

## Safety Culture where you work and live: investigation findings from a man overboard event

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Much has been written about developing effective safety culture within high reliability industries, and accordingly, the International Maritime Organization has recognised the importance of developing a strong safety culture amongst shipping companies and in individual seafarers. A recent safety investigation conducted by the Australian Transport Safety Bureau has highlighted some of the complexities involved in supporting an effective safety commitment culture on board merchant ships.

In most high risk industries, workers and leaders demonstrate their commitment to safety by consistently planning for and applying safe working procedures and practices. There is no requirement on them to apply these practices in their leisure time away from their workplace. Seafarers, however, live where they work. Their leisure time is spent in the same inherently risky environment, with available leisure activities bearing comparable risk to their work tasks.

The investigation established that seafarers on board this ship (and likely many others) did not appreciate the importance of employing safe work practices and using safety equipment beyond their work tasks, for the conduct of their on board leisure time activities. This conceptual separation of work and leisure was indicative of a culture of safety compliance, rather than safety commitment. The investigation found that these attitudes and beliefs about when and when not to apply safe work practices contributed to the man overboard event and subsequent fatality.

**Keywords:** safety culture, safety climate, seafarer safety, marine accident investigation

### 1. The maritime working environment:

The maritime environment is characterised by a unique set of features which set it apart from other occupations. The ship is an isolated place of both work and residence, where seafarers, often from diverse national cultures, are distanced from their homes and families for long periods of time, and where the organisational, and associated social structure, is usually strongly hierarchical.

Some authors have likened shipboard life to that of Goffman's (1961) concept of the *total institution* – 'an isolated, enclosed social system that controls aspects of its members' lives' (Theotokas, Lagoudis, & Kotsiopoulos, 2014), comparable to a military barracks or boarding school for example. If we consider, as Goffman suggests, that a basic tenet of modern society is that we sleep, work and eat in different places, with different co-participants (Goffman, 1961), then the institution-like characteristics of life on board a merchant ship become apparent – a place where the boundaries between work relationships, activities, and facilities; and recreational relationships, activities, and facilities are often indistinct (Østreng, 2001).

Further, seafarers are almost constantly exposed to safety hazards inherent in the maritime environment. It is an occupation with a high rate of fatal accidents (Hansen, Nielson, & Frydenberg, 2002), with some studies suggesting a more than 10 times higher fatal accident rate than in shore

based industries. Rough weather, inadequate awareness of safety, lack of use of personal protective equipment, and inexperience have been identified as contributing to seafarer fatal work injuries (Hansen, 1996).

In other high risk industries, workers and leaders demonstrate their commitment to safety by consistently planning for and applying safe working procedures and practices. There is no requirement on them to apply these practices in their leisure time away from work. But seafarers live where they work, and must therefore spend their leisure time in the same inherently risky environment. Accordingly, with seafarer wellbeing in mind, the *Maritime Labour Convention*, (International Labour Organization, 2016), requires ship owners and masters to ensure that adequate recreational facilities are provided on board. It follows then, that recognising individual seafarers' need for some level of autonomy to balance the many restrictions presented above, masters would seek to maximise seafarers' capacity for self-direction in the use of their recreation time. However, on a merchant ship this goal must be balanced with the responsibility to ensure seafarer safety and wellbeing, at all times; not just in work hours.

A recent safety investigation conducted by the Australian Transport Safety Bureau has highlighted some of the complexities involved in supporting an effective safety commitment culture which extends beyond the conduct of work tasks and into seafarers' recreational time. This paper will describe the sequence of events for the man overboard event, and discuss the findings of the investigation as they pertain to the safety climate and safety attitudes, beliefs and behaviours on board.

## **2. Man Overboard:**

On 27 September 2014, a bulk carrier was anchored about 13 nautical miles off Port Hedland, Western Australia, awaiting a berth to load iron ore. While at anchor, the ship's crew, of 22, went about routine duties, including cleaning, painting and other minor maintenance tasks. During the morning of 5 October, the master received information that the ship was scheduled to berth in the early hours of 7 October.

At 0645 (local time) on 6 October, at their daily meeting to plan work, the chief mate gave the boatswain (bosun) a number of tasks in preparation for the ship's berthing, including preparing the mooring lines and accommodation ladder. Later that morning, the bosun and two able seamen (AB) donned lifejackets and prepared to rig the port side accommodation ladder.

The ladder was unhoused and swung out from the ship's side. The seamen positioned the handrails and lowered the ladder to about 2 m above the water so that the stanchions and side ropes could be correctly set. While rigging the accommodation ladder, the bosun remarked to the others about the numerous fish visible around the bottom of the ladder.

By about 1130, the work rigging the ladder was completed and the bosun and crew stopped for lunch, leaving the ladder in the lowered position.

During the lunch break, the bosun further investigated the fishing opportunity he had seen from the accommodation ladder. At 1238, the bosun went to an AB's cabin and asked him for assistance at the accommodation ladder. The AB changed into work clothes and at about 1245 went out onto deck. When he reached the accommodation ladder, he saw the bosun on its lower platform (Figure 1).



Figure 1: The accommodation ladder as rigged at the time of the accident showing distances and approximate positions of bosun and able seaman. Source: ATSB.

The bosun was bare chested, with the sleeves of his overalls tied around his waist, and wearing slip-on shoes. He was handling fishing gear from a bucket positioned on a ladder step nearby. The AB descended the ladder and asked the bosun if he was comfortable with the angle of the lower platform. The bosun replied that he was. Shortly thereafter, the bosun was standing with both hands occupied with fishing gear when the AB felt the accommodation ladder move. The bosun lost his balance and fell, backwards, off the platform into the water.

The AB immediately turned and hurried up the ladder to the deck and threw a nearby lifebuoy towards the bosun. The lifebuoy fell about 20 m short of the bosun, who had been carried aft by the current. The bosun attempted to swim toward the lifebuoy, but was being carried further away from the ship's port quarter.

The AB then telephoned the master's cabin and informed him of the man overboard. The master immediately used the public address system to broadcast an emergency call to all crew. Shortly afterwards, when the master and chief mate arrived on the after deck, the bosun was seen to be about 50 m from the ship's stern. He was trying, unsuccessfully, to swim towards the now three lifebuoys and a lifejacket in the water, which the crew had thrown to help him.

By about 1255, the ship's rescue boat was in the water and away. At this stage, the bosun was still visible from the after deck and the bridge. However, as the ship's rescue boat rounded the stern of the vessel, he slipped from sight.

At 1300 the master reported the man overboard to the Shipping Control Tower. The Joint Rescue Coordination Centre (JRCC) coordinated a response which comprised six boats from Port Hedland, the marine pilot transfer helicopter, and two rescue boats, one from the bulk carrier and another from a nearby ship. The search continued until last light, and resumed at first light on 7 Oct, continuing into 8 Oct. At 1400 on 8 Oct, the search was suspended. The bosun was not seen again.

### 3. Investigation findings:

The ship's safety management system (SMS) included a documented risk assessment for falls from height when working over the side of the ship. The assessment was consistent with recognised industry publications and practices relating to work over the side, which is also acknowledged as work at height. Further, the SMS included procedures and permits to work that were relevant to safely undertaking work over the side, including rigging accommodation ladders.

However, when ATSB investigators attended the ship after the accident, they observed the crew rigging the ship's port side, midships accommodation ladder (Figure 2), and noted:

- an absence of standard working at height precautions, such as fall prevention equipment;
- unraised handrails on ladder section, 13 m above the water, where two crew members were positioned; and
- a crew member standing outside the ship's handrails with no fall protection or lifejacket.



Figure 2: Crew rigging the accommodation ladder without fall protection and/or lifejacket. Source: ATSB.

Other evidence, including interviews with crew and permit to work records, indicated that the ladder was routinely rigged in a similar way. These were the crew's usual practices, demonstrating that they did not appreciate the importance of fall prevention when working over the side, and rather, considered fall prevention precautions only with working at heights on board the ship (for example, when working on a mast). The critical importance of fall prevention when working over the side, rather than relying completely on safe recovery after a fall into the water, was not recognised.

Further, and significantly, crew members did not consider that safe work precautions were necessary during recreational activities.

### 4. Safety during recreational activities

Current industry guidance and legislation for the safety of seafarers emphasises the working aspect of the seafarer's life (see *Maritime Labour Convention* (International Labour Organization, 2016); *Code of Practice for Accident Prevention on board Ship at Sea and in Port* (International Labour Organization, 1996); *Code of Safe Working Practices for Merchant Seafarers* (Maritime and

Coastguard Agency, 2015)). These publications make little reference to recreational activities involving work areas of the ship, or recreational activities that overlap with similar work activities.

In this accident, when the bosun went down the accommodation ladder to fish during a period of rest, the dangers involved were not adequately considered. The bosun and other crew had just completed rigging the accommodation ladder and had reportedly followed safety precautions such as wearing a lifejacket and PPE for this task. However, when fishing, the same risks and actions to mitigate them were not considered.

At interview, crewmembers indicated their belief that compliance with safety procedures (usually undertaken during work activities) did not extend to recreational activities, even if the risks were the same. Neither the conduct of a risk assessment nor the use of PPE was considered necessary when the activity was a leisure activity, conducted in off-duty time.

Accordingly, it was evident that despite the good intentions of the organisation in developing safety policy and procedures, for this ship's crew at least, a conceptual separation existed between attitudes to safety during work, and safety during recreation time. Crewmembers' attitude to tasks involving the same or similar levels of risk differed depending on whether the task was undertaken during work time or as recreation. Therefore, commitment to following established procedures and using available safety equipment when undertaking recreational activities was compromised by a belief that the procedures and equipment were only applicable to work activities.

## **5. Safety Culture:**

Outside of the maritime domain, safety culture, and safety climate (as an indicator, or snapshot, of culture) have been studied for some time. Zohar (2010) suggests that safety climate consists of 'shared perceptions among employees concerning the procedures, practices and kinds of behaviours that get rewarded and supported with regard to (performance of high risk operations).'

### ***5.1 The ISM Code and Safety Culture***

The International Maritime Organization (IMO)'s recent amendments to the International Safety Management (ISM) Code, and the International Chamber of Shipping & International Shipping Federation (ICS&ISF) Guidelines (2014) provide general guidance on the importance of establishing and maintaining an effective safety culture within shipping companies and the industry more widely.

IMO proposes that

*An organization with a safety culture is one that gives appropriate priority to safety and realises that safety has to be managed like other areas of the business. For the shipping industry, it is in the professionalism of seafarers that the safety culture must take root.*

IMO seeks to improve safety culture by changing individual seafarers' attitudes towards safety, and suggests that improvement in safety will be achieved when shipping companies can reduce the incidence of seafarers' violations of good practice. IMO suggests therefore, that shipping companies should aim to 'inspire seafarers towards firm and effective self-regulation and encourage personal ownership of established good practice' (International Maritime Organization, 2015).

The ICS&ISF Guidelines provide more detailed guidance, and define an effective safety culture as 'the values and practices that management and personnel share to ensure that risks are always minimised and mitigated against to the greatest degree possible', where the company and personnel will 'always and automatically, think about the implications for safety of every action, rather than simply following safety procedures because they have been imposed from outside' (International Chamber of Shipping & International Shipping Federation, 2014).

The guidance provided by IMO is focussed heavily towards a goal of changing individual seafarers' attitudes and behaviours so that they will comply with safe procedures. While this is a commendable goal, it does not sufficiently address the impact of the social and organisational environment on seafarers' safety related attitudes and behaviours. The ICS&ISF Guidelines discuss the importance of shared responsibility for safety with both management and seafarers. However, acknowledgement of the established determinants of effective safety culture, and thus the effective implementation and sustainment of safety culture within the maritime industry is scant within the current guidance.

A useful, and operationally relevant definition has been put forward by Fogarty and Shaw (2010) who define safety climate as 'employees' perceptions of the emphasis placed by management on safety issues relative to other organisational concerns.' This definition acknowledges the significant influence of employees' perceptions of their superiors' priorities, both spoken and unspoken.

When supervisors repeatedly make safety goals contingent upon production pressures, workers will infer low safety priority even if management's overt policy is that safety has top priority (Zohar & Luria, 2004).

## ***5.2 Safety commitment cultures versus safety compliance cultures***

Within organisations with a genuine safety commitment culture, safety is an inherent value that employees come to internalise, where employees consider safety to be supremely important and behave in a safe manner even when safety is at odds with other aspects of performance. In contrast, organisations with a culture of safety compliance are characterised by employees practising safety, but not because they perceive safety as an important organisational goal, rather because there is an external law that they feel obliged to obey (Griffin & Neal, 2000; Luria & Rafaeli, 2008).

In a compliance culture, therefore, employees embrace safety only when safe behaviour does not accrue other costs. For instance, oftentimes, rules and procedures associated with safety compete with those associated with other goals, (eg. safety versus productivity or efficiency) (Zohar, 2010). In maritime operations, efficiency and its associated market share is an obvious competing priority for safety, just as it is more broadly in non-maritime commercial operations. However, the nature of seafaring also affords additional factors influencing shipboard safety culture, including the sometimes competing goal of permitting self-directed leisure time for seafarers during their off duty hours.

Thus, while a shipping company may espouse a commitment to safety, the way in which the safety policies are practically implemented aboard individual ships may differ from that intended at an organisational level.

Safety climate research has explained this inconsistency within an organisation as follows: employees will perceive signals from senior management regarding the intent of safety policies, as well as from their local supervisor regarding how these practices are operationalised in their immediate job context. The result is that employees develops layered beliefs regarding both the overarching organisational requirements, as well as the local group-level requirements. These two co-existing climates may be well aligned and consistent, but can also be quite inconsistent and discrepant (Zohar, 2010). Luria and Rafaeli (2008) describe this phenomenon as a differentiation between *espoused theories*, being those formal safety declarations, which are generally very pro-safety, and *theories-in-use*; the daily organisational behaviours, that is, the way things are actually done.

Practically speaking, employees will place more importance on behaviours which promote safety or which promote other competing organisational (broad or local) goals, based on what they observe is rewarded by their proximal superiors and supervisors, rather than from the company's policies. 'If

productivity is favoured over safety across a variety of situations, it implies a higher priority and employees will align their behaviours accordingly to the detriment of safety (Zohar, 2010).

## 6. Conclusion

From the evidence available to the ATSB during the course of this investigation, a climate of safety compliance was in existence on this ship, such that crew members performed tasks in a safe manner not because they perceived safety as an important organisational goal, but because there was a rule they were required to observe. Further, this compliance was limited to work tasks, with no evident regard to safety during recreational activity outside of work hours – the rules were considered to apply to work only.

This investigation demonstrates some of the challenges faced in the maritime industry in striving to establish and sustain a genuine safety commitment culture; ensuring that safety is valued and prioritised across all shipboard activities, including both work and recreation, while also being mindful of the importance of seafarers' self-directed leisure time. It is therefore critically important that not only companies, but also masters, officers, supervisors, and seafarers themselves, take every opportunity to encourage and reinforce the primary importance of safety at all times, and across all activities.

*This paper has discussed the implications of the safety climate related findings from the investigation only. For a full account, readers should consult the investigation report, available at: [http://www.atsb.gov.au/publications/investigation\\_reports/2014/mair/314-mo-2014-011/](http://www.atsb.gov.au/publications/investigation_reports/2014/mair/314-mo-2014-011/)*

## References

- Fogarty, G., & Shaw, A. (2010). Safety climate and the theory of planned behaviour: Towards the prediction of unsafe behaviour. *Accident Analysis*, 42, 1455-1459.
- Goffman, E. (1961). *Asylums: essays on the social situation of mental patients and other inmates*. Anchor Books.
- Griffin, M., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate performance, knowledge and motivation. *Journal of Occupational Psychology*, 5(3), 347-358.
- Hansen, H. (1996). Surveillance of deaths on board Danish merchant ships, 1986-93: implications for prevention. *Occupational and Environmental Medicine*, 53, 269-275.
- Hansen, H., Nielson, D., & Frydenberg, M. (2002). Occupational accidents aboard merchant ships. *Occupational & Environmental Medicine*, 59(2), 85-91.
- International Chamber of Shipping & International Shipping Federation. (2014). *Guidelines on the application of the IMO International Safety Management (ISM) Code (4th ed.)*. London: Marisec Publications.
- International Labour Organization. (1996). *ILO Code of Practice: Accident prevention on board ship at sea and in port*. Geneva: International Labour Organization. Retrieved from [http://www.ilo.org/wcmsp5/groups/public/@ed\\_protect/@protrav/@safework/documents/normativeinstrument/wcms\\_107798.pdf](http://www.ilo.org/wcmsp5/groups/public/@ed_protect/@protrav/@safework/documents/normativeinstrument/wcms_107798.pdf)
- International Labour Organization. (2016). *Maritime Labour Convention, 2006*. Retrieved from <http://www.ilo.org/global/standards/maritime-labour-convention/lang--en/index.htm>
- International Maritime Organization. (2015). *Safety Culture*. Retrieved from <http://www.imo.org/OurWork/HumanElement/SafetyCulture/Pages/Default.aspx>
- Luria, G., & Rafaeli, A. (2008). Testing safety commitment in organizations through interpretation of safety artefacts. *Journal of Safety Research*, 39, 519-528.

- Maritime and Coastguard Agency. (2015). *Code of Safe Working Practices for Merchant Seafarers*. London: TSO. Retrieved from <https://www.gov.uk/government/publications/code-of-safe-working-practices-for-merchant-seafarers>
- Østreng, D. (2001). *Does togetherness make friends? Stereotypes and intergroup contact on multiethnic-crewed ships*. Tønsberg: Vestfold College Publications Series. Paper 2. Retrieved from <http://www-bib.hive.no/tekster/hveskrift/notat/2001-02/>
- Theotokas, I., Lagoudis, I. N., & Kotsiopoulos, N. (2014). Leadership Profiling of Ocean Going Masters. *The Asian Journal of Shipping and Logistics*, 30(3), 321-343.
- Zohar, D. (2010). Thirty years of safety climate research: reflections and future directions. *Accident Analysis and Prevention*, 42, 1517-1522.
- Zohar, D., & Luria, G. (2004). Climate as a social-cognitive construct of supervisory safety practices; scripts as proxy of behaviour patterns. *Journal of Applied Psychology*, 89(2), 322-333.