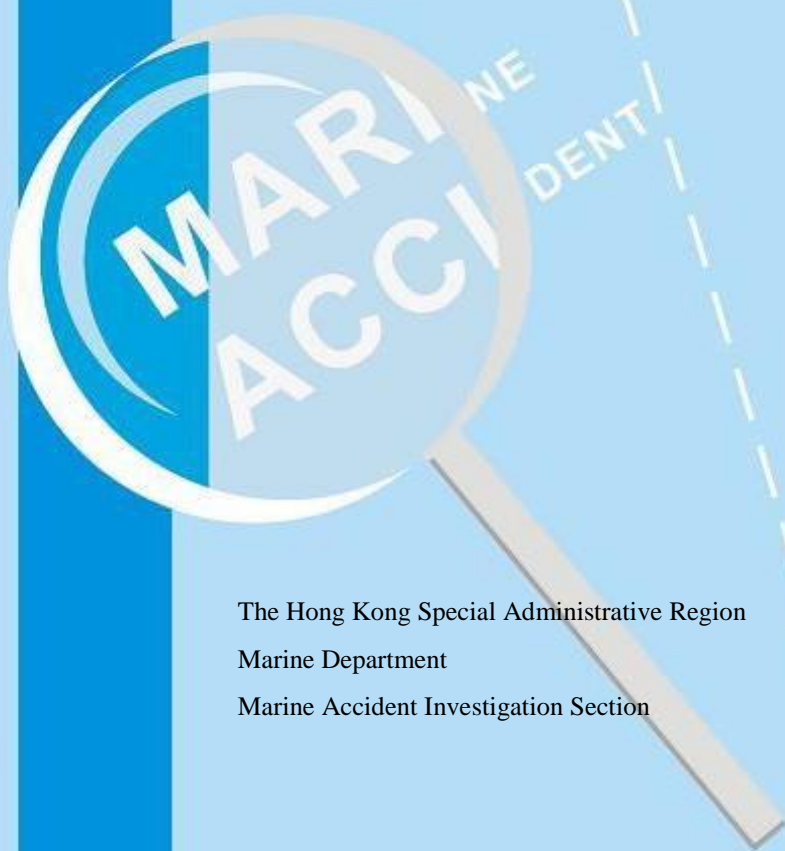




Report of Investigation into
Sinking of Hong Kong Registered
Bulk Carrier “Trans Summer” at
Position 21°55.3’N, 113°40.4’E
West of Dawanshan Dao, China
on 14 August 2013



The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

16 March 2015

Purpose of Investigation

This incident is investigated in accordance with the Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (the Casualty Investigation Code) adopted by IMO Resolution MSC 255(84).

The purpose of this investigation conducted by the Marine Accident Investigation and Shipping Security Policy Branch (MAISSPB) of Marine Department, in pursuant to the Merchant Shipping Ordinance Cap. 281, the Shipping and Port Control Ordinance (Cap. 313), or the Merchant Shipping (Local Vessels) Ordinance (Cap. 548), as appropriate, is to determine the circumstances and the causes of the incident with the aim of improving the safety of life at sea and avoiding similar incident in future.

The conclusions drawn in this report aim to identify the different factors contributing to the incident. They are not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAISSPB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

Table of Contents

	Page
1. Summary	1
2. Description of the Vessel	3
3. Sources of Evidence.....	5
4. Outline of Events	6
5. Analysis	13
6. Conclusion	19
7. Recommendations.....	21
8. Submissions	22
Appendix.1 The loading operation of Trans Summer	24
Appendix 2 The requirements of IMSBC Code and the Compliance of Trans Summer on handling of nickel ore	26

1. Summary

- 1.1 On 15 July 2013, the Hong Kong registered bulk carrier “*Trans Summer*” (*the vessel*) arrived at Subaim, Indonesia for loading of nickel ore cargo. The loading was completed on 6 August 2013 with about 54067 mt¹ of nickel ore loaded in five cargo holds. *The vessel* departed on 7 August 2013 bound to Yang Jiang, China for discharging.
- 1.2 On 12 August 2013, super typhoon “Utor” crossed Luzon Island, the Philippines and reduced to severe typhoon moving northwesterly to Yangjiang, China. The master altered course of the vessel to take shelter and finally dropped anchor at about 2 n.m south of Dawanshan Dao (about 100 n.m. to Yang Jiang, China) on 13 August 2013. *The vessel* was yawing and rolling heavily and dredging her anchor at the anchorage due to strong wind and heavy sea.
- 1.3 On the morning of 14 August 2013, *the vessel* encountered a strong wave pushing her to heel to port about 20° but returned and maintained only at about 10° listing to port. The listing to port of *the vessel* was further deteriorated to more than 90° within 2 hours. Finally, she capsized and sank at about 1156 on 14 August 2013 at position 21°55.3’N, 113°40.40’E.
- 1.4 All crew evacuated and abandoned *the vessel* before sinking. They were rescued without injuries. More than 600 mt of oil leaked into the sea and took more than 3 months for clean-up. *The vessel* was refloated on 20 August 2014.
- 1.5 The investigation into the accident revealed contributory factors leading to the accident as follows: -
 - a. The requirements of International Maritime Solid Bulk Cargoes Code (IMSBC Code) for the cargo of nickel ore, under group A & B, was not strictly followed. Nickel ore was loaded despite moisture content exceeded its Transportable Moisture Limit;
 - b. The safety shipboard procedures for loading and carriage of nickel ore were not followed. The relevant procedures were:
 - the procedure for handling of cargo ;
 - the instruction of handling of bulk cargo which may liquefy;
 - the requirement of cargo care at sea;

¹ mt. metric ton. 1 mt = 1000 kg

- the instruction for preventing strong wind; and
 - the voyage instruction.
- c. Liquefaction of cargo inside cargo holds while the anchored vessel experienced rolling at the anchorage, compounded by worsening weather and sea condition due to approaching of typhoon and mistakenly pumping water into ballast tank.
- d. The master's assessment to select the shelter for the vessel to anchor was not appropriate. The place selected by the master could shelter the wind from the north only. The vessel could not shelter from the southeasterly strong wind and waves when the typhoon "Utor" was passing the south of the vessel.

1.6 The investigation also revealed the follow safety issues:

- a. The moisture content certificate was issued by the shipper instead of local administration or independent organization (or authorized organization);
- b. The crew was not trained and therefore not competent to carry out Oven Drying Test on board to verify the moisture content of the cargo before loading.

2. Description of the Vessel

2.1 “*Trans Summer*”

Ship Information

Nationality	:	Hong Kong, China
Port of Registry	:	Hong Kong
Official No.	:	HK-3339
IMO No.	:	9615468
Call Sign	:	VRJS9
Ship Type	:	Bulk carrier
Year of Built (Delivery)	:	03 Feb. 2012
Gross Tonnage	:	33044
Net Tonnage	:	19231
Deadweight (Summer)	:	56823.9 mt
Length (Overall & LPP)	:	189.99 m / LOA, 185.636 m / LPP
Breadth (moulded)	:	32.26 m
Depth (moulded)	:	18.00 m
Summer Draft	:	12.80 m
Main Engine & Power	:	9480Kw (MAN B&W 6S50MC-C)
Classification Society	:	Bureau Veritas
Owner/Management Company	:	Amoysailing Maritime Co.,Ltd
Persons onboard	:	21



Fig.1 – *“Trans Summer”*

3. Sources of Evidence

- 3.1 The statements of the master, crew and company staffs of the “Trans Summer”;
- 3.2 The voyage information and ISM documents from the management company;
- 3.3 The search and rescue information provided by Hong Kong MRCC; and
- 3.4 The information provided by Guangdong MSA.

4. Outline of Events

All time are local (UTC + 8) if not specified otherwise.

Loading of nickel ore

- 4.1 On 7 July 2013, the Hong Kong registered bulk carrier “*Trans Summer*” (*the vessel*) discharged coke cargo at Fang Cheng Gang, China. The cargo holds were then cleaned at the anchorage. Hose testing for all cargo hold hatch covers was conducted, and their weather-tightness was found satisfactory. On 9 July 2013, she sailed to the next port at Subaim, Indonesia for loading of nickel ore.
- 4.2 On 10 July 2013, the company sent the precaution notice for loading nickel ore to the master reminding him to pay particular attention on the possible high moisture content in nickel ore. Moreover, “Can Test²” should be conducted for the cargo of each barge so as to satisfy himself before loading the cargo on board.
- 4.3 After the vessel arrived at Subaim, Indonesia on 15 July 2013, the chief officer and the chief engineer inspected the nickel ore mine. They did not verify the conditions of cargo stockpiles, nor aware whether the cargo stockpiles would be covered by tarpaulins to prevent wetting.
- 4.4 Before commencement loading of cargo at about 1230 (UTC+9) on 17 July 2013, the master had already received the cargo declaration together with a Moisture Content (MC) certificate issued by shipper. The characteristic of the cargo was given in the table below:

Cargo name	IMSBC* Code Group	Moisture Content	TML [†]	FMP [‡]
Nickel Ore	A+B	33.87	34.79	38.66

* IMSBC Code means International Maritime Solid Bulk Cargo Code.

[†] TML means Transportable Moisture Limit (TML) of a cargo which may liquefy.

[‡] FML means the Flow Moisture Point of the cargo. The TML is 90% of the FMP.

² Section 8.4 of IMSBC Code: A complementary test procedure for determining the possibility of liquefaction. A ship's master may carry out a check test for approximately determining the possibility of flow on board ship or at the dockside by the following auxiliary method: Half fill a cylindrical can or similar container (0.5 to 1 litre capacity) with a sample of the material. Take the can in one hand and bring it down sharply to strike a hard surface such as a solid table from a height of about 0.2 m. Repeat the procedure 25 times at one- or two-second intervals. Examine the surface for free moisture or fluid conditions. If free moisture or a fluid condition appears, arrangements should be made to have additional laboratory tests conducted on the material before it is accepted for loading.

- 4.5 It rained frequently during the loading of cargo. To avoid rain water entering into cargo holds and wetting the cargo inside, the loading operation was suspended during raining. The crew on board *the vessel* closed the cargo hold hatch covers while the stevedores on the barges covered the cargo by tarpaulins.
- 4.6 Each barge carried about 2500 mt to 3000 mt of cargo. Can Test of cargo on each barge was carried out by the crew of *the vessel* before transfer. Test sample was taken from about 1 m below cargo surface. If that test failed, Oven Drying Test³ would be followed to determine the moisture content. In case of the moisture content found exceeded the Transportable Moisture Limit (TML), the cargo in the barge would be rejected. The results of all the cargo moisture content tests were recorded and sent to the company by email.
- 4.7 All documents of the vessel including the above records were lost in the accident. The information about cargo loading sequences was retrieved from emails exchange between *the vessel* and the management company (see Appendix 1).
- 4.8 In the course of cargo loading operation, *the vessel* received cargo declarations and MC certificates respectively on 23 July and 30 July (that were for the second and third week for cargo loading). Nobody on board *the vessel* checked the cargo declaration and MC certificate received on 23 July. Hence, they did not know the moisture content of cargo loaded into the cargo holds during the second week (i.e. from 24 to 30 of July). The third cargo declaration and MC certificate received on 30 July, as shown in the table below, was checked by the crew and it was sent to the company.

Cargo name	IMSBC Code Group	Moisture Content	TML	FMP
nickel ore	A+B	33.88	34.80	38.69

³ Oven Drying Test: The moisture content of the concentrate “as received” is *in percent*
 $(m1-m2)/m1 \times 100\%$ Percent.
m1 as the exact mass of the sample “as received”
m2 as the exact mass of the “as received” sample, after drying,

- 4.9 The loading was completed on 6 August 2013. There were 26 stoppages, a total of about 84 hours, due to rain. A total of 19 Can Tests and 7 Oven Drying Tests were carried out. It revealed that on 2 August, the vessel accepted cargo in two occasions with unacceptable moisture content (that were 35.54% and 37% respectively comparing with TML 34.80%).
- 4.10 The cargo inside the cargo holds was trimmed and pressed by means of cargo grabs. Each cargo hold was about half-full. The total amount of cargo loaded on board was about 54750 mt. The approximate distribution of cargo in the cargo holds was given in the table below:

Cargo hold	No 1	No.2	No.3	No.4	No.5
Weight mt	10708	11602	9948	11159	11333

On the route to Yangjiang, China

- 4.11 At about 1342 on 7 August 2013, the vessel departed Subaim, Indonesia bound for her discharge port in Yangjiang, China. Everything was found normal upon departure with her intact stability, as shown below, met the requirement of International Code on Intact Stability, 2008.

Draft forward :	12.61 m	GoM	= 3.684 m
Draft after :	12.84 m	Maximum GZ	= 2.157 m
Displacement :	67174.7 mt	Area under GZ to 40°	= 0.858 m-rad.

- 4.12 On the morning of 9 August 2013, the chief officer inspected the cargo in No.4 cargo hold and found normal. On the same day, the company informed the master to monitor a tropical depression developing in the Philippines. The tropical depression eventually developed into a typhoon next day and was named “Utor”. It was predicted that “Utor” would approach to the Pearl River Delta and the likely place of landing at Yangjiang, China. Typhoon precautionary measures were executed by the crew, which included tightening of hatch covers, sealing up of bilge sounding ports and other deck openings, etc.. *The vessel* tried to proceed at her best speed to keep a distance away from “Utor” which was about 500 n.m behind her.
- 4.13 At 1540 on 12 August 2013, after consulting the company, the master altered course to sail *the vessel* towards Wanshan QuanDao, China (about 100 miles to Yangjiang) for sheltering from the effect of

typhoon “Utor”.

Encountered the typhoon “Utor” at the anchorage

- 4.14 At 0001 on 13 August 2013, *the vessel’s* port anchor was dropped at position 21°54’N 113°43’E with 7 shackles in water. It was about 2 n.m south of Dawanshan Dao, and about 100 n.m to Yangjiang, China. The water depth was about 27 m. At about 2000, easterly wind increased to force 8 to 9 on Beaufort scale, and wave height about 5 to 6 m. The duty officer found *the vessel* dredging her anchor, rolling and yawing in a rage of 10 degrees with longer period. The master extended the anchor chain to 9 shackles. The main engine was running at slow ahead to ease the strain on the cables.

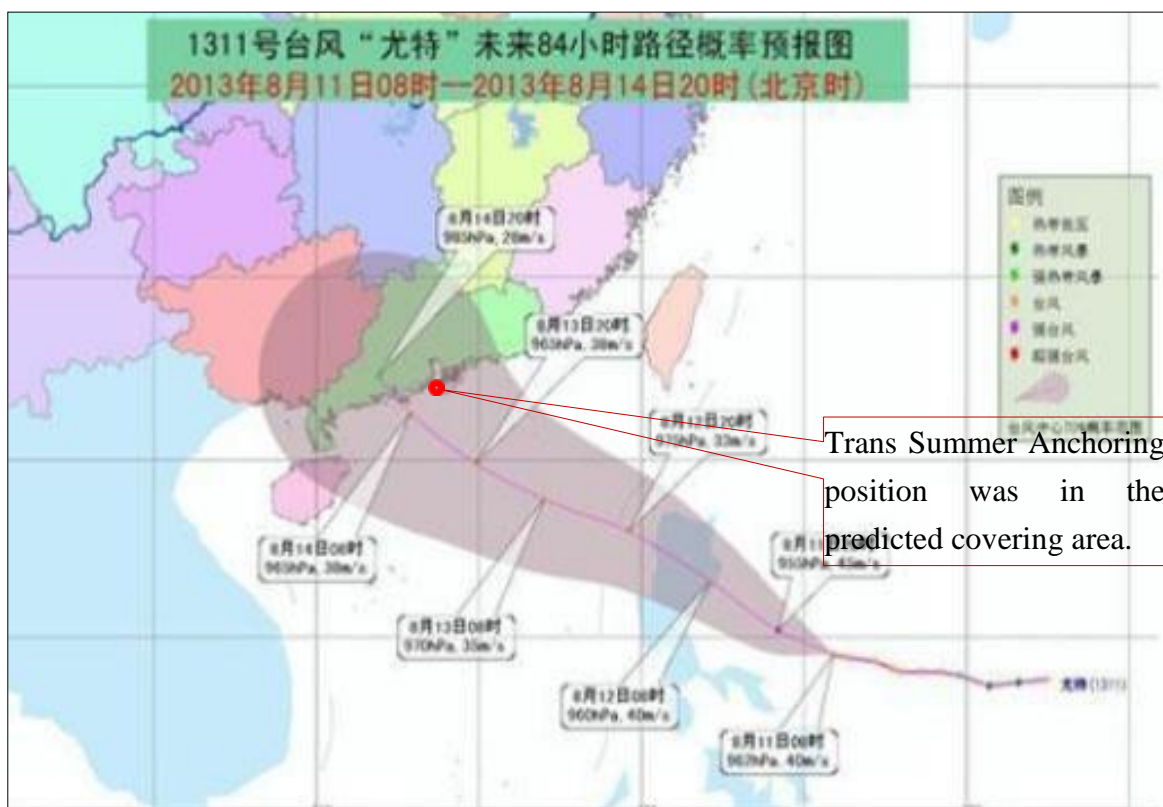


Fig. 2 – The predicted track of Typhoon “Utor” on 11 August 2013.

- 4.15 On the early morning of 14 August 2013, easterly wind was blowing at force 9 on Beaufort scale, and the sea condition was much rougher. With the engine running at slow ahead continuously, *the vessel* was still dredging her anchor in the northwesterly direction, yawing about 10 degrees and rolling slowly at a range of 7 to 8 degrees.
- 4.16 At 0757 on 14 August 2013, the wind was blowing from the southeast at force 9, wave height about 4 to 6 m. Main engine was running at slow

ahead. The distance to typhoon centre was about 120 n. m. (Figure.2)

Listing, capsizing and sinking of vessel

- 4.17 At about 1000 on 14 August 2013, wind force was intensified to about force 10 on Beaufort scale, and waves up to 7 m high. At 1010, a very high wave rushed from starboard side caused *the vessel* heeled to port side more than 20 degrees with the deck edge immersed in water. *The vessel* rolled back and stayed at a listing to port of about 10°. The starboard anchor was then dropped with 5 shackles of anchor chain in water. The listing to port was aggravated to 15 degrees soon afterward and persisting. The management company suggested the master to put ballast water into double bottom ballast water tanks to low the height of gravity centre of the vessel. The master followed the instruction but the ballast water was wrongly pumped into No.3 starboard topside ballast tank.
- 4.18 At 1030, *the vessel* listed to port about 17°, the second officer transmitted Distress Signal under master's order. Liferafts and lifeboat were prepared for launching.
- 4.19 The master announced abandon ship at 1105. All valves for oils were shut by the chief engineer. The remaining oil on board was about 800 mt.
- 4.20 *The vessel* listed further to port by more than 22°. At 1109, the master confirmed that the rescue vessel “Nan Hai Jiu 116 (南海救 116)” was underway for the rescue. At 1120, the free fall lifeboat could not be launched due to port listing of 20° of the vessel exceeded the design limit of the lifeboat for free fall launching.
- 4.21 The master ordered all crewmembers jump into the sea from the stern deck and board the inflated liferafts nearby *the vessel*. At 1137, two rescue helicopters from HKGFS⁴ arrived at scene and commenced lifting stricken seamen. After evacuation of all crew, *the vessel* listed further to port more than 90°. The last AIS position of the vessel received by shore station was at 1156, at position 21°55.3'N, 113°40.40'E. It was about 2.7 n.m northwest from the original anchor position. The time at which the vessel sank was therefore at 1156 on 14 August 2013.

⁴ Hong Kong Government Flying Service



Fig. - 3 Trans Summer listed to port more than 45° (View from Rescue Helicopter)



Fig. - 4 Trans Summer listed to port about 90° (View from Rescue Helicopter).

Search and Rescue operation

- 4.22 At 1033 on 14 Aug. 2013, HKMRCC received the DSC distress alert from *the vessel*. HKGFS was tasked to the scene to perform search and rescue operation. Meanwhile Guangdong Rescue Coordination Centre (GDRCC)

was informed of the case.

- 4.23 At 1137, rescue helicopters R83 and R87 of HKGFS arrived at scene and rendered assistance. Total 19 crewmembers were air-lifted by the helicopters. The rescue vessel “Nan Hai Jiu 116 (南海救 116)” arrived and picked up two crewmembers from a liferaft. There was no injury, dead or people missing. The deck log with other statutory document was lost at sea.

Cleaning of the oil pollution and Salvage of *the vessel*

- 4.24 Since 16 August 2013 more than 10 vessels were deployed at scene to control and collect oil spillage from *the vessel*. In the incident, there was about 610 mt of oil spilled into the sea. The Wan Shan port, marine fishing farms and sea coast nearby were polluted by the oil spill. The cleaning of oil pollution was completed in November 2013.
- 4.25 *The vessel* was refloated on 20 August 2014. (Fig. 5).



Fig.5 – “*Trans Summer*” refloated after one year of the accident.

5. Analysis

Ship's certificates and the qualification of crewmembers

- 5.1 *"Trans Summer"* (The vessel) was built and delivered for service on February 2012, the statutory certificates were all valid at the time of the accident. She had served for more than 10 voyages without any abnormality. During the accident, no observation was reported by crewmembers on any abnormal findings on the ship's construction and equipment.
- 5.2 The vessel was manned by 21 Chinese crew. All crewmembers held valid Certificates of Competency issued by Chinese administration appropriate to the positions on board. The requirement of ship's Minimum Safe Manning Certificate was met.

Loading of nickel ore in Indonesia

- 5.3 In the fourth quarter of 2010, there were three vessels⁵ sank with a total loss of 44 lives while on voyages from Indonesia to China laden with nickel ore. The probable cause of the accidents was due to liquefaction of cargo. The management company reminded the master of the above fatal accidents and the danger of liquefaction of nickel ore if its moisture content exceeded the Transportable Moisture Limit (TML).
- 5.4 The statutory requirements with respect to group A cargo extracted from the IMSBC Code vis-a-vis compliance actions taken on board is tabled in Appendix 2.
- 5.5 The cargo was categorized as group A and B⁶. It means the cargo had the risk of liquefaction if the moisture content exceeding its TML. Notwithstanding of alerts given to the master, numerous omissions were found for loading of the nickel ore cargo.
- 5.6 For example, in the second week, the master allowed cargo loading to continue without confirming the suitability of its moisture content. The crew did not verify anymore the condition of cargo on the barge after it

⁵ Jian Fu Star sank on 27 Oct.2010, Nasco Diamond sank on 10 November 2010, Hong Wei sank on 3 Dec. 2010.

⁶ IMSBC Code 1.7.2 Group A consists of cargoes which may liquefy if shipped at a moisture content in excess of their transportable moisture limit. 1.7.13 Group B consists of cargoes which possess a chemical hazard which could give rise to a dangerous situation on a ship. Group A and B means the cargo has the characteristics of group A and group B.

passed the initial Can Test. The master did not require the shipper to take further verification of the moisture content of the cargo after heavy rain. The requirement of Section 4.5.2 of IMSBC was not complied with.

- 5.7 A P & I Circular, which had been sent to the master for information, stated that Can Test could only assess the suitability of cargo to be loaded on board. The result of Can Test could not indicate the fitness of transportation, which should be relied on laboratory analysis.
- 5.8 The crewmembers of *the vessel* conducted Can Test and Oven Drying Tests by themselves. Instead of taking samples from various points, it was obviously inappropriate that they only took one sample from the middle (1 m below the surface) of the cargo in each barge. While Oven Drying Tests discovered the moisture content of cargo exceeded its TML (34.80%) on 2 August 2012, one batch of cargo from a barge with moisture content of 35.53% was loaded on board without further verification. Besides, another batch with moisture content of 37% was also loaded on board after drying under the sun for four hours. The requirement under section 7.3.1.1 of IMSBC Code of not accepting cargo with moisture content exceeding its TML was not complied with. The master did not ask the shipper to take additional tests and submit a new MC Certificate after they found that the results of Can Test were failed. Neither did the master requested independent laboratory to verify the moisture content of the cargo.

Cargo care at sea passage

- 5.9 The Safety Management System (SMS) required that cargo should be checked twice a day during voyage. However, the crewmember only carried out one inspection in No.4 cargo hold. As a result, the condition of cargo in cargo holds was unknown before the accident. The SMS's requirement of caring of group A and B cargo with high moisture content was not followed by the master. Besides, cargo stowage and securing precaution for preparation of typhoon stipulated in the SMS was omitted. Section 7.2.1 & 7.2.3 of IMSBC Code (Appendix 2) was not observed.

Sheltering from the super typhoon “Utor”

- 5.10 Super typhoon “Utor” took a northwesterly track over the northern part of the South China Sea to the south of Hong Kong after crossing over Luzon, the Philippines on 12 August 2013 (Fig.2 & Fig.7). It was predicted to land at Yangjiang, China.

- 5.11 The master dropped anchor at 21°53.42'N, 113°42.31'E about 2 n.m south of Dawanshan Dao of Wanshan Quandao for sheltering from the typhoon. It was about 100 n.m to Yangjiang, China (Fig.6, 7).
- 5.12 Investigation into the topography of the anchorage south of Dawanshan Dao revealed that the islands of Wanshan Quandao could shelter the wind from the north only. *The vessel* was in the right semicircle of the typhoon while she was moving northwesterly and passed south of *the vessel*. The prevailing wind was easterly to southeasterly while the typhoon moved closer and passed on south of *the vessel*. It was obviously that *the vessel* could not be sheltered from the southeasterly strong wind and waves.

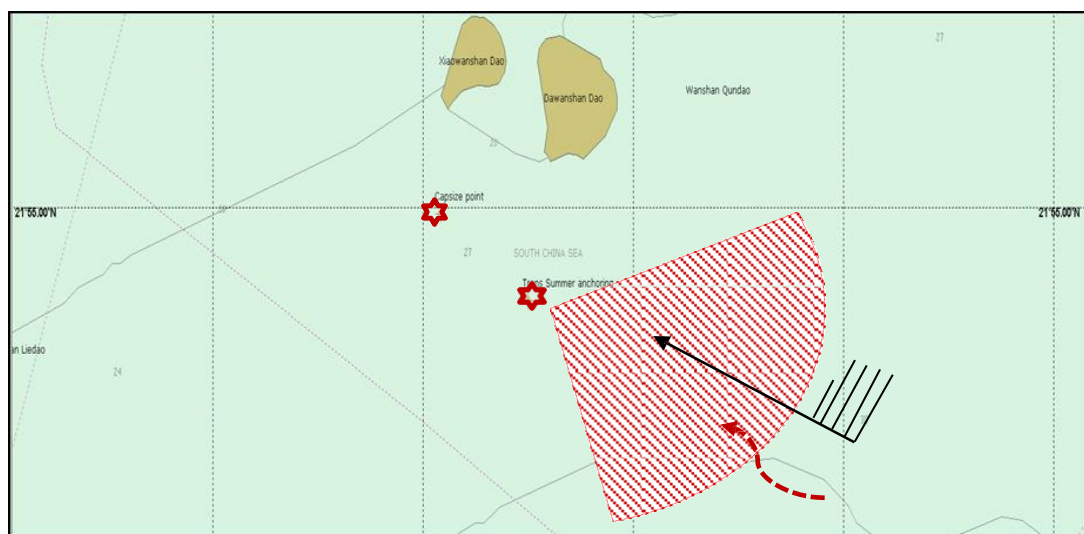


Fig.6 - Anchoring area of “Trans Summer”, strong southerly wind and seas.



Fig. 7 – Track of “Utor” on 14/1200 hours, the real track in black line. Predicted track in red

- 5.13 On the evening of 13 August 2013, strong wind of force 9 and 10 on Beaufort scale and heavy waves 7 to 8 m from southeast in the anchorage was prevailing. After extending the anchor chain to 9 shackles in water, with running of main propulsion at slow-ahead, *the vessel* was still experienced anchor dredging. It was obviously *the vessel* could not hold her position by anchor and running of engine at slow-ahead under this severe weather condition.
- 5.14 At 1100 hours on 14 August 2013, the center of “Utor” was about 103 n.m west of *the vessel*, the southerly wind intensified to force 9 to 10 in the area and wave at sea about 9 to 10 m high. At the time of the accident, the anchorage gave no sheltering benefit from the wind and waves.

Intact stability of *the vessel*

- 5.15 *The vessel* was built on 2012. The International Code on Intact Stability, 2008 applied to the vessel. On departure, the stability met the criteria of the code.

Liquefaction of cargo

- 5.16 The moisture content of nickel ore cargo was high and close to the TML (Paragraph 4.4 & 4.8). Part of the cargo with moisture content exceeding TML was loaded on board on 2 August 2013. In the second week (24 to 30 July), nobody knew the moisture content of the cargo. It was probable that more than two barges of cargo with moisture content exceeded TML were loaded on board.
- 5.17 The crew conducted only one inspection of cargo in No.4 cargo hold while en-route and found normal (i.e. without any sign of liquefaction). While the vessel was at the anchorage, the cargo stowage condition inside cargo holds was unknown to the crew.
- 5.18 On the morning of 14 August 2013, *the vessel* was suddenly heeled to port 20° under the effect of a strong wave and could not right up afterward but stayed at port listing of 10°. Under such circumstance, it was obviously that part of the cargo inside any of the cargo holds had slid to port side and did not return. The master was deemed not realize liquefaction of cargo occurred. He dropped starboard anchor to stabilize the ship and hold her in position. He pumped in ballast water intended to bring the ship upright but accidentally took wrong action pumping water into No.3 starboard topside ballast tank instead of double-bottom tank.

- 5.19 Under the influence of free surface effect due to liquefaction of cargo inside cargo hold(s) and ballast water being pumped into No.3 topside ballast tank whose gravity center was high, the ship's stability became worse.
- 5.20 The liquefaction of cargo inside cargo holds might have been speeded up by vessel rolling heavily under severe weather. When the typhoon came closer to *the vessel*, the cargo slid quickly to one side (i.e. port side in this accident). *The vessel* listed to port over 22° at 1100 hours. The port listing was further up to more than 90° within 2 hours. Finally she capsized and sank.
- 5.21 In hindsight, if the master realized that liquefaction of cargo had occurred when the vessel first listed to 10° port side and took decision to beach the vessel at nearby island, sinking of the vessel could have been avoided.

Abandon ship

- 5.22 As the emergency situation occurred on the morning of 14 August 2013, the master ordered the crew to launch and secure the liferafts on ship's sides and also to prepare the free fall lifeboat for launching. When it came to launch the lifeboat at 1135 hours, *the vessel's* listing had exceeded the design limit (i.e.20°) for free fall launching of lifeboat. The lifeboat could not be launched.
- 5.23 The master led his crew jump into the sea and embarked or clung to the liferafts waiting for rescue. All the crew was successful rescued by the helicopters of Hong Kong Government Flying Service (HKGFS) and Zhuhai Rescue boat.

Non-compliance with statutory requirements and SMS procedures

- 5.24 The IMSBC Code was adopted on 4 December 2008 by IMO Resolution MSC 268(85). The majority of IMSBC Code was mandatory as of 1 January 2011.
- 5.25 Section 7.3.1.1 of IMSBC Code states that concentrates or other cargoes which may liquefy shall only be accepted for loading when the actual moisture content of the cargo is less than its TML. This principle was mentioned in the SMS manual regarding "Procedure for handling cargo" and "Instruction for handling bulk cargo which may liquefy". However, after the moisture contents of some batches of cargo were found exceeded the TML, they were still accepted and loaded on board.

- 5.26 The master and company relied solely on the Can Test and Oven Drying Test carried out by crew to determine the fitness of loading. They did not follow the SMS procedure of “*Instruction for handling bulk cargo which may liquefy*” to request the shipper to recheck moisture content after it was found in doubt or exceeded its TML.
- 5.27 There was a warning in the loading instruction of nickel ore of not to taking ballast water to counteract the listing of vessel due to cargo sliding, as it might cause the loss of buoyance and stability and result in sudden capsizing. But the master and the company made the decision to add ballast water into double bottom water ballast tanks. It was evidence that management on board and ashore did not follow instruction in the SMS manual.
- 5.28 According to the company’s instruction of loading nickel ore cargo, an Oven Drying Test should be followed if the Can Test failed. It described that a sample should be baked for 1-2 hours in oven, and then cooked in a stove until no white vapor omission could be seen when it was dried completely. The weight deduction after the test would amount to the moisture content of the sample. The Oven Drying Test method is based on section 1.1.4.4 “*Determination of moisture content in the Appendix 2 Laboratory test procedures*” of IMSBC Code. Since it is a laboratory analysis method, it would be difficult for the crew on board without proper training to follow the requirements (such as temperature control, ventilation control and dried to constant mass) for conducting the test in order to achieve accurate results. Oven Drying Test should not be taken as a moisture content determining method by crew, it should be carried out by qualified persons instead.

6. Conclusion

- 6.1 On 15 July 2013, the Hong Kong registered bulk carrier “*Trans Summer*” (*the vessel*) arrived at Subaim, Indonesia for loading of nickel ore cargo. The loading was completed on 6 August 2013 with about 54067 mt⁷ of nickel ore loaded in five cargo holds. *The vessel* departed on 7 August 2013 bound to Yang Jiang, China for discharging.
- 6.2 On 12 August 2013, super typhoon “Utor” crossed Luzon Island, the Philippines and reduced to severe typhoon moving northwesterly to Yangjiang, China. The master altered course of the vessel to take shelter and finally dropped anchor at about 2 n.m south of Dawanshan Dao (about 100 n.m. to Yang Jiang, China) on 13 August 2013. *The vessel* was yawing and rolling heavily and dredging her anchor at the anchorage due to strong wind and heavy sea.
- 6.3 On the morning of 14 August 2013, *the vessel* encountered a strong wave pushing her to heel to port about 20° but returned and maintained only at about 10° listing to port. The listing to port of *the vessel* was further deteriorated to more than 90° within 2 hours. Finally, she capsized and sank at about 1156 on 14 August 2013 at position 21°55.3’N, 113°40.40’E.
- 6.4 All crew evacuated and abandoned *the vessel* before sinking. They were rescued without injuries. More than 600 mt of oil leaked into the sea and took more than 3 months for clean-up. *The vessel* was refloated on 20 August 2014.
- 6.5 The investigation into the accident revealed contributory factors leading to the accident as follows: -
- a. The requirements of IMSBC Code for the cargo of nickel ore, under group A & B, was not strictly followed. It was loaded despite moisture content exceeded its Transportable Moisture Limit;
 - b. The safety shipboard procedures for loading and carriage of nickel ore were not followed. The relevant procedures were:
 - the procedure for handling of cargo ;
 - the instruction of handling of bulk cargo which may liquefy;
 - the requirement of cargo care at sea;
 - the instruction for preventing strong wind; and

⁷ mt. metric ton. 1 mt = 1000 kg

➤ the voyage instruction.

- c. Liquefaction of cargo inside cargo holds while the anchored vessel experienced rolling at the anchorage, compounded by worsening weather and sea condition due to approaching of typhoon and mistakenly pumping water into ballast tank.
- d. The master's assessment to select the shelter for the vessel to anchor was not appropriate. The place selected by the master could shelter the wind from the north only. The vessel could not shelter from the southeasterly strong wind and waves when the typhoon "Utor" was passing the south of the vessel.

6.6 The investigation also revealed the follow safety issues:

- a. The moisture content certificate was issued by the shipper instead of local administration or independent organization (or authorized organization);
- b. The crew was not trained and therefore not competent to carry out Oven Drying Test on board to verify the moisture content of the cargo before loading.

7. Recommendations

- 7.1 The management company of “*Trans Summer*” (the vessel) should issue a safety circular informing all masters and officers the findings of this accident investigation. The company should also issue guidance advising them in seeking shelter for typhoon or considering movement away from typhoon.
- 7.2 The company should review and enhance the safety management system for loading bulk cargo which may liquefy, so as to ensure that the masters of ships follow strictly :
- a) the requirements of IMSBC Code; and
 - b) all relevant shipboard procedures for safe handling of cargo and preventing strong wind.
- 7.3 The master should request shipper to deliver new Moisture Content Certificate if Can Test is failed; or request an independent laboratory for verification prior to accepting the cargo.
- 7.4 The company should inform the Marine Accident Investigation Section of the Hong Kong Marine Department of the above corrective actions taken upon completion.
- 7.5 A Hong Kong Merchant Information Note should be issued to promulgate the lessons learnt from the accident.

8. Submissions

- 8.1 In the event that the conduct of any person or organization is criticized in an accident investigation report, it is the policy of the Marine Department that a copy of the draft report should be given to that person or organization so that they can have an opportunity to express their comments on the report or offer evidence not previously available to the investigating officer.
- 8.2 Copy of the draft report has been sent to the following parties for comments:
- a) the management company, the Master and the Chief Officer of “*Trans Summer*” ;
 - b) the Guangdong Maritime Safety Administration, China, as the Competency of Certificate issuing authority and coastal administration of the accident; and
 - c) the Shipping Division of the Marine Department, as flag Administration of “*Trans Summer*”.
- 8.3 A submission was received. The report was revised as appropriate.

Appendix.1 The loading operation of Trans Summer

Date	Stoppage due to Raining (Hours)	loaded (mt)	Can test	Oven Drying Test	Cargo rejected	Remarks
17/07	1500 – 2400,	310				<i>MC certificate rec'd</i>
18/07	0000-0300, 1700-1900	4800				
19/07	1600-2100	0				No loading operation
20/07	1300-1630,	1283	1 (Fail)		Rejected one	
21/07	0030-0230, 0800-1040	808	1			
22/07	1430-1530, 2255-2330	1830				
23/07	1630-1730, 1855-1930	1588	1 (Fail)		Rejected one was towed back.	<i>A MC cert. did not check.</i>
24/07	1730-2140	2204	1			
25/07	0210-0525, 1820-1930, 2100-2250	2657	1			
26/07	0300-0800, 1315-1505, 2000-2320	5587				
27/07		2833				
28/07		6394	1	1		0220-0745 stop due to Wet cargo

Date	Stoppage due to Raining (Hours)	loaded (mt)	Can test	Oven Drying Test	Cargo rejected	Remarks
29/07		2213	1			
30/07	1200-2400	1281	1			<i>A MC Cert received</i>
31/07	0000-1000, 1150-1220, 1640-1720	5549				
1/08	2115-2400	1382	1	1		
2/08		4896	1	1 <i>MC 35.53% > 34.80% TML</i>	<i>No information.</i>	<i>At 0907hours Company enquiry of why the cargo was loaded on board.</i>
			2	1, <i>MC 37% > 34.8% TML</i>	<i>at1250, Drying in Sun 4 hours</i>	<i>Rechecked by can test. Cargo was loaded o/b</i>
3/08		3040	3	1		
4/08	1340-1800,	1809	2	2		
5/08	0800-1500, 1525-1640, 1800-2010	1839				
6//08	Completed loading	2448	2			0010-0800 stop due to Wet cargo
Total		54750	19	7		

Appendix 2 The requirements of IMSBC Code and the Compliance of Trans Summer on handling of nickel ore

IMSBC Code	Requirements	Compliance or not in the handling of nickel ore
Sec.4.3.2	<i>When a concentrate or other cargo which may liquefy is carried, the shipper shall provide the ship's master or his representative with a signed certificate of the TML, and a signed certificate or declaration of the moisture content. The certificate of TML shall contain, or be accompanied by the result of the test for determining the TML. The declaration of moisture content shall contain, or be accompanied by, a statement by the shipper that the moisture content is, to the best of his knowledge and belief, the average moisture content of the cargo at the time the declaration is presented to the master.</i>	<p>The Shipper provided the information of cargo in form of cargo declaration and moisture certificate (Test report). The Cargo was specified as Group A & B in the declaration.</p> <p>First one (16/07) indicated the MC of 33.87%, TML of 34.79%.</p> <p>The second one (23/07) was not checked.</p> <p>The third one (31/07) indicated the MC 33.88%, TML of 34.80%.</p>
Sec.4.5.2	<i>“Sampling and testing for moisture content shall be conducted as near as practicable to the time of loading. If there has been significant rain or snow between the time of testing and loading, check tests shall be conducted to ensure that the moisture content of the cargo is still less than its TML. The interval between sampling/testing and loading <u>shall never be more than seven days.</u>”</i>	<p>There were about 26 stoppages of loading about 84 hours due to rainy weather during the 20 days loading operation. The master did not request the shipper to take any check test or provide additional MC certificate.</p> <p>One week after commence of loading, on 23 July, the loading was permitted to go on without consulting the MC of the cargo. The MC was unknown for the second week.</p>

Sec.7.2.1	<i>Group A cargoes contain a certain proportion of small particles and a certain amount of moisture. Group A cargoes may liquefy during a voyage even when they are cohesive and trimmed level. Liquefaction can result in cargo shift.</i>	The Cargo of nickel ore in the cargo declaration was specified as Group A & B.
Sec.7.2.3	<i>A cargo shift caused by liquefaction may occur when the moisture content exceeds the TML. Some cargoes are susceptible to moisture migration and may develop a dangerous wet base even if the average moisture content is less than the TML. Although the cargo surface may appear dry, undetected liquefaction may take place resulting in shifting of the cargo. Cargoes with high moisture content are prone to sliding, particularly when the cargo is shallow and subject to large heel angles.</i>	It was about half stowed in the cargo holds. But the crew checked one time only the cargo in No.4 Cargo hold at the voyage.
Sec.7.3.1.1	<i>Concentrates or other cargoes which may liquefy shall only be accepted for loading when the actual moisture content of the cargo is less than its TML.</i> <i>Sec.3 of Merchant Shipping (Safety) (Carriage of Cargoes) regulations (Cap.369AV) of Hong Kong stipulates likely the same as above.</i>	On 2 August 2013, cargo with MC exceeded its TML was loaded on board. (MC of 35.54%, and 37% cf its TML of 34.80%). The MC of 35.54% and 37% was discovered by Oven Drying Test carried by crew on board. The cargo with MC of 37% was loaded on board after 4 hours drying in sun.
Sec.8.1,	<i>For a Group A cargo, the actual moisture content and</i>	The Moisture Content Certificate declared that the test

8.2	<p><i>transportable moisture limit shall be determined in accordance with a procedure determined by <u>the appropriate authority</u> as required by section 4.1.4 of this Code.</i></p> <p><i>Test procedures for measurement of moisture content There are recognized international and national methods for determining moisture content for various materials. Reference is made to paragraph 1.1.4.4 of Appendix 2.</i></p>	<p>procedures was adopted from the international Maritime Organization's Code of safety Practice for Solid Bulk cargoes. And declared the cargo was inspected by independent surveyor.</p> <p>But the certificates were issued by the shipper instead of the independent surveyor.</p>
Sec.8.4	<p><i>Complementary test procedure (can test) for determining the possibility of liquefaction, A ship's master may carry out a <u>check test</u> for approximately determining the possibility of flow.</i></p>	<p>Can test were conducted for each cargoes. But only one sample was taken for each barge. Sampling procedures was not followed up.</p>