

Log M-219

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 7, 1983

Forwarded to:

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

SAFETY RECOMMENDATION(S)

M-83-60 and -61

About 0015 on June 16, 1982, the engineer on watch discovered an excessive amount of water in the engineroom bilges on the U.S. flag tankship OGDEN WILLAMETTE, which was en route to Bayway, New Jersey, from Puerto Armuelles, Panama, via the Panama Canal loaded with 150,000 barrels of Alaskan crude oil. The vessel was steaming at its normal sea speed of about 16.0 knots in the Caribbean Sea about 50 nmi southeast of Jamaica. He immediately ordered the engineroom bilge pump started and notified the chief engineer. The entry of water exceeded the capacity of the bilge pump, and when the water level reached the main circulating pump motors, the engineering plant was secured. Although the chief engineer closed the main circulating pump's high sea suction valve and the main condenser's overboard discharge valve, the water continued to rise, and the master ordered the crew to abandon ship. 1/

The engineroom flooded to about 6 feet below the main deck. The vessel remained afloat with its after deck awash. It was towed to the Cayman Islands, where the engineroom was pumped out and the cargo was transferred to another tanker. The OGDEN WILLAMETTE was later towed to New Orleans for repairs. The damage was estimated to be \$16 million.

While in the Cayman Islands, salvage divers began surveying the underwater hull in the way of the engineroom. After finding no visible damage, they rigged a patch over a seachest where they detected a surge of water. They also plugged the auxiliary condenser's overboard discharge line. Salvage pumps were set up, and by 1800 on June 29 the engineroom was pumped out, and the survey party entered the engineroom. The salvage master discovered that the water entered the engineroom through the auxiliary condenser's overboard discharge line. The U.S. Coast Guard inspector stated that, "the chief engineer was very distraught with himself in that he did not secure this valve when the casualty was discovered." While the salvage crew was pumping the engineroom, the plug in the discharge line became dislodged, and the water level started to rise. After the salvage crew closed the 12-inch-diameter gate valve to the discharge line, the water was pumped out. When the pumps were secured, the auxiliary condenser's overboard discharge valve was opened slightly to allow seawater to enter the system to determine the location

1/ For more detailed information, read Marine Accident Report--"Engineroom Flooding and Near Foundering of U.S. Tankship OGDEN WILLAMETTE, Caribbean Sea, June 16, 1983" (NTSB/MAR-83/06).

of the leak. A crack was discovered on the bottom of the 26-inch-diameter rubber expansion joint in the main low sea suction line inboard of the suction valve. The 12-inch-diameter inlet valve to the auxiliary condenser located over the inlet pipe to the main condenser also was found open. No other sources of water entry were found.

At the ship repair facility near New Orleans, Safety Board and Coast Guard inspectors examined in place the ruptured expansion joint which had been found on the OGDEN WILLIAMETTE by the salvage master and noted its inaccessibility for inspection. The joint was located beneath a section of walkway close to the tank top in the forward end of the engineroom. Examination revealed a 17-inch-long crack in the exterior of the arch where the joint had ruptured. The carcass appeared to be rotted, and the tube was similarly cracked. The chief engineer, who had served aboard the OGDEN WILLIAMETTE since it was new, said that the expansion joint was the original joint installed during construction of the vessel.

The expansion joint was manufactured in June 1968 by the Goodall Rubber Company of Trenton, New Jersey. It was a standard service spool-type, single-arch, rubber expansion joint. The inside diameter was 26 inches, the face-to-face dimension was 10 inches, and the 1-inch-thick flange had a 24-hole bolt circle, with each hole measuring 1 3/8 inch in diameter. It was manufactured with a red neoprene cover, a black neoprene tube, cotton fabric, and 0.035-inch by 15-strand by 7/16-inch-wide steel bead wire.

The OGDEN WILLIAMETTE had completed a U.S. Coast Guard drydock inspection on March 20, 1982, in Jacksonville, Florida. This inspection included the underwater portion of the hull, rudder, propeller, tail shaft, sea valves, seachests, strainers, anchors and chains, and cargo tanks. This inspection is required every 2 years. The sea valves installed in the OGDEN WILLIAMETTE were of the butterfly type except for the auxiliary condenser's 12-inch-diameter overboard discharge valve, which had been changed during the drydocking to a gate valve. During the inspection of the sea valves in the engineroom, a visual inspection of the expansion joints adjacent to the sea valves was made by a Coast Guard inspector.

Butterfly valves in the main sea suction and main overboard lines on vessels normally are not opened for inspection but are checked through the seachest or external shell openings in the hull. The valve is looked at in the open position so the rubber "boot" or seat is exposed. While checking this area, the inspector usually looks into the line beyond the valve for any obvious defect or obstruction. If an expansion joint is installed inboard of the butterfly valve, it cannot be thoroughly examined by this method. It is not possible to see if there are any defects in the arch of the expansion joint nor is there a standard test for expansion joints other than a visual examination. The Coast Guard regulations in Subchapter F, Marine Engineering (46 CFR 56.60-25(e)) address the design features and tests of nonmetallic expansion joints including installation.

The Coast Guard inspector who inspected the OGDEN WILLIAMETTE on March 20, 1982, stated at the hearing:

I am not aware of any required or policy type inspections other than — usually just other than a good visual outside inspection. If you see anything that would indicate a flaw in the joint or — you would examine it more closely or try to, you know, hammer test it possibly to see how sound or firm the joint appeared to be. If there was anything that would indicate a possible defect, we would normally have the ship owner remove it for either a better inspection or replacement, as required.

He recalled doing the operational inspection of the machinery, checking the piping systems and tank tops for any leaks, which would include the expansion joints, after the vessel was refloated and the engineering plant was placed in operation. He did not observe any leaks or other problems of that nature.

The inspection of the joint after removal from the vessel revealed that the inner fabric or carcass was deteriorated. This condition apparently developed over an extended period as water leaked into the carcass through an unknown crack or puncture. The configuration of the arch as it was installed in the vessel did not permit the water to drain even when the cooling system was drained. The manufacturer recommends replacement of the joint if the arch feels soft, which indicates the loss of adhesion between fabric plies. The location of the joint in the pipe inboard of the butterfly valve did not permit the interior of the joint in the arch to be so inspected. Although many expansion joints in cooling water systems have been in service for long periods of time, those that are found suspect during inspections are replaced, as was done with the six expansion joints replaced in the engineroom of the OGDEN WILLAMETTE during the last overhaul. Scheduled periodic replacement of rubber expansion joints would eliminate any doubt as to the condition of those joints in areas where complete inspection is not possible.

Coast Guard regulations (46 CFR 56.60-25(e)) require that the design of short nonmetallic expansion joints shall "provide a burst pressure of not less than four times the maximum allowable working (rated) pressure." However, there is no provision for periodic replacement or pressure testing. The Safety Board believes that nonmetallic expansion joints installed in such a manner that precludes their complete inspection in place should be replaced periodically.

Therefore, the National Transportation Safety Board recommends that the U.S. Coast Guard:

With the cooperation of the manufacturers of nonmetallic expansion joints and the American Bureau of Shipping, establish guidelines for the periodic replacement of expansion joints in main seawater circulating systems, particularly in areas where a complete internal examination is not possible without removal of the expansion joint from the system. (Class II, Priority Action) (M-83-60)

Require in the current Coast Guard drydock inspection procedures for U.S. flag vessels a complete internal inspection of adjacent nonmetallic expansion joints when seavalue inspections are made through external shell openings in the hull. (Class II, Priority Action) (M-83-61)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.


By: Jim Burnett
Chairman