



REPUBLIC OF THE PHILIPPINES
MARITIME INDUSTRY AUTHORITY

**MARINE SAFETY INVESTIGATION ON THE
SWAMPING AND SINKING OF LCT "PACIFICA
1" OWNED AND OPERATED BOOMETRIX
DEVELOPMENT CORPORATION**



DATE AND TIME OF ACCIDENT: 0640H of 10 February 2023

Consequences: Total Loss of Ship

**IMO ACCIDENT CLASIFICATION: VERY SERIOUS MARINE
CASUALTY**

AUTHORITY: The Marine Casualty Investigation Section (MCIS) of the MARINA ENFORCEMENT SERVICE (ES) was created pursuant to Administrative Order No. 01-18, to assume the responsibility of the Flag State in relation to its obligation under the provision in the IMO Casualty Investigation Code and other relevant national laws and regulations.

This safety investigation was conducted pursuant to the issuance of Special-Order No. 163-23 dated 15 February 2023 authorizing the conduct of marine safety investigation of the swamping and sinking of LCT "PACIFICA 1"¹.

PURPOSE: The main purpose of this investigation is to ascertain the level of the accident and the circumstances that caused the casualty event through prudent analysis, in order to draw useful conclusions and lessons learned by providing safety recommendations directly addressed to concerned parties for their perusal and appropriate actions. It is not the purpose of this inquiry to determine liability, nor to apportion blame to anyone or any party.

NOTE: The marine safety investigations conducted by the ES-MCIS are separate from any criminal and/or administrative investigations, with no other basic aim but preventing future similar recurrence, through sound recommendations, by re-visiting/ reviewing applicable and existing national maritime policies, circulars and memoranda. Consequently, any use of this investigation report for other purposes may lead to erroneous or misleading interpretations.

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Maritime Industry Authority
Central Office
Bonifacio Drive cor. 20th Street,
Port Area, Manila, Philippines

¹ Copy of Special Order No. 163-23 dated 15 February 2023 is attached hereto as Annex-A



MARINE SAFETY INVESTIGATION ON THE SWAMPING AND SINKING OF LCT "PACIFICA 1" OWNED AND OPERATED BOOMETRIX DEVELOPMENT CORPORATION

I. CASUALTY BRIEF

1. On or about 0640H of 10 February 2023, LCT "PACIFICA 1" (07-0003275), 1,781.00-GT steel hulled Landing Craft Transport (LCT) cargo vessel owned and operated by BOOMETRIX DEVELOPMENT CORPORATION which sank at the vicinity waters of Dapa, Siargao or at GPS position LAT 09°48.541N LONG 125°47.90 E;
2. By way of background, the 77.50-m LCT type cargo vessel departed the loading port of Cabinet, Cabadbaran, Agusan Del Sur under voyage no. 02-A with 750-metric tons of sand and aggregates while being manned by 22 Officers and crew;
3. Accordingly, loading of sand and aggregates started last 0900H of 06 February 2023 and was completed around 1740H of the same date. After completion of loading, LCT "PACIFICA 1" went on anchor while waiting for a good weather window before sailing to her next port of call;
4. On or about 1410H of 09 February 2023, LCT "PACIFICA 1" departed the anchorage area of Cabinet, Cabadbaran bound for Dapa, Siargao with the following draught condition: FWD= 2.4m, AFT=2.8 and mean draught of 2.6m with a trim by the stern;
5. LCT "PACIFICA 1" departed the loading port of Cabinet, Cabadbaran on an initial course of 320° and speed over ground (SOG) of 4.2 knots. Initially, the voyage was uneventful while sailing under loaded condition with 80 tons of ballast water on her WBT no. 2 and no. 3 (P/S), 14 tons of fresh water for consumption and 4,500 liters of diesel fuel on both of her Fuel Oil Tanks (P/S);
6. Whilst navigating on the early morning of 10 February 2023 along Hinatuan Channel on course 110°, LCT "PACIFICA 1" begun to experience 2.8 - 3 meters swells with wind speed of 21-22 knots coming from the northeast direction. Subsequently, the vessel begun to experience heavy rolling and pitching while under following sea² condition;
7. LCT "PACIFICA 1" was having difficulty in making headway³ and controlling her steering as large amount of sea water started to spray onboard her cargo deck, thus swamping⁴ the vessel;
8. Consequently, the Master ordered to gradually reduced her speed from 4.5 to 2.5 knots as sea and wave condition started to shift to quartering sea⁵, exacerbating the rolling period of LCT "PACIFICA 1":

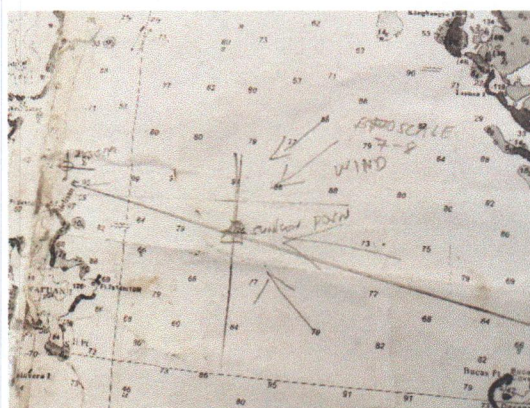


Figure 1 GPS plotted position of the sunken LCT "PACIFICA 1"

² Following sea means a sea in which the waves move in the general direction of the heading and can be dangerous if the sea and winds are to strong as defined by Bowditch's American Practical Navigator
³ Forward movement of the ship especially when slow and difficult
⁴ Swamping is when the vessel is filled with seawater, increasing the risk of sinking
⁵ a sea striking a ship's quarter at an angle of about 45 degrees to its heading

9. Thereafter, the vessel begun to develop an initial list of up to 15° to port which prompted more sea water to enter her cargo deck and deluged her cargo of sand and gravel while rolling. Accordingly, sea water had accumulated at the aft section of the cargo deck, prompting the Master to order the use of two (2) 1.5 HP submersible pumps to pump-out the volume of water on deck;
10. Having the accumulation of sea water onto the vessel's cargo deck caused by the continuous spraying of seawater, all efforts to remove the additional weight onboard and stabilize the vessel proved futile. Thereafter, the initial list to port progressed up to 20°, prompting more sea water to accumulate at the aft section of the cargo deck and inducing a hefty amount of cargo in bulk to shift to port;
11. Accordingly, due to the continuous ingress of sea water and shifting of cargoes on her port side, the list to port had later increased up to 30°. The situation prompted the Master to send a distress call on Channel 16 and declared the order to abandon ship. All Officers and crew were able to deploy the two (2) liferafts and go onboard for safely;
12. On or about 0640H of 10 February 2023, while onboard the liferafts the crew observed that LCT "PACIFICA 1" immediately capsized to port with her bottom hull exposed to the surface of the water;
13. Coincidentally, MV "REINA VENONICA" (04-0002418), a 443.00-GT steel hulled passenger vessel owned and operated by Montenegro Shipping Lines, noticed that distress smoke signal used by the crew was bellowing on the horizon while sailing from Dapa, Siargao to Surigao Port;
14. Immediately, MV "REINA VERONICA" altered her course towards the location of the buoyant smoke signal and saw the distress crew of LCT "PACIFICA 1" onboard the two liferafts. Thereafter, all Officers and crew of the ill-fated cargo vessel were later rescued and brought to Surigao Port;
15. On 12 February 2023, the overturned vessel had gradually sunk at the vicinity waters of Dapa, Siargao prompting the Philippine Coast Guard North Eastern Mindanao District Office to issue a "Notice to Mariners" (CGSSDN-2023-001)⁶ reminding all vessels plying the route of Surigao City, Siargao Island and Bucas Grande Island to take extra precautionary measures when navigating at the said area;
16. During the time of the occurrence, the Bridge Team Composition (BTC) was comprised of the Chief Mate as the Officer on the Watch (OOW) and deck rating AB seaman on the helm and was later accompanied by the Master who immediately took over of the command;
17. Consequences to the casualty event had resulted to the total loss of the ship and her cargoes. No casualty or fatal injury and severe damage to the marine environment was reported as a result of the occurrence;
18. Circumstances suggest that the potential cause of the casualty was the loss of stability brought by added weight on the portside aft section by way of accumulated sea water which was exacerbated by shifting of solid cargoes in bulk;

II. AUTHORITY

19. Pursuant to *Special Order No. 163-23 issued on 15 February 2023*, the undersigned ES-MARINA personnel were authorized to conduct the marine safety investigation on the swamping and sinking of LCT "PACIFICA 1".

⁶ Copy of Notice to Mariners(CGSSDN-2023-001) is attached hereto as Annex-B

III. PURPOSE AND OBJECTIVE

20. The primary objective of this marine safety investigation is to determine the most probable root cause/s of the accident pursuant to Administrative Order 05-17 and in accordance with MSC A. 255 (84) Code of International Standards and Recommended Practices for a Safety investigation into a Marine Casualty or Marine Incident and Maritime Safety Committee-Maritime Environmental Protection Committee (MSC-MEPC).3/ Circ. 4.
21. The conduct of this marine safety investigation does not seek to apportion blame or determine liability but instead has the objective of preventing recurrence of similar marine casualty in the future. Likewise, this aims to gather relevant information for recommendation in the formulation of safety policies and guidelines of the Administration.

IV. FACTUAL INFORMATION

A. SHIP PARTICULARS:⁷

Name of Ship	LCT "PACIFICA 1"
Former Name	DONG HUA BO 696
Type of Ship	LCT type Cargo vessel
Owner/Operator	BOOMETRIX DEVELOPMENT CORP.
Business Address	Manuel Lim and Sons Building Unit 202 A.S. Fortuna St., Banilad, Mandaue City, Cebu
Port of Registry	Cebu City
Official Number	07-0003275
IMO Number	N/A
GRT	1,781.00-GT
NRT	623.00-GT
LOA	77.50-meters
Breadth/ Extreme Beam	15.50-meters
Depth	3.50-meters
Engine Make	ZHICHAJ Diesel Engine
Engine Power	540.00 x 2 kw
Year built	2002
Place built	China
Builder	-
Hull Material	Steel
Classification Society	MARINA Class Surveyed (MARINA-MROVII-CSS-22-1295) dated 13 January 2023 valid until 05 March 2023

⁷

Details of vessel particulars is based on the issued Certificate of Philippine Registry

B. VESSEL DOCUMENTS⁸

Type of Certificates	License/ Certificate No.	Issuing Authority	Issuing Date (dd/mm/yyyy)	Expiry date (dd/mm/yyyy)
Certificate of Public Convenience (Company)		MARINA		
Certificate of Ownership	REG-0007397	MARINA	19 July 2019	N/A
Certificate of Philippine Registry	REG-0007396	MARINA	19 July 2019	N/A
Coastwise License	LIC 0077958	MARINA	30 January 2023	29 January 2024
Safe Manning Certificate	0237459	MARINA	28 October 2022	02 November 2023
Cargo Ship Safety Certificate	0244356	MARINA	06 January 2023	25 October 2023
Stability Certificate	CS-014788	MARINA	13 October 2022	For endorsement every 5 years
Load Line Certificate	LL-366-0819	MARINA	08 August 2019	18 May 2024

22. The vessel is certificated based on the requirements of the Safety of Life at Sea (SOLAS) and has valid safety and statutory certificates issued by MARINA in accordance with the provisions of the Philippine Merchant Marine Rules and Regulations (PMMRR) and applicable SOLAS regulation;
23. Conversely, it was divulged that LCT “PACIFICA 1” was not issued a Safety Management Certificate (SMC) and that Boometrix Development Corporation was not issued a Document of Compliance (DOC) by MARINA Regional Office VII as per Certification dated 03 March 2020;⁹
24. Further, an exemption to secure a Certificate of Public Convenience (CPC) was issued by MRO VII under CPC Certificate of Exemption Case No. MRO VII 2019-501 dated 06 February 2020 was issued to LCT “PACIFICA 1” provided that the vessel shall be solely and exclusively used for Company use only;

C. ACCIDENT INFORMATION

Nature of Accident	Swamping and Sinking
Time and Date of Accident	0640H of 10 February 2023
Vessel operation/voyage segment	On transit
Vessel’s course and speed	110°/2.5 knots
Consequences to the casualty	Total loss of ship and cargo
Location of Accident/Incident	Vicinity waters of Dapa, Siargao or at GPS position LAT 09°48.541N LONG 125°47.90 E
IMO Classification of Accident	Very Serious Marine Casualty

⁸ Copy of vessel documents is attached hereto as Annex -C

⁹ Copy of Certification issued by MRO VII dated 03 March 2020 is attached hereto as Annex-D

V. TIMELINE OF EVENTS¹⁰

25. The following information and sequence of events were gathered based on the actual interviews from the ship's officers and crews, including the statement of facts derived from the vessel's last loading port.

A. LOADING OF SAND AND AGGREGATE

26. On or about 0900H of 6 February 2023, the loading of sand and aggregates cargo started onboard LCT "PACIFICA 1", a 1,781.00-GT steel hulled LCT type cargo vessel owned/operated by BOOMETRIX DEVELOPMENT CORP. in favour of its consignee (Vert Bleu Acquisition);

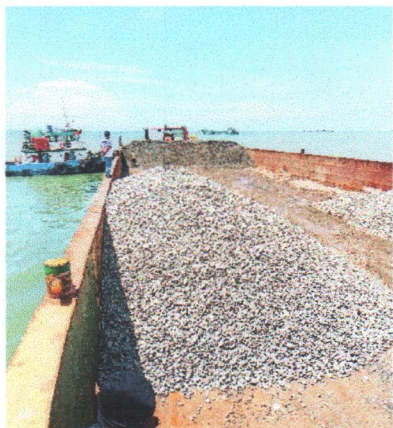


Figure 2 loading of aggregates at Cabinet Cabadbaran loading port by LCT "PACIFICA 2", the other vessel of Boometrix Devpt. Corp.

27. According to the Master, the loading sequence started with the placing of two (2) trucks as counter weights on both port and starboard side to stabilize the vessel while sand and gravel were being discharge by dump trucks onto the cargo deck. Accordingly, the cargo deck onboard LCT "PACIFICA 1" has a maximum loading capacity of 1,000 tons with a maximum trim height of 2-meters from its main deck;

28. Moreover, the aft section of the cargo deck was left void (approximately 3 meters) as a buffer space between the super structure and cargoes of gravel (as shown by example in Figure No. 2). Based on interview, it was divulged that a homogenous load of sand and aggregates were alternately loaded onboard compromising a total of 50 dump trucks;

29. After completion of cargo loading at around 1740H of 06 February 2023, draught conditions were taken by the Chief Officer were as follows: FWD= 2.4m, AFT=2.8 and mean draught of 2.6m with a trim condition by the stern;
30. Subsequently, LCT "PACIFICA 1" was also loaded with 14 tons of fresh water for consumption, 4,500 liters of diesel fuel on both of her Fuel Oil Tanks (P/S) and 80 tons of ballast water on both her WBT (P/S);
31. On or about 1750H of even date, LCT "PACIFICA 1" had temporarily anchored at Cabinet Anchorage while waiting for a departure clearance from the Philippine Coast Guard and a good weather window prior to the intended voyage;

B. CASUALTY EVENT

32. On or about 1410H of 09 February 2023, LCT "PACIFICA 1" departed Cabinet, Cabadbaran¹¹ with initial course 320° and an SOG of 4.2 knots;
33. Initially, the voyage was uneventful while sailing under light to moderate sea with visibility up to 200-meters. The vessel's rolling period was estimated around 14 seconds under following sea condition;
34. On or about 0530H of 10 February 2023, while sailing along at Hinatuan Channel on course 110°, LCT "PACIFICA 1" begun to experience 2.8 - 3 meters swells¹² with wind speed of 21-22 knots coming from the northeast direction. Subsequently, the

¹⁰ Copies of Marine Protest and statement of the Master are attached hereto as Annex-E

¹¹ Copy of Masters Declaration of Safe Departure (MDSD) is attached hereto as Annex-F

¹² Copy of weather and sea forecast by PAGASA is attached hereto as Annex-G

vessel begun to experience heavy rolling and pitching while under prevailing sea condition;

35. On or about 0616H, LCT "PACIFICA 1" was already having difficulty in making headway and controlling her steering as large amount of sea water started spray onboard the cargo deck, thus swamping the vessel;
36. At around 0619H, the Master ordered to gradually reduced her speed from 4.5 to 2.5 knots as sea and wave condition started to shift to quartering sea, exacerbating the rolling period of LCT "PACIFICA 1";
37. On or about 0621H, the vessel begun to develop an initial list of up to 15° to port which prompted more sea water to enter her cargo deck and deluged her cargo of sand and gravel while rolling. Subsequently, sea water had accumulated at the aft section of the cargo deck, prompting the Master to order the use of two (2) submersible pumps to pump-out sea water;
38. Having the accumulation of sea water onto the vessel's cargo deck caused by the continuous spraying of seawater, all efforts to remove the additional weight onboard and stabilize the vessel proved futile. Thereafter, the list to port had progressed up to 20°, prompting more sea water to accumulate at the aft section of the cargo deck and inducing a hefty amount of cargo in bulk to shift to port;
39. According to the Master, their starboard engine propeller was almost exposed above the water due to the port side listing of the ship;
40. On or about 0630H, due to the continuous ingress of sea water and shifting of cargoes in bulk at her port side, the list to port had later increased up to 30°. The situation prompted the Master to send a distress call on Channel 16 and declared the order to abandon ship;
41. At around 0636H, all Officers and crew were able to deploy the two (2) liferafts and go onboard for safely while the vessel was being swamped by sea water on her cargo deck;
42. On or about 0640H of 10 February 2023, while onboard the liferafts the crew observed that LCT "PACIFICA 1" immediately capsized to port with her bottom hull exposed to the water surface at GPS position LAT 09°48.541N LONG 125°47.90 E (as shown in Figure No. 3);



Figure 3 Overturned and capsized LCT "PACIFICA 1"

C. POST ACCIDENT EVENT

43. On or about 0650H 10 February 2023, MV "REINA VENONICA" (04-0002418), noticed a distress smoke signal used by the crew that was bellowing on the horizon while sailing from Dapa, Siargao bound for Surigao Port;
44. Immediately, MV "REINA VERONICA" alter her course towards the location of the buoyant smoke signal and saw the distress crew of LCT "PACIFICA 1" onboard the two liferafts;
45. 0740H of 10 February 2023, all Officers and crew of the ill-fated cargo vessel were later rescued and brought to Surigao Port;
46. On 12 February 2023, the overturned vessel had gradually sunk at the vicinity waters of Dapa, Siargao prompting the Philippine Coast Guard North Eastern Mindanao

District Office to issue a "Notice to Mariners" (CGSSDN-2023-001) to all vessels plying the said route;

VI. DETERMINATION OF SAFETY ISSUES

47. Based on the documents, interviews, statements and other relevant marine safety records gathered in the course of the marine safety investigation, the following are potential safety issues and deficiencies which could have contributed to the progression of the occurrence:

1. It was divulged during investigation that there was no specific loading plan on carriage of solid bulk cargoes. During interview, it was disclosed that essential information such as cargo characteristics, stowage factor, angle of repose, and special properties of the cargoes in bulk were not taken into consideration during loading of cargoes;
2. It was also observed that there are no cargo trimming procedures reflected on the company's Safety Management System (SMS) Manual which would provide guidance to the crew. Accordingly, cargo trimming is a mandatory requirement for solid bulk cargoes, to avoid the risk of the cargo shifting;
3. It was also noted that the Master and Chief Officer failed to consider the significance of loads induced by fuel and ballast water prior to the vessel's voyage which can have an effect on the weight distribution along the ship length when subjected to rolling and pitching moment;
4. It was also observed that the crew failed to ensure that drain pipes and freeing ports (P/S) located on the both the forward and aft section of the cargo deck were free from debris and accumulated sand and gravels. Initial assessment indicates that seawater was trapped on the cargo deck (as shown under figure no. 4 under similar vessel LCT "PACIFICA 2" owned by BOOMETRIX DEVELOPMENT CORP.);

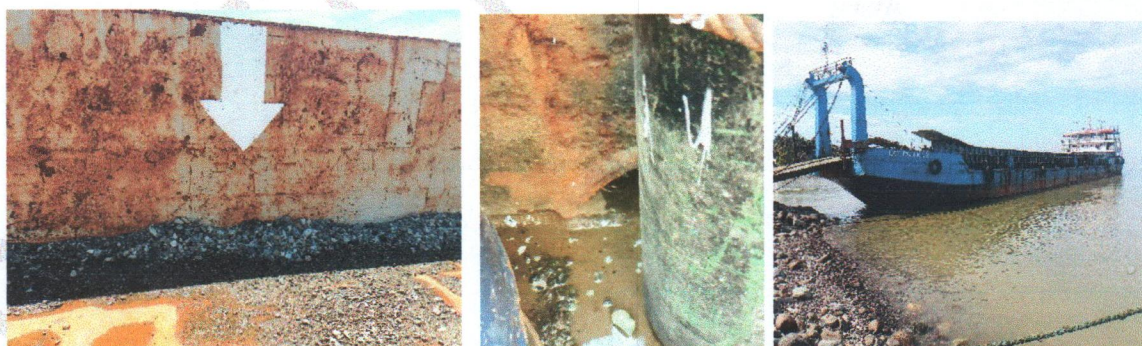


Figure 4 Freeing ports and drain pipes onboard LCT PACIFICA 2 were also obstructed by sand and gravel and other debris

5. Accordingly, LCT "PACIFICA 1" was not issued an SMC and that Boometrix Development Corp. was not required a DOC as per certification issued by MRO VII. The requirement to develop, adopt and implement safety procedures compliant with the standards set by the Revised Guidelines on the Implementation of the International Safety Management (ISM) Code by Companies (MSC-MEPC.7/Cir.8) pursuant to the ISM Code is compulsory for cargo ships 50-GT and above as indicated under Section II Item No. 5 of MARINA MC 2015-11.

VII. FINDINGS AND ANALYSIS

DETERMINATION OF POTENTIAL CAUSE(S)

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DETERMINATION OF POTENTIAL CAUSE(S)

48. The complete loss of the ship prevented the opportunity to carry out close examination and testing of other cascade failures as well as to accurately establish the root cause(s) of the casualty.
49. In narrowing down the probable cause(s) of the casualty event, it was reasonably deduced that the potential cause of the casualty was the loss of stability brought by added weight on her portside aft section by way of accumulated sea water which was later exacerbated by the shifting of solid cargoes in bulk;
50. Accordingly, the initial list of up to 10° to port was caused by added weight of the sea water sprayed on cargo deck, while the vessel was rolling under following sea condition. The additional weight on deck above the vessel's center of gravity (COG), resulted to a negative impact on the vessel's stability;
51. Accordingly, when external force (such as waves and wind) rolled the vessel from side-to-side, the trapped seawater with the cargoes will also slosh from side-to-side, causing a free surface effect;
52. Subsequently, there was a large probability that some of the loaded cargo of gravel and sand had blocked the vessel's drain pipes and freeing ports, preventing the egress of water;
53. With the sloshing of the seawater on deck and continuous rolling of the vessel, large portions of solid bulk cargoes stowed on deck had begun to shift towards the portside of the vessel increasing her list up to 20°;
54. Consequently, the shifting of cargo on deck will definitely cause a list, if the cargo does not return to its original position with subsequent vessel movement. This means that the righting lever for angles of heel will also be reduced, preventing the vessel to regain her upright position;

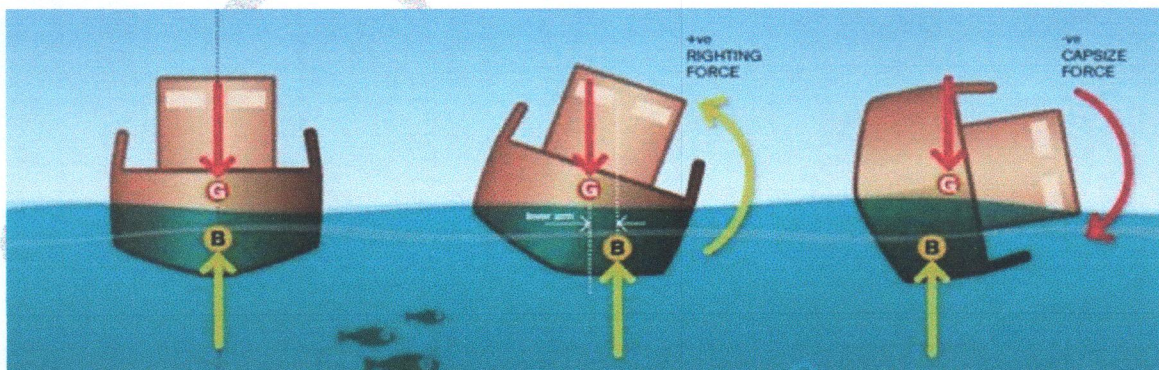


Figure 5 capsizing sequence

55. Moreover, once the angle of deck edge immersion has been reached, the vessel's stability would also start to diminish, prompting LCT "PACIFICA 1" to list further up to 30° to port and eventually capsized;
56. Finally, an underlying factor that was neglected by the Master is the significance of loads induced by fuel and the amount of ballast water during the voyage that had an effect on the weight distribution along the ship length when LCT "PACIFICA 1" was subjected to rolling and pitching moment;

VIII. CONCLUSIONS

57. Based on the foregoing discussions and analysis, the following conclusions are submitted:

1. Considering the total loss of the ship and cargo, the statements obtained from interviews of the crews provide useful information to this investigation. It is understood that person's memory recall can be flawed depending upon the level of trauma suffered and the time elapsed since the event. However, this safety investigation has been provided with evidence in the form of draft survey result, statement of facts and weather data which allow considerable analysis of the casualty event.
2. In narrowing down the potential cause(s) of the casualty event, it was reasonably deduced that the potential cause of the casualty was the loss of stability brought by added weight on her portside aft section by way of accumulated sea water which was exacerbated by shifting of solid cargoes in bulk.
3. With respect of the direct root cause of the casualty, it may be concluded that it is difficult to completely ascertain until such time that post-accident structural assessment onboard the vessel is conducted. Further analysis and cross referencing of the aforesaid causation models is required to further determine the root cause of the accident.

IX. SAFETY RECOMMENDATIONS

58. Based on the foregoing discussions and considerations, the following safety recommendations are hereby submitted:

A. For the Company "BOOMETRIX DEVELOPMENT CORPORATION"

1. To immediately adopt and implement in the Safety Management System (SMS) Manual the cargo trimming procedures for solid cargoes in bulk, taking into consideration the cargo characteristics, stowage factor, angle of repose, and special properties of the cargoes in bulk;
2. To conduct additional fleet safety and navigational audits of their remaining vessels;
3. To ensure that drain pipes, freeing ports, and scuppers¹³ are free of obstructions and accumulated debris during voyages;
4. To ensure the monitoring of weather condition and wave condition prior and during the voyage; and
5. To ensure the monitoring of cargo loading operation, and effective communication between the terminal and ship are maintained at all times, especially during the final trimming of the ship.

B. For the Maritime Industry Authority (MARINA)

6. For the Maritime Safety Service (MSS) to formulate/amend its policy on the carriage of solid cargoes in bulk for open deck vessel operating in the coastwise trading and study policy guidance on cargo distributions along ship's length;

¹³

A drain at the edge of the deck exposed to the weather, for allowing accumulated water to drain away into the sea or into the bilges

7. For MSS in coordination with MARINA Regional Office VII to validate/assess the issuance of exemption from requirement of ships for company use on the requirement of the ISM Code under MARINA MC 2015-11;

59. This Marine Safety Investigation report on the swamping and sinking accident involving LCT 'PACIFICA 1" is respectfully submitted for information and consideration of the Management in compliance with *Special Order No. 163-23 dated 15 February 2023*.