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Breaking the Chain: Lessons from a Fatal Tank Entry Incident

Katerina Elikonida Maroudi
Regulatory Manager, BIMCO

Enclosed Space Accidents Webinar
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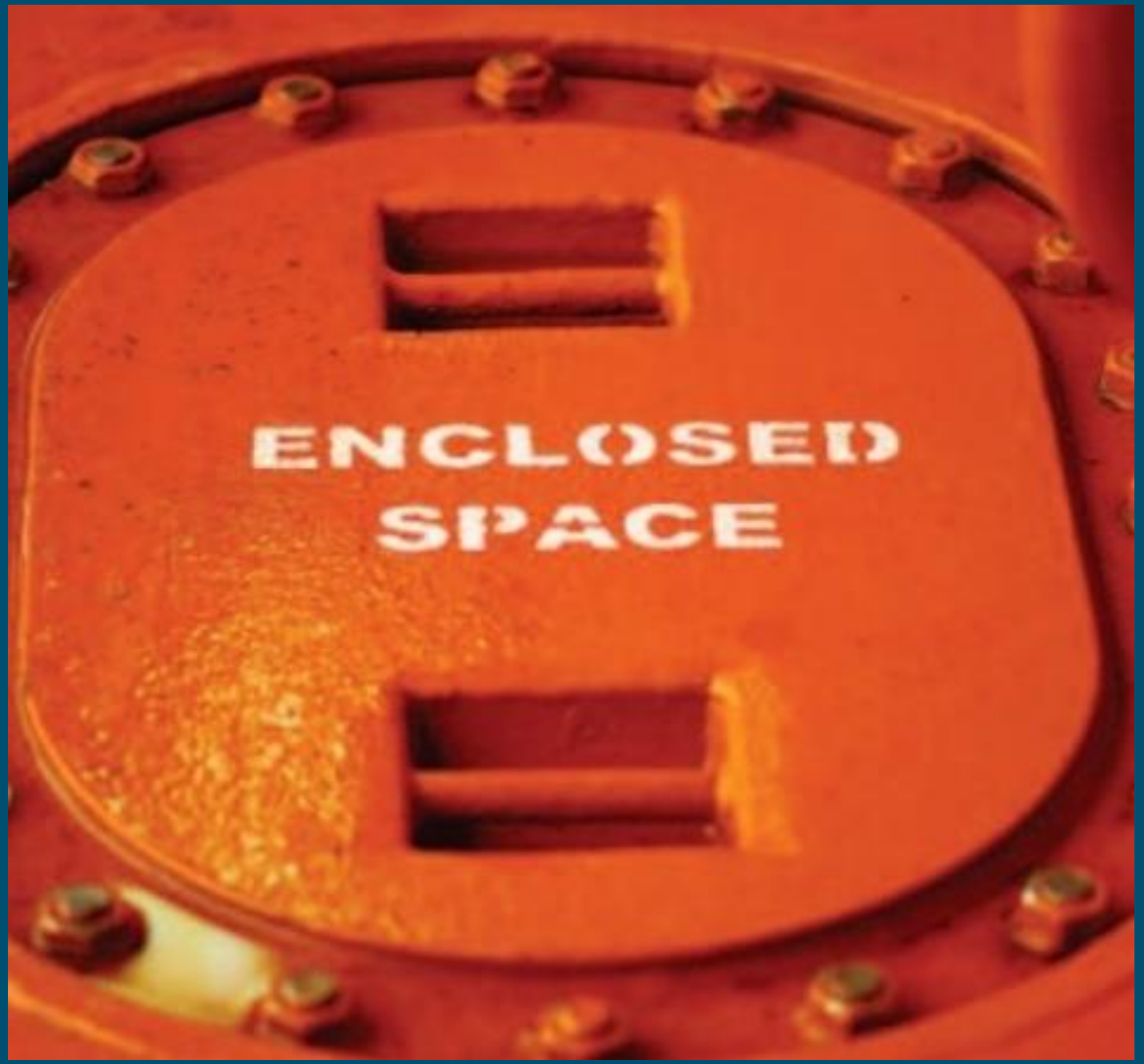
Agenda

- Global statistics & urgency
- The accident
- Consequences
- Key factors
- Safety learning
- Call to action



Broader Context

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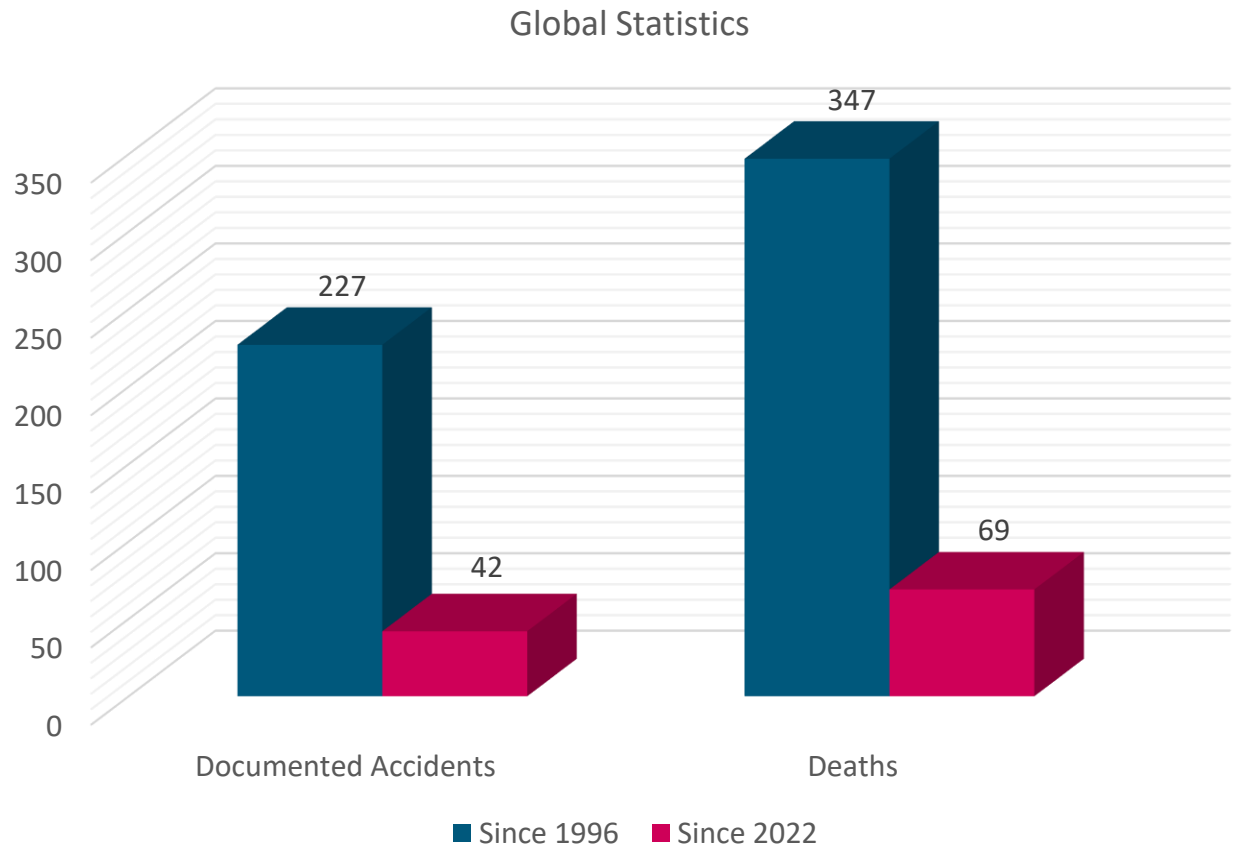

Over 50% of fatalities occur during rescue attempts!

Source: InterManager

Case Overview

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Product tanker

Off port anchorage

Discharging soybean oil

Routine cargo oil tanks inspection

Two subcontracted technicians lost their lives

Exposure to toxic gases, specifically hydrogen sulphide (H_2S)

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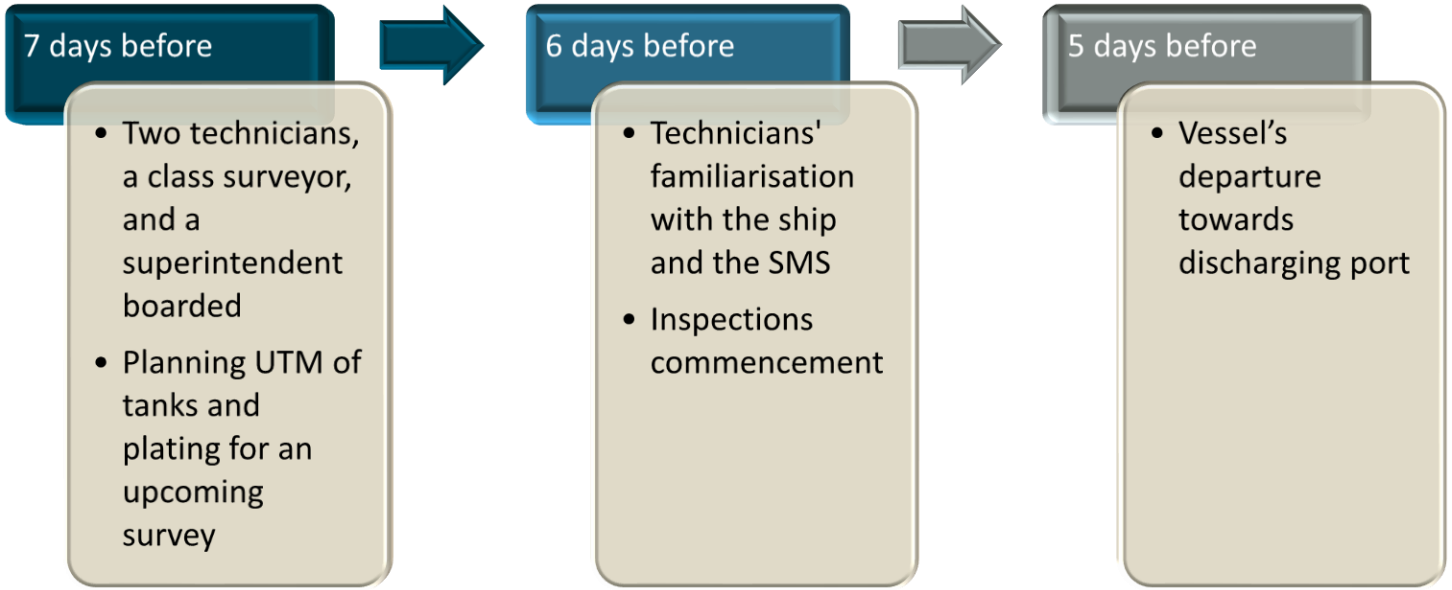
Timeline - Before the accident



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Timeline - The accident

08:30

Planning FPT and No.2 COT (S) inspection

Work permit for FPT entry issued by master, valid from 0955

FPT inspection postponed due to heavy rain

14:04

AB notified OOW about technicians entering FPT and planning to enter No.2 COT (S)

FPT ventilated, and gas checks performed in the morning

14:53

AB notified OOW about technicians entering No.2 COT (S)

Technicians descended to the middle platform and commenced measurements

15:12

AB was asked to assist in securing a cargo barge approaching

10 meters away from the tank's hatch

15:43

AB returned to the tank hatch

Technicians lying on the middle platform

15:50

OOW announcement on the public address

By then, the technicians had been in the tank for about one hour

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Timeline - The evacuation

15:50

- OOW announcement on the public address
- By then, the technicians had been in the tank for about one hour

Crew mustering

- Strong odour from the tank hatch
- H_2S > 100 ppm, Oxygen ~ 20%
- Equipment gathering, tank ventilation, rescue teams

16:08

- Technicians' evacuation
- First aid and medical grade oxygen
- Both technicians were breathing

16:12

Master informed Port Control and asked for a boat

17:30

Technicians transferred ashore

The one technician passed away en route to the hospital and the other succumbed the following day. The one death was a result of asphyxia caused by H_2S poisoning; the other a result of a fatal injury to the head from a fall caused by the effects of H_2S poisoning.

Consequences

- TWO LIVES LOST
- Families, shipmates, communities
- Compensation claims & settlement
- Operational Delays
- Investigation & Compliance
- Reputational Impact

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Key factors leading to the accident

H_2S undetected hazard

Key factors leading to tank entry

Procedural failures

OrganiSational challenges

Broader context

H_2S undetected hazard

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- MSDS did not identify hazards related to toxic gases.
- Soybean oil residues mixed with seawater in the tank for 19 days created conditions for gas generation.
- Crew had not detected H_2S when entering other tanks with soybean oil.
- H_2S gas, heavier than air and paralySing to the sense of smell, remained unnoticed and built up due to tank's limited ventilation.

Key factors leading to tank entry

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False sense of safety	Tank appeared safe to enter (partially open hatch, empty interior, tank entry discussed, crew squeezed other tanks without atmosphere problems). Technicians inspected another cargo tank without safety issues or equipment.
Normalized safety lapses	Absence of safety equipment near tank entrances and a partially open hatch appeared as normal practices.
Permit omission	Work permits were managed solely by the chief officer, with others signing without full awareness. The absence of a permit for No. 2 COT (S) went unnoticed.
Crew communication gaps	The AB and relieving OOW were unaware of tank inspection plans, due to incomplete handovers and lack of coordination, so no one intervened when the technicians entered the tank.
Procedural failure	Safety procedures and work permits, designed to identify hazards and assign responsibilities, failed to function effectively, leading to a breakdown in safeguards.

Procedural failures

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Lack of implementation

- Tank not ventilated, atmosphere not tested, work permit not issued.

Procedure limitations

- Difficult to understand and apply.
- Did not communicate its purpose and who it aimed at.
- Lack of guidelines for critical processes, emergency responses and equipment use.
- No reference to training and no advice regarding the use of the work permit.

Work permit limitations:

- Inconsistencies between the work permit and the procedure.
- Did not describe how it was to be used practically.
- Vague language requiring crew discretion without adequate guidance.

Permit omission

- System emphasized obtaining signatures over ensuring procedural compliance.

Management of change

- Obsolete safety materials and safety management system.

Management challenges

- Responsibility for permits rested solely with the chief officer, with no handover mechanism or active use by other crewmembers.

Safety culture gaps

- The process was treated as a bureaucratic formality rather than a safety tool.

Organizational Challenges

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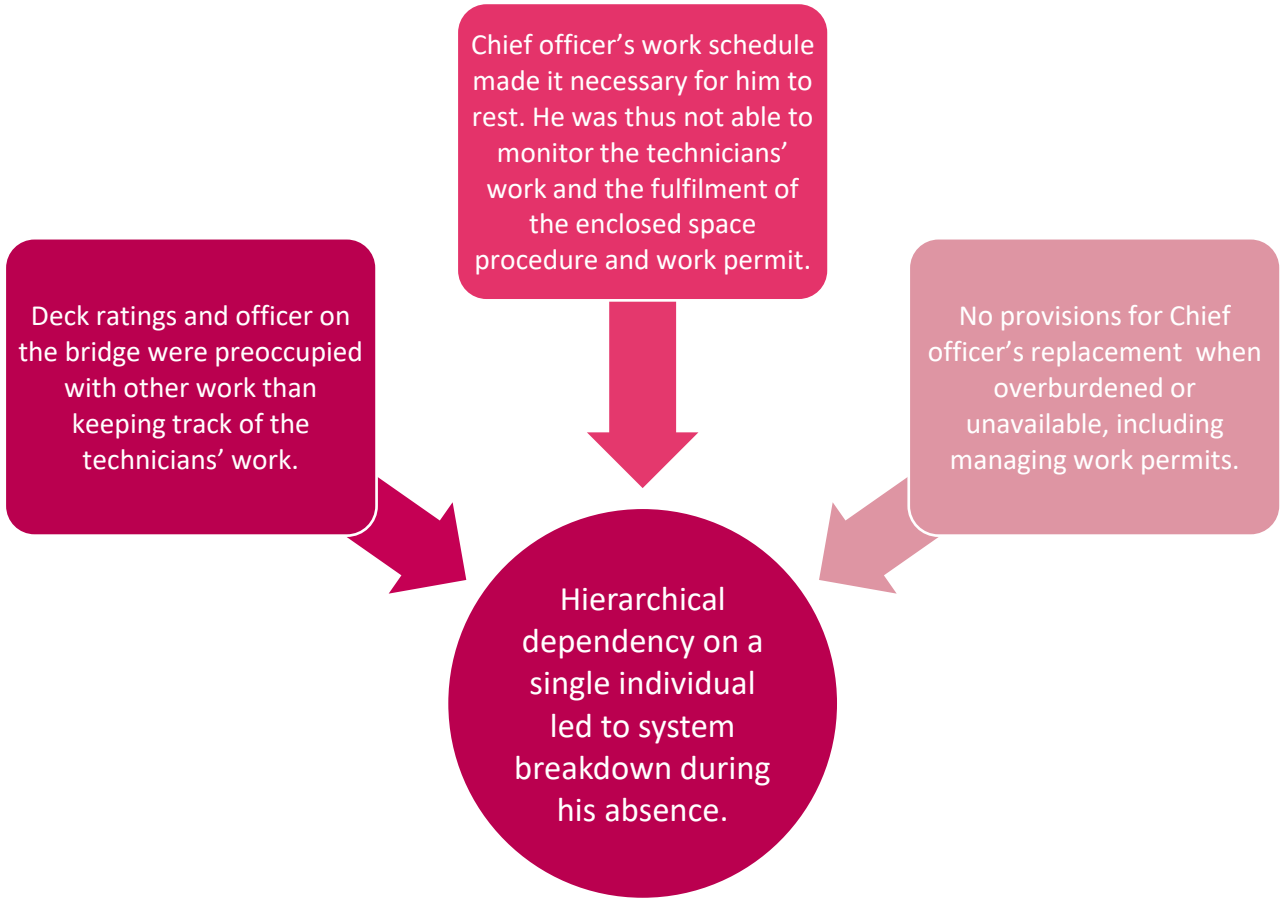

Broader context

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- Frequent enclosed space entries onboard normalised complacency toward safety practices.
- Similar procedural and systemic safety management issues have been identified across the shipping industry, making it difficult to put the procedural documents into practical use.

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It is rarely questioned why crewmembers deviate from procedures:

- Procedures become difficult to put into practical use
- How are they created, for what purpose and which are their functional limits
- They are badly written or hard to understand
- Inadequate familiarisation
- In changing circumstances, it becomes necessary for the crewmembers to negotiate the content of the procedure with the situational context, which brings them to be non-compliant with the procedure.

Safety Learning

In the aftermath of an accident…

“The accident happened because procedure was not followed.”

Frequently observed reasoning in ship management reports.

The initiative taken to counter future accidents often involves adding procedures to an already large SMS, without extra training and change in safety culture.

Call to action

Rather than pointing to the crewmembers' abilities and will to follow procedures, take a critical look at the performance of the procedures and trainings, as tools for supporting work in a dynamic environment, and make a cultural shift.

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- Prioritise safety over operational efficiency
- Foster a no-shortcuts mindset across the workforce
- SWA to all crew members - Encourage people to speak up
- Make audits matter
- Lead by example
- Embrace the just culture approach
- Create a safe environment in order not to lose any more people!

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