U.S. Department of Homeland Security
United States Coast Guard

Commanding Officer
United States Coast Guard
Marine Safety Center

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02 Mar 2022

MEMORANDUM

From: [redacted]
CG MSC SERT

Reply to Attn of: MSC-1 [redacted]

To: [redacted] CDR
CGD ONE Lead Investigating Officer

Subj: POST SINKING STABILITY ANALYSIS OF F/V EMMY ROSE, O.N. 909149

Ref:
(a) Your Memo, dated January 5, 2021
(b) Thomas M. Farrell Naval Architects (TMFNA) Doc., "F/V SASHA-LEE Stability Booklet," 63 pages, dated March 16, 2002
(c) TMFNA Dwg. No. 033-C-116-01, Rev. 0, "Lines Plan," 1 sheet
(d) Marine Safety Consultants, Inc. Doc. No. 19-0635, "Condition and Valuation Report F/V SASH LEE," 14 pages, dated August 5,2019
(e) MIND Technology Doc., Rev. 0, "Side Scan Sonar Search for the F/V EMMY ROSE," 11 pages, dated May 25, 2021
(f) Woods Hole Oceanographic Institution (WHOI) Doc., Rev. 0-02, "ROV Survey Report Fishing Vessel Emmy Rose," 41 pages, dated October 13, 2021

1. This analysis is in response to reference (a), wherein you requested the Marine Safety Center (MSC) assistance with a stability review of F/V EMMY ROSE (ex. SASHA LEE) in support of a marine casualty investigation regarding the vessel's sinking on November 23, 2020. Specifically, you requested the MSC conduct a technical stability analysis of the vessel in various loading conditions. We were unable to conduct a fully independent stability analysis of the vessel with the information provided. However, we reviewed the vessel based on references (b) and (c) from 2002, estimated loading condition at the time of the casualty, and information supplied by witness testimony to evaluate the vessel's stability at the time of incident. Our complete technical report can be found in enclosure (1).

2. Serving as an uninspected fishing vessel, EMMY ROSE was subject to 46 CFR Subchapter C regulations for stability requirements. The applicable stability criteria at the time of the incident are 46 CFR 25.550 Icing, 46 CFR 28.565 Water on Deck, 46 CFR 28.570 Intact Righting Energy, and 46 CFR 28.575 Severe Wind and Roll. Icing was not evaluated because the temperature at the time of incident was well above freezing.

3. Using testimony regarding normal operation of the vessel, we established load conditions to cover the range of loads the vessel would encounter during routine operations:

a. Load conditions 1 through 7 covered departure, mid voyage with different cargo loads, and arrival with different cargo loads, all of which matched those of the 2002 stability analysis for comparison.
b. Load condition 8 accounted for port arrival after a long transit without fishing.
c. Load condition 9 represented the load condition at the time of incident based on all available information.
d. Based on witness testimony of the fuel transfer operation, load condition 10 represents a fuel load difference of ¼ tank between port and starboard fuel tanks.
e. Load condition 11 represents a fuel load difference of ½ tank between port and starboard fuel tanks.

4. Based on the analysis, the vessel lacked sufficient stability in all load conditions, specifically at the time of incident, per the regulatory criteria in 46 CFR Subchapter C. The limiting criteria in all cases was 46 CFR 28.570 Intact Righting Energy. At the time of incident, the vessel failed by 20% or more in each failure of this criteria. The failure percentage exceeds any expected differences from the assumptions made in the analysis, therefore indicating the vessel lacked sufficient stability per the regulatory standards. Although failure of the criteria does not necessarily indicate capsize, the likelihood is increased. Additionally, any off center loading or weight shifts that would cause a list would have reduced the vessel's stability further. This could be caused by large shifting weights on deck, shifting catch in the fish hold, or internal liquid transfers. The lack of sufficient drainage could also cause entrapment or pocketing of water on deck, producing a heeling moment and list.

5. MSC also evaluated 46 CFR 28.580 "Unintentional Flooding" stability criteria considering flooding in each of the three watertight compartments at the request of the investigation team. Unintentional flooding criteria was not required since the vessel was built before September 15, 1991. The vessel fails the damage criteria with any of the three compartments flooded. It is important to note that a failure of the stability criteria does not necessarily mean the vessel capsizes but rather has inadequate stability according to the regulations. However, when the forward auxiliary/engine room compartment or aft fish hold compartment floods, the result is capsize. When the aft lazarette compartment floods, the vessel remains afloat with a significant aft trim.

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Enclosure: (1) Post-Sinking Stability Analysis of F/V EMMY ROSE
(2) Rhinoceros 3-D Model
(3) GHS Model
(4) GHS Model Hydrostatics
(5) GHS Lightship
(6) GHS Loading Conditions
(7) GHS Analysis: 46 CFR 28.565 Water on Deck
(8) GHS Analysis: 46 CFR 28.570 Intact Righting Energy
(9) GHS Analysis: 46 CFR 28.575 Severe Wind and Roll
(10) Drainage Calculations
(11) GHS Analysis: 46 CFR 28.580 Unintentional Flooding