

209 M-48 DOT 1979 A

Rec M-76-11 Nov 19

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

FOR RELEASE: 6:30 ^{P.M.}~~A.M.~~, E.S.T., NOVEMBER 28, 1976
(202) 426-8787

ISSUED: November 28, 1976

Forwarded to:

Admiral Owen W. Siler
Commandant
U.S. Coast Guard
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

M-76-11 thru 19

On 31 March 1973, the freighter SS SILVER DOVE, en route from Guam to the Panama Canal with a bulk cargo of raw sugar, listed suddenly 22⁰ to port and subsequently sank about 180 miles southwest of Johnston Island.^{1/}

The small crack which permitted seawater to enter No. 3 hold was in the SILVER DOVE's wind and weather zone. When the empty hold had been inspected, the leak was not detected. Such small cracks cannot be detected reliably by the visual examinations made by the Coast Guard during its periodic ship inspections. Even small cracks are a serious threat to bulk cargo carriers on long voyages, since the cargo itself often impedes draining the hold of water and since seawater can alter the cargo characteristics in dangerous ways. In addition, the cracks may grow during the voyage and cause the ship structure to fail. The methods for discovering such cracks during the Coast Guard periodic ship inspections need to be improved. In recent years, portable crack detector instruments have been developed to detect cracks in steel bridges. Such instruments may be adaptable for use in detecting cracks in ship plating. If they are not, other means should be devised to improve the detection of cracks in ship hulls.

Existing Coast Guard evaluations of hull plating thickness are intended to determine if the average ship plating thickness has diminished by more than the allowable 25 percent. However, if excessively low gauge readings are obtained, another reading is taken in the surrounding area, and the two readings are averaged before the plating thickness is evaluated. In order to discover potential hull leaks, such low readings should be highlighted and not combined with higher readings. Although readings probably are averaged because the accuracy of ultrasonic thickness readings can vary considerably, it is risky to integrate low readings into higher readings without verifying the reason for the low reading. An approach with less risk would be to confirm or deny the existence of any suspected excessively

^{1/} For more detailed information on this accident, read "Marine Casualty Report: SS SILVER DOVE, Cargo Damage and Sinking, North Pacific Ocean, 2 April 1973." USCG/NTSB-MAR-76-1.

M-76-11 thru 19

thin spot by other means such as drill testing. Further, the Coast Guard specifically ought to require a thickness reading in areas where the inner hull is covered with sheathing, and such measurements should not be made by ultrasonic instruments.

The investigation showed that the ventilation systems, the scupper valves, the deck in hold No. 3, and the hull behind the starboard reefer were wasted extensively; this deterioration was not found during the earlier Coast Guard and ABS inspections. The inspection of similar areas which could fail and admit seawater into old vessels should be emphasized to reduce the risk of flooding. The Coast Guard needs to develop special inspection procedures for such older vessels; otherwise, the deterioration of areas which are difficult to inspect will continue to escape detection.

The cement patch which the crew placed over the crack before the ship reached Guam and the cement patch which shoreside personnel in Guam placed over the crack both failed. Despite the extensive marine experience of the persons involved in these emergency repairs, the failures indicate lack of knowledge of how to install concrete patches. Since most ships carry cement for emergency repairs, adequate instructions on how to make such repairs reliably also should be provided.

Drain pipes servicing the repair area became clogged and the air supply was insufficient to drive the portable pump at its capacity. The resulting accumulation of water complicated repair efforts and leaked into the vessel's largest cargo hold. If the portable pump had been able to function at its rated 15-gpm capacity (over 75 LT per day), considerably less water would have accumulated to leak into the sugar.

This accident demonstrates the lack of understanding regarding the hazards to a ship's stability that occur when water is added to bulk sugar. The Coast Guard OCMI did not consider either the hazard from water which had already infiltrated the sugar or the potential hazard of ingress through the patch or through additional hull cracks. The master created an asymmetrical liquid load to correct the starboard list, failed to continue his efforts to reduce water entry, and failed to divert to the nearest safe refuge when further leakage was discovered; these actions indicate his lack of awareness of the hazard. However, his actions were not surprising, since information regarding the hazards of water in bulk sugar has not been provided to ship masters.

Bulk cargoes other than sugar can threaten a vessel's stability when water is added. Certain bulk cargoes are classified as concentrates by the National Cargo Bureau, Inc., and are identified in Appendix B of their manual, "Stowage of Bulk Cargoes," which the Coast Guard recognizes as an authoritative document on the subject. In this manual, concentrates are required to be shipped under the same conditions as liquids, and not as "dry" bulk cargoes, when their moisture content exceeds a specified limit. However, no precautions are required or advised for situations when these

concentrates are dry when loaded and have water (or other liquid) added accidentally while at sea. Sugar is listed in Appendix A, "List of Bulk Cargoes Other Than Concentrates." The cargoes which are listed in Appendix A might be considered to pose no hazard when water is added. However, there may be other cargoes listed in Appendix A and some that are not included in the manual which can threaten a vessel's stability when water is added. This manual is a guide of conditions which exist at the time of loading; it does not consider changes to cargo which might occur after loading. Thus, there is a need to evaluate and document the hazards to a vessel's stability that may develop when water is added to bulk cargoes after loading. This information should be in a format that can aid ship's personnel and Coast Guard field marine safety personnel in assessing the risk of water infiltration into all bulk cargoes. The Coast Guard should not wait until a resolution to evaluate and document such information is developed through the lengthy deliberate processes of IMCO (Intergovernmental Maritime Consultative Organization).

The drainage from pipe nipples in the bulkhead between the No. 3 lower hold and the machinery space indicated that water was mixing with the bulk sugar. However, lack of drainage after repairs were made in Guam may have led the master to believe that there was no further problem when, in fact, considerable water already might have leaked in lower hold No. 3 and been absorbed into the bulk sugar. If the source of water entry had been on the port side at the forward end of the lower hold, the master might not have been warned of water ingress by leakage through a visible crack, the sugar and water drainage from the nipple, and the larger than normal starboard list. The only warning under such conditions might have been a sudden, large list. A means to detect water entry into bulk cargo or to determine the cargo moisture content at various points in any hold where a cargo shift can endanger the vessel is necessary to the master's continuous evaluation of his vessel's safety.

Even with the knowledge that a cargo condition may threaten a vessel's safety, evaluation of possible corrective actions may require technical analysis beyond the expected capability of the vessel's personnel and Coast Guard field marine safety or operations personnel who may become involved. Options available to the SILVER DOVE required evaluation both of stability and of longitudinal strength. Issuance of a Navigation and Vessel Inspection Circular to advise masters of the hazards of shifting weights or counter-flooding is not sufficient to assure that appropriate corrective action is taken. The Coast Guard has the technical expertise to evaluate such situations; it should make this expertise available to U.S. merchant vessels and to its field personnel as soon as it is needed.

Vessel masters as well as Coast Guard field personnel have considerable pride in their ability to perform their jobs without assistance. Often they do not seek assistance until it is too late. Only if they are required to seek assistance or, at least, to alert the Coast Guard when a hazardous situation is first identified, can assistance be made available in a timely manner.

M-76-11 thru 19

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

Develop or adapt existing crack detectors to provide its marine inspectors with a reliable means of detecting small cracks in ship hulls and utilize such detectors once developed. (M-76-11) (Class III, Longer-Term Followup)

Develop detailed procedures to be followed in making hull thickness measurements during periodic Coast Guard inspections. These procedures should insure that reliable ultrasonic readings are obtained, that low readings are highlighted as potential origins of cracks or leaks, and that areas covered by sheathing or insulation are measured by more reliable means such as drill gauging. (M-76-12) (Class II, Priority Followup)

Conduct a one-time special inspection of all certificated U.S. seagoing break-bulk vessels constructed before 1965 to detect wastage of hull plating that is covered by insulation and sheathing and wastage of ventilation systems and piping systems that have openings outside the hull. This special inspection should be completed within 2 years. (M-76-13) (Class II, Priority Followup)

Develop, with the assistance of the Portland Cement Association, guidelines for the use of cement for making watertight temporary repairs aboard ship and inspection of such repairs and issue these guidelines in a Navigation and Vessel Inspection Circular. (M-76-14) (Class II, Priority Followup)

Develop standards for and require portable pump(s) with the necessary ancillary equipment to remove seawater which may leak into the cargo holds of ships which carry bulk cargoes. (M-76-15) (Class III, Longer-Term Followup)

Identify those "dry" bulk cargoes which can threaten a ship's stability when water is added and publish this information with a description of the hazard in a Navigation and Vessel Inspection Circular. (M-76-16) (Class II, Priority Followup)

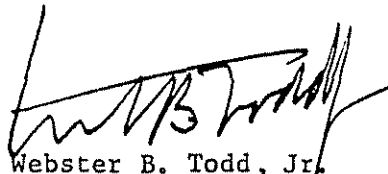
Establish, with the assistance of the National Cargo Bureau, Inc., procedures for detecting water infiltration into bulk cargoes while the vessel is at sea. (M-76-17) (Class III, Longer-Term Followup)

Establish a means to provide rapid technical advice to vessel masters and to Coast Guard field personnel regarding vessel stability and the effects of water entry into bulk cargo. (M-76-18) (Class II, Priority Followup)

M-76-11 thru 19

Advise masters of vessels that carry bulk cargoes that may affect ship stability adversely when water is added to alert the Coast Guard immediately if water leaks into the cargo.
(M-76-19) (Class II, Priority Followup)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, members, concurred in the above recommendations.


By: Webster B. Todd, Jr.
Chairman

THESE RECOMMENDATIONS WILL BE RELEASED TO THE PUBLIC ON THE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THE INFORMATION CONTAINED HEREIN SHOULD BE MADE BEFORE THAT DATE.