TAIC safety themes for large language model analysis of legacy reports

A. **Fatigue**

Impairment of performance through fatigue is a recurring feature of many accidents.

Fatigue is a significant risk to any safety critical activity and its presence can greatly increase the risk of human error leading to an accident. Fatigue adversely affects human performance and is known to contribute to accidents. It is important that people are properly rested to avoid fatigue.

B. **Substance use: regulatory environment for preventing performance impairment (in particular re recreational boating)**

The consumption of alcohol or drugs can significantly impair a person's performance. It can adversely affect their risk perception, reaction time and co-ordination. It is not acceptable under any circumstances for workers to be affected by performance-impairing substances, regardless of what roles they are performing.

C. **Essential knowledge and skills for recreational boating**

New Zealand's maritime rules place no obligations on recreational boat users to demonstrate that they understand and practise safe boating behaviour before getting on the water. Although recreational boat users are legally required to observe the rules covering boating, they are not required to show that they know them, or have the skills needed to comply..

D. **Crew resource management (CRM), and bridge resource management (BRM)**

For the operation of any vehicle or vessel, crew resource management is crucial to safety.

Crew members need to be properly trained. They need to have available and know how to use electronic aids to navigation. All crew should understand the movement plan and the part they play in its successful performance. They must understand the importance of working together and must be able to communicate well. There must also be a culture of challenge where all crew members feel free to identify and call out errors and mistakes. Too often the failure of one or more of these aspects has been a significant contributing factor in an accident occurring.

E. **Maintenance**

For any vehicle or vessel, it is important that it is well maintained mechanically. The failure to do so can lead to critical failures and in turn this can result in accidents. All operators should ensure that they have operating procedures in

place that include maintenance of all mechanical parts. Particular attention should be given to safety critical parts.

F. Safety management systems

Safety management systems are at the heart of how society manages risks. They are key to the safe operation of any vehicle or vessel. A large number of the cases that TAIC has dealt with are the result of the failure of one or more aspects of those systems. To be successful a safety management system should identify all hazards and risks and have successful control mechanisms in place. Those operating the vehicle or vessel must fully understand the safety management system and the part they play in its successful implementation. There must be a culture where all staff feel empowered to identify new risks and hazards and one where it is ok to challenge the behaviour of others. The system must include monitoring and correction and there must be a mechanism for lessons to be learnt and shared. Too often a failure of one or more of these aspects significantly contributes to accidents. system and the part they play in its successful implementation. There must be a culture where all staff feel empowered to identify new risks and hazards and one

G. Interfaces between modes (in particular between road and rail)

Where there is an interface between different modes there is a greater risk of confusion leading to accidents. Wherever possible authorities should pay particular attention where there is an interface between different modes of transport and/or and between different controlling authorities.

For example, the more than 3000 level crossings in New Zealand create a significant risk and the seriousness of this matter is highlighted by this issue being on TAICs watchlist. The best solution for preventing this risk is complete separation but the cost of doing so is likely to be prohibitive. The Rail network provider should be ensuring that its risk mitigations are consistently applied based on robust modelling of each intersection.

TAIC has identified that the interface between road controlling authorities and the network provider is not working as well as it should be and, as a consequence, accidents are occurring where work on the road is occurring in or near the rail corridor and where there are disputes/disagreements about who is responsible for improving visibility by controlling vegetation. Better coordination by both parties is needed to mitigate this risk.where it is ok to challenge the behaviour of others. The system must include monitoring and correction and there must be a mechanism for lessons to be learnt and shared. Too often a failure of one or more of these aspects significantly contributes to accidents.

H. Navigation in pilotage waters

What is the problem?

The Transport Accident Investigation Commission has inquired into several incidents in pilotage waters that have resulted in groundings or contact with objects. Deficiencies in bridge resource management, an international standard for ensuring safe navigation of a ship, have been a feature of these incidents. Errors in navigation in pilotage waters have the potential to have serious consequences for people, the environment, and commerce.

** Pilotage waters are those areas in which a ship is usually required to use the services of a maritime pilot (there are sometimes exemptions). A maritime pilot is an experienced and highly skilled sailor who has detailed knowledge of a particular waterway.*

What is the solution?

Safe conduct of a ship through pilotage waters depends on high standards of passage planning. Pilots and the bridge team must share an understanding of the navigation plan, and know where the ship is allowed to go. If the ship deviates into unsafe waters, members of the bridge team must be able to challenge those in charge. Also essential is a high standard of bridge resource management and adherence to best practice, as set out in international standards.