraph 3 of the ANPRM suggested the addition of new sections to 46 CFR 58.60 concerning the acceptance of portable, temporary industrial equipment and the development of instructions to USCG inspectors pertaining to the acceptance and inspection of industrial systems. The USCG also proposed an additional section to 46 CFR 58.60 pertaining to the installation and interconnection of industrial and shipboard systems. The Safety Board urges the USCG to proceed with its regulatory project and incorporate the proposed changes to 46 CFR 58.60 regarding inspection and interconnection of portable, temporary industrial equipment.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the U.S. Coast Guard:

Amend U.S. Coast Guard regulations for mobile offshore drilling units (46 CFR 58.60) to include a requirement for the inspection of crude oil burners and their component parts to determine the mechanical and electrical conditions and to ensure that the equipment is maintained in a serviceable and safe condition. (Class II, Priority Action) (M-86-18)

Require that compressed air supplied to crude oil burners and well test equipment on all existing and new mobile offshore drilling units be supplied from a dedicated, separate, compressed air source and that the compressed air supply piping to crude oil burners and well test equipment be fitted with a device to prohibit the backflow of well hydrocarbons that may enter the compressed air piping. (Class II, Priority Action) (M-86-19)

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

By: 
Jim Burnett
Chairman