ACCIDENT REPORT

Red Ensign Group

Isle of Man Ship Registry
A Member of the Red Ensign Group

INVESTIGATED BY THE MAIB ON BEHALF OF THE ISLE OF MAN ADMINISTRATION

Report on the investigation of

the deaths of three stevedores in a cargo hold access space on board the bulk carrier

Berge Mawson

at Bunyu Island anchorage, Indonesia

on 27 June 2022

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 5/2025 MARCH 2025

This investigation was carried out by the UK Marine Accident Investigation Branch (MAIB) on behalf of the Isle of Man Administration in accordance with the Memorandum of Understanding between the MAIB and the Red Ensign Group Category 1 registries of Isle of Man, Cayman Islands, Bermuda and Gibraltar.

Extract from

The Isle of Man Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2001 – Regulation 4:

The fundamental purpose of investigating a casualty, an accident, or an incident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

NOTE

Under Section 4 of the Isle of Man Merchant Shipping Act 1985 a person is required to answer an Inspector's questions truthfully. If the contents of this report were subsequently submitted as evidence in court proceedings then this would contradict the principle that a person cannot be required to give evidence against themselves. Therefore, the Isle of Man Ship Registry makes this report available to interested parties on the understanding that it shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes, is to attribute or apportion liability or blame.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

°C	-	degrees Celsius
2/O	-	second officer
AB	-	able-bodied seaman
BA	-	breathing apparatus
BC Code	-	Code of Safe Practice for Solid Bulk Cargoes
Berge Bulk	-	Berge Bulk Maritime Pte. Ltd
BKS	-	PT Bintang Kartika Segara
BLU Code	-	The Code of Practice for the Safe Loading and Unloading of Bulk Carriers
C/O	-	chief officer
CCTV	-	closed-circuit television
CO	-	carbon monoxide
CO_2	-	carbon dioxide
COSWP	-	Code of Safe Working Practices for Merchant Seafarers
CPR	-	cardiopulmonary resuscitation
H_2S	-	hydrogen sulphide
HEIG	-	Human Element Industry Group
IGP&I	-	International Group of Protection and Indemnity Clubs
IMO	-	International Maritime Organization
IMSBC Code	-	International Maritime Solid Bulk Cargoes Code
IMSR	-	Isle of Man Ship Registry
ISM Code	-	International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention
LEL	-	lower explosive limit
m^3	-	cubic metres
MAIIF	-	Marine Accident Investigators' International Forum
MSC	-	The Maritime Safety Committee
MTIS	-	Marine Terminal Information System
OCIMF	-	Oil Companies International Marine Forum. Information available from https://www.ocimf.org
OOW	-	officer of the watch
OS	-	ordinary seaman

P&I	-	Protection and Indemnity
PPE		personal protective equipment
ppm	-	parts per million
SMS	-	safety management system
SOLAS	-	International Convention for the Safety of Life at Sea, 1974 as amended
SPK	-	*Surya Pratama Karya*, a floating crane
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 as amended
TAN	-	Technical Advisory Notice
TJS	-	PT Tara Jaya Samudera
VHF	-	very high frequency

TIMES: all times used in this report are GMT+8 unless otherwise stated.

Image courtesy of Komite Nasional Keselamatan Transportasi

Berge Mawson

SYNOPSIS

On 27 June 2022, three unconscious stevedores were recovered from a cargo hold access space on board the Isle of Man registered bulk carrier *Berge Mawson* at Bunyu Island Anchorage, Indonesia. Despite prompt medical attention by ship and port staff, the three men died.

Berge Mawson was loading a bulk cargo of coal from barges using a floating crane. The coal in cargo hold No.7 was being levelled by a bulldozer, when loading was paused and all hatches were closed due to heavy rain. Once the rain had stopped, a stevedore made several attempts to gain access to the bulldozer. Unsupervised, the stevedore mistakenly descended into cargo hold No.8 access space where he collapsed. As *Berge Mawson*'s crew were collecting rescue equipment, two stevedores also collapsed in cargo hold No.8 access space as they attempted to rescue their stricken colleague.

The MAIB investigation concluded that:

- The stevedores died because they entered an enclosed space that had a noxious atmosphere that could not sustain life.
- Atmosphere testing of cargo spaces was not routinely carried out before stevedores entered the compartments.
- The stevedores were not adequately supervised on board *Berge Mawson*.
- Access ways to cargo spaces were not locked closed when not in use.
- The stevedores were unable to understand safety labels and warnings and cargo space identification.
- The agreed Ship-Shore Safety Checklist had limited validity after the commencement of cargo operations.
- The terminal had not trained the stevedores in line with international guidelines on safe cargo work on board bulk carriers.
- An industry-led initiative that requires bulk terminals to implement safety training and management systems could improve stevedore safety on board vessels.

Following the accident, Berge Bulk Maritime Pte. Ltd has reviewed its procedures for entry into cargo hold spaces, undertaken to fit physical barriers to prevent unauthorised cargo hold access on all its bulk carriers and revised its Ship-Shore Safety Checklist. A recommendation has been made to the Maritime and Coastguard Agency to review the guidance provided in the Code of Safe Working Practices for Merchant Seafarers on the inclusion of third parties such as stevedores during enclosed space drill scenarios. Recommendations have been made to Bunyu Port Organizing Unit, PT Bintang Kartika Segara, and PT Tanjung Mas to ensure adequate training of stevedores; and Berge Bulk Maritime Pte. Ltd to ensure masters and crew are provided with clear and precise guidance for the conduct of safe operations. A final recommendation has been made to Intercargo, InterManager and RightShip to compile and issue a minimum safety standard for stevedores working cargo on their members' vessels.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *BERGE MAWSON* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	*Berge Mawson*
Flag	Isle of Man
Classification society	Lloyd's Register
IMO number/fishing numbers	9738868
Type	Bulk carrier
Registered owner	Berge Mawson Co. Inc
Manager(s)	Berge Bulk Maritime Pte. Ltd
Construction	Steel
Year of build	2015
Length overall	291.98
Registered length	284.28
Gross tonnage	92,732
Minimum safe manning	15
Authorised cargo	Solid bulk cargoes
VOYAGE PARTICULARS	
Port of departure	Gangavaram, India
Port of arrival	Bunyu Island anchorage, Indonesia
Type of voyage	International
Cargo information	Coal
Manning	20
MARINE CASUALTY INFORMATION	
Date and time	27 June 2022 at about 1300
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Bunyu Island anchorage, Indonesia
Place on board	Main deck
Injuries/fatalities	3 fatalities
Damage/environmental impact	None
Ship operation	Cargo loading: ship-to-ship
Voyage segment	Anchored or alongside
External & internal environment	Daylight, wind north-north-westerly force 3; clear visibility; slight seas
Persons on board	20 crew, unknown number of shore personnel

1.2 INVESTIGATION

This investigation into a very serious marine casualty was conducted by the Marine Accident Investigation Branch (MAIB) on behalf of the Isle of Man Ship Registry, a member of the Red Ensign Group.

The on board investigation was conducted by the MAIB. Access to the port was not possible due to COVID-19 travel restrictions. Evidence from Bunyu Island port and shoreside entities was completed by Komite Nasional Keselamatan Transportasi Republik Indonesia on behalf of the MAIB.

1.3 NARRATIVE

1.3.1 Background

On 18 June 2022, the Isle of Man registered bulk carrier *Berge Mawson* anchored at the Bunyu Island anchorage, Indonesia **(Figure 1)** while waiting to load 150,000 metric tonnes of coal in bulk. The coal was to be loaded into *Berge Mawson* from barges using a floating crane; bulldozers driven by port stevedores were to be used to level (trim) the coal in the cargo holds **(Figure 2)**.

Images courtesy of OpenStreetMap

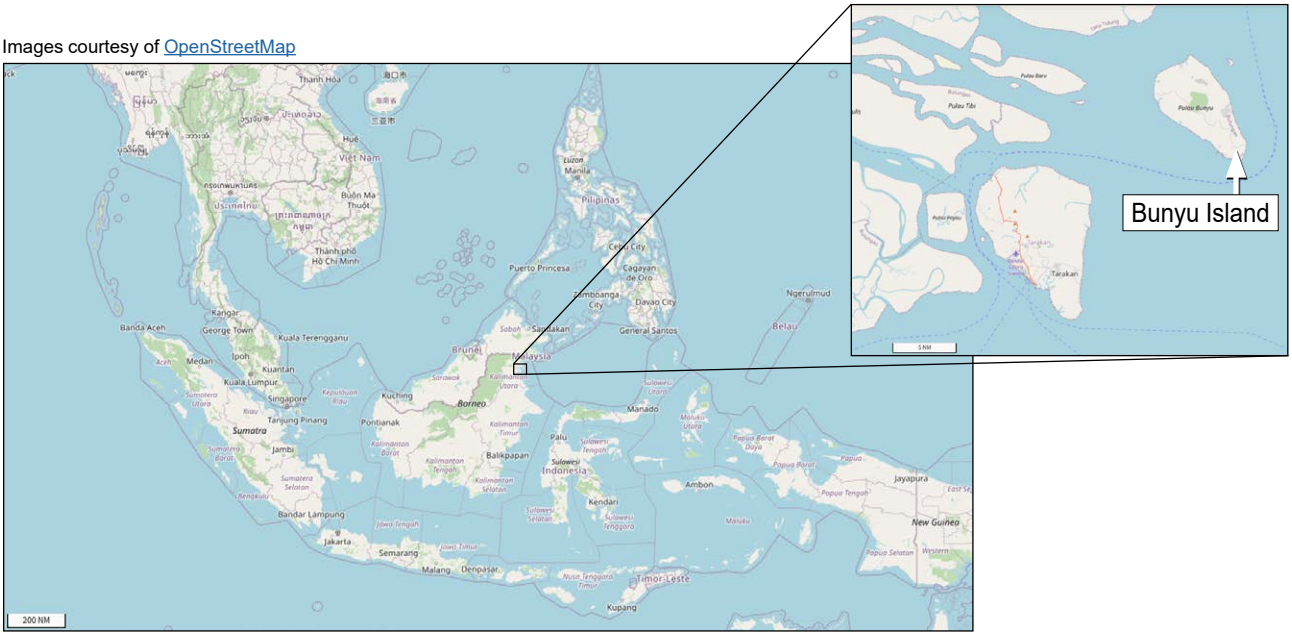

Figure 1: Bunyu Island, Indonesia

Image courtesy of Berge Bulk Maritime Pte. Ltd

Figure 2: Cargo work at Bunyu Island

1.3.2 Arrival at Bunyu Island

At 1240 on 19 June 2022, *Berge Mawson* raised its anchor and manoeuvred under pilotage to the designated loading area where, at 1354, the ship anchored again. At 1600, the chief officer (C/O) and the surveyor completed the Ship-Shore Safety Checklist **(Annex A)**. By 1700, the floating crane *Surya Pratama Karya* (SPK) was moored on the bulk carrier's starboard side in preparation to load coal from open barges towed from Bunyu Island.

At 1815, *Berge Mawson*'s cargo hold No.7 hatch covers were opened and loading commenced at 2006. Cargo operations continued for the next 8 days, following the C/O's loading plan for the nine cargo holds. There were frequent stops due to barge logistics and heavy rain showers that required the hatch covers to be closed to prevent the cargo becoming saturated.

On 25 June at 1730, loading was completed into cargo hold No.8 and its hatch covers were closed at 1919. Cargo was loaded into the other holds through to 26 June.

1.3.3 Events leading up to the accident

At 0320 on 27 June, the twentieth barge was alongside SPK and, at 0325, loading resumed into cargo hold No.7 and continued until 0630, when a bulldozer was lifted into the hold for the trimming[1] of the cargo.

At 0830, the daily testing of hold atmospheres was completed through the testing point on the hold hatches using a portable gas detector[2]. Cargo hold No.8 was noted to have 8% lower explosive limit (LEL) methane, 225 parts per million (ppm) carbon monoxide (CO), and 5.8% oxygen.

At 0840, heavy rain caused cargo work to be stopped, and about 20 minutes later all of *Berge Mawson*'s cargo hatches were closed. The bulldozer operator on duty left the bulldozer in cargo hold No.7 and exited the hold.

At about 1236, another bulldozer operator (hereafter referred to as bulldozer operator 2) arrived on *Berge Mawson*'s main deck and asked the foreman and assistant foreman to request that cargo hold No.7 hatch cover was opened to complete the trimming operation in the hold. The foreman used very high frequency (VHF) radio to relay the request to *Berge Mawson*'s second officer (2/O), who was on duty.

The 2/O ordered the on duty able-bodied seaman (AB) and ordinary seaman (OS) to open cargo hatch No.7, which was fully open by 1244:10. The AB made their way back to the ship's accommodation while the OS moved forward along the starboard side of the main deck.

The closed-circuit television (CCTV) cameras on *Berge Mawson*'s main deck recorded bulldozer operator 2 making several entries into the cargo holds. The CCTV actions of bulldozer operator 2 are detailed at **Table 1**.

---

[1] The process of levelling a bulk cargo to reduce free surface effect and maximise loading space.

[2] The meter used was a Riken Keiki GX-3R, last calibrated ashore on 16 February 2022, and on board on 24 May 2022.

Time	Action	Activity
1248:46	1	Walked back and forth, looking at the booby hatches[3] between cargo hold No.6 and cargo hold No.7
1250	2	Opened cargo hold No.7 forward booby hatch, descended into cargo access space, and climbed back out
1251:43	3	Closed cargo hold No.7 forward booby hatch and looked over the coaming[4] into cargo hold No.7
1251:49	4	Opened the void space booby hatch between cargo holds No.6 and No.7 and descended into it
1254:12	5	Emerged from the void space booby hatch and closed the hatch
1255:06	6	Leaned against the forward hatch coaming around cargo hold No.7
1255:18	7	Moved to the starboard side of the hold, then returned to cargo hold No.7 forward booby hatch
1255:39	8	Opened cargo hold No.7 forward booby hatch and descended into the cargo access space, then climbed out leaving booby hatch open
1256:38	9	Walked back and forth alongside the coaming around cargo hold No.7
1257:22	10	Moved to cargo hold No.6 aft booby hatch
1257:32	11	Opened, looked into and then closed cargo hold No.6 aft booby hatch, returned to cargo hold No.7 and looked into it over the coaming
1258:44	12	Paused by the coaming then moved to the starboard side and headed aft, passing under cargo hold No.7 hatch cover
1259:36	13	Paused to look into cargo hold No.7 over the aft coaming
1259:42	14	Moved to cargo hold No.8 forward booby hatch
1259:48	15	Opened cargo hold No.8 forward booby hatch
1300:36	16	Descended through cargo hold No.8 forward booby hatch into the cargo hold access space

Table 1: Activities of bulldozer operator 2 on *Berge Mawson*'s main deck between 1247 and 1300

1.3.4 The search for bulldozer operator 2

At about 1305, the assistant foreman went to check on the progress in cargo hold No.7 but could not hear the bulldozer working. The assistant foreman checked the main deck surrounding cargo hold No.7 before returning aft. At 1316, the assistant foreman returned to look for bulldozer operator 2 again, and after checking cargo

[3] Industry term for an access hatch.

[4] A raised frame around a cargo hold or access hatch to keep out water.

hold No.7 he shouted to the crew on board SPK to ask if bulldozer operator 2 had returned to the accommodation. On receiving a negative response, the assistant foreman returned to cargo hold No.7 and looked again into the hold.

At 1321:52, the assistant foreman climbed into cargo hold No.7 forward booby hatch to look for bulldozer operator 2. At 1322:43, the assistant foreman emerged from the booby hatch then walked past an AB, who was working at the aft end of cargo hatch No.6 and climbed onto the port side coaming of cargo hold No.7 hatch. The assistant foreman then walked aft along the top of the coaming, pausing twice to check the hold in the search for bulldozer operator 2. On reaching the aft port corner of the coaming the assistant foreman moved inboard, then jumped down to the main deck.

At 1324:36, the assistant foreman opened cargo hold No.7 aft booby hatch and looked inside. The assistant foreman then saw that cargo hold No.8 forward booby hatch was open and moved starboard towards the hatch. At 1325:04, the assistant foreman looked into cargo hold No.8 forward access space and saw bulldozer operator 2 lying unconscious on the deck below, his upper torso through the access point to the lower level of the space.

The assistant foreman immediately used the SPK VHF radio to shout "*Someone fell into the hatch!*", then ran forward to cargo hold No.6 shouting for help. The AB at cargo hold No.6 and the bosun, who had been walking up the main deck, responded to the assistant foreman's shout and the bosun accompanied the assistant foreman to cargo hold No.8 forward booby hatch.

1.3.5 Emergency response

At about 1326, on seeing bulldozer operator 2 in the cargo hold No.8 access space, the bosun called the 2/O using a ship's handheld VHF radio. The 2/O immediately attended the scene and shouted to bulldozer operator 2, who did not respond. The 2/O told the assistant foreman that no one should enter the space. The 2/O, bosun and AB left the area to raise the alarm and retrieve the ship's rescue equipment, which included breathing apparatus (BA) sets.

At 1326:55, the assistant foreman was with two other stevedores at cargo hold No.8 forward booby hatch. Shortly afterwards, *Berge Mawson*'s crew started to bring the rescue equipment. By this time, about six stevedores, including another bulldozer operator (hereafter referred to as bulldozer operator 3) and the foreman had assembled by the booby hatch. At 1329, bulldozer operator 3 and the foreman descended the ladder into cargo hold No.8 forward cargo access space. Bulldozer operator 3 and the foreman collapsed onto the deck below and the stevedores on the main deck scattered.

1.3.6 Recovery

At 1330:14, *Berge Mawson*'s BA team arrived on scene and saw that there were now three casualties in the space **(Figure 3)**. The bosun then opened the cargo hold No.8 hatch covers. At 1340, the C/O lowered a gas monitor into cargo hold No.7 and cargo hold No.8 to test the atmosphere. The readings are summarised at **Table 2**.

At 1341, the BA team entered cargo hold No.8 forward access space. At 1343, 1347, and 1352, the three casualties were recovered to the main deck and cardiopulmonary resuscitation and oxygen were administered. None of the casualties regained consciousness. At 1430, the casualties were transferred to a boat and taken ashore where they were later declared deceased.

Figure 3: Stevedores collapsed in cargo hold No.8 forward access space

Space	Methane (% LEL)	Oxygen (% vol)	CO (ppm)	Hydrogen sulphide (ppm)
Cargo hold No.7 aft access	0	20.7	0	0
Cargo hold No.8 forward access	36	0.9	2,147	3,100

Table 2: Readings from the 1340 atmosphere tests

1.3.7 Postmortem examinations

Postmortem examinations of the deceased stevedores were not performed and the causes of their death were not established.

1.3.8 Environmental

Since loading of *Berge Mawson* started on 19 June 2022, there had been frequent heavy rain showers that reduced visibility. The air temperature during the day varied between 30°C and 33°C, falling to about 28°C at night.

1.4 *BERGE MAWSON*

1.4.1 General

Berge Mawson was built by Imabari Shipbuilding Co. Ltd, Japan and delivered to its owners in August 2015. The vessel was operated by Berge Bulk Maritime Pte. Ltd (Berge Bulk), Singapore.

Founded in 2007, Berge Bulk managed a fleet of over 80 vessels ranging from handysize to capesize bulk carriers. In 2022, the fleet transported over 70 million tonnes of cargo.

Berge Mawson had nine cargo holds **(Figure 4)**, which were separated by corrugated transverse bulkheads. Cargo holds No.2 to No.8 each had a capacity of about 22,970 cubic metres (m³), while cargo holds No.1 and No.9 had a capacity of 19,862m³ and 20,743m³, respectively.

Berge Mawson was fitted with two CCTV cameras that provided surveillance of the main deck **(Figure 5)**. The images could be viewed on monitors located on the bridge and in the cargo control office.

1.4.2 Cargo hold access

Each cargo hold had hydraulically operated transverse sliding hatch covers and personnel access via booby hatches; one at the forward end of the hold **(Figure 5)**, the other at the aft end.

Below each booby hatch was a vertical ladder that led to a cargo hold access space. The forward cargo hold access spaces led to further vertical ladders that descended into the hold **(Figure 6a)**. The aft cargo hold access spaces led to spiral staircases (known as Australian ladders) that descended into the holds **(Figure 6b)**. The Australian ladders were the normal means of personnel access into the holds, while the vertical ladders were for emergency escape (see section 1.5.7).

The booby hatches each had a coaming that extended 650mm above the deck and had a cantilevered 840mm square cover with six twist screws to secure it in the closed position **(Figure 7)**. Each booby hatch cover had an eye and catch arrangement to allow the hatch lid to be secured with a padlock. Before the accident, *Berge Mawson*'s booby hatch lids were not locked but were kept *dogged-down*[5]. Immediately following the accident, *Berge Mawson*'s master implemented the locking of enclosed space entry points with padlocks.

[5] The twist screws were closed and tightened down to secure the hatch.

For illustrative purposes only: not to scale (based on general arrangement courtesy of Berge Bulk Maritime Pte. Ltd

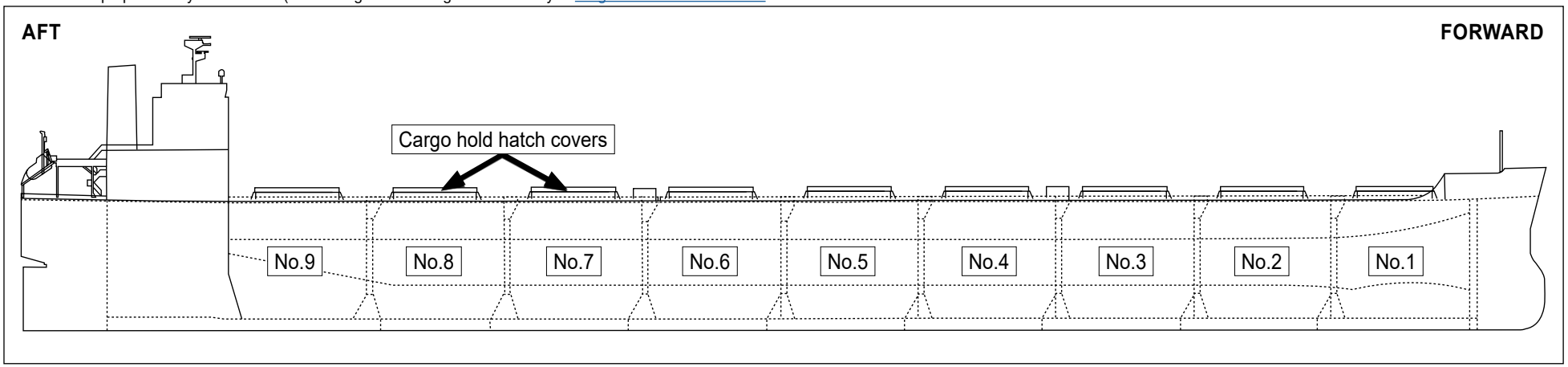

Figure 4: General arrangement of *Berge Mawson*'s cargo holds

Image courtesy of Berge Bulk Maritime Pte. Ltd

Figure 5: Cargo hold No.7 and cargo hold No.8

Images courtesy of Berge Bulk Maritime Pte. Ltd

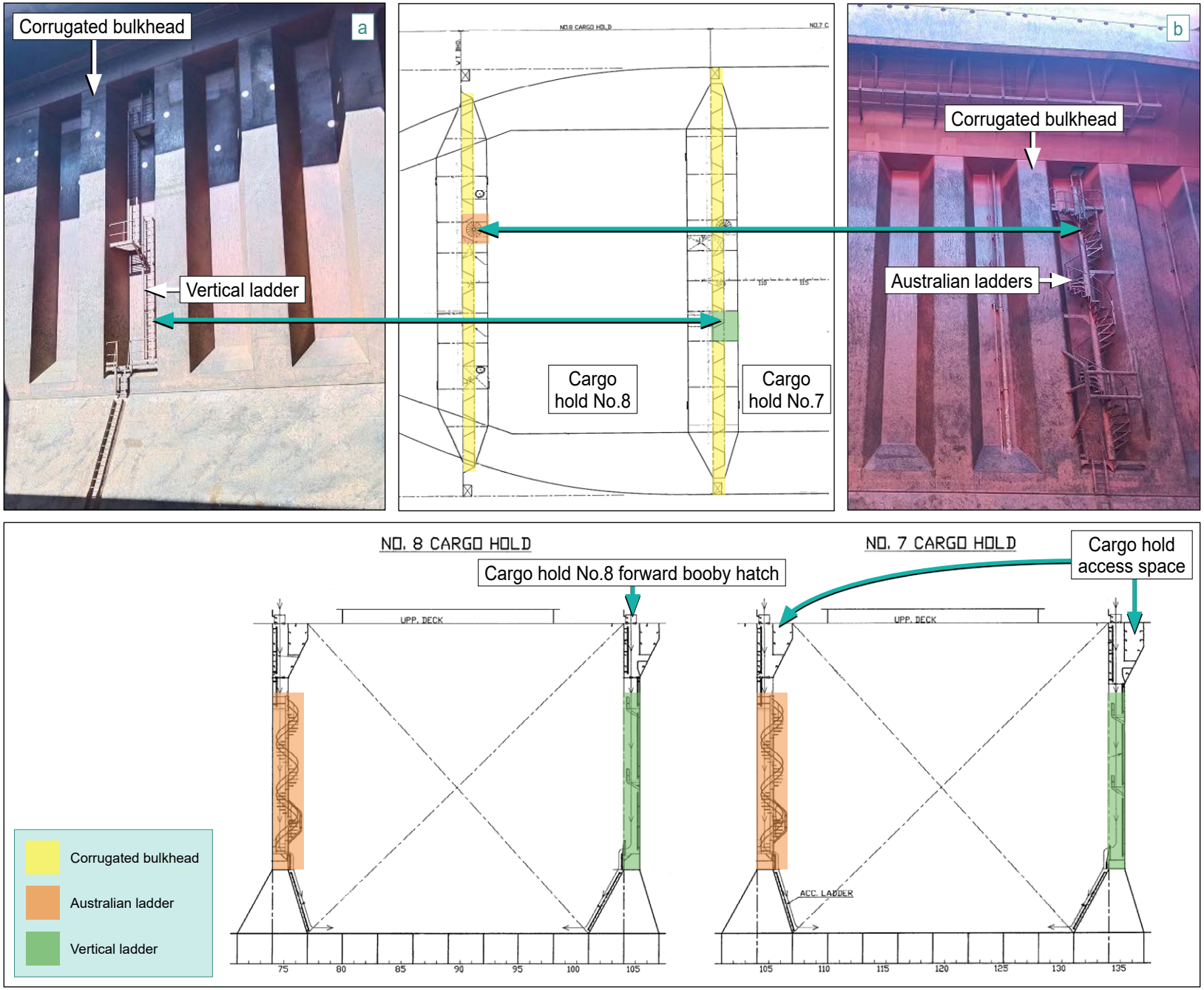

Figure 6: Cargo hold access ladders, showing (insets) view to aft (a) and view to forward (b) of the corrugated bulkhead

Image courtesy of Berge Bulk Maritime Pte. Ltd (taken after the accident and after maintenance)

Figure 7: Cargo hold No.8 forward booby hatch

1.4.3 Cargo hold identification

Each cargo hold was identified by a number stencilled onto its hatch coaming. The booby hatch lids had the hold number stencilled on them and a plastic label indicated whether it was the forward or aft access to the hold. The plastic label on some of the booby hatch lids, including that of cargo hold No.8 forward, had become obscured by paint or were broken so it was unclear which end of the hold the booby hatch led to. Cargo hold No.7 aft had a plastic label that read *No.7 HOLD ENTRANCE*. Several warnings were painted on the exterior sides of the booby hatches' coamings **(Figure 8)**.

Images courtesy of Berge Bulk Maritime Pte. Ltd (taken at the time of the accident)

Figure 8: Cargo hold No.8 forward booby hatch signage

1.4.4 Crew

Berge Mawson's crew comprised eight officers and 12 ratings. The officers were Ukrainian, Filipino, and Indian nationals and the ratings were Filipinos. All the crew held appropriate International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended (STCW) certification. English was the working language on board.

Berge Mawson's master was a Ukrainian national who had worked for Berge Bulk since 2018 and had joined the vessel in April 2022.

The C/O was a Filipino national who had worked for Berge Bulk since 2021 and had joined the vessel at the same time as the master. The C/O had served on bulk carriers since 2012 and had previous but infrequent experience of dealing with coal cargoes.

The 2/O was a Filipino national who had joined the vessel in April 2022 for their first contract with Berge Bulk.

At the time of the accident the master and the C/O were in their respective cabins and the 2/O and two deck crew were on duty.

The crew wore personal protective equipment (PPE) comprised of coveralls, safety boots and a safety helmet while working on deck.

1.5 SAFETY MANAGEMENT SYSTEM

1.5.1 General

Berge Bulk's safety management system (SMS) complied with the requirements of the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code). On 21 May 2021, a document of compliance was issued by Lloyd's Register Singapore based on an audit completed that day. On 11 May 2022, an annual verification that the SMS continued to comply with the requirements of the ISM Code was completed in Singapore.

Section 7 of the ISM Code, Shipboard Operations, stated:

> *The Company should establish procedures, plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the personnel, ship and protection of the environment. The various tasks should be defined and assigned to qualified personnel.*

The Berge Bulk SMS comprised 14 chapters, of which chapter 7 provided instructions for shipboard operations and chapter 8 provided detail on emergency preparedness.

1.5.2 Gangway log

A gangway log was used while *Berge Mawson* was in port to record when any visitors embarked and disembarked. Not all arrivals and departures of stevedores on board *Berge Mawson* were recorded in the gangway log during the cargo work at the port of Bunyu Island.

1.5.3 Permit to work system

Document 07.04.05 of Berge Bulk's SMS (Permit to work systems) stated the procedure to be followed when completing planned and unplanned tasks. It included:

> *3.2 Safe Entry – Enclosed Spaces*
>
> *Enclosed spaces shall include but not be limited to – ballast tanks, void spaces, peak tanks, cofferdams, sewage tanks, holding tanks, bunker tanks, duct keel, cargo holds, fresh water tanks that are normally kept closed, crankcases, scavenge space, unfavourable natural ventilation etc. If in doubt, the compartment or space shall be regarded and treated as an enclosed space. These instructions shall be followed to ensure that the entry into an enclosed space will not cause any harm to the persons performing the task.*
>
> *Due to limitation in terms of resources including personnel and rescue equipment not more than one space requiring an Enclosed Space Permit should be entered at any one point of time. No person should enter an enclosed space alone and a buddy system (at least 2 personnel) should be used when entering an enclosed space.*

Section 3.2 also specified that:

> *Gas Measurement*
>
> *Prior to entry into a confined space, atmospheric testing shall be conducted (with ventilation stopped for this duration). Testing should be conducted at a minimum of three levels and this shall include the lowest point of the space being tested. Properly calibrated gas detection instruments should be used for the space to be considered safe for entry. If the enclosed space is entered 30 mins after issuance of permit, gas of the space should be checked again and recorded in the permit before an entry is permitted by the Responsible Officer.* [sic]

Under the SMS, the C/O was the responsible officer for permits to work for deck department operations.

1.5.4 Cargo loading procedures

Document 07.03.05 of Berge Bulk's SMS (Cargo Operation) provided instructions to ensure safe cargo operations on board *Berge Mawson*. Section 3.6 provided instructions for the safety of personnel, including that:

> *Any activity of the stevedores on board which pose safety or environmental risk should be reported at once to the OOW, Chief Officer and Master.* [sic]

On cargo watches, section 3.9 stated that:

> *Sufficient deck watch should be arranged during cargo operations taking into consideration the available shipboard staff and the no. of gangs working.*
>
> *Normally, one OOW and two deck ratings comprise the cargo watch, which are also doing a dual role of being security watches.* [sic]

1.5.5 Ship-Shore Safety Checklist

Document 07.03.03-09 (the Ship-Shore Safety Checklist) consisted of 21 tick box requirements that had to be agreed by *Ship* and *Terminal* before starting cargo operations. Requirement 13 asked:

> *Is the atmosphere safe in holds and enclosed spaces to which access may be required? Have fumigated cargoes (if any) been identified and has the need for monitoring of atmosphere been agreed by ship and terminal?*

1.5.6 Coal cargoes

The SMS provided guidance on coal cargoes, including the properties of coal, carriage requirements and general precautions, and stated:

> *Routine testing for methane, oxygen, and carbon monoxide levels shall also be performed in all working spaces, storerooms, passageways, tunnels and other spaces adjacent to cargo spaces.*

1.5.7 Cargo hold access

Document 07.03.25 provided instructions for safe entry into a cargo hold and stated that:

> *Entry to holds/cargo spaces should only be undertaken on the authority of a Responsible ship's Officer (Chief Officer) who should ensure prior to granting authority that the space has been adequately ventilated and, where appropriate, tested for noxious gases and oxygen content.*

And:

> *Unless adequate ventilation and air circulation throughout the free space above the cargo have been effected, personnel should not be permitted entry until tests have been carried out, and it has been established that the oxygen content has been restored to normal levels throughout the space and that no toxic gas is present.*

Also that:

> *Persons entering the cargo hold should wear the correct PPE, accessing should be always done from the Australian ladder. Vertical ladders should be used only in an emergency.* [sic]

In addition:

> *During the pre-loading/discharging safety meeting with terminal representative, Chief Officer to inform and discuss about the entry in the cargo hold.* [sic]
>
> *The vessel will comply with enclosed space entry procedures, Proper Personal Protective Equipment (PPE) shall be worn.* [sic]
>
> *If an access point to an unsafe space has to be left open, always ensure that warning signs are clearly posted to avoid accidental entry.* [sic]

1.5.8 Emergency preparedness and drills

Document 08.20.01 **(Annex B)** provided instructions for a rescue of persons from an enclosed space. The contingency plan specified four teams: command; emergency; engine; and support/first aid, with actions assigned to each. One responsibility of the support/first aid team was to, *Man the entrance of enclosed space*.

Berge Bulk's SMS included a requirement for vessels to complete various emergency drills on a monthly, bimonthly and trimonthly basis. The training and drill matrix specified a bimonthly requirement for an enclosed space entry/rescue drill. The SMS procedure prescribed a guard at the entrance to the enclosed space in which an incident had occurred, but this was not undertaken during drills. The last drill before the accident was completed on 14 June 2022 and involved a rescue from cargo hold No.9. *Berge Mawson*'s master recorded that the drill had been satisfactory and there were no outstanding items or recommendations from the post-drill meeting.

1.6 PORT OF BUNYU ISLAND

1.6.1 General

The port of Bunyu Island anchorage was administered by the regulator, Bunyu Port Organizing Unit. There were several companies that employed stevedores for ship operations at the port. At the time of the accident, stevedores supplied by PT Bintang Kartika Segara (BKS), PT Tara Jaya Samudera (TJS) and PT Tanjung Mas were working on board *Berge Mawson*.

1.6.2 Stevedore roles on board

The foreman was responsible for coordinating the movements of the floating crane and bulldozer operations with the requirements of ship's crew and the shipper's representative. The foreman also recorded the cargo quantities and passed them to the shipper's representative.

The foreman and the assistant foreman completed the mooring operations for the floating crane as it adjusted its position during the loading operation. The bulldozer operators completed the trimming operation as directed by the foreman. Under the terms of the charter party agreement[6] the stevedores remained under the control of *Berge Mawson*'s master while working on board.

1.6.3 Training and personal protective equipment

Neither BKS, TJS nor PT Tanjung Mas provided safety or cargo operations training for employees who were appointed to on board duties. None of the casualties involved in this accident had completed enclosed space awareness training.

There was no formal English language skills test during the recruitment process for foremen or bulldozer operators, though a candidate's level of spoken English was assessed during interviews for the role of foreman.

PT Tanjung Mas supplied its employees with PPE for working on board vessels that comprised of a safety helmet, gloves, glasses and safety shoes. It was not possible to establish if either BKS or TJS provided PPE.

[6] A maritime contract between a ship owner and a charterer stating the terms of carriage for the cargo.

1.6.4 The deceased

The three casualties were Indonesian nationals who were regularly assigned to work on vessels loading at Bunyu Island. None of the casualties had completed the STCW Basic Safety Training course, the syllabus for which included personal survival techniques, firefighting and personal safety.

The foreman, Muhammad Sajuddin, was 28 years old and held a diploma in trade and port ship management. He had joined BKS as an assistant foreman in October 2020 and was promoted to foreman a year later. He was reported to have a passable standard of English. Muhammed was wearing a long-sleeved T-shirt, shorts and sandals at the time of the accident.

Bulldozer operator 2, Fredi Simon, was 49 years old and was employed by PT Tanjung Mas. A qualified bulldozer operator, he held no formal qualifications for working on board a ship and could not read or speak English. Fredi was wearing a short-sleeved T-shirt, shorts and rigger boots when he entered cargo hold No.8 forward access hatch.

Bulldozer operator 3, Marten Seko, was 38 years old and was also employed by PT Tanjung Mas. He was a qualified bulldozer operator but held no formal qualifications for working on board a ship and could not read or speak English. Marten was wearing a short-sleeved T-shirt, shorts and a pair of sandals when he entered cargo hold No.8 forward access hatch.

1.6.5 Cargo operations

There were no risk assessments for cargo operations completed on board vessels and it was not established if BKS was aware of international guidelines for bulk carrier operations and safety.

1.7 LOADING AT BUNYU ISLAND

1.7.1 Preparations

In preparation for arrival at Bunyu Island anchorage *Berge Mawson*'s C/O completed a loading plan that detailed the:

- total amount of coal to be loaded
- order in which the holds were to be loaded
- ballasting operations
- projected structural stresses during loading
- vessel's draught on completion of loading.

On 13 June, the C/O prepared a risk assessment for the loading operation at Bunyu Island. Item 11 specifically addressed uncontrolled entry into cargo holds by terminal and ship's staff and had identified *injuries* as the hazard. The risk control measures were:

> *OOW to monitor access to cargo holds. Entries to be made strictly in accordance with enclosed space entry checklist and controlled diligently. Proper supervision and recording of entries in cargo hold.*

1.7.2 Cargo declaration

Before arrival at Bunyu Island the master received a cargo declaration **(Annex C)** from the shippers containing information that the cargo was:

- solid bulk cargo;
- unlikely to liquefy during the voyage;
- unlikely to emit significant amounts of methane; and
- trimming was to be completed by bulldozer.

1.7.3 Cargo operations on board *Berge Mawson*

On 18 June at 1600, *Berge Mawson*'s C/O and the surveyor completed the Ship-Shore Safety Checklist **(**see **Annex A)** with all requirements ticked for both *Ship* and *Terminal*. Requirement 13, on the identification of fumigated cargoes in holds and enclosed spaces, had been annotated with *Entry with C/Off permission only* in handwritten text.

Explanatory notes were provided on the second page of the checklist. The guidelines for requirement 13 advised that:

> *Rusting of steelwork or the characteristics of a cargo may cause a hazardous atmosphere to develop. Consideration should be given to: oxygen depletion in holds; the effect of fumigation either of cargo to be discharged, or of cargo in a silo before loading from where gas can be swept on board along with the cargo with no warning to the ship; and leakage of gases, whether poisonous or explosive, from adjacent holds or other spaces.* [sic]

Requirement 5 recorded that the communication method was to be *verbal* and in *English*.

The investigation was unable to establish whether the surveyor was one of the stevedores or if the Ship-Shore Safety Checklist had been seen by the stevedores.

An examination of *Berge Mawson*'s enclosed space entry permits before the accident showed that the last permit was completed on 15 June 2022, for a cargo hold and light inspection. There were no completed enclosed space permits for cargo operations.

During cargo work the duty deck officer entered the times that hatches were opened and closed and the position of the bulldozers into the Port Log Book **(Annex D)**.

1.7.4 Cargo hold gases and ventilation status

During the loading operation *Berge Mawson*'s C/O entered the atmospheric readings for each of the cargo holds into Berge Bulk document 07.03.07-02 **(Annex E)**; these included the levels of methane, CO and oxygen and the ambient temperatures.

A note in the ventilation column stated the *hold vents are closed* and were not being ventilated during the operation. The cargo access spaces had no means of ventilation aside from opening the booby hatch covers.

1.8 EFFECTS OF AN UNSAFE ATMOSPHERE

1.8.1 Oxygen depletion

The oxygen content in normal ambient air is 20.9% by volume. Humans require an oxygen level above 20% to breathe and function normally; lower atmosphere oxygen levels cause a loss of function. At an oxygen level below 12% there is a risk to life if the casualty is not immediately resuscitated. An atmosphere with less than 6% oxygen can cause brain damage leading to the cessation of breathing, loss of consciousness, and death within 6 to 8 minutes. **Table 3** describes the physiological effects of oxygen depletion on humans at various concentration levels.

Oxygen in air (%)	Physiological effects
20 to 21	Normal performance
18	Night vision begins to be impaired
17	Respiration volume increases, muscular coordination diminishes, attention and thinking requires more effort
12 to 15	Shortness of breath, headache, dizziness, quickened pulse, effort fatigues quickly, muscular coordination for skilled movement lost
10 to 12	Nausea and vomiting, exertion impossible, paralysis of motion
6 to 8	Collapse and unconsciousness occurs
6 and below	Death in 6 to 8 minutes

Table 3: Effects of oxygen depleted atmospheres on humans[7]

[7] Health and Safety Executive – Methods of Approximation and Determination of Human Vulnerability for Offshore Major Accident Hazard Assessment.

1.8.2 Other noxious gases

The storage of bulk cargoes such as coal in unventilated holds can generate a build-up of carbon dioxide (CO_2), which being heavier than air causes oxygen to displace upwards. Also, CO can accumulate in coal-filled cargo holds and adjacent spaces. CO is lighter than air, is colourless and has a flammable limit in air of between 12% and 75% by volume. **Table 4** describes the physiological effects of CO on humans at various concentration levels.

CO concentration (ppm)	Physiological effects
1,500	Headache after 15 minutes, collapse after 30 minutes, death after 1 hour
2,000	Headache after 10 minutes, collapse after 20 minutes, death after 45 minutes
3,000	Maximum 'safe' exposure for 5 minutes, danger of collapse in 10 minutes
6,000	Headache and dizziness in 1 to 2 minutes, danger of death in 10 to 15 minutes
12,800	Immediate effect, unconscious after 2 to 3 breaths, danger of death in 1 to 3 minutes

Table 4: Effects of carbon monoxide exposure[8]

Methane is another flammable, odourless, colourless gas that reacts violently with various substances including oxygen. Methane has an LEL of 5.53%. Human inhalation can cause euphoria, agitation and nausea and vomiting, while high concentrations can cause seizure or death[9].

Hydrogen sulphide (H_2S) is a gas that is rapidly absorbed by the lungs into the blood stream when inhaled. Exposure to high concentrations of H_2S can rapidly cause debilitating conditions such as respiratory paralysis, cyanosis and collapse. Concentrations above 500 ppm can be fatal.

1.9 REGULATION AND GUIDANCE

1.9.1 Definition of a confined space

The International Labour Organization defined a confined space as *one which is both enclosed, or largely enclosed, and which also has a reasonably foreseeable risk to workers of fire, explosion, loss of consciousness, asphyxiation or drowning*.

1.9.2 International Maritime Solid Bulk Cargoes Code

The Code of Safe Practice for Solid Bulk Cargoes (BC Code) was first adopted by the International Maritime Organization (IMO) in 1965. The BC Code highlighted the dangers involved in the shipment of bulk cargoes and provided guidance on the

[8] Health and Safety Executive – Methods of Approximation and Determination of Human Vulnerability for Offshore Major Accident Hazard Assessment.

[9] https://www.gov.uk/government/publications/methane-properties-uses-and-incident-management

procedures that should be adopted. Integrated into SOLAS VI in 1991, the BC Code was replaced on 1 January 2011 by the International Maritime Solid Bulk Cargoes Code (IMSBC Code).

The aim of the IMSBC Code was to promote the safe stowage and shipment of solid bulk cargoes by providing information on the hazards involved in the shipment of certain bulk cargoes. The primary hazards identified were structural damage to a vessel through incorrect cargo stowage; loss of stability; and chemical reactions of cargoes. The IMSBC Code prescribed practices and procedures to be followed and the corresponding precautions to be taken when loading, trimming, transporting and discharging bulk cargoes by vessels.

On the general requirements for safety of personnel and ship, Section 3 of the IMSBC Code specified that:

> *3.1.1 Prior to and during loading, carriage and discharge of a solid bulk cargo, all necessary safety precautions shall be observed;*
>
> *3.2.4 Prior to entry into an enclosed space aboard a ship, appropriate procedures shall be followed...*; and
>
> *3.2.6 Emergency entry into a cargo space shall be undertaken only by trained personnel wearing self-contained breathing apparatus and protective clothing and always under the supervision of a responsible officer.*

Annex 7 of the IMSBC Code specified that:

> *Coal may create flammable atmospheres, may heat spontaneously, may deplete the oxygen concentration, may corrode metal structures. This cargo may liquefy if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.*

On the special precautions to take for coals emitting methane, Annex 7 stated that:

> *Personnel shall not be permitted to enter the cargo space or enclosed adjacent spaces unless the space has been ventilated and the atmosphere tested and found to be gas-free and to have sufficient oxygen to support life. Notwithstanding these provisions, emergency entry into the cargo space may be permitted without ventilation, testing the atmosphere or both, provided that the entry into the cargo space is undertaken only by trained personnel wearing self-contained breathing apparatus under the supervision of a responsible officer and special precautions are observed to ensure that no source of ignition is carried into the space.*

1.9.3 The Code of Practice for the Safe Loading and Unloading of Bulk Carriers

The Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code) was adopted by IMO Resolution A.862(20) in November 1997. The purpose of the BLU Code was to prevent accidents and the loss of vessels carrying solid bulk cargoes through improper loading and unloading practices.

IMO Resolution Maritime Safety Committee (MSC).47(66) linked the BLU Code to Regulation VI/7 – Loading, Unloading and Stowage of Solid Bulk Cargoes) – of the International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended. The BLU Code was amended by MSC.238(82) and MSC.304(87). There has not been a major review of the BLU Code since its adoption.

The BLU Code advocated the use of checklists to ensure that adequate information is exchanged to prevent damage to the vessel during loading or unloading.

On ship duties, Section 6.2 included a requirement for the master to make sure frequent ventilation checks were conducted of the cargo holds and other enclosed spaces, and that entry was permitted only after such areas had been declared *safe*.

In May 2005, the IMO approved the BLU Manual, which contained guidance for terminal representatives. Amendments to the BLU Manual were approved in MSC.1/ Circular.1356. Section 2.3.3. stated:

> *Terminal personnel should be trained in all aspects of safe loading and unloading of bulk carriers, commensurate with their responsibilities*; and,
>
> *The training should be designed to provide familiarity with the general hazards of loading, unloading and carriage of bulk cargoes…*

Annex 4 specified the operational requirements for terminal personnel and the training requirements for the nominated terminal representative, who should:

1. *Have a thorough understanding of the underlying principles related to the loading and/or unloading of bulk carriers as described in the BLU Code.*

2. *Know how to implement all aspects of the BLU Code.*

3. *Understand and manage the ship/shore interface in relation to the operations and limitations of the terminal, its cargo handling equipment and procedures, the planning, control and monitoring of cargoes, relevant properties of the cargoes being handled, berthing/ mooring operations and emergency procedures.*

The hazards required to be understood by the terminal representative were specified in Annex 5 of the BLU Code. These included:

- Hazardous substances, such as cargoes liable to cause oxygen depletion and accumulation of dangerous gases in cargo spaces or in the adjacent spaces.

- Inadequately trained personnel.

- Activities that might occur at and around any terminal, including control of these activities.

1.9.4 Isle of Man Ship Registry

Primary legislation for operations on board Isle of Man registered bulk carriers was contained in the Merchant Shipping (Code of Safe Working Practices) Regulations 1989[10] and the Merchant Shipping (SOLAS VI – Carriage of Cargoes and Oil Fuels) Regulations 2021.

On 9 December 2019, the Isle of Man Ship Registry (IMSR) issued Technical Advisory Notice (TAN) 008-19 to highlight the dangers of enclosed spaces on board ships. TAN 008-19 included that:

> *Enclosed spaces are unique and can in fact include cargo holds, even when the hatches are open…*
>
> *…we would like to re-iterate to all ship managers that they must ensure all the vessels they manage have sufficient information and procedures on the correct identification of enclosed spaces and have safe procedures for personnel entering an enclosed space.* [sic]

1.9.5 International Maritime Organization Resolutions

On 27 November 1997, the IMO adopted Resolution A.684(20) – Recommendations for Entering Enclosed Spaces Aboard Ships. The Resolution was aimed at addressing the loss of lives that resulted when personnel entered an enclosed space with an oxygen depleted or toxic atmosphere.

On 30 November 2011, the IMO adopted Resolution A.1050(27), which revoked Resolution A.684(20) and approved the Revised Recommendations for Entering Enclosed Spaces Aboard Ships. The revised Resolution noted that accidents on board ships were influenced by insufficient knowledge or disregard for the necessary precautions required for safe entry into enclosed spaces. Section 6 of the Resolution stated:

> *Entry door doors or hatches leading to enclosed spaces should at all times be secured against entry, when entry is not required.*

China submitted Document MSC.106/16/1 to the IMO proposing revisions to Resolution A.1050(27) that included a *traffic light* system for the signage of enclosed spaces.

The UK, along with several industry organisations including Intercargo[11], submitted Document MSC.106/16/4 to the IMO with comments on Document MSC 106/16/1. The document proposed that the scope proposed by Document MSC 106/16/1 should be expanded to include wider re-examination and revision of Resolution A.1050(27).

The Republic of Korea submitted Document III 9/4/6 to the sub-committee on implementation of IMO Instruments. The document considered the deaths of stevedores on board a bulk carrier and the information provided on bulk cargoes.

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[10] Although a Maritime and Coastguard Agency (MCA) document, the Code of Safe Working Practices for Merchant Seafarers (COSWP) was accepted as best practice on Isle of Man registered vessels and its carriage on board was a requirement of the Isle of Man legislation.

[11] The International Association of Dry Cargo Shipowners represents the interests of dry bulk shipowners, managers and operators.

1.9.6 The Code of Safe Working Practices for Merchant Seafarers

In October 2019, the MCA published Amendment 4 of the COSWP 2015 Edition. Chapter 4 – Emergency drills and procedures, section 4.8.5 required that:

> *Regular drills should prove the feasibility of the ship's rescue plan under different and difficult circumstances.*

Section 4.9 provided guidance on actions in the event of an enclosed space emergency and stated that:

> *Any attempt to rescue a person who has collapsed within a space should be based on a vessel-specific pre-arranged plan, which has been drilled against. The plan should take account of the design of the individual ship and include risk assessment.*

Chapter 11 – Safe movement on board ship, section 11.10 – Entry into dangerous (enclosed) spaces, specified:

> *11.10.2 The master is required to ensure that all unattended dangerous spaces are secured against entry, except when it is necessary to enter (see sections 15.1.5 and 15.1.6 for details on identifying dangerous spaces, creating an inventory and use of risk assessment).*
>
> *11.10.3 The Company must have procedures in place for entering and working in dangerous spaces, and it is the master's responsibility to ensure these are followed. No person should enter or remain in a dangerous space unless they are trained to do so, and follow the set procedures.*

Further guidance on enclosed spaces was provided in Chapter 15 – Entering Enclosed Spaces:

> *15.1.5 Awareness of any risks is necessary for all spaces on board ship.*
>
> *15.1.14 Entrances to all unattended dangerous spaces on a ship should be kept locked or secured against entry. Any hatches to readily accessible enclosed spaces should be marked as the entrance to a dangerous space. When the space is open for work to be carried out, an attendant should be posted or a barrier and warning sign put in place. As far as possible, work should be arranged in such a way that no one has to enter the space.*
>
> *15.1.16 All crew should be given on-board training and familiarisation with the risks of entry into dangerous spaces on board.*

Annex 1.2 provided guidance on the preparation of risk assessments and identified five steps in the process. Step 3 prescribed the principles of controlling risks that, if possible, were to be applied in the following order:

- *try a less risky option (e.g. switch to using a less hazardous chemical);*
- *prevent access to the hazard (e.g. by guarding);*
- *organise work to reduce exposure to the hazard (e.g. put barriers between pedestrians and traffic);*

- *issue personal protective equipment (e.g. clothing, footwear, goggles); and*
- *provide welfare facilities (e.g. first-aid and washing facilities for removal of contamination).*

1.9.7 Bulk Carrier Practice

Published by the Nautical Institute, the Bulk Carrier Practice provided guidance on bulk carrier operations such as loading, loading berth considerations and enclosed spaces.

1.10 SIMILAR ACCIDENTS

1.10.1 *Iron Queen* – enclosed space fatality and near fatality

On 25 November 2011, as the Isle of Man registered bulk carrier *Iron Queen* was departing Richards Bay, South Africa with a cargo of coal, an OS and an AB were discovered collapsed in cargo hold No 2 (IMSR report CA116[12]). The two crew members were recovered to the main deck from the cargo hold access space, where first aid was administered. The OS was declared deceased and the AB suffered serious injuries.

1.10.2 *Suntis* – enclosed space fatalities

On 26 May 2014, the Germany registered general cargo vessel *Suntis* was alongside in Goole, England discharging a timber cargo when three crew members were found unconscious in the main cargo hold forward access space within the forecastle (MAIB Safety Bulletin 3/2014[13] and Federal Bureau of Maritime Casualty Investigation report 140/14[14]). The crew members were recovered from the space but did not regain consciousness despite the best efforts of their rescuers.

Post-accident analysis of the atmosphere within the space showed that the oxygen content was normal (20.9%) at the access hatch; this reduced to 10% just below main deck level and to between 5% and 6% at the bottom of the ladder.

1.10.3 *Saga Frontier* – enclosed space fatalities

In April 2015, the Hong Kong registered general cargo vessel *Saga Frontier* was discharging semi coke bulk cargo in Antwerp, Belgium when two stevedores and a bulldozer operator were overcome (Hong Kong Marine Department report, dated 28 April 2016[15]). They had entered the access trunk to cargo hold No.4 but collapsed due to the oxygen deficient atmosphere at the bottom of the space. The three casualties were transferred ashore for treatment but were later declared deceased.

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12 https://www.iomshipregistry.com/forms-reports/casualty-reports/

13 https://www.gov.uk/maib-reports/safety-warning-issued-after-entry-to-confined-space-on-general-cargo-vessel-suntis-results-in-loss-of-3-lives

14 https://www.bsu-bund.de/SharedDocs/pdf/EN/Investigation_Report/2015/Investigation_Report_140_14.pdf?__blob=publicationFile&v=1

15 https://www.mardep.gov.hk/filemanager/en/share/publications/pdf/reports/mai150411_f.pdf

1.10.4 *Eny* – enclosed space fatalities

In March 2021, the Korea registered bulk carrier *Eny* was discharging a cargo of zinc concentrates when an employee of a stevedoring company entered No.2 cargo hold to rescue a stevedore who had collapsed due to entering an oxygen depleted atmosphere (Korea Maritime Safety Tribunal report 2022-007[16]). The employee, who was wearing BA, was also overcome while performing first aid. They did not survive. A third stevedore who had also entered the hold was able to return to the main deck before collapsing and later made a full recovery.

The accident happened 30 minutes after the cargo hatches on the hold had been opened after a long period of being closed. The stevedore had not informed anyone of their intention to enter No.2 cargo hold before accessing it through the booby hatch, which had no effective means to prevent entry.

1.11 SAFETY-RELATED INFORMATION

1.11.1 Previous MAIB recommendations

In 2008, the MAIB issued *Safety Bulletin 2/2008 – Fatalities in enclosed spaces*[17] highlighting three investigations into enclosed space accidents on board the emergency response and rescue vessel *Viking Islay*, the general cargo ship *Sava Lake* and the passenger cruise ship *Saga Rose*. A total of six seafarers died in the accidents.

Ship owners and managers, and industry bodies and organisations were recommended to:

2008/145

- *Identify and implement measures aimed at improving the identification of all dangerous and potentially dangerous spaces and increasing compliance with the safe working practices required when working in such compartments.*

- *Individually and collectively raise the awareness of the continuing high incidence of fatalities of seafarers working in enclosed spaces.*

The MCA was recommended to:

2008/146

Co-sponsor with the Maritime Administration of Vanuatu and other concerned administrations a submission to the IMO aimed at raising the awareness of the number of fatalities on ships which have occurred in enclosed spaces, and highlighting the need for measures to be identified which will reduce this unnecessary loss of life, such as the identification and marking of all potentially dangerous spaces.

[16] https://www.kmst.go.kr/eng/board.do?menuIdx=229&bbsIdx=100214

[17] https://www.gov.uk/maib-reports/safety-warning-issued-after-3-investigations-concern-entry-to-enclosed-spaces-with-total-loss-of-6-lives

Following these recommendations, the Marine Accident Investigators' International Forum's (MAIIF) information on enclosed space incidents was included in the revision of guidance on entering enclosed spaces during the IMO's Sub-Committee on Dangerous Goods, Solid Cargoes and Containers 14th session in September 2009. The guidance indicated that training was inadequate, and that the necessary drills were not being completed. Recommendations were made for the update and expansion of Resolution A.864(20).

Subsequent amendments to SOLAS mandated enclosed space entry and rescue drills and Resolution A.864(20) was replaced by Resolution A.1050(27) – Revised Recommendations for Entering Enclosed Spaces Aboard Ships.

1.11.2 International Group of Protection and Indemnity Clubs

The International Group of Protection and Indemnity Clubs (IGP&I) comprised 12 Protection and Indemnity (P&I) Clubs[18] that provided marine liability cover for about 90% of the world's ocean going ships. IGP&I shared industry knowledge gained through its shipowners' liabilities and had a forum for sharing this information.

In 2021, the IGP&I launched a safety video[19] to help prevent loss of life in enclosed spaces on board ships. The video was based on the group's research into 83 enclosed space fatalities between 2015 and 2020. The research found that over 60% of these incidents had occurred in the cargo hold and 53% were due to oxygen depletion.

1.11.3 Human Element Industry Group statistics

In 2018, the Human Element Industry Group (HEIG) was formed following a request from IMO's Secretary General. The group comprised many maritime sector organisations and unions, including InterManager[20], Oil Companies International Marine Forum (OCIMF) and the Baltic and International Maritime Council[21].

The enclosed space project was initiated by InterManager following a survey of 5,000 seafarers on the basis that enclosed space fatalities appeared to be increasing.

The project determined that there were 257 fatalities in enclosed spaces on board bulk carriers between 1 January 1999 and 1 January 2023. Of those fatalities, 67 were stevedores/shoreside workers. Analysis of enclosed space fatal accidents on merchant vessels showed that:

- 47% occurred on bulk carriers
- 49% happened in a cargo hold.

On 13 May 2024, InterManager submitted document III 10/INF.18 – Analysis of enclosed space accidents on board ships **(Annex F)** to the IMO. The document included analysis of enclosed space accidents due to asphyxiation between 1996

[18] A Protection and Indemnity (P&I) Club was a mutual insurance association that provided risk pooling, information and representation for its members.

[19] Enclosed Space Entry – The International Group of P&I Clubs (igpandi.org)

[20] An organisation dedicated to representing the ship management industry.

[21] BIMCO – the world's largest organisation for shipowners, charterers, shipbrokers and agents.

and 2024, and noted that the number of fatalities remained substantial during this period. III 10/INF.18 Figure 2 showed the year-on-year trend for the number of fatalities in enclosed spaces between 1996 and 1 May 2024. It indicated that after the introduction of Resolution A.1050(27), there was a marked increase in the number of third parties who died in enclosed spaces. The updated analysis indicated that 43% of accidents occurred on bulk carriers.

1.11.4 Other marine sectors

The OCIMF was formed in 1970 as a voluntary association of oil companies with an interest in the transportation of, and terminals involved in, the crude oil, oil products, petrochemical and gas sectors. The OCIMF had specific programmes for different segments of the industry and had produced risk assessment aids for ship operators, terminal operators and charterers.

The association's Marine Terminal Information System (MTIS) aimed to ensure that all marine terminals involved in the shipment of oil, chemicals and gas maintained common high standards of safety. The MTIS included competences and training for terminal staff involved in ship operations.

The OCIMF's programmes were successful worldwide in allowing the sector to self-regulate, demanding a high standard for those involved in shipping.

SECTION 2 – ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 FATIGUE

There is no evidence that any of the crew or stevedores were suffering from fatigue and it is therefore not considered a contributing factor to this accident.

2.3 OVERVIEW

The three stevedores died after entering a cargo hold access space that had been closed for 2 days, the atmosphere of which had been in direct contact with the coal cargo.

The InterManager statistics showed that stevedore deaths such as in the *Berge Mawson* accident were not rare events and accounted for more than a quarter of all enclosed space deaths on board bulk carriers.

This section of the report will examine the circumstances of the accident and factors including the cargo hold atmosphere, control of the deck and access into cargo holds.

2.4 THE ACCIDENT

2.4.1 The cargo hold access space atmosphere

The hazards associated with coal cargoes were stated in the company's SMS as well as industry guidance and regulation; the IMSBC Code, Annex 7 provided that coal cargoes might deplete the oxygen concentration in a space. Further, the build-up of CO within a confined space atmosphere that was in contact with coal was likely and could reach a concentration that was lethal to humans.

Cargo hold No.8 was loaded with coal and its hatches had been closed for about 2 days before bulldozer operator 2 made a mistaken entry into the cargo hold access space. Before this the hatch covers had been opened and closed due to rain. Although not measured or recorded, it is possible that CO_2 build-up caused oxygen to be displaced while the hatches were open. When the hold was full and loaded up to almost the top of the hatch coaming, the atmosphere beneath the cargo hatch and in the cargo hold access spaces was in direct contact with the surface of the coal **(Figure 9)**. Given that the spaces had been closed and unventilated for nearly 48 hours, it was almost inevitable that they would become oxygen deficient and that noxious gases from the cargo would be present in high levels. The levels of methane (8% LEL), CO (225 ppm) and oxygen (5.8%) recorded during the last atmosphere test of cargo hold No.8 at 0830 on the day of the accident showed that the coal cargo had already depleted the air quality. The post-accident readings taken by the C/O 40 minutes after the discovery of the three stevedores showed that the cargo hold access space atmosphere had not yet been refreshed; CO was still present; and the low oxygen level and high H_2S level could

not sustain life. It is evident that ventilation of the cargo hold access space had not been achieved by the opening of the booby hatch lid and that it would have taken a considerable amount of time before the enclosed atmosphere did not present a risk to life.

There are clear parallels between this accident and the fatalities on board both *Saga Frontier* and *Eny*. In all three cases, stevedores entered oxygen depleted cargo spaces that they assumed would be safe. The fatalities involved in the *Berge Mawson* and *Saga Frontier* accidents occurred in access spaces adjacent to the cargo hold. Although the atmosphere was not tested when each of the stevedores entered the space, it was apparent that the access to *Berge Mawson*'s cargo hold No.8 was oxygen deficient, noxious, and presented a severe risk to life.

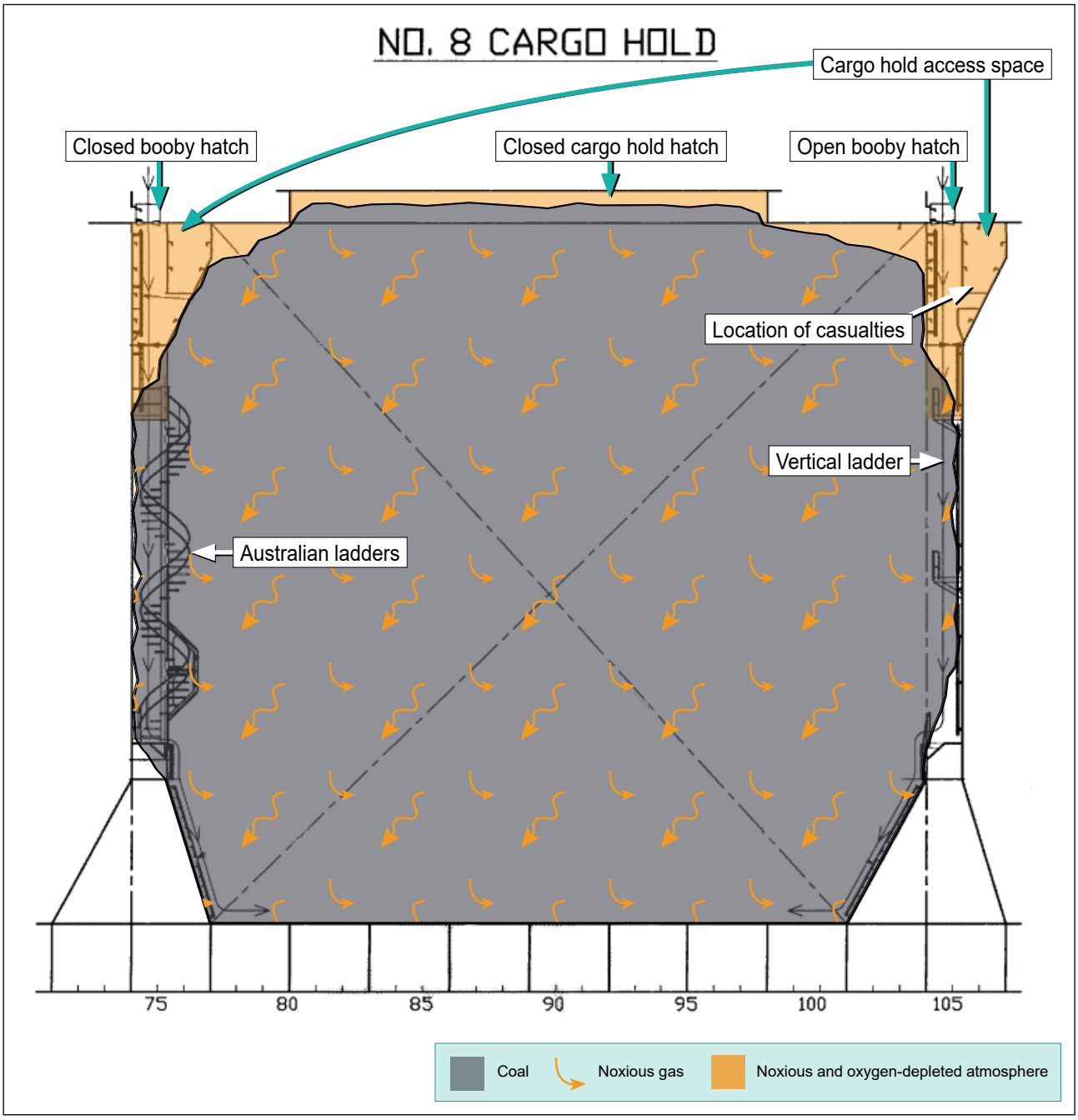


Figure 9: Representation of the level of coal in cargo hold No.8

2.4.2 Cause of death

The position of bulldozer operator 2, who was wedged in the entrance of the vertical ladder into cargo hold No.8 **(**see **Figure 3)** indicated that he was immediately overcome and fell from the cargo access hatch ladder as he entered the space. Bulldozer operator 2 was exposed to the atmosphere in cargo hold No.8 access space for about 40 minutes before being recovered to the main deck; the foreman and bulldozer operator 3 were exposed for about 13 minutes. Although a CO level above 2,000 ppm can result in death after approximately 45 minutes, it does not result in immediate unconsciousness.

Postmortem examinations were not conducted, and the cause of death was not confirmed. However, the atmospheric readings of the cargo hold No.8 forward access space taken after the casualties were found **(**see **Table 2)** show a deficiency of oxygen and a high level of H_2S. It is highly likely that the noxious air breathed by the three stevedores caused them to be incapacitated upon entry into the cargo access space, and the resulting shutdown of their brain and/or lungs led to their death.

2.5 *BERGE MAWSON*

2.5.1 Monitoring of the cargo hold space atmosphere

The requirement to monitor the atmosphere of bulk carrier cargo holds was detailed in the IMSBC Code, the BLU Code and in Berge Bulk's SMS. Atmosphere tests of *Berge Mawson*'s cargo hold were conducted daily **(**see **Annex E)** and the record showed a change of atmosphere during the loading of coal into the vessel and consistently low oxygen levels in all cargo holds that had been closed.

The Ship-Shore Safety Checklist also required a *safe* atmosphere in holds and enclosed spaces to which access might be required. Furthermore, the *Berge Mawson* cargo hold access procedure required that the atmosphere be tested for oxygen levels and noxious gas levels before entry.

At about 1230 on the day of the accident bulldozer operator 2 had requested cargo hold No.7 hatch to be opened, and it was subsequently opened at 1244 by *Berge Mawson*'s crew. No atmosphere tests of the hold or cargo access space were conducted and the only records entered into *Berge Mawson*'s Berge Bulk Port Log Book **(**see **Annex D)** applied to hold access tests undertaken on days following the accident.

It is apparent that the procedures on board *Berge Mawson* for atmosphere testing before cargo hold entry were not routinely followed. Consequently, the opportunity to identify the hazardous atmosphere and prevent people accessing these enclosed spaces was missed.

2.5.2 Control of deck operations and access to cargo holds

Berge Mawson's SMS required that a 'sufficient' deck watch was maintained during cargo operations and the cargo declaration and the Ship-Shore Safety Checklist indicated that stevedores would carry out trimming as part of the loading operation. The terms of the charter party agreement required that *Berge Mawson*'s master retained responsibility for the stevedore's actions on board. *Berge Mawson*'s cargo hold access procedure required that *proper* PPE be worn.

Stevedores had been working on board *Berge Mawson* for 8 days at the time of the accident. During this time the stevedores did not wear appropriate PPE and carried out unsafe acts such as walking on top of hatch coamings, so exposing themselves to the risk of falling from height into a cargo hold. On the day of the accident, bulldozer operator 2 made four entries into cargo hold access and void spaces **(**see **Table 1)** without following any of the procedures agreed during the Ship-Shore meeting before the start of cargo operations.

There were at least three deck crew on duty at the time of the accident, which complied with Berge Bulk's SMS (Cargo Operation), and the deck CCTV cameras were operating; it is therefore likely that it was possible to monitor the activity of stevedores while working on board *Berge Mawson*'s deck. However, as the respective roles of ship's crew and the foreman had not been clarified, in practice there was an assumption that the stevedores were being monitored; they were not. The Ship-Shore Safety Checklist did not specify who was responsible for supervising the stevedore's activities and consequently no one was, so the opportunity to prevent unsafe acts was lost.

Stevedores requested that crew open the cargo hold hatch to enable trimming to continue so the ship's crew were aware of the presence of stevedores on board and their intention to enter a cargo hold. However, it is apparent that the stevedores' actions from this point were unsupervised and that unsafe actions went unchallenged. Further, as the gangway log was not consistently used during the loading at Bunyu Island, the actual number of stevedores on board at any particular time was unknown and so made it difficult to account for all on board personnel should a shipboard emergency occur.

It is possible that *Berge Mawson*'s crew considered that the port's supervisors were solely responsible for monitoring the stevedores and that their working practices had become normalised. It is evident that there was ineffective supervision of the stevedores working on board *Berge Mawson* and their safety was not managed.

2.5.3 Control of access into cargo holds

The COSWP and IMO documentation required entrances to enclosed spaces to be secured against entry when not in use. *Berge Mawson*'s cargo holds and their access spaces were deemed to be enclosed spaces and the booby hatches had twist screws and an eye and catch arrangement to allow them to be secured with a padlock. It was therefore possible to prevent unauthorised access into these enclosed cargo and void spaces.

Before the accident, and consistent with the securing arrangements on many bulk carriers, *Berge Mawson*'s booby hatches were kept closed and *dogged-down* when access was not required. Consequently, there was no physical means to prevent access and control relied on the procedural instructions stipulated in the Ship-Shore Safety Checklist, which stated *entry with C/Off permission only*.

It can often be easy for shore-based personnel to access enclosed spaces on board ships, as seen in the *Iron Queen* and *Suntis* accidents, and crew members can also find their way into an enclosed space and at risk of harm. The adoption of physical means to prevent access combined with procedural measures provides an additional safeguard to mitigate the hazards of entering an enclosed space and follows the hierarchy of risk control principle detailed in the COSWP guidance on the preparation of risk assessments.

Access hatches to enclosed spaces were not locked while stevedores were working on board *Berge Mawson*. Consequently, unauthorised and unsupervised entry into the cargo hold access spaces was not prevented.

2.5.4 Identification of enclosed spaces

The IMSR's TAN 008-19 required that enclosed spaces were correctly identified and the COSWP advised that any hatches that were accessible and led to an enclosed space were marked as the entrance to a dangerous space.

Berge Mawson's cargo hold access space booby hatches were identified with a plastic label; however, some of the labels, such as at cargo hold No.8 forward booby hatch, were damaged and unreadable. Each booby hatch was similar to the next and the absence of a readable label required detailed knowledge of the hatch positions to understand to which cargo hold or void space they led.

Additionally, the warnings stencilled on to the booby hatches of insufficient oxygen and the requirement for the C/O's permission to enter the space were in English, the working language of *Berge Mawson*, of which the three casualties in this case had no or little understanding. Reliance on written warnings to convey safety critical information is especially ineffective when those working on board do not understand the working language of the vessel. Adopting a traffic light system for enclosed spaces, as proposed to the IMO by China (Document MSC.106/16/1), using pictorial signage, or provision of shore workers information cards in the appropriate languages, could all provide methods of signposting hazards that enhances understanding for all.

The numerous entries made by bulldozer operator 2 into various cargo hold access and void spaces **(**see **Table 1)** demonstrated that he was unable to understand the labels or heed the warnings about insufficient oxygen. His misidentification of cargo hold No.8 access space booby hatch as the route to the bulldozer contributed to him entering a compartment with a dangerous atmosphere. It is probable that effective access control, either by a physical barrier or robust entry procedures that prevented easy access to hold spaces, might have averted this accident.

2.5.5 Permit to work

The Berge Bulk SMS provided an enclosed space definition similar to that of the IMO definition. *Berge Mawson*'s cargo hold access spaces met these criteria so the SMS required a permit to work and atmospheric testing to be completed before entry and that the space be retested if it had been closed for more than 30 minutes. This C/O's risk assessment further endorsed this requirement.

The permit to work system prescribed roles and responsibilities for the responsible officer, issuing officer and authoriser. Deck officers were able to oversee a permit to work and permits for entry into a cargo hold had to be issued by the C/O and approved by the master.

Berge Mawson operated in the Far East and Asia, regions well-known for their rainy seasons and squalls throughout the year. It was foreseeable that there would be frequent hatch closures and that numerous enclosed space entry permits to work would need to be issued when the hatches were reopened, which presented an increased workload for the duty deck officers.

There was approximately 30 minutes between bulldozer operator 2's request for cargo hold No.7 hatch to be opened and his subsequent entry into the incorrect booby hatch. Had the permit to work procedure been rigorously enforced on board, the requirements for entry into the space, including atmospheric testing by the C/O, would have been underway. The C/O was in their cabin at the time of the accident.

It is possible that the deviation from written procedure by not issuing enclosed space permits to work for stevedores entering cargo holds had become normal procedure over time. It is evident that, by not using the permit to work system, necessary elements of enclosed entry protocol such as atmosphere testing were not conducted and the stevedores were unprotected from the inherent risks.

2.5.6 Ship-Shore Safety Checklist

The parameters for the ship and shore responsibilities were set out and agreed between the C/O and the surveyor in the Ship-Shore Safety Checklist as prescribed in the BLU Code. Requirement 13 indicated that the cargo holds and access spaces were *safe*. Although permission should have been sought from the C/O, analysis of the movements around the main deck and numerous space entries made by both bulldozer operator 2 and the assistant foreman suggested that this requirement was not being strictly enforced. As no atmosphere testing was carried out at the time of signing the checklist this assurance could not be made, However, the results of any testing would have provided only a snapshot of the holds' atmospheres, which would have changed as loading progressed.

It is probable that the Ship-Shore Safety Checklist was not shared with the stevedores who would be working cargo on board *Berge Mawson*. Without enforcement of a compliance-based working routine, there was no effective application of the Ship-Shore Safety Checklist; consequently, its objective of promoting safe cargo work was not achieved.

2.5.7 Emergency preparedness

Berge Mawson's crew had last completed an enclosed space entry/rescue drill from a cargo hold on 14 June 2022. The scenario did not include a guard at the entrance to an enclosed space as required by *Berge Mawson*'s SMS, nor were stevedores or other third parties involved.

Crucially, after bulldozer operator 2 had been discovered in cargo hold No.8 access space and the alarm raised, the cargo access space was left unguarded. Consequently, the two other stevedores were able to attempt to rescue their colleague and also succumbed to the effects of the atmosphere. It is possible that the lack of a guard during enclosed space entry/rescue drills meant that the crew followed this embedded practice during a real emergency.

With no guard in place, the unsupervised and untrained stevedores were presented with an opportunity to gain entry after the initial alarm was raised, with tragic consequences.

COSWP required that *Regular drills should prove the feasibility of the ship's rescue plan under different and difficult circumstances*. Cargo operations on bulk carriers required stevedores to work on board so the possibility of third parties being present during a cargo space rescue was foreseeable. Further, it is possible that the third parties might be untrained in the actions to take in a shipboard emergency, placing additional burden on a ship's crew to muster stevedores and keep them safe.

Neither COSWP nor *Berge Mawson*'s SMS advised the inclusion of third parties in drill scenarios, but it is likely that the simulated inclusion of supernumeraries in training scenarios would better prepare ships' crews for actual emergencies, particularly those that occur in port.

The maintenance of the security of access points to a space once an enclosed space incident has started is of prime importance to prevent more casualties occurring.

2.6 PORT OF BUNYU ISLAND STEVEDORES

The foreman and bulldozer operators had not received any training on cargo operations, enclosed spaces awareness or general shipboard safety. The port had not risk assessed the working practices of stevedores on board bulk carriers so the foreman, as terminal representative, was limited in his ability to guide his team on safety matters.

The stevedores and crew working on board *Berge Mawson* faced identical hazards and so it is reasonable to expect that the stevedores' employer would provide them with PPE similar to that of the ship's crew. However, this was not the case and rather than wearing safety helmets, coveralls and boots the stevedores mostly wore casual clothing and footwear.

The three casualties were experienced in shipboard working. It is possible that the lack of incident on *Berge Mawson* in the days before the accident combined with their lack of knowledge about the inherent dangers of enclosed spaces meant that bulldozer operator 2 felt confident to make an unauthorised entry to the cargo access space. The same factors probably caused his two colleagues to follow their natural instinct to rescue their stricken colleague without considering their personal safety.

It is noteworthy that the stevedores were required to live and work on board a barge for extended periods but had not completed basic sea survival training. This raises further concerns about the port's understanding of the requirements for hazard awareness and safety training.

The absence of hazard awareness, safety training, PPE and risk assessments meant the stevedores were ill-equipped to either work safely on board *Berge Mawson* or respond appropriately to an emergency situation.

2.7 INDUSTRY GUIDANCE

The Bulk Carrier Practice, IMSBC Code, the BLU Code and the BLU Manual provided industry guidance to bulk terminal operators.

The IMSBC Code promoted the safe stowage of solid bulk cargoes and identified the associated primary hazards as structural damage, loss of vessel stability and chemical reactions from cargo. It also referenced general requirements for the safety of personnel, including enclosed space entry procedures, ventilation, and atmosphere testing.

The BLU Code's purpose was to prevent the accidents to and loss of bulk carrier vessels through improper loading and it advocated the use of checklists during loading. The BLU Code also specified the training requirements of terminal staff and

identified potential hazards that they might face, including the depletion of oxygen in cargo spaces. The BLU Manual also stated that *terminal personnel* training should provide familiarity with the hazards of working cargo on bulk carriers.

Review of the guidance documents strongly indicates that their focus was on the prevention of damage to vessels. References to personnel were relatively brief and they lacked detail about issues such as safe enclosed space entry and cargo trimming. While it is possible that the information provided on personnel safety lacked emphasis, it is certain that the guidance was not followed during the loading of bulk ships at the port of Bunyu Island. Consequently, the opportunity to provide a safe system of work for the stevedores was missed.

2.8 ENCLOSED SPACE FATALITIES

In addition to this accident, the fatalities on board *Iron Queen*, *Suntis*, *Saga Frontier* and *Eny* highlight the ever-present hazards associated with enclosed space entry and the specific risk to stevedores. The InterManager paper submitted to the IMO in May 2024 indicated a disproportionate increase in the number of third party deaths in enclosed spaces since the introduction of Resolution A.1050(27) in 2011. This is unsurprising given that non-crew fatalities, such as stevedores, were not reported before 2011 and that bulk carrier cargo operations required significant third party participation. While an apparent drop in the percentage of bulk carrier asphyxiation deaths over the analysis timeframe is evident, the increase in third party fatalities strongly suggests that industry guidance and the recommendations made in publications such as MAIB's safety bulletin, *Fatalities in enclosed spaces*, have yet to result in an increased level of safety.

OCIMF's initiatives to improve the safety standards of oil terminals shows that industry-led solutions can deliver necessary change. It is likely that the bulk carrier industry could achieve similar results if it were to establish a framework for members to demand the provision of an acceptable standard of training and SMS at the ports visited by their ships. This could lead to long overdue improvements in training and safety standards for stevedores working on board bulk carriers, enable masters of ships to have confidence in the stevedores' ability to work safely, and help prevent further fatalities.

SECTION 3 – CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The three stevedores entered a cargo access space adjacent to the coal cargo that had a noxious atmosphere deficient in oxygen and high in hydrogen sulphide. [2.4.1]

2. It is highly likely that the noxious atmosphere in the cargo access space caused each of the three stevedores to lose consciousness and die. [2.4.2]

3. Atmosphere testing was not carried out before entries into cargo holds or cargo access spaces contrary to international guidelines and *Berge Mawson*'s procedures. Consequently, personnel were at risk of exposure to an unsafe atmosphere. [2.5.1]

4. The stevedores working on board *Berge Mawson* were ineffectively supervised and their safety was not managed. [2.5.2]

5. The access points to *Berge Mawson*'s enclosed spaces were not secured while the stevedores were working on board, so unauthorised access into cargo hold access spaces was not prevented. [2.5.3]

6. The stevedores had little or no understanding of the safety warnings and enclosed space signage. They were unaware of the inherent risk of entering the cargo hold access spaces. [2.5.4]

7. The on-board permit to work system was not used for cargo hold access while *Berge Mawson* was loading cargo. The stevedores were therefore unprotected from the inherent risk associated with enclosed space entry. [2.5.5]

8. The Ship-Shore Safety Checklist applied only at the start of cargo loading and the agreed requirements were neither followed nor promoted safe cargo work on board *Berge Mawson*. [2.5.6]

9. The port authority had not followed international guidelines. Consequently, the stevedores had not received basic safety training, did not have correct PPE and had no risk assessments to enable them to work safely on board *Berge Mawson*. [2.6]

10. Industry guidance on personnel safety during loading operations was not followed at the terminal, resulting in compromised stevedore safety due to the lack of a safe system of work. [2.7]

3.2 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The enclosed space entry/rescue drill scenarios practised on board *Berge Mawson* did not consider that stevedores might be working on the vessel during a rescue from a cargo hold. [2.5.7]

2. The COSWP did not include the possible presence of third parties during an enclosed space entry/rescue. [2.5.7]

3. It is likely that a bulk carrier industry initiative that requires ports to implement safety training and an SMS could improve the level of safety for stevedores working on board bulk carriers. [2.8]

SECTION 4 – ACTIONS TAKEN

4.1 ACTIONS TAKEN BY OTHER ORGANISATIONS

Isle of Man Ship Registry has issued Technical Advisory Notice 005-24: Enclosed Space Entry – Gas Detection and CO_2 Hazards, highlighting the gas detection requirements and safety management systems for entry into enclosed spaces.

Berge Bulk Maritime Pte. Ltd has:

- Updated its SMS procedure for cargo hold access to include a physical safety barrier within the booby hatch access **(Figure 10)**.
- Revised its training matrix to ensure all ranks receive enclosed space training, incorporating lessons from the accident.
- Enhanced its SMS procedure for cargo hold access, with clear instructions for warning signs and identification markings on enclosed space entry points and safeguards against wrongful entry during ventilation.
- Amended its cargo hold entry checklist to record atmosphere testing before entry.
- Revised its Ship-Shore Safety Checklist to include warnings against unauthorised opening/closing of enclosed spaces; clear procedures; 72-hour checklist validity; and a stevedore familiarisation section with emergency procedures.
- Added a requirement in its cargo operations checklist to monitor Ship-Shore Safety Checklist conditions every watch and ensure compliance with cargo hold entry procedures.

Image courtesy of Berge Bulk Maritime Pte. Ltd

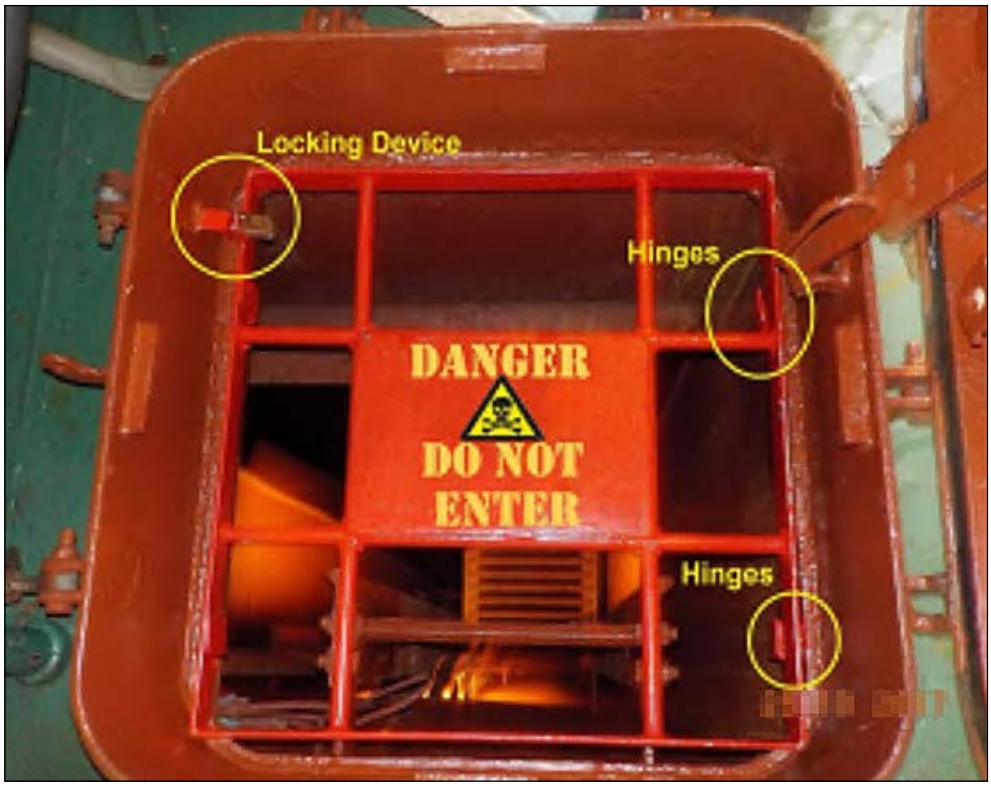


Figure 10: Barrier preventing access into the cargo hold

SECTION 5 – RECOMMENDATIONS

The **Maritime and Coastguard Agency** is recommended to:

2025/101 Review and revise the Code of Safe Working Practices for Merchant Seafarers to ensure that emergency drill scenarios for enclosed space rescues include the possible presence of shoreside staff or third parties.

Bunyu Port Organizing Unit, **PT Bintang Kartika Segara** and **PT Tanjung Mas** are recommended to:

2025/102 Follow the guidelines set out in the International Maritime Solid Bulk Cargoes Code, BLU Code and BLU Manual to provide stevedores with training and personal protective equipment to enable them to work safely on board bulk carriers.

Berge Bulk Maritime Pte. Ltd is recommended to:

2025/103 Maintain clear and precise guidance for masters and ships' crews on cargo operations and ensure that:

- specific duties for cargo-related and emergency scenarios for ship and shore personnel are considered
- the control of access to the vessel, deck and all spaces during cargo operations is robustly applied.

Intercargo, **InterManager** and **RightShip** are recommended to:

2025/104 Develop a minimum operational safety standard for stevedores conducting cargo operations on board their members' vessels to include:

- compilation and distribution of a Ship-Shore Safety Checklist
- cargo hold entry procedures
- communication with ships' crews
- personal protective equipment.

2025/105 Encourage their members to introduce the minimum operational safety standard for stevedores as a port and/or terminal requirement and consider its inclusion in the charter party agreement.

Safety recommendations shall in no case create a presumption of blame or liability

Annex A

Ship-Shore Safety Checklist

Image courtesy of Berge Bulk Maritime Pte. Ltd

Chapter : Cargo Operation
Topic : Ship-Shore Safety Checklist

Safety Management System

Document **07.03.03-09**

Ship's name	MV BERGE MAWSON	Date	18-06-2022
Port	BUNYU	Terminal/Quay	BUNYU
Available depth of water in berth	21.0	Minimum Air draft	16.50
Arrival draft (read/calculated)	F- 5.11 A- 11.50	Air draft	17.46
Calculated departure draft	F- 12.00 A- 12.00	Air draft	10.76

The Master and terminal representatives should complete the checklist jointly. Advice on points to be considered is given in the accompanying guidelines. The safety of operation requires that all questions should be answered affirmatively and the boxes ticked. If this is not possible, the reason should be given and agreement reached upon precautions to be taken between ship and terminal. If a question is considered to be not applicable write "N/A", explaining why; if appropriate.

No	Requirement	Ship	Terminal
1	Is the depth of water at the berth and the air draft, adequate for the cargo operation?	☑	☑
2	Are mooring arrangements adequate for all local effects of tide, current, weather, traffic and craft alongside?	☑	☑
3	In emergency, is the ship able to leave the berth at any time? ANCHORED	☐	☑
4	Is there safe access between the ship and the wharf? Tended by Ship/Terminal *(cross out the appropriate)* LADDER	☑	☑
5	Is the agreed ship/terminal communications system operative? Communication method: VERBAL Language ENGLISH Radio channels/phone numbers	☑	☑
6	Are the liaison contact persons during operations positively identified? Ship contact person(s) [redacted] Shore contact person(s) [redacted] Location: ON BOARD	☑	☑
7	Are adequate crew onboard and adequate staffs at the terminal for emergency?	☑	☑
8	Have any bunkering operations been advised and agreed? N/A.	☐	☐
9	Have any intended repairs to wharf or ship whilst alongside been advised and agreed? N/A	☐	☐
10	Has a procedure for reporting and recording damage from cargo operations been agreed?	☑	☑
11	Has the ship been provided with copies of port and terminal regulations including safety and pollution requirements and details of emergency services?	☑	☑
12	Has the shipper provided the Master with the properties of the cargo in accordance with the requirements of chapter VI of SOLAS?	☑	☑
13	Is the atmosphere safe in holds and enclosed spaces to which access may be required. Have fumigated cargoes (if any) been identified and has the need for monitoring of atmosphere been agreed by ship and terminal? ENTRY WITH CARGO PERMISSION ONLY	☑	☑
14	Have the cargo handling capacity and any limits of travel for each loader/unloader been passed to the ship/terminal? Loader. 1500-2000 [redacted] Loader ~ Loader ~	☑	☑
15	Has a cargo operations plan been calculated for all stages of loading/deballasting or unloading/ballasting? Copy lodged with: [redacted]	☑	☑
16	Have the holds to be worked been clearly identified in the loading or unloading plan, showing the sequence of work and the grade and tonnage of cargo to be transferred each time the hold is worked?	☑	☑
17	Has the need for trimming of cargo in the holds been discussed and the method and extent been agreed?	☑	☑
18	Do both ship and terminal understand and accept that if the ballast programme becomes out of step with the cargo operation, it will be necessary to suspend cargo operation until the ballast operation has caught up?	☑	☑
19	Have the intended procedures for removing cargo residues lodged in the holds while unloading been explained to the ship and accepted? N/A	☐	☐
20	Have the procedures to adjust the final trim of the loading been decided and agreed? Tonnage held by the terminal conveyor system. 10 [redacted]	☑	☑
21	Has the terminal been advised of the time required for the ship to prepare for sea on completion of cargo work?	☑	☑

Remarks:

THE ABOVE HAS BEEN AGREED:

Date:	18/06/2022	Time:	16:00
For ship:	[redacted]	For Terminal:	[redacted]
Rank:	CHIEF OFFICER	Position / Title:	[redacted] SURVEYOR

BERGE MAWSON CHIEF OFFICER

Revision No.	1	Revision Date	15-11-2017	Approved by	[redacted]
		Issued Date	21-07-2017	Issued by	

"UNCONTROLLED WHEN PRINTED"

"FILLING AND RETENTION AS PER 11.01.01-A1"

Image courtesy of Berge Bulk Maritime Pte. Ltd

BLU Code - Code of Practice for the Safe Loading and Unloading of Bulk Carriers / Appendix 4 - Guidelines for Completing the Ship/Shore Safety Checklist

1.. Is the depth of water at the berth, and the air draught, see footnote adequate for the cargo operations to be completed?

The depth of water should be determined over the entire area the ship will occupy, and the terminal should be aware of the ship's maximum air draught and water draught requirements during operations. Where the loaded draught means a small underkeel clearance at departure, the Master should consult and confirm that the proposed departure draught is safe and suitable. The ship should be provided with all available information about density and contaminates of the water at the berth.

2.. Are mooring arrangements adequate for all local effects of tide, current, weather, traffic and craft alongside?

Due regard should be given to the need for adequate fendering arrangements. Ships should remain well secured in their moorings. Alongside piers or quays, ranging of the ship should be prevented by keeping mooring lines taut; attention should be given to the movement of the ship caused by tides, currents or passing ships and by the operation in progress. Wire ropes and fibre ropes should not be used together in the same direction because of differences in their elastic properties.

3.. In emergency, is the ship able to leave the berth at any time?

The ship should normally be able to move under its own power at short notice, unless agreement to immobilise the ship has been reached with the terminal representative, and the port authority where applicable. In an emergency a ship may be prevented from leaving the berth at short notice by a number of factors. These include low tide, excessive trim or draught, lack of tugs, no navigation possible at night, main engine immobilised, etc. Both the ship and the terminal should be aware if any of these factors apply, so that extra precautions can be taken if need be. The method to be used for any emergency unberthing operation should be agreed taking into account the possible risks involved. If emergency towing-off wires are required, agreement should be reached on their position and method of securing.

4.. Is there safe access between the ship and the wharf?

The means of access between the ship and the wharf must be safe and legal, and may be provided by either ship or terminal. It should consist of an appropriate gangway or accommodation ladder with a properly fastened safety net underneath it. Access equipment must be tended, since it can be damaged as a result of changing heights and draughts; persons responsible for tending it must be agreed between the ship and terminal, and recorded in the checklist. The gangway should be positioned so that it is not underneath the path of cargo being loaded or unloaded. It should be well illuminated during darkness. A lifebuoy with a heaving line should be available on board the ship near the gangway or accommodation ladder.

5.. Is the agreed ship/terminal communications system operative?

Communication should be maintained in the most efficient way between the responsible officer on duty on the ship and the responsible person ashore. The selected system of communication and the language to be used, together with the necessary telephone numbers and/or radio channels, should be recorded in the checklist.

6.. Are the liaison contact persons during operations positively identified?

The controlling personnel on ship and terminal must maintain an effective communication with each other and their respective supervisors. Their names, and if appropriate where they can be contacted, should be recorded in the checklist. The aim should be to prevent development of hazardous situations, but if such a situation does arise, good communication and knowing who has proper authority can be instrumental in dealing with it.

7.. Are adequate crew on board, and adequate staff in the terminal, for emergency?

It is not possible or desirable to specify all conditions, but it is important that a sufficient number of personnel should be on board the ship and in the terminal throughout the ship's stay, to deal with an emergency. The signals to be used in the event of an emergency arising ashore or on board should be clearly understood by all personnel involved in cargo operations.

8.. Have any bunkering operations been advised and agreed?

The person on board in charge of bunkering must be identified, together with the time, method of delivery (hose from shore, bunker barge, etc.) and the location of the bunker point on board. Loading of bunkers should be co-ordinated with the cargo operation. The terminal should confirm agreement to the procedure.

9.. Have any intended repairs to wharf or ship whilst alongside been advised and agreed?

Hot work, involving welding, burning or use of naked flame, whether on the ship or the wharf may require a hot work permit. Work on deck which could interfere with cargo work will need to be co-ordinated. In the case of combination carrier a gas free certificate (including for pipelines and pumps) will be necessary, issued by a shore chemist approved by the terminal or port authority.

10.. Has a procedure for reporting and recording damage from cargo operations been agreed?

Operational damage can be expected in a harsh trade. To avoid conflict, a procedure must be agreed, before cargo operations commence, to record such damage. An accumulation of small items of damage to steel work can cause significant loss of strength for the ship, so it is essential that damage is noted, to allow prompt repair.

11.. Has the ship been provided with copies of port and terminal regulations, including safety and pollution requirements and details of emergency services?

Although much information will normally be provided by a ship's agent, a fact sheet containing this information should be passed to the ship on arrival, and should include any local regulations controlling the discharge of ballast water and hold washings.

12.. Has the shipper provided the master with the properties of the cargo in accordance with the requirements of chapter VI of SOLAS?

The shipper should pass to the Master, for example, the grade of cargo, particle size, quantity to be loaded, stowage factor, and cargo moisture content. The IMSBC Code gives guidance on this. The ship should be advised of any material which may contaminate or react with the planned cargo, and the ship should ensure that the holds are free of such material.

13.. Is the atmosphere safe in holds and enclosed spaces to which access may be required, have fumigated cargoes been identified, and has the need for monitoring of atmosphere been agreed by ship and terminal?

Rusting of steelwork or the characteristics of a cargo may cause a hazardous atmosphere to develop. Consideration should be given to: oxygen depletion in holds; the effect of fumigation either of cargo to be discharged, or of cargo in a silo before loading from where gas can be swept on board along with the cargo with no warning to the ship; and leakage of gases, whether poisonous or explosive, from adjacent holds or other spaces.

14.. Have the cargo handling capacity and any limits of travel for each loader/unloader been passed to the ship/terminal?

The number of loaders or unloaders to be used should be agreed, and their capabilities understood by both parties. The agreed maximum transfer rate for each loader/unloader should be recorded in the checklist. Limits of travel of loading or unloading equipment should be indicated. This is essential information when planning cargo operations in berths where a ship must be shifted from one position to another due to loading. Gear should always be checked for faults and that it is clear of contaminates from previous cargoes. The accuracy of weighing devices should be ascertained frequently.

15.. Has a cargo loading and unloading plan been calculated for all stages of loading/deballasting or unloading/ballasting?

Where possible the ship should prepare the plan before arrival. To permit her to do so the terminal should provide whatever information the ship requests for planning purposes. On ships which require longitudinal strength calculations, the plan should take account of any permissible maxima for bending moments and shear forces.

The plan should be agreed with the terminal and a copy passed over for use by terminal staff. All watch officers on board and terminal supervisors should have access to a copy. No deviation from the plan should be allowed without agreement of the master. According to SOLAS regulation VI/7, it is required to lodge a copy of the plan with the appropriate authority of the port State. The person receiving the plan should be recorded in the checklist.

16.. Have the holds to be worked been clearly identified in the loading or unloading plan, showing the sequence of work, and the grade and tonnage of cargo to be transferred each time the hold is worked?

The necessary information should be provided in the form as set out in appendix 2 of the Code.

17.. Has the need for trimming of cargo in the holds been discussed, and the method and extent been agreed?

A well-known method is spout trimming, and this can usually achieve a satisfactory result. Other methods use bulldozers, front-end loaders, deflector blades, trimming machines or even manual trimming. The extent of trimming will depend upon the nature of the cargo, and must be in accordance with the IMSBC Code, or the International Grain Code, as appropriate.

18.. Do both ship and terminal understand and accept that if the ballast programme becomes out of step with the cargo operations, it will be necessary to suspend cargo operations until the ballast operation has caught up?

All parties will prefer to load or discharge the cargo without stops if possible. However, if the cargo or ballast programmes are out of step a stop to cargo handling must be ordered by the Master and accepted by the terminal to avoid the possibility of inadvertently overstressing the ship's structure. A cargo operations plan will often indicate cargo check points, when conditions will also allow confirmation that the cargo and ballast handling operations are in alignment. If the maximum rate at which the ship can safely accept the cargo is less than the cargo handling capacity of the terminal, it may be necessary to negotiate pauses in the cargo transfer programme or for the terminal to operate equipment at less than the maximum capacity. In areas where extremely cold weather is likely, the potential for frozen ballast or ballast lines should be recognized.

19.. Have the intended procedures for removing cargo residues lodged in the holds while unloading, been explained to the ship and accepted?

The use of bulldozers, front-end loaders or pneumatic/hydraulic hammers to shake material loose, should be undertaken with care as wrong procedures can damage or distort ships' steel work. Prior agreement to the need and method intended, together with adequate supervision of operators, will avoid subsequent claims or weakening of the ship's structure.

20.. Have the procedures to adjust the final trim of the loading ship been decided and agreed?

Any tonnages proposed at the commencement of loading for adjusting the trim of the ship can only be provisional, and too much importance should not be attached to them. The significance lies in ensuring that the requirement is not overlooked or ignored. The actual quantities and positions to be used to achieve final ship's trim will depend upon the draft readings taken immediately beforehand. The ship should be informed of the tonnage on the conveyor system since that quantity may be large and must still be loaded when the order "stop loading" is given. This figure should be recorded in the checklist.

21.. Has the terminal been advised of the time required for the ship to prepare for sea, on completion of cargo work?

The procedure of securing for sea remains as important as it ever was, and should not be skimped. Hatches should be progressively secured on completion so that only one or two remain to be closed after cargo work is finished. Modern deep water terminals for large ships may have very short passages before the open sea is encountered. The time needed to secure, therefore, may vary between day or night, summer or winter, fine weather or foul weather. Early advice must be given to the terminal if any extension of time is necessary.

Document 08.20.1 – Rescue of Persons from Enclosed Space

1. Objectives

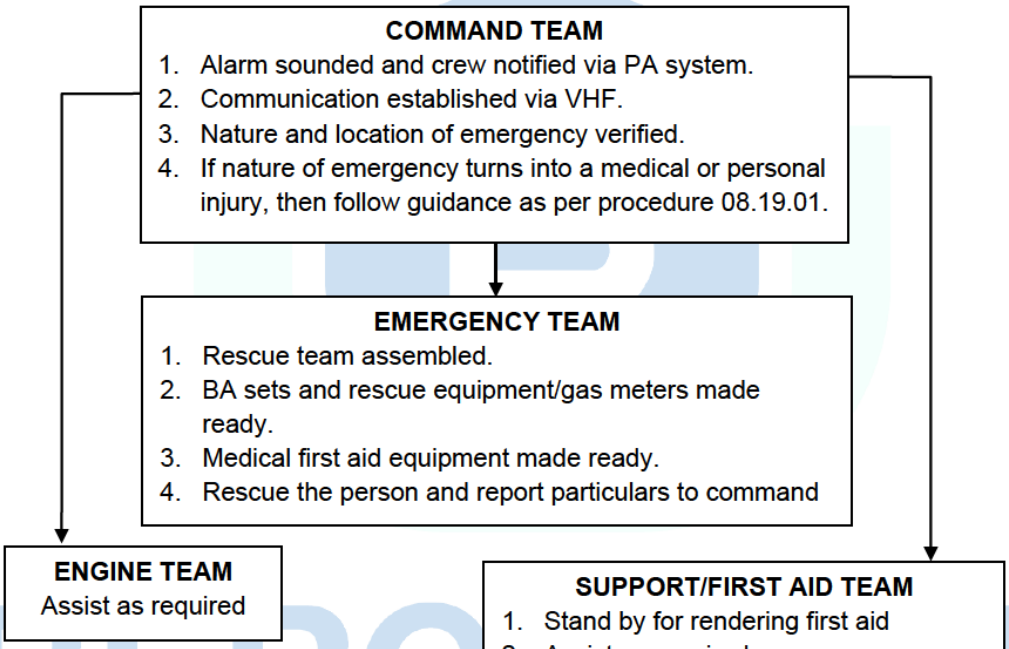
The objective of this procedure is to guide the Master in rescue from an enclosed space related procedures.

2. Responsibilities

Masters of All vessels managed by Berge Bulk Maritime Ltd.

3. Instructions

3.1 Contingency plan



4. References

08.20.01-01 Rescue from enclosed space checklist

Annex C

Cargo Shipper’s Declaration

Image courtesy of Berge Bulk Maritime Pte. Ltd

CARGO SHIPPER'S DECLARATION

This form meets the requirements of SOLAS 1974, Chapter VI, Reg 2 (for general cargo, cargo in cargo units, cargo carried in solid bulk) and the IMSBC Code, section 4.2.

General Information

Shipper : **PT. LAMINDO INTER MULTIKON**

Transport document number: **0015/LIM-BNY/CSD/2022**

Carrier: **MV. BERGE MAWSON**

Consignee : To Order

Name/means of transport : **Mother Vessel**

Port/place of departure : **Bunyu Anchorage, North Kalimantan, Indonesia.**

Port/place of destination : **ANY PORT (S) IN INDIA**

Instructions or other matters:

Refer to IMSBC code section 4.2

Cargo Information

General description of the cargo (For solid bulk cargo – type of material/particle size)

Gross mass (kg/tonnes) : **150.000 +/- 10%**

General cargo : -

Cargo unit(s) : **Metric** Ton

Bulk cargo : **In Bulk**

Relevant special properties of the cargo
(eg highly soluble in water. For solid bulk cargo, see Section 4 of the IMSBC Code)

Solid Bulk Cargo Information

BCSN : **COAL**

Specification of bulk cargo (if applicable) :

Stowage factor : **42-44 CUFT / MT** - WOG (without guarantee)

Size crush coal
Size (+50 MM) : 7,13 % **Size (10-50 MM)** : 60,30 % approx
Size (0-1 MM) : 6,97 % **Size (-10 MM)** : 20,21 %

Angle of repose : **30 – 45 degree**

Trimming procedures: **Dozer / Heavy Equipment**

If potential hazard - chemical properties*:
**eg: Class, UN number or MHB*

☐ This commodity is not considered a cargo which may liquefy during the voyage
■ The cargo is not considered liable to emit significant amounts of methane
■ The cargo is considered not liable to spontaneous combustion

Group of the cargo
☐ Group A and B*
☐ Group A*
■ Group B
☐ Group C
** For cargoes which may liquefy (Group A and Group A and B cargoes)*

Transportable moisture limit: **Not Applicable**
Sulfur Content at Shipment: **0.90%**

Moisture content at shipment: **0-20 %**

EHS/HME (*see Chapters 2.10 and 2.9.3 of the IMDG Code and MARPOL Annex V*) Cargo residues must be disposed of in accordance with MARPOL Annex V

EHS/Marine Pollutant ☐ Yes ■ No
Human Health Criteria Met ☐ Yes ■ No ☐ Not Available
Rubber /Plastic ☐ Yes ■ No

Note: Human Health Criteria data may not be available only until 31 December 2014. From 1 January 2015 Human Health data must be available

Additional certificate(s) (if required)
Certificate of moisture content and transportable moisture limit
☐ Weathering certificate
☐ Exemption certificate
☐ Other (specify):

Declaration

I hereby declare that the consignment is fully and accurately described and that the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative for the cargo to be loaded.

Name/status, company/organization of signatory
PT. LAMINDO INTER MULTIKON

Place and date:
Bunyu Anchorage, June 18th.2022

Signature on behalf of shipper

Shippers' may deliver this declaration by fax or other electronic means. In any electronic transmission, where the signature of the declarant cannot be transmitted, full name of the declarant in capital letters must be provided on the form.

Document BB03 – Port Log Book

Image courtesy of Berge Bulk Maritime Pte. Ltd

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	Remarks
	2130	Passing Breakwater						
		GPS1	17-37.5 N	083-14.7 E	083	7.1	12.1	
		LOP	142 x 0.45 to Breakwater					
	2140	GPS2	17-37.4 N	083-15.7 E	130	5.5	14.7	
		LOP	270 x 0.84 to Breakwater					
	2142	- PILOT OFF						
	2148	- C.O.S.P in posn ϕ- 17-37.04 N λ- 083-16.73 E						
		- Master hand over the conn to OOW						
	2213	- Reported to Gangavaram Port control on VHF CH 14 exiting Port limit						
18 Jun 22		VOY 23B - BULYU						
	1700	GPS 2	03-01.4N	115-09.7E	212	10.0	108	ECDP / MASTER TAKE CONN [illegible]
	1705		[illegible] MANUAL STEERING					
	1706-1720		M/E TESTED AHEAD & ASTERN [illegible] - ALL IN GOOD ORDER					
	1720-1725		[illegible] INTO ANT.					
	1800	GPS1	03-10.0N	118-04.9E	344	12.5	61.3	ECHO SOUNDER SWITCH ON
	1900	GPS1	03°22.1'N	118° 00.6'E	334°	10.5	46.5	
	1950	Lower Stbd anchor to 1 shackle in the water and Hold on						
	2005	Continue lowering Stbd anchor						
*	2012	Drop anchor in posn ϕ- 03-27.0 N λ- 117-58.6 E / NOR tendered						
	2014	4 ϕ's on deck						
	2016	5 ϕ's on deck						
	2018	6 ϕ's on deck						
	2020	7 ϕ's on deck						
	2022	8 ϕ's on deck						
	2024	9 ϕ's on deck						
	2026	10 ϕ's on deck						
	2028	~~10 ϕ's~~ BROUGHT UP TO 10 ϕ's IN THE WATER						
	2030	F.W.E / Master hand over the conn to OOW						
	2100	GPS1	03-27.42 N	117-58.76 E	177	0.1	20.5	
	2200	GPS2	03-27.41 N	117-58.76 E	181	0.1	20.4	
	2300	GPS1	03-27.40 N	117-58.80 E	200	0.1	20.0	
	2400	GPS2	03-27.39 N	117-58.81 E	204	0.1	20.0	
19 JUNE22	0100	GPS1	03-27.36 N	117-58.82 E	210	0.1	19.8	
	0200	GPS2	03-27.35 N	117-58.86 E	215	0.10	19.9	
	0300	GPS2	03-27.35 N	117-58.87 E	235	0.10	19.9	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
[illegible]	0400	GPS1	03-27.30 N	117-58.54 E	224	0.10	19.3	
	0500	GPS 2	03-27-41 N	117-58.74 E	176	0.1	18.5	
	0600	GPS 1	03-27-31 N	117-58.67 E	109	0.3	18.1	
	0700	GPS 1	03-27-20 N	117-58.61 E	051	0.1	19.0	
	0800	GPS 2	03-27-22 N	117-58-61 E	048	0.1	19.5	
	0900	GPS 2	03-27.15 N	117-58-62 E	042	0.1	19.1	
	1000	GPS 1	03-27.12 N	117-58-67 E	021	0.1	20.0	
	1045	PORT	AUTHORITIES ONBOARD					
	1045	1 HR	NOTICE TO E/R					
	1100	GPS 2	03-27.11 N	117-58.74 E	354	0.1	19.6	
	1200	GPS 1	03-27.14 N	117-58.81 E	330	0.1	19.4	
	1200-1215	M/E TEST AHEAD / ASTERN, STEERING TEST. ALL IN						
		GOOD CONDITION. 1215 - FREE PRATIQUE / S.B.E.						
	1221	MASTER ON THE BRIDGE / P.O.B.						
	1240	START HEAVE UP ANCHOR						
	1245	PORT AUTHORITIES DISEMBARKED						
	1300	ANCHOR UP / MASTER / PILOT EXCHANGE COMMENCED						
	1354	DROPPED AT 03-30.59 N — 117-58.36 E. 10 SHACKLES						
	1406	PILOT OFF						
	1412	F.W.E.						
	1430	COMMENCE MOORING OPERATION BY PUTTING LINE						
	1700	FINISHED MOORING OPERATION.						
	1800	NO CARGO OPERATION.						
	1815	Open Cargo Hold no. 7						
	1900	GPS 1	03-30-68 N	117-58-34 E	128	0.1	17.1	
	2000	GPS 2	03-30.71 N	117-58.36 E	141	0.1	17.4	
	2006	Commenced loading	CH no 7					
	2100	GPS 1	03-30.75 N	117-58.42 E	160	0.1	18.1	
	2200	GPS 2	03-30.75 N	117-58.48 E	183	0.1	18.5	
	2300	GPS 1	03-30.73 N	117-58-52 E	198	0.1	19.3	
	2400	GPS 2	03-30.69 N	117-58-45 E	228	0.1	19.4	
20 JUNE 22	0100	GPS 1	03-30.67 N	117-58.47 E	230	0.10	19.5	
	0200	GPS 2	03-30.68 N	117-58-59 E	232	0.1	19.4	
	0300	GPS 1	03-30.68 N	117-58.55 E	235	0.1	19.6	
	0400	GPS 2	03-30.70 N	117-58.50 E	200	0.10	19.6	
	0500	GPS 1	03-30.72 N	117-58.39 E	182	0.2	19.5	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
20 JUNE 22	0555 -	Temp. STOP CONTINUE CH. # 7.						
	0600 -	GPS2	03-30.52N	117-58.31 E	101	0.1	19.5	
	0700 -	GPS1	03-30.57N	117-58.31 E	081	0.1	16.6	
	-	2nd Barge Alongside / Resume loading C/H no. 7						
	0800	GPS2	03-30.57N	117-58.31 E	082	0.1	16.8	
	0900	GPS1	03-30.57N	117-58.31 E	083	0.1	17.1	
	0926	Temp stop loading C/H no 7, shift to C/H no.5						
	0930	Open C/H no. 5		Closed C/H no. 7				
	0935	Start loading C/H no. 5						
	0945	Temp stop loading C/H no. 5 due to rain, close C/H no. 5						
	1010	Open C/H no. 5, Resume loading C/H no. 5						
	1100	GPS2	03-30.45N	117-58.40 E	029	0.1	18.6	
	1200	GPS1	03-30.48N	117-58.55 E	332	0.2	20.0	
	1300	GPS2	03-30.55N	117-58.62 E	277	0.1	20.6	
	1400	GPS1	03-30.61N	117-58.62 E	270	0.16	20.5	
	1500	GPS2	03-30.62N	117-58.63 E	263	0.1	20.1	
	1600	GPS1	03-30.60N	117-58.60 E	230	0.1	20.2	
	1700	GPS2	03-30.58N	117-58.60 E	220	0.1	20.2	
	1710 -	TEMP. STOP CONTINUE CH. # 5 (BARGE # 2 FINISHED)						
	1715 -	RESUME CONTINUE CH. # 5.						
	1800 -	GPS1	03-30.50N	117-58.50 E	110	0.1		
		CARGO OPERATION IN PROGRESS.						
	1900	GPS1	03-30.49N	117-58.38 E	040	0.1	17.8	
	2000	GPS2	03-30.67N	117-58.33 E	122	0.0	16.8	
		Open Cargo Hold no. 1						
	2010	Temp stop loading C/H no. 5, shift to C/H no 1						
	2025	Closed Cargo Hold no. 5						
	2035	Start loading C/H no 1						
	2100	GPS1	03-30.71N	117-58-36 E	139	0.1	17.5	
	2200	GPS2	03-30.75N	117-58-43 E	169	0.1	17.6	
	2300	GPS1	03-30.75N	117-58.48 E	191	0.1	18.6	
	-	Temp stop loading C/H no. 1 (Barge #3 Empty)						
	2321	4th Barge alongside						
	2330	Resume loading C/H no. 1						
	2400	GPS2	03-30.78N	117-58.52 E	202	0.1	18.3	
21 JUNE 22	0100	GPS1	03-30.71N	117-58.57 E	227	0.1	19.0	

BB03 PORT LOG BOOK

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
21 JUNE22	0200	GPS2	03-30.71 N	117-58.58 E	229	0.1	17.0	
	0300	GPS1	03-30.72 N	117-58.50 E	232	0.1	19.0	
	0400	GPS2	03-30.76 N	117-58.48 E	185	0.2	12.3	
	0446 -	Temp. stop loading CH. #1. Finished barge #						0446 - close CH. #1 due to rain.
	0500	GPS1	03-30.70 N	117-58.46 E	180	0.1	12.5	
	0600 -	GPS2	03-30.75 N	117-58.44 E	169	0.1	14.0	
	0605	Resume loading c/H no. 5						
	0700	GPS1	03-30.46 N	117-58.37 E	124	0.1	17.5	
	0800	GPS2	03-30.48 N	117-58.37 E	043	0.1	18.1	
	0945	Temp stop loading c/H no. 5						
	0955	Open c/H no 9						
	1000	GPS1	03-30.47 N	117-58.41 E	025	0.1	19.0	
	1010	Start loading c/H no. 9						
	1110	Closed c/H no. 5 & 6						
	1120	Temp stop loading c/H no 9 (Empty Barge #5)						
	1200	GPS2	03-30-47 N	117-58-41 E	032	0.1	19.5	
	1300	GPS1	03-30.49 N	117-58.57 E	310	0.1	21	
	1340 -	Resume loading CH. # 9. (Barge # 6)						
	1400 -	GPS2	03-30.50 N	117-58.57 E	321	0.1	21.0	
	1500 -	GPS1	03-30-52 N	117-58.59 E	313	0.0	20.9	
	1600 -	GPS2	03-30-53 N	117-58.61 E	304	0.1	20.0	
	1700 -	GPS1	03-30-52 N	117-58.60 E	312	0.0	20.0	
	1800 -	GPS2	03-30.52 N	117-58.60 E	310	0.0	20.0	
	1900 -	GPS1	03-30.46 N	117-58.49 E	359	0.1	18.8	
	1915 -	Temp stop loading c/H no 9 (Empty Barge #6)						
	1945 -	Barge casted off #6						
	2000	GPS2	03-30-53 N	117-58.32 E	049	0.2	17.3	
	2010	Open Cargo Hold no 3						
	2020	7th Barge Alongside						
	2025	Resume loading c/H no. 9						
	2050	Temp stop loading c/H no. 9, shift to c/H no. 3, close c/H no. 9						
	2100	GPS1	03-30.09 N	117-58.34 E	127	0.1	16.6	
	2110	Start loading c/H no. 3						
	2200	GPS2	03-30.74 N	117-58.40 E	150	0.1	17.6	
	2300	GPS1	03-30.73 N	117-58.44 E	159	0.1	17.6	
	2400	GPS2	03-30.74 N	117-58.45 E	167	0.1	17.4	
22 Jun E22	0100	GPS1	03-30.67 N	117-58.32 E	124	0.1	16.6	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
22 JUNE 22	0200	GPS 2	03-30.66 N	117-58.37 E	132	0.2	19.0	
	0205	- TEMP. STOP LOADING CH. # 3 (FINISHED BARGE # 7)						
	0230	- BARGE MONGSIOC # 8						
	0248	- CLOSE CH # 3 DUE TO MAIN						
	0300	- GPS,	03-30.72 N	117-58.57 E	22W	0.0	19.1	
	0310	- OPEN CH. # 3						
	0315	- RESUME LOADING CH. # 3.						
	0400	- GPS2	03-30.71 N	117-58.58 E	229	0.0	19.1	
	0500	- GPS,	03-30.70 N	117-58.60 E	238	0.1	19.3	
	0505	- TEMP STOP LOADING CH. # 3						
	0570	- OPEN CH. # 6.						
	0725	- START LOADING CH. # 6.						
	0555	- CLOSED CH. # 3.						
	0600	- GPS,	03-30.71 N	117-58.57 E	232	0.1	19.0	
	0700	- GPS 2	03-30.71 N	117-58.59 E	232	0.1	18.8	
	0800	- GPS 1	03-30.72 N	117-58.58 E	224	0.1	19.1	
	0835	- Temp stop loading CH NO. 6 (Awaiting cargo)						
	0850	- Barge # 8 casted off						
	0900	GPS 2	03-30.65 N	117-58.59 E	249	0.1	19.3	
	1000	GPS 1	03-30.44 N	117-58.49 E	351	0.1	190	
	1100	GPS 2	03-30.51 N	117-58.35 E	052	0.1	17.8	
	1200	GPS 1	03-30.52 N	117-58.33 E	058	0.1	18.1	
	1300	GPS 2	03-30.46 N	117-58.39 E	631	0.1	18.8	
	1400	GPS 1	03-30.47 N	117-58.38 E	340	0.3	20.3	
	1414	- BARGE MONGSIOC (BARGE # 9)						
	1416	- RESUME LOADING CH. # 6.						
	1500	GPS 2	03-30.57 N	117-58.62 E	288	0.0	20.1	
	1600	- GPS 1	03-30.59 N	117-58.63 E	271	0.0	20.0	
	1700	- GPS 2	03-30.60 N	117-58.63 E	250	0.1	20.0	
	1750	- OPEN CH. # 2, TEMP. STOP LOADING CH. # 6.						
	1800	- GPS,	03-30.57 N	117-58.60 E	700	0.1	19.0	
	1805	START LOADING CH NO. 2						
	1900	GPS 1	03-30.49 N	117-58.53 E	333	0.1	18.8	
	1920	Temp stop loading CH NO. 2 (Awaiting Cargo)						
	1930	Barge # 9 casted off						
	2000	GPS 2	03-30.48 N	117-58.40 E	026	0.2	17.8	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	DRFT	Remarks
	2100	GPS1	03 - 30.60 N	117 - 58.31 E	097	0.1	16.8	
	2200	GPS2	03 - 30.62 N	117 - 58.29 E	105	0.1	16.8	
	2230	Barge #10 Alongside / Resume loading C/H no. 2						
	2300	GPS1	03 - 30.64 N	117 - 58.30 E	114	0.1	16.8	
	2400	GPS2	03 - 30.65 N	117 - 58.30 E	114	0.1	17.0	
23 JUNE 22	0100	GPS1	03 - 30.74 N	117 - 58.41 E	161	0.1	18.5	
	0200	GPS2	03 - 30.73 N	117 - 58.43 E	167	0.1	18.5	
	0300	GPS1	03 - 30.77 N	117 - 58.34 E	136	0.0	17.5	
	0345	- Temp STOP LOADING C/H. # 2 (Finished Barge #10)						
	0351	- BARGE # 10 CAST OFF.						
	0400	- GPS2	03 - 30. 71N	117 - 58 - 13 E	200	0.1	18.0	
	0500	GPS1	03 - 30.77 N	117 - 58. 54 E	216	0.0	18.0	
	0600	GPS2	03 - 30.66 N	117 - 58 - 58 E	242	0.2	20.0	
	0630	Barge #11 Alongside / Resume loading C/H 2						
	0646	Temp stop loading C/H no. 2, shift to C/H no. 8						
	0705	Start loading C/H no. 8						
	0820	Temp stop loading C/H no. 8 (Due to rain)						
	0825	Cargo Hold no. 8 closed						
	0900	GPS1	03 - 30 - 46 N	117 - 58 - 34 E	042	0.1	17.4	
	1000	GPS2	03 - 30 . 50 N	117 - 58 - 39 E	045	0.1	17.5	
	1100	GPS1	03 - 30 . 50 N	117 - 58 . 31 E	044	0.1	17.6	
	1200	GPS2	03 - 30 . 59 N	117 - 58 - 62 E	283	0.2	19.0	
	1202	- OPEN C/H. # 8.						
	1235	- RESUME LOADING C/H. # 8.						
	1300	- GPS1	03 - 30.50 N	117 - 58 - 31 E	055	0.0	17.8	
	1400	- GPS2	03 - 30. 45 N	117 - 58. 37 E	030	0.1	18.0	
	1500	- GPS1	03 - 30 . 43 N	117 - 58. 40 E	023	0.2	18.1	
	1600	- GPS2	03 - 30 . 57 N	117 - 58 . 57 E	303	0.2	19.6	
	1630	- Temp. STOP LOADING C/H. # 8. (Finished Barge #11.)						
	1635	- CAST OFF BARGE # 11.						
	1700	- GPS2	03 - 30 . 57 N	117 - 58 . 59 E	290	0.0	19.0	
	1800	GPS1	03 - 30 . 53 N	117 - 58 . 60 E	285	0.0	19.0	
	1815	Barge #12 Alongside / Resume loading C/H # 8						
	1900	GPS1	03 - 30 . 57 N	117 - 58 . 62 E	283	0.2	19.0	
	1947	Open Cargo Hold # 4						
	1950	Temp stop loading C/H no 8, shift to C/H no. 4						

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	Remarks
	2000	GPS2	03-30.57 N	117-58.63 E	281	0.1	19.3	
	2005	Start loading C/H no. 4						
	2100	GPS1	03-30.63 N	117-58.58 E	249	0.2	19.1	
	2200	GPS2	03-30.73 N	117-58.41 E	164	0.1	17.6	
	2245	Temp stop loading C/H no. 4 (Awaiting Cargo)						
	2247	Barge # 12 casted off						
	2300	GPS1	03-30.92 N	117-58.38 E	150	0.1	17.8	
	2400	GPS2	03-30	117-58				
24 JUNE 22	0100	GPS1	03.30.72 N	117-58.38 E	162	0.1	15.0	
	0200	GPS2	03-30.72 N	117-58.38 E	165	0.0	15.2	
	0213	- closed CH. # 4 (due to Main)						
	0300	- GPS1	03-30.77 N	117-58.45 E	163	0.2	15.5	
	0400	- GPS2	03.30.69 N	117-58.33 E	129	0.1	17.3	
	~~0400 - 0455~~ ~~0405 - OPEN CH. # 4~~ ~~0430 - BARGE ALONGSIDE # 13.~~				0400 - 0455 - BARGE CANNOT ALONGSIDE DUE TO BAD (WEATHER) LOCATION			
	0500	- closed CH. # 4 due to Main						
		GPS1	03-30.66 N	117-58.31 E	118	0.0	16.8	
	0600	GPS2	03-30.65 N	117 58.32 E	114	0.1	16.6	
	0700	GPS1	03-30.67 N	117-58.38 E	131	0.1	17.8	
	0800	GPS2	03-30.61 N	117-58.63 E	267	0.1	20.3	
	0900	GPS1	03-30.55 N	117-58.63 E	277	0.2	20.3	
	1000	GPS2	03-30.45 N	117-58.51 E	349	0.1	19.1	
	1100	GPS1	03-30.54 N	117-58.33 E	091	0.1	17.5	
	1140	Open Cargo Hold # 04						
	1155	Resume loading C/H no. 4						
	1200	GPS2	03-30.58 N	117-58.32 E	085	0.1	19.3	
	1300	GPS1	03-30.58 N	117 58.37 E	090	0.1	19.5	
	1400	GPS2	03-30.62 N	117-58.32 E	058	0.0	17.5	
	1500	GPS1	03-30.65 N	117-58-35 E	111	0.1	17.5	
	1535 -	open CH. # 8						
	1537 -	Temp stop loading CH. # 4						
	1543 -	closed CH. # 4						
	1550 -	Resumed loading CH. # 8						
	1600 -	GPS2	03-30.65 N	117-58.36 E	105	0.0	17.4	
	1700	GPS1	03-30.63 N	117-58.36 E	106	0.1	17.5	
		Temp stop loading CH. # 8 (BARGE # 13 casted off)						

Image courtesy of Berge Bulk Maritime Pte. Ltd

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	Remarks
	1720 -	CASTED OFF BARGE # 13.			205	0.1.	18.0	
	1800 -	GPS 2	03 - 30 - 63 N	117 - 58. 63 E				
	1810	Barge # 14 Alongside / Resume loading C/H no. 8						
	1900	GPS 1	03 - 30. 66 N	117 - 58. 42 E	257	0.1	19.3	
	2050	Temp stop loading C/H no. 8						
	2100	GPS 2	03 - 30. 72 N	117 - 58. 59 E	234	0.1	18.1	
		Bulldozer at C/H no. 8						
	2110	Resume loading C/H no. 4						
	2200	GPS 1	03 - 30. 73 N	117 - 58. 54 E	204	0.1	17.8	
	2250	Temp stop loading C/H no. 4 (Awaiting Cargo)						
	2300	GPS 2	03 - 30. 75 N	117 - 58. 46 E	172	0.1	16.5	
	2315	Barge # 14 casted off						
	2340	Barge # 15 alongside / Resume loading C/H no. 4						
	2400	GPS 1	03 - 30. 72 N	117 - 58. 55 E	221	0.1	18.9	
25 June 22	0100	GPS 2	03 - 30. 75 N	117 - 58. 46 E	175	0.0	17.0	
	0140	TEMP. STOP LOADING CH-#4						
	0200	GPS 1	03 - 30. 75	117 - 58. 47 E	178	0.1	17.2	
	0240	RESUMED LOADING CH. # 8.						
	0300	GPS 2	03 - 30. 77 N	117 - 58. 45 E	182	0.0	18.2	
	0400	GPS 1	03 - 30. 76 N	117 - 58. 49 E	175	0.1	9.1	
	0405	- OPEN CH. # 2.						
	0410 -	TEMP. STOP LOADING CH - # 8						
	0450 -	1 BULLDOZER @ CH. # 8						
	0500 -	GPS 2	03 - 30. 75 N	117 - 57. 47 E	188	0. 2	16.6	
	0570 -	RESUME LOADING CH. # 2.						
	0600 -	GPS 1	03 - 30. 71 N	117 - 58. 55 E	222	0.2	18.1	
	0627 -	Temp stop loading C/H no. 2 (Awaiting Cargo)						
	0635 -	Barge # 15 ~~Alongside~~ 4/n casted off.						
	0700 -	GPS 2	03 - 30. 66 N	117 - 58. 59 E	249	0.1	18.1	
	0735 -	Barge # 16 Alongside / Resume loading C/H no. 2						
	0800	GPS 1	03 - 30. 64 N	117 - 58. 59 E	200	0.1	18.1	
	0900	GPS 1	03 - 30. 63 N	117 - 58. 60 E	265	0.1		
	0943	Temp stop loading C/H no. 2						
	0950	Take out Bulldozer C/H # 4, close cargo hold 4 (due to rain)						
	1000	GPS 2	03 - 30. 55 N	117 - 58. 60 E	258	0.1	18.3	
	1005	Take out Bulldozer C/H # 8, close C/H 8 (due to rain)						
	1013	Close C/H # 2 (due to rain)						

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	1100	GPS1	03-30.54 N	117-58.58 E	306	0.2	18.3	
	1200	GPS2	03-30.53N	117-58.32 E	063	0.1	15.4	
	1300	GPS1	03-30.62 N	117-57.30 E	095	0.1	35.1	
		Depth	CH # 2, 41.8.					
	1320	RESUMED WORKING	CH # 2					
	1400	GPS2	03-30.62 N	117-57.30 E	095	0.0	16.0	
	1435	TEMP STOP WORKING	CH. # 2.					
	1445	1 BULLDOZER	CH. # 2.					
	1500	GPS1	03-30.62 N	117-57.30 E	101	0.0	16.2	
	1505	RESUMED WORKING	CH. # 6.					
	1600	GPS2	03-30.63.7N	117-57.30 E	104	0.1	15.6	
	1700	GPS1	03-30.57N	117-57 31 E	090	0.0	15.6	
	1730	RESUMED WORKING	CH # 6					
	1730	RESUMED WORKING	CH. # 4.					
	1800	GPS2	03-30.53 N	117-58.32E	070	0.0	15.8	
	1826	Temp stop loading	C/H no. 4	(Awaiting cargo)				
	1840	Barge # 16	casted off.					
	1900	GPS1	03-30.48 N	117-58.42 E	022	0.1	17.2	
	1919	Class cargo hold	# 8					
	1932	Barge # 17	Alongside / Resume loading	C/H # 4				
	2000	GPS2	03-30.46 N	117-58.48 E	354	0.1	17.1	
	2021	Temp stop loading	C/H no. 4					
	2040	Bulldozer at	C/H # 4					
	2057	Take out Bulldozer	at C/H # 2					
	2103	GPS1	03-30.48 N	117-58.55 E	326	0.1	17.8	
	2103	Resume loading	C/H no. 6					
	2156	Temp stop loading	C/H no. 6					
	2200	GPS2	03-30.63N	117-58.58 E	266	0.0	17.8	
	2205	Resume loading	C/H no. 4					
	2300	GPS1	03-30.475 N	117-58.44 E	188	0.1	15.6	
	2310	Finished loading	C/H no. 4					
	2320	Resume loading	C/H no. 6					
	2400	GPS2	03-30.63 N	117.58.29 E	102	0.1	15.0	
16 JUNE 22	0100	GPS1	03-30.61N	117-58-29 E	090	0.0	15.3	
	0200	GPS2	03-30.6 N	117-58.30 E	100	0.1	15.1	
	0210	- TEMP STOP WORKING	CH. # 6	(FINISHED BARGE # 17)				

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
26.06.22	0225 -	BARGE # 17 CASTED OFF.						
	0242 -	1 BULLDOZER CAT. # 6						
	0308 -	GPS1	03-30.77 N	117-58-35 E	137	0.1	15.6	
	0400 -	GPS2	03-30.64 N	117-58.30 E	135	0.1	15.5	
	0500 -	GPS1	03-30.65 N	117-58-30 E	115	0.0	15.4	
	0552 -	BARGE # 16 ALONGSIDE						
	0554 -	RESUME LOADING CH. # 2.						
	0600 -	GPS2	03-30.67 N	117-58-33 E	132	0.0	15.6	
	0700 -	GPS2	03-30-45 N	117-58-41 E	025	0.1	17.0	
	0736	Bulldozer at CH no. 2						
	0800	GPS1	03-30-47 N	117-58.56 E	329	0.1	18.0	
	0900	GPS2	03-30-47 N	117-58.56 E	322	0.1	17.6	
	1000	GPS1	03-30-47 N	117-58-55 E	328	0.1	17.3	
	1010	Complete loading CH no. 2						
	1015	Bulldozer out at CH no. 6						
	1020	Resume loading CH no. 6						
	1100	GPS2	03-30.46 N	117-58-38 E	030	0.1	15.3	
	1200	Temp stop loading CH no. 6 / Open Cargo Hold no. 9						
	1200	GPS1	03-30.51 N	117-58.32 E	042	0.1	14.5	
	1210 -	1 BULLDOZER CAT. # 6.						
	1230	RESUME LOADING CAT. # 9.						
	1300 -	GPS2	03-30.47 N	117-58.37 E	060	0.1	14.5	
	1400 -	GPS1	03-30.47 N	117-58.31 E	064	0.0	14.0	
	1415 -	Temp. stop loading CH. # 9						
	1430 -	BARGE # 18 CASTED OFF.						
	1500 -	GPS2	03-30.48 N	117-58-30 E	065	0.0	15.5	
	1600 -	GPS1	03-30.50 N	117-58.50 E	070	0.0	15.0	
	1630 -	BARGE ALONGSIDE # 19.						
	1628 -	RESUME LOADING CH. # 6.						
	1650 -	(TEMP. STOPPED) LOADING CH. # 6. (FOR TRIMMING)						
	1700	GPS2	03-30.53 N	117-58.28 E	053	0.1	15.0	
	1800	GPS1	03-30.53 N	117-58-28 E	050	0.0	15.0	
	1900	GPS1	03-30.47 N	117-58.33 E	057	0.2	14.6	
	1910	Temp stop loading CH # 9						
	1930	Bulldozer @ CH # 9.						
	1955	Resume loading CH # 1						
	2000	GPS2	03-30.41 N	117-58.49 E	352	0.1	16.8	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	~~GPS~~ 2100	GPS 1	03-30.47 N	117-58.58 E	313	0.1	16.6	
	2100	Open	C/H no. 2					
	2105	Temp	stop loading	C/H no. 1				
	2120	Bulldozer @ C/H # 1						
	2135	Resume loading C/H no. 7						
	2200	GPS 2	03-30.46 N	117-58.57 E	321	0.1	16.5	
	2300	GPS 1	03-30.43 N	117-58.81 E	348	0.1	15.8	
	2325	Temp	stop loading	C/H no: 7 (Awaiting cargo)				
	2335	Barge	# 19 casted off					
	2400	GPS 2	03-30.43 N	117-58.40 E	031	0.1	14.8	
24 Jan 22	0100	GPS 1	03-30.50 N	117-58.50 E	010	0.0	15.0	
	0200	GPS 2	03-30.52 N	117-58.29 E	050	0.1	14.8	
	0300	GPS 1	03-30.52 N	117-58.29 E	056	0.0	14.6	
	0320	BARGE # 20 ALONGSIDE						
	0325	RESUME LOADING CH # 7.						
	0400	GPS 2	03-30.54 N	117-58.29 E	091	0.0	7.1	
	0500	GPS 1	03-30.49 N	117-58.32 E	065	0.0	14.8	
	0527	1 BULLDOZER LIFTED OUT CH # 9.						
	0600	GPS 2	03-30.42 N	117-58.37 E	031	0.1	15.1	
	0630	Temp	stop loading	C/H no 7				
	0635	Bulldozer @ C/H no. 7						
	0653	Take	out Bulldozer	C/H no. 1				
	0700	Resume	loading C/H	no. 3				
	0700	GPS 1	03-30.40 N	117-58.48 E	349	0.1	15.6	
	0800	GPS 2	03-30.40 N	117-58.49 E	344	0.0	15.5	
	0840	Temp	stop loading	due to heavy rain				
	0855	All	cargo holds closed					
	0900	GPS 1	03-30.40 N	117-58.48 E	353	0.1	15.1	
	1000	GPS 2	03-30.40 N	117-58.48 E	352	0.1	14.6	
	1100	GPS 1	03-30.40 N	117-58.40 E	007	0.1	13.8	
	1200	GPS 2	03-30.42 N	117-58.35 E	025	0.1	13.3	
	1243	OPEN CH. # 7.						
	1300	GPS 1	03-30.42 N	117-58.34 E	037	0.1	13.2	
	1326	INCIDENT TOOK PLACE 1 PERSON IN BOOBY HATCH # 5						
	FALLEN INSIDE. CALL MASTER, C/O & GENERAL ALARM							
	TO SOUND. CALL SHORE ASSISTANCE. ALL CREW GETTING							
	THE STRETCHER FOR ENCLOSED SPACE INCLUDING FIRST AID							

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	Remarks
	1341.	2 CREW (AB & BSN) HELPS THE 3 UNCONSCIOUS PERSONS INSIDE THE BOOBY HATCH #8 WEARING BREATHING APPARATUS.						
	1343 -	1st VICTIM UP & IMMEDIATELY GIVE CPR.						
	1347 -	2ND VICTIM UP & IMMEDIATELY GIVE CPR.						
	1352 -	3RD VICTIM UP & IMMEDIATELY GIVE CPR						
	1354 -	2ND & 3RD VICTIM UNDER HATCH COVER #8 & CONTINUE CPR / FIRST AID.						
	1430 -	MEDICAL ASSISTANCE ARRIVED (RESCUE BOAT).						
	1452 -	3 UNCONSCIOUS PERSON BROUGHT FROM THE SHIP BY RESCUE BOAT (RESCUE MEDICAL BOAT).						
	1500	GPS 1	03 - 30.45 N	117 - 58.28 E	062	0.0	14.0	
	1600	GPS 2	03 - 30.47 N	117 - 58.28 E	069	0.0	13.6	
	1700	GPS 1	03 - 30.52 N	117 - 58.27 E	072	0.1	13.5	
	1800	GPS 2	03 - 30.62 N	117 - 58.28 E	089	0.0	13.8	
	1900	GPS 1	03 - 30.60 N	117 - 58.28 E	104	0.1	13.8	
	1900	P & I Surveyor onboard						
	1912	Police and Master from Barge "Surya Pratama Karya" onboard						
	1950	Police and Master from Barge "Surya Pratama Karya" disembark						
	2000	GPS 2	03 - 30.58 N	117 - 58.28 E	099	0.1	14.1	
	2043	P & I surveyor disembark						
	2100	GPS 1	03 - 30.43 N	117 - 58.48 E	259	0.2	14.4	
	2200	GPS 2	03 - 30.49 N	117 - 58.53 E	327	0.1	15.5	
	2300	GPS 1	03 - 30.50 N	117 - 58.57 E	305	0.1	16.0	
	2400	GPS 2	03 - 30.52 N	117 - 58.55 E	299	0.1	15.8	
25.06.22	0100	GPS 1	03 - 30.45 N	117 - 58.37 E	023	0.0	13.6	
	0200	GPS 2	03 - 30.60 N	117 - 58.60 E	096	0.0	13.9	
	0300	GPS 1	03 - 30.66 N	117 - 58.30 E	141	0.1	14.0	
	0400	GPS 2	03 - 30.63 N	117 - 58.31 E	135	0.1	14.2	
	0500	GPS 1	03 - 30.54 N	117 - 58.30 E	101	0.0	14.0	
	0600	GPS 2	03 - 30.48 N	117 - 58.34 E	064	0.1	14.3	
	0700	GPS 1	03 - 30.44 N	117 - 58.38 E	010	0.1	14.8	
	0800	GPS 2	03 - 30.41 N	117 - 58.46 E	344	0.1	15.6	
	0900	GPS 1	03 - 30.45 N	117 - 58.54 E	312	0.1	15.8	
	1000	GPS 2	03 - 30.44 N	117 - 58.53 E	311	0.1	15.3	
	1100	GPS 1	03 - 30.48 N	117 - 58.57 E	297	0.1	15.5	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	Remarks
	1125	C/O & AB Lloyd disembarked, escorted by agent [redacted] going to police office						
	1200	GPS2	03-30.47 N	117-58.55 E	303	0.1	15.1	
	1300	GPS1	03-30.42 N	117-58.35 E	034	0.0	14.0	
	1400	GPS2	03-30.46 N	117-58.30 E	049	0.0	14.1	
	1500	GPS1	03-30.46 N	117-58.28 E	062	0.0	14.1	
	1600	GPS2	03-30.57 N	117-58.28 E	067	0.0	14.1	
	1700	GPS1	03-30.52 N	117-58.27 E	072	0.1	14.0	
	1737 - C/O & AB coming along w/ (7) police officers (1) P&I lawyer (4) agents & master on the barge onboard							
	1800	GPS2	03-30.52 N	117-58.26 E	059	0.0	14.2	
	1900	GPS1	03-30.53 N	117-58.28 E	086	0.0	13.5	
	2000	GPS2	03-30.57 N	117-58.30 E	098	0.1	13.3	
	[redacted]							
	2100	GPS1	03-30.71 N	117-58.50 E	195	0.1	13.8	
	2200	GPS2	03-30.68 N	117-58.58 E	262	0.0	15.6	
	2300	GPS1	03-30.55 N	117-58.61 E	282	0.3	15.4	
	2400	GPS2	03-30.56 N	117-58.64 E	280	0.1	16.0	
29.06.22	0100	GPS1	03-30.57 N	117-58.63 E	281	0.0	13.8	
	0200	GPS2	03-30.70 N	117-58.57 E	232	0.1	14.0	
	[redacted]							
	0300 -	GPS1	03-30.70 N	117-58.35 E	135	0.0	14.2	
	0400 -	GPS2	03-30.63 N	117-58.37 E	112	0.0	13.9	
	0500 -	GPS1	03-30.61 N	117-58.31 E	106	0.0	14.0	
	0600 -	GPS2	03-30.57 N	117-58.32 E	053	0.0	14.1	
	[redacted]							
	0700	GPS1	03-30.49 N	117-58.38 E	045	0.1	15.0	
	0800	GPS2	03-30.47 N	117-58.52 E	324	0.2	16.5	
	0900	GPS1	03-30.53 N	117-58.60 E	295	0.1	16.4	
	1000	GPS2	03-30.54 N	117-58.61 E	293	0.1	16.3	
	[redacted]							
	1100	GPS1	03-30.53 N	117-58.61 E	297	0.1	15.8	
	[redacted]							
	1200	GPS2	03-30.57 N	117-58.62 E	294	0.1	15.4	
	[redacted]							

Image courtesy of Berge Bulk Maritime Pte. Ltd

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	1300	GPS 1	03-30-47 N	117-58-55 E	328	0.0	15.9	
	[redacted]							
	1400 -	GPS 2	03-30.48 N	117-58.37 E	046	0.0	14.8	
	1426 -	(7) POLICE OFFICERS, 3 AGENTS & PS / SURVEYOR DISEMBARKED						
	1500 -	GPS 1	03-30.53 N	117-58.33 E	079	0.0	14.9	
	1600 -	GPS 2	03-30.53 N	117-58.33 E	072	0.0	14.9	
	1620 -	CHARTERERS PRINCIPAL PS / SURVEYOR ONBOARD.						
	1700 -	GPS 1	03-30.56 N	117-58.32 E	086	0.0	14.6	
	1734 -	GENERAL MANAGER FROM AGENT / MANNING AGENCY ONBOARD						
	1800 -	GPS 2	03-30.62 N	117-58.31 E	103	0.0	15.0	
	1823 -	General manager [redacted] disembarks						
	1900	GPS 1	03-30.69 N	117-58.34 E	131	0.2	13.3	
	2000	GPS 2	03-30.75 N	117-58.44 E	175	0.2	13.8	
	2100	GPS 1	03-30.74 N	117-58.53 E	205	0.1	15.0	
	2200	GPS 2	03-30.72 N	117-58.58 E	225	0.0	15.3	
	2300	GPS 1	03-30.72 N	117-58.68 E	226	0.1	14.8	
	2400	GPS 2	03-30.70 N	117-58.60 E	236	0.0	15.1	
30.06.22	0100	GPS 1	03-30.70 N	117-58.59 E	244	0.0	14.0	
	0200	GPS 2	03-30.66 N	117-58.60 E	258	0.0	15.5	
	0300	GPS 1	03-30.71 N	117-58.41 E	167	0.0	14.3	
	0400	GPS 2	03-30.63 N	117-58.37 E	103	0.0	14.3	
	0500	GPS 1	03-30.61 N	117-58.30 E	054	0.0	14.4	
	0600	GPS 2	03-30.64 N	117-58.31 E	111	0.0	14.2	
	0700	GPS 1	03-30.60 N	117-58.33 E	099	0.1	13.6	
	0800	GPS 2	03-30.49 N	117-58.38 E	044	0.2	15.0	
	0824	Charterer Principal PS / Surveyor [redacted] disembark						
	0900	GPS 1	03-30.47 N	117-58.54 E	333	0.1	15.3	
	1000	GPS 2	03-30.50 N	117-58.57 E	317	0.1	14.1	
	1100	GPS 1	03-30.53 N	117-58.61 E	301	0.0	14.0	
	1200	GPS 2	03-30.52 N	117-58.61 E	296	0.1	15.6	
	1300	GPS 1	03-30.49 N	117-58.60 E	341	0.1	14.9	
	1400	GPS 2	03-30.53 N	117-58.57 E	054	0.0	15.0	
	1406 -	SHIPPER [redacted] ONBOARD.						
	1500 -	GPS 1	03-30.57 N	117-58.31 E	086	0.0	15.3	
	1600 -	GPS 2	03-30.56 N	117-58-31 E	086	0.0	15.3	

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HOG	SPD	UKC	REMARKS
	1700	GPS,	03-30.55 N	117-58.30 E	086	0.0	15.3	
	1800	GPS 2	03-30.56 N	117-58.30 E	089	0.0	15.3	
	1900	GPS1	03-30.60 N	117-58.30 E	100	0.1	13.5	
	2000	GPS2	03-30.70 N	117-58.34 E	135	0.2	13.3	
	2100	GPS 1	03-30.75 N	117-58.45 E	179	0.1	13.6	
	2200	GPS 2	03-30.75 N	117-58.49 E	192	0.0	13.8	
	2300	GPS 1	03-30.76 N	117-58.49 E	193	0.1	13.6	
	2400	GPS 2	03-30.76 N	117-58.48 E	191	0.0	13.3	
01.07.22	0100	GPS,	03-30.75 N	117-58.52 E	202	0.0	14.5	
	0200	GPS 2	03.30.64 N	117-58.62 E	262	0.0	15.0	
	0300	GPS,	03-30.72 N	117-58.57 E	227	0.1	14.5	
	0400	GPS 2	03-30.62 N	117-58.52 E	057	0.0	15.3	
	0500	GPS 1	03-30.57 N	117-58.30 E	091	0.0	15.3	
	0600	GPS 2	03-30.56 N	117-58.31 E	080	0.0	14.7	
	0700	GPS1	03-30.61 N	117-58.31 E	102	0.1	14.1	
	0800	GPS 2	03-30-60 N	117-58.32 E	098	0.1	14.0	
	0900	GPS 1	03-30-48 N	117-58.48 E	359	0.2	15.6	
	1000	GPS2	03-30-51 N	117-58.61 E	302	0.1	16.5	
	1100	GPS 1	03-30-51 N	117-58.62 E	299	0.1	16.1	
	1200	GPS 2	03-30-55 N	117-58.63 E	285	0.0	15.8	
	1234 -	STARTED [redacted] ON BOARD			282			
	1300 -	GPS,	03-30.52 N	117-58.63 E	282	0.0	15.6	
	1400 -	GPS 2	03-30.54 N	117-58.62 E	289	0.0	15.6	
	1500 -	GPS,	03-30.49 N	117-58.58 E	305	0.2	15.5	
	1600 -	GPS2	03-30.53 N	117-58.33 E	070	0.1	15.4	
	1700	GPS,	03-30.54 N	117-58.32 E	073	0.1	14.0	
	1800	GPS 2	03-30-53 N	117-58.32 E	075	0.0	14.0	
	1900	GPS1	03-30.54 N	117-58.32 E	079	0.0	13.8	
	2000	GPS2	03-30-55 N	117-58.33 E	084	0.0	13.6	
	2100	GPS1	03-30.62 N	117-58.34 E	104	0.2	13.3	
	2200	GPS2	03-30.73 N	117-58.49 E	189	0.2	14.5	
	2300	GPS1	03-30.69 N	117-58.58 E	228	0.0	15.3	
	2400	GPS2	03-30.69 N	117-58.57 E	228	0.0	15.0	
02.07.22	0100	GPS,	03-30.72 N	117-58.54 E	241	0.0	19.6	
	0200	GPS 2	03-30.69 N	117-58.57 E	215	0.0	15.1	
	0300	GPS 1	03-30.65 N	117-58.32 E	131	0.0	12.6	

Image courtesy of Berge Bulk Maritime Pte. Ltd

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	0400	GPS,	03-30.56 N	117-58.27 E	090	0.1	13.5	
	0500	GPS 2	03-30.57 N	117-58.29 E	080	0.0	13.8	
	0600	GPS,	03-30.56 N	117-58.29 E	080	0.0	13.8	
	0700	GPS 2	03-30.56 N	117-58.29 E	082	0.0	13.6	
	0800	GPS 1	03-30.56 N	117-58.30 E	086	0.1	13.5	
	0900	GPS 2	03-30.45 N	117-58.38 E	030	0.2	14.6	
	1000	GPS 1	03-30.44 N	117-58.49 E	351	0.1	15.5	
	1100	GPS 2	03-30.45 N	117-58.51 E	343	0.1	15.3	
	1200	GPS 1	03-30.48 N	117-58.54 E	324	0.0	15.5	
	1300	GPS,	03-30.48 N	117-58.56 E	322	0.1	15.5	
	1350 -	open C/H # 3						
	1354 -	open C/H. # 7.						
	1400 -	GPS 2	03-30.59 N	117-58.62 E	227	0.0	15.0	
	1500	GPS,	03-30.68 N	117-58.57 E	235	0.0	14.9	
	1600	GPS 2	03-30.67 N	117-58.32 E	122	0.2	14.2	
	1700	GPS 1	03-30.61 N	117-58.30 E	095	0.0	14.0	
	1714 -	Foreman [redacted] 2 Bulldozer operator onboard.						
	1730-1745 -	Briefing conducted to Montring Barge Crew and ship's [illegible]						
	1750 -	Closed C/H. # 3 & 7 due to rain.						
	1800 -	GPS 2	03-30.58 N	117-58.25 E	055	0.0	13.8	
	1820	Open C/H no. 3 / Booby hatch (Fwd / Aft) open						
	1846	Resume loading C/H no. 3						
	1849	Foreman [redacted] and 1 Operator [redacted] disembarked						
	1849	Foreman [redacted] onboard						
	1900	GPS 1	03-30.57 N	117-58.22 E	091	0.0	12.5	
	1902	open C/H no. 7 / Booby hatch (Fwd / Aft) open						
	1945	Temp - 38, LEL - 0, CO - 0, H_2S - 0			O_2 -	20.9	/ CH no. 7	
	1953	1 Operator [redacted] inside the CH no. 7 for trimming						
	2000	1 Operator [redacted] out in C/H no. 7						
	2000	GPS 2	03-30.55 N	117-58.22 E	091	0.0	12.6	
	2040	Temp stop loading C/H no. 3						
	2042	1 Operator [redacted] disembarked						
	2100	Agent [redacted] inside the C/H no. 7 for taking out bulldozer						
	2100	GPS 1	03-30.60 N	117-58.23 E	096	0.1	12.5	
	2105	Agent [redacted] out in CH/7 + Bulldozer out						
	2107	Resume loading C/H no. 7 / open CH. 9 / Booby Hatch no. 9 (Fwd / Aft) open						
	2200	GPS 2	03-30.72 N	117-58.31 E	159	0.3	12.5	
	2200	Temp - 31, LEL - 0, CO - 0, H_2S - 0,			O_2 -	20.9	/ CH no. 9	

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Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	2215	Temp stop loading		C/H no. 7				
	2255	Bulldozer ~~out~~ of		C/H no. 7				
	2300	GPS1	03-30.69 N	117-58.46 E	217	0.1	13.8	
	2370	Resume loading C/H no. 9						
	2317	1 Operator [redacted]		onboard				
	2330	1 Operator [redacted]		inside C/H no. 7 for trimming			2357 -	Foreman [redacted] onboard
	2400	GPS2	03-30.69 N	117-58.47 E	216	0.1	13.3	
03/04/22	0010 -	FOREMAN [redacted]		DISEMBARK.				
	0025 -	OPERATOR [redacted]		IN CH # 7.				
	0030 -	TEMP. STOP LOADING CH # 7, 9.						
	0046 -	OXYGEN & GAS CHECKED CH # 9. (20.9 O2, LEL-0.0 CO 0.0,						
	0049 -	OPERATOR [redacted]		IN CH # 9 / START TRIMMING				
	0058 -	FOREMAN [redacted]		IN CH # 7.				
	0100	GPS1	03-30.66 N	117-58.49 E	228	0.0		
	0201 -	FOREMAN [redacted]		OUT CH. # 7.				
	0183 -	OPERATOR [redacted]		OUT CH # 9.				
	0142 -	OPERATOR IN CH # 7 (START TRIMMING)						
	017	REMOVE BULLDOZER @ CH. #9.						
	0200 -	GPS2	03-30.57 N	117-58.57 E	257	0.0		
	0205 -	RESUME LOADING CH # 9.						
	0222 -	FINISHED LOADING CH # 7 & OPERATOR OUT CH #7						
	029 -	BULLDOZER OUT CH # 7.						
	0230 -	TEMP STOP LOADING CH # 9 (FOR TRIMMING)						
	0300 -	GPS1	03-30.4 N	117-58.46 E	330	0.0		
		BULLDOZER IN CH # 9 & OPERATOR IN FOR TRIM						
	0343 -	CLOSED CH. # 7.						
	0400 -	GPS2	03-30.50 N	117-58.40 E				
	0425 -	CLOSED CH. # 1, 3 DUE TO HEAVY RAIN & CH. #9						
		CANNOT CLOSED BECAUSE HAVE 1 BULLDOZER INSIDE ITS						
		ALMOST FULL.						
	0500 -	OPEN CH # 3 / RAIN STOPPED						
	0513 -	BULLDOZER OUT IN CH. # 9 / OPERATOR [redacted]						
		DISEMBARKED / FINISHED LOADING CH. # 9.						
	0542	RESUME LOADING CH. # 3.						
	0600 -	TEMP. STOP LOADING CH. # 3 DUE TO HEAVY RAIN						
		GPS1	03-30.57 N	117-58.20 E	040	0.0	13.2	
	0615	Resume loading C/H no 3						
	0635	Foreman [redacted]		disembarked				

Image courtesy of Berge Bulk Maritime Pte. Ltd

Date	Time	Remarks	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	0650	~~GPS~~ closed c/H no. 9						
	0700	GPS 1	03- 30. 54 N	117 - 58. 22 E	076	0.1	12.5	
	0738	Temp stop loading c/H no 3 (Awaiting Cargo)						
	0750	Barge # 21 casted off.						
	0800	GPS 2	03 - 30. 52 N	117 - 58. 22 E	069	0.0	12.8	
	0850	Open c/H no. 5 / Booby hatch no. 5			(Fwd / Apt) open			
	0853	Open c/H no. 1 / Booby hatch no. 1			(Fwd / Apt) open			
	0900	GPS 1	03- 30. 47 N	117 - 58. 24 E	047	0.1	13.1	
	0905	Barge # 21 Alongside / No operation due to long swell						
	0920	Tugboat made fast apt "Mandiri 8"						
	1000	GPS 2	03 - 30. 43 N	117 - 58. 32 E	025	0.1	13.8	
		Oxygen and gas checked		(Temp - 34, LEL - 0, CO - 0, H_2S - 0, O_2 - 20.9)				Ch no. 1
		Oxygen and gas checked		(Temp - 35, LEL - 0, CO - 0, H_2S - 0, O_2 - 20.9)				Ch no. 5
	1100	GPS 1	03 - 30. 42 N	117 - 58. 36 E	011	0.0	13.6	
	1200	GPS 2	03 - 30. 43 N	117 - 58. 42 E	342	0.1	14.1	
		No cargo operation due to long swell						
	1300	GPS 1	03 - 30. 47 N	117 - 58. 52 E	322	0.4	14.0	
	1400	GPS 2	03 - 30. 53 N	117 - 58. 62 E	280	0.1	15.1	
	1437	- Foreman [redacted] on board						
	1446	- open CH. # 1 & 5.						
	1450	- resumed cargo in CH. # 3.						
	1500	GPS 1	03 - 30. 45 N	117 - 58. 61 E	290	0.0	15.0	
	1515	- Foreman [redacted] disembarked						
	1532	- Temp. stop CH. # 3 / Surveyor [redacted] disembarked						
	1540	- opened CH. # 7						
	1543	- closed CH. # 7.						
	1547	- Operator [redacted] on board						
	1554	- checked gas & oxygen CH # 3 O_2 - 20.9 & 20.0 other CH						
	1559	- Operator [redacted] @ CH # 3 for trimming						
	1605	- resumed cargo in CH. # 5.						
	1623	- Surveyor [redacted] on board.						
	1735	- Temp. stop cargo in CH. # 5.						
	1800	GPS 2	03 - 30.63 N	117 - 58.31 E	115	0.0	14.8	
	1804	Foreman [redacted] and / Operator [redacted] onboard.						
	1810	Oxygen and gas checked (Temp - 34, LEL - 0, CO - 0, H_2S - 0, O_2 - 20.9) Ch no 5						
	1814	Bulldozer @ CH no. 5						

Date	Time	Remarks GPS	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	1835	Resume loading C/H no. 3						
	1900	GPS1	03-30-61 N	117-58-29 E	102	0.1	12.5	
*	1940	Finish loading C/H no. 3 / Take out Bulldozer @ C/H no. 3						
	2000	GPS2	03-30.59 N	117-58-26 E	095	0.1	12.5	
		Resume loading C/H no. 1						
	2021	Temp stop loading	C/H no. 1 due to long swell					
	2029	Closed C/H no. 3						
	2100	GPS1	03-30.61 N	117-58-28 E	109	0.0	12.3	
	2150	Resume loading C/H no. 5						
	2200	GPS2	03-30.68 N	117-58.28 E	132	0.3	12.1	
	2300	GPS1	03-30.71 N	117-58.47 E	198	0.2	13.5	
*	2325	Finish loading C/H no. 5 / Take out Bulldozer @ C/H no. 5						
	2330	Operator [redacted] disembarked. Completed loading / Start draft survey						
	2345	Resume loading C/H no. 1						
	2400	GPS2	03-30.66 N	117-58-53 E	233	0.1	14.5	
04 JULY 21	0030	- FINISHED DRAFT SURVEY						
	0100	GPS1	03-30.63 N	117-58.55 E	249	0.0	14.2	
	0200	GPS2	03-30.64 N	117-58.64 E	288	0.0	14.6	
	0300	GPS1	03-30.66 N	117-58.58 E	319	0.0	14.3	
	0400	GPS2	03-30.46 N	117-58 35 E	044	6.0	14.5	
	0500	GPS1	03-30.49 N	117-58.30 E	066	0.0	14.0	
	0600	GPS2	03-30.53 N	117-58.29 E	082	0.0	14.1	
	0700	GPS1	03-30.63 N	117-58-29 E	084	0.1	13.5	
	0705	Foreman disembark						
	0723	Placing Crane "Surya Pratama Karya"			casted	off		
	0800	GPS2	03-30.52 N	117-58-25 E	095	0.1	13.5	
	0900	GPS1	03-30.49 N	117-58-30 E	059	0.1	13.6	
	1000	GPS2	03-30.43 N	117-58-37 E	031	0.1	14.0	
	1030	Shipper & Surveyor disembark						
	1100	GPS1	03-30.42 N	117-58-44 E	356	0.1	13.5	
	1200	GPS2	03-30.45 N	117-58.48 E	335	0.0	14.3	
	1300	GPS1	03-30.55 N	117-58.58 E	275	0.0	14.0	
	1400	GPS2	03-30.54 N	117-58.64 E	272	0.1	14.2	
	1500	GPS1	03-30.58 N	117-58.63 E	274	0.0	14.1	
	1600	GPS2	03-30.42 N	117-58.63 E	260	0.1	14.4	
	1700	GPS1	03-30.63 N	117-58.61 E	257	0.0	13.8	

Date	Time	Remarks	LATITUDE	LONGITUDE	HDG	SPD	UKC	REMARKS
	1800	GPS 2	03-30.6 N	117-56.4 E	255	0.0	14.0	
	1800	1 Hr notice to	E/R					
	1805	2 agent onboard						
	1807 - 1818	- Steering gear test as per C/L 07.01.03.03						
	1836	S.B.E						
	1845	3 Agent disembarked						
	1847	Master on Bridge	/ Master took the com.					
		Commenced stowaway search						
	1848	M/E tested ahead	/astern. All in good order					
	1850	Commenced heaving up anchor						
		Reported to Tuas VTS. Ack						
	1851	10 ϕ's on deck						
	1853	9 ϕ's on deck						
	1855	8 ϕ's on deck						
	1857	7 ϕ's on deck						
	1859	6 ϕ's on deck						
	1901	5 ϕ's on deck						
	1903	4 ϕ's on deck						
	1905	3 ϕ's on deck	/ Gangway secured.					
	1907	2 ϕ's on deck						
	1909	1 ϕ on deck						
	1910	Anchor aweigh	/ Reported to Tuas VTS, Ack.					
	1912	Anchors home						
	1930	C.O.S.B in pos	1-03-30.6S N	λ-117-56.6E	/ DTG-1407			
	VOYAGE 23	BUNYU TO SINGAPORE						
09-07-22	1200	EOSP / MASTER TOOK THE FROM OOW						
	1300	GPS1	01-21.5N	104-23.3E	232	10.1	35	
		LOP	226.3 X 0.95	TO HORSBURGH LIGHTHOUSE				
		CALL VTIS EOSP on VHF CH. 10, ADVISE ENTERING SECTOR 9.						
	1315 -	GPS2	01-20.0N	104-21.3E	053.4°T	X	3.0 nm (HORSBURGH)	
	1330 -	LOP	01-18.9N	104-15.0E	307°T	X	4.25 nm (JOHOR)	
	1400	GPS1	01-18.3N	104-14.4E	204	10.1	18.3	
		LOP	308 X	3.12 (JOHOR)				
		CALL PILOT (SINGAPORE) CH. 20, ADVISE ETA TO P/S.						

Document 07.03.07-02 – Holds temperatures, gases and ventilation status

Vessel		Master Name		C/O Name
BERGE MAWSON		[redacted]		[redacted]
Load Port	BUNYU, INDONESIA	Sailed		Cargo Type
Disch Port	MUNDRA, INDIA	Arrived		COAL IN BULK

Hold	Hold 1	Hold 2	Hold 3	Hold 4	Hold 5	Hold 6	Hold 7	Hold 8	Hold 9
Quantity MT									
Cargo Loaded at Temperature									

Hold No.	Day/Month	Time	Methane	C/Monoxide	Oxygen	pH	Cargo Temp.	Sea Temp	Ambient Temperature			Hold Temperature	Enter duration of Ventilation, else comment.
									Dry	Wet	Dew		
1	21/06	0830	12	830	5.9		n/a					35	Hold vents are closed
2	21/06							29	30	28	85		
3	21/06												Hold vents are closed
4	21/06												Hold vents are closed
5	21/06												Hold vents are closed
6	21/06												
7	21/06	0830	22	412	6.1		n/a					36	Hold vents are closed
8	21/06												
9	21/06												Hold vents are closed
1	22/06	0830	24	314	5.3		n/a					34	Hold vents are closed
2	22/06	0830						30	31	29	85		
3	22/06	0830	27	218	6.6		n/a					35	Hold vents are closed
4	22/06												Hold vents are closed
5	22/06	0830	23	168	6.2		n/a					38	Hold vents are closed
6	22/06												
7	22/06	0830	32	236	4.5		n/a					36	Hold vents are closed
8	22/06												
9	22/06											34	Hold vents are closed
1	23/06	0830	21	213	5.8		n/a					34	Hold vents are closed
2	23/06							29	30	28	85		Hold vents are closed
3	23/06	0830	16	146	6.6		n/a					36	Hold vents are closed
4	23/06												Hold vents are closed
5	23/06	0830	18	512	4.2		n/a					35	Hold vents are closed
6	23/06												Hold vents are closed
7	23/06	0830	32	310	4.5		n/a					36	Hold vents are closed
8	23/06	0830	20	422	5.6		n/a					36	Hold vents are closed
9	23/06	0830	15	187	5.9		n/a					35	Hold vents are closed
1	24/06	0830	25	331	6.1		n/a					35	Hold vents are closed
2	24/06	0830	18	109	4.6		n/a	30	31	29	85	35	Hold vents are closed
3	24/06	0830	32	311	6.9		n/a					35	Hold vents are closed
4	24/06	0830	29	604	6.3		n/a					38	Hold vents are closed
5	24/06	0830	16	520	4.8		n/a					38	Hold vents are closed
6	24/06	0830	25	412	6.1		n/a					36	Hold vents are closed
7	24/06	0830	34	328	4.8		n/a					35	Hold vents are closed
8	24/06	0830	28	218	5.6		n/a					36	Hold vents are closed
9	24/06	0830	15	194	5.9		n/a					34	Hold vents are closed

Vessel		Master Name		C/O Name
BERGE MAWSON		[redacted]		[redacted]
Load Port	BUNYU, INDONESIA	Sailed		Cargo Type
Disch Port	MUNDRA, INDIA	Arrived		COAL IN BULK

Hold	Hold 1	Hold 2	Hold 3	Hold 4	Hold 5	Hold 6	Hold 7	Hold 8	Hold 9
Quantity MT									
Cargo Loaded at Temperature									

Hold No.	Day/Month	Time	Methane	C/Monoxide	Oxygen	pH	Cargo Temp.	Sea Temp	Ambient Temperature			Hold Temperature	Enter duration of Ventilation, else comment.
									Dry	Wet	Dew		
1	25/06	0830	29	148	5.2		n/a					35	Hold vents are closed
2	25/06							29	30	28	85	35	Hold vents are closed
3	25/06	0830	27	233	6.4		n/a					35	Hold vents are closed
4	25/06											38	Hold vents are closed
5	25/06	0830	19	511	4.9		n/a					38	Hold vents are closed
6	25/06	0830	31	418	6.1		n/a					35	Hold vents are closed
7	25/06	0830	23	310	5.2		n/a					35	Hold vents are closed
8	25/06											36	Hold vents are closed
9	25/06	0830	20	224	6.9		n/a					36	Hold vents are closed
1	26/06	0830	33	187	5.5		n/a					34	Hold vents are closed
2	26/06							30	3	29	85	35	Hold vents are closed
3	26/06	0830	16	411	5.4		n/a					35	Hold vents are closed
4	26/06	0830	14	212	8.3		n/a					38	Hold vents are closed
5	26/06	0830	25	115	6.8		n/a					38	Hold vents are closed
6	26/06											37	Hold vents are closed
7	26/06	0830	18	214	6.5		n/a					35	Hold vents are closed
8	26/06	0830	9	412	7.8		n/a					36	Hold vents are closed
9	26/06	0830	11	610	6.8		n/a					36	Hold vents are closed
1	27/06	0830										34	Hold vents are closed
2	27/06	0830	17	399	4.6		n/a	30	31	29	85	35	Hold vents are closed
3	27/06											35	Hold vents are closed
4	27/06	0830	22	430	6.7		n/a					38	Hold vents are closed
5	27/06	0830										38	Hold vents are closed
6	27/06	0830	12	633	6.9		n/a					35	Hold vents are closed
7	27/06											35	Hold vents are closed
8	27/06	0830	8	225	5.8		n/a					36	Hold vents are closed
9	27/06											35	Hold vents are closed
1	28/06	0830	7	830	9.9		n/a					36	Hold vents are closed
2	28/06	0830	21	422	12.2		n/a	30	31	29	85	33	Hold vents are closed
3	28/06	0830	17	815	5.3		n/a					34	Hold vents are closed
4	28/06	0830	22	416	4.7		n/a					35	Hold vents are closed
5	28/06	0830	15	174	6.1		n/a					38	Hold vents are closed
6	28/06	0830	9	278	7.5		n/a					37	Hold vents are closed
7	28/06	0830	12	852	8.2		n/a					36	Hold vents are closed
8	28/06	0830	19	318	8.5		n/a					36	Hold vents are closed
9	28/06	0830	12	371	10.2		n/a					33	Hold vents are closed

Image courtesy of Berge Bulk Maritime Pte. Ltd

Vessel		Master Name		C/O Name
BERGE MAWSON		[redacted]		[redacted]
Load Port	BUNYU, INDONESIA	Sailed		Cargo Type
Disch Port	MUNDRA, INDIA	Arrived		COAL IN BULK

Hold	Hold 1	Hold 2	Hold 3	Hold 4	Hold 5	Hold 6	Hold 7	Hold 8	Hold 9
Quantity MT									
Cargo Loaded at Temperature									

Hold No.	Day/Month	Time	Methane	C/Monoxide	Oxygen	pH	Cargo Temp.	Sea Temp	Ambient Temperature			Hold Temperature	Enter duration of Ventilation, else comment.
									Dry	Wet	Dew		
1	29/06	0830	7	830	9.9		n/a					38	Hold vents are closed
2	29/06	0830	10	636	10.0		n/a	29	30	28	85	35	Hold vents are closed
3	29/06	0830	11	1045	6.2		n/a					35	Hold vents are closed
4	29/06	0830	10	816	3.6		n/a					38	Hold vents are closed
5	29/06	0830	10	73	5.9		n/a					38	Hold vents are closed
6	29/06	0830	13	385	8.3		n/a					36	Hold vents are closed
7	29/06	0830	7	854	5.7		n/a					35	Hold vents are closed
8	29/06	0830	14	488	4.5		n/a					37	Hold vents are closed
9	29/06	0830	5	591	11.2		n/a					33	Hold vents are closed
1	30/06	0830	12	612	8.9		n/a					39	Hold vents are closed
2	30/06	0830	22	126	11.3		n/a	29	30	28	85	33	Hold vents are closed
3	30/06	0830	18	445	9.2		n/a					35	Hold vents are closed
4	30/06	0830	9	216	5.6		n/a					38	Hold vents are closed
5	30/06	0830	12	173	7.8		n/a					36	Hold vents are closed
6	30/06	0830	31	331	10.1		n/a					36	Hold vents are closed
7	30/06	0830	17	447	6.7		n/a					35	Hold vents are closed
8	30/06	0830	26	189	5.6		n/a					37	Hold vents are closed
9	30/06	0830	10	342	12.5		n/a					33	Hold vents are closed
1	01/07												
2	01/07												
3	01/07												
4	01/07												
5	01/07												
6	01/07												
7	01/07												
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Document III 10/1NF.18 – Analysis of enclosed space accidents on board ships

INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON IMPLEMENTATION OF IMO INSTRUMENTS
10th session
Agenda items 4 and 7

III 10/INF.18
13 May 2024
ENGLISH ONLY
Pre-session public release: ☒

LESSONS LEARNED AND SAFETY ISSUES IDENTIFIED FROM THE ANALYSIS OF MARINE SAFETY INVESTIGATION REPORTS

IDENTIFIED ISSUES RELATING TO THE IMPLEMENTATION OF IMO INSTRUMENTS FROM THE ANALYSIS OF DATA

Analysis of enclosed space accidents on board ships

Submitted by InterManager

SUMMARY	
Executive summary:	This document provides information and analysis on enclosed space accidents on board ships between 1996 and 1 May 2024.
Strategic direction, if applicable:	7
Output:	7.4 and 7.5
Action to be taken:	Paragraph 4
Related documents:	III 10/4/3 and III 9/INF.11

Introduction

1 This document has been submitted in accordance with the provisions of paragraph 6.12.4 of *the Organization and method of work of the Marine Safety Committee and the Marine Environmental Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5) and provides sub-comment information on enclosed space accidents from 1996 to 1 May 2024 as well as updates on InterManager's previous submission to III 9 through document III 9/INF.11.

2 InterManager has gathered and analysed available verified information on enclosed space accidents which have occurred as a result of asphyxiation only. Although other accidents occur within enclosed spaces, such as slips, trips and falls, and also fires and explosions, these have been excluded since their root cause is different.

3 The trend for the number of enclosed space accidents in the near term appears to be stable, acknowledging that there remains a significant lag between the accident occurrence, its investigation, the release of the report and its submission into the marine casualties and incidents module (MCI) of the Global Integrated Shipping Information System (GISIS) or its release elsewhere. There is, however, an apparent increase in the number of seafarers and third parties dying in enclosed spaces, particularly in 2023, and these numbers appear to be increasing which is a cause for concern to all involved in maritime safety.

Action requested of the Sub-Committee

4 The Sub-Committee is invited to take note of the analysis, trends and information provided above and in the annex to this document and to consider how such information might be taken into account when deliberating safe entry into enclosed spaces, while taking cognizance of lessons learned from past incidents.

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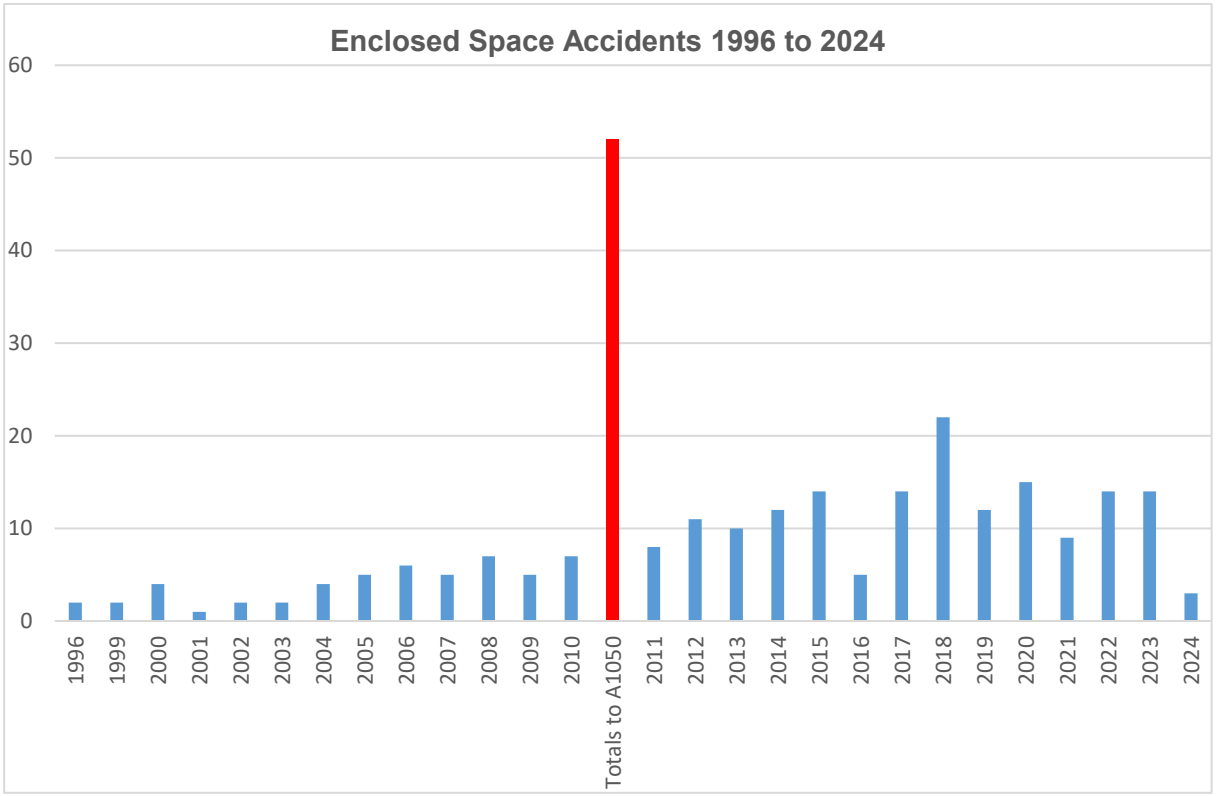
ANNEX

ANALYSIS OF ENCLOSED SPACE ACCIDENTS DUE TO ASPHYXIATION

Figure 1



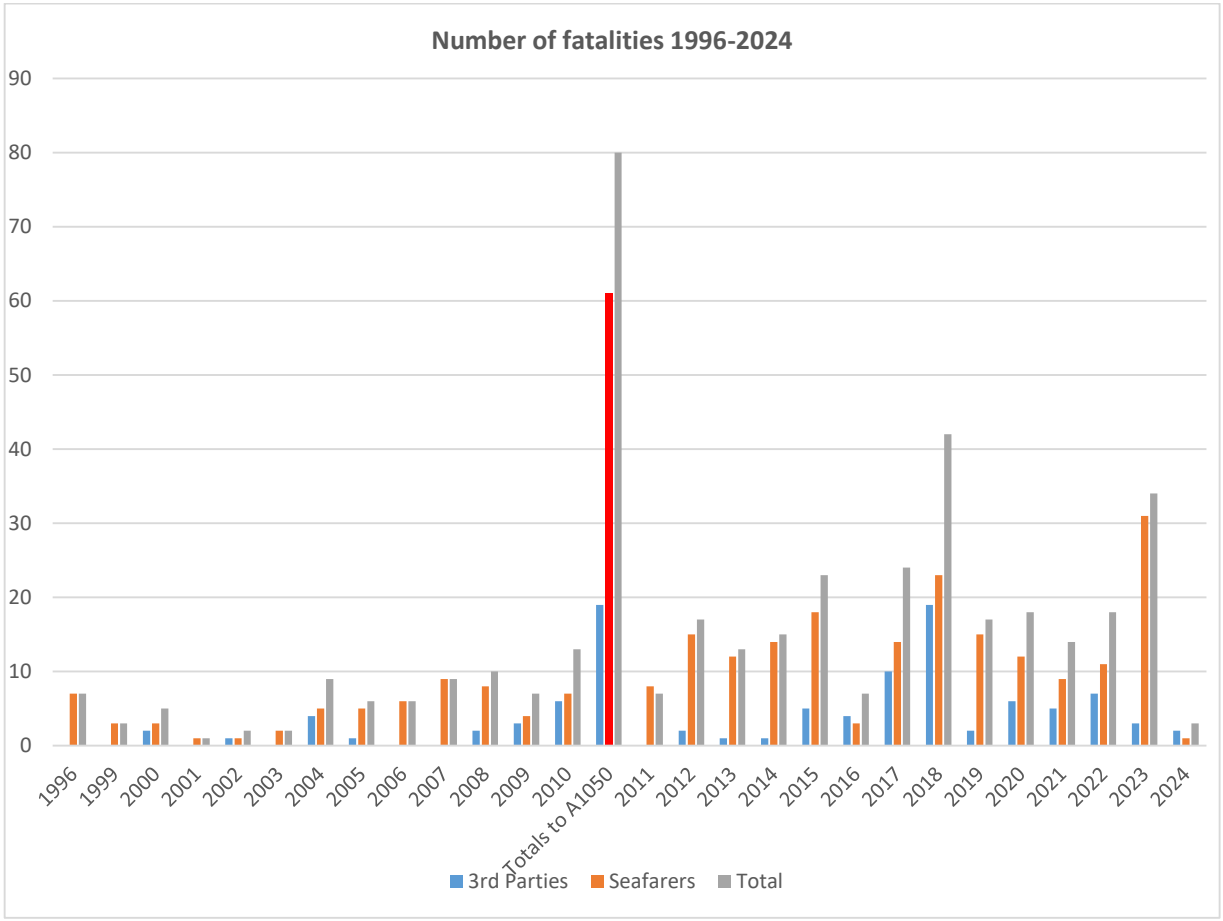
1 Figure 1 shows the number of verified enclosed space accidents due to asphyxiation per year from 1996 to 1 May 2024.

2 The vertical axis is the count of accidents, and the horizontal axis represents individual years. The red vertical bar indicates cumulative accidents that occurred before the introduction of the Assembly resolution on *Revised recommendations for entering enclosed spaces aboard ships* (resolution A.1050(27)).

3 Given the increased transparency within the industry together with more efficient reporting and investigating, the number of accidents captured is increasing. However, there remains a natural lag between the accident occurring, it being investigated and the report being released. This means that the data set for recent years will, by its nature be incomplete, and depict an evolving landscape.

4 Although such a lag is understandable, it inhibits the ability of others to learn, and there remains a risk that similar accidents may occur in the period from the initial event occurrence to the final report being released. The use of safety bulletins, safety flashes and interim reports assists in mitigating this risk and those who utilize these and other means of communicating initial findings should be commended for their contribution to ongoing safety on board ships and the learning opportunity within the industry.

Figure 2



5 Figure 2 shows the number of verified enclosed space fatalities per year from 1996 to 1 May 2024, where the vertical axis measures the fatality count, and the horizontal axis represents the individual years.

6 The following colour key has been used:

.1 Buff – Seafarers who have died in enclosed spaces on board ships for the year indicated.

.2 Blue – Third parties who have died in enclosed spaces on board ships for the year indicated.

.3 Grey – The total number of seafarers and third parties who have died in enclosed spaces on board ships for the year indicated.

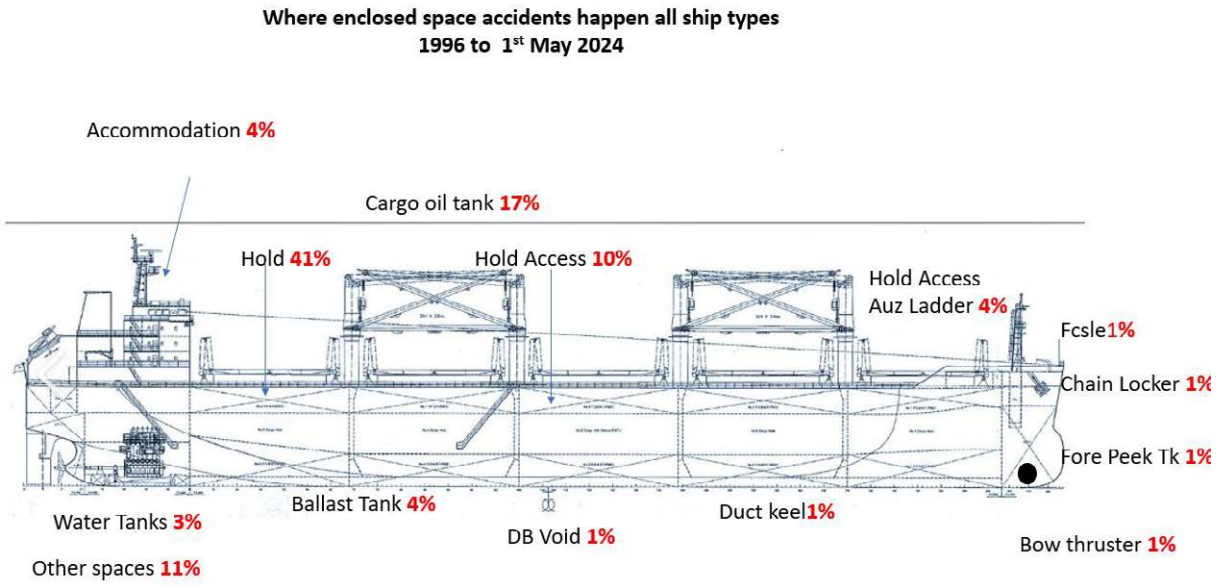
.4 Red – The totals from 1996 to the end of 2011, the time period prior to the introduction of the current Assembly resolution on enclosed spaces.

7 Seafarers remain those most at risk from losing their lives within an enclosed space on board ships.

8 With improvements in communications from ship to shore, both commercially and for private use, there is currently much greater transparency within the industry particularly when things do not go as planned. Likewise, the process of reporting and that of investigation are now more mature and have become more encompassing. These factors have led to a greater number of incidents being reported, recorded and investigated.

9 The number of all fatalities remains substantial and any improvement in hazard awareness, design and process will assist in mitigating such deaths in the future.

Figure 3



10 Figure 3 shows pictorially where enclosed space accidents have occurred on board ships within the period from 1996 to 1 May 2024 utilizing a generic ship profile.

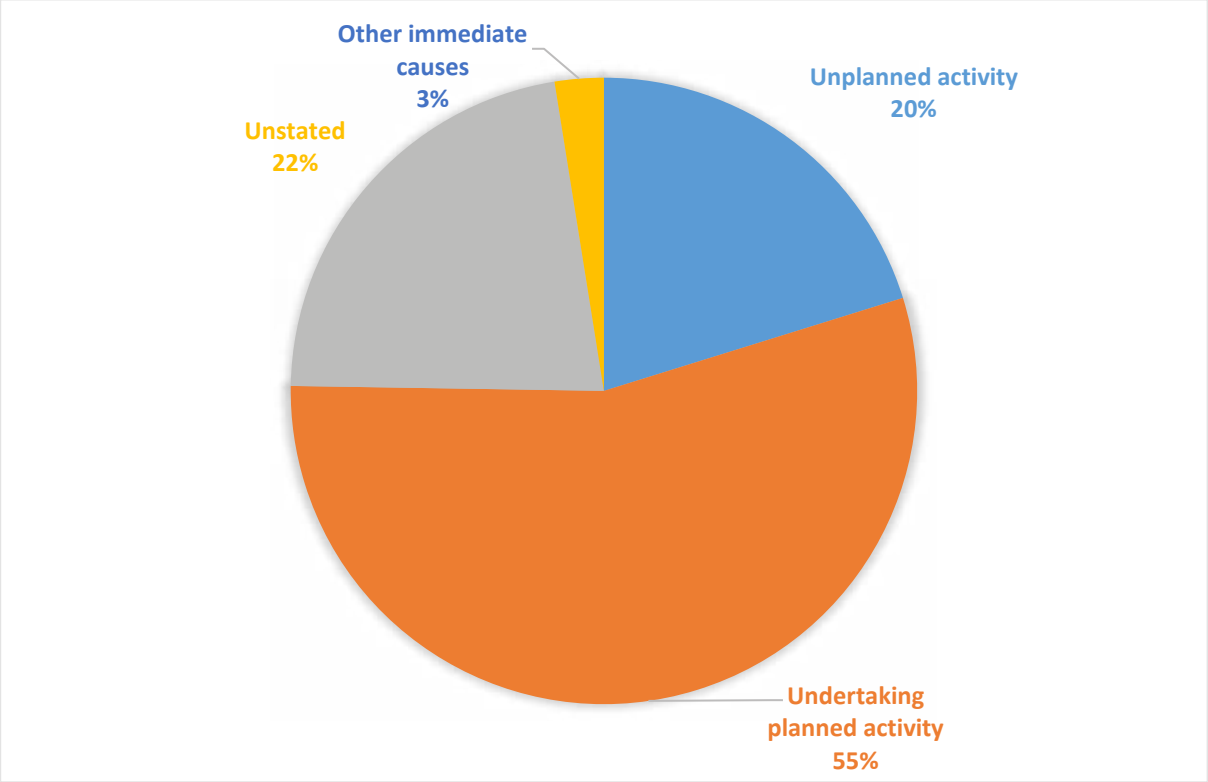
11 It can be seen that the majority of accidents continue to occur, expectedly, within the working areas of ships such as cargo oil tanks, holds and water tanks as well as void spaces.

12 Four per cent of all enclosed space accidents have occurred within the accommodation space of a ship, this being the crew's living and recreational areas, and they are attributable mainly to the ingress of cargo fumigant.

13 Enclosed space accidents in the access areas of ships' holds account for 14% of the total for the period studied. Although the accidents occurring within the so-called Australian Ladder style of access have accounted for less than a third of these types of accidents, the number of ships with this style of access points is few, numbering in the hundreds rather than the thousands of bulk carriers with a more traditional form of access.

14 Enclosed space accidents within the ship's forecastle space have been primarily attributed to gas migration from the cargo holds through bulkheads which are not gastight.

Figure 4



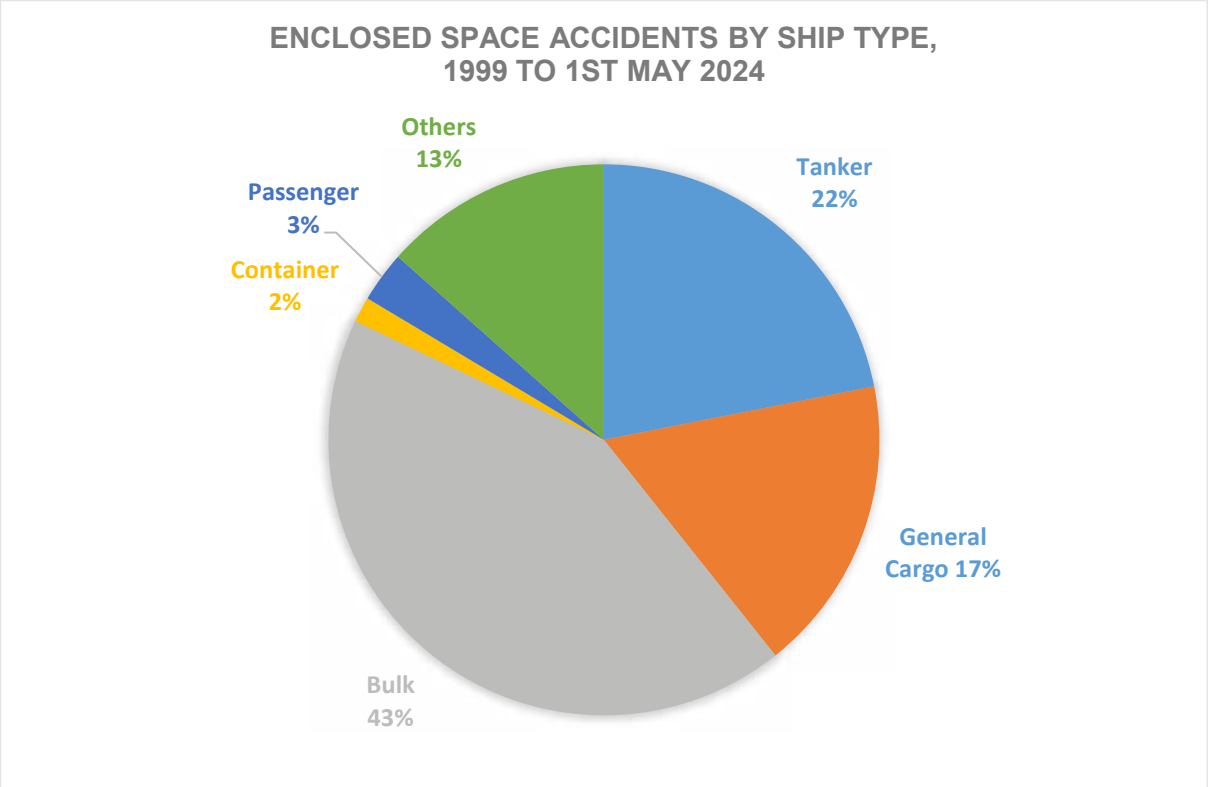
15 Figure 4 shows the nature of the immediate cause of accidents that occurred within an enclosed space on board ships within the period from 1996 to 1 May 2024.

16 Some accidents remain under investigation, with immediate causes as yet unclear. Unfortunately, it is still not possible to determine the initial cause of accident from some accident reports other than that the casualties involved were asphyxiated while in other recorded accidents, the investigation report remains unavailable. The combined sum of these figures is shown in the "Unstated" section.

17 The primary area captured in the immediate cause of an incident is that of the ship's crew or contracted shore staff undertaking an activity which was planned to happen, but which unfortunately went wrong, leading to an accident.

18 The second substantive segment is where an accident has occurred in an unplanned activity on board the ship. This is primarily where seafarers and shore-based third parties have entered a space considered safe but unfortunately, this has turned out not to be the case. Lack of knowledge of the ship and an appreciation or understanding of signage, when displayed, remains a reoccurring causal factor for third-party fatalities. Additionally, for ships' crews, it is where a space was known to be unsafe for entry and an individual has entered it to take "a quick look" or in too many other cases, entered an unsafe space to affect the rescue of another individual who has collapsed within that space.

Figure 5



19 Figure 5 shows the breakdown of ship types which have had an enclosed space accident resulting from asphyxiation due to deficient atmosphere within the period from 1996 to 1 May 2024. As with all accidents contained within this study, those caused by fall, fire or explosion have been excluded.

20 The ship types which have been included within the category "others" are:

.1 livestock ships;
.2 tugs and offshore service vessels;
.3 large fish catching and/or processing types; and
.4 special service or specialist ship types.

21 The tanker category includes all bulk liquid carrying ships, including those which carry oils, chemicals and gases. The relative size of this segment remains surprising when considering the additional industry scrutiny that has been applied to it over many years.

22 General cargo ships and bulk carriers account for a high proportion of accidents. However, they also employ the greatest number of third parties in high-activity situations to assist in the loading or discharging of their cargoes. Importantly, unlike the ship's crew, many of them do not have the necessary knowledge of safety procedures on board the ship they have been temporarily engaged to work on.

Marine Accident Report

INVESTORS IN PEOPLE