REPORT OF THE BOARD OF INQUIRY INTO THE MARINE INCIDENT INVOLVING THE SHIP *WUNMA* IN THE WATERS OF THE GULF OF CARPENTARIA ON 6 AND 7 FEBRUARY 2007

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CHAPTER 1 INTRODUCTION

[1] On 5 February 2007 the Master of the *Wunma* found himself in a difficult situation. The ship was loaded with zinc ore concentrate and a cyclone was forecast. The cargo could not be unloaded. The objective of the Maritime Cyclone Contingency Plan for the Port of Karumba was for large vessels to go to sea. No cyclone mooring was available to which the *Wunma* could safely moor. No cyclone mooring had been established in the Norman River to replace the "decommissioned" cyclone mooring at Sweers Island.

[2] This ore-carrying transfer vessel was originally intended to have access to a cyclone mooring in the event of a cyclone threat. She now faced the prospect of sailing into extreme weather, in open waters and in a loaded condition.

[3] The ship had been unable to transfer her cargo to an export vessel late on the night of Saturday, 3 February and during 4 February because of unsuitable weather and sea conditions. On Sunday, 4 February the ship returned to port with her "dirty water tanks" full. During Monday, 5 February a strong wind warning was issued for Eastern Gulf waters. The Bureau of Meteorology's ("BOM") synopsis issued at 1130 hours on Monday, 5 February was that a tropical low in the SW Gulf of Carpentaria was moving eastwards and "may develop into a Tropical Cyclone over the South East Gulf on Tuesday."

[4] The threat of a cyclone prompted a decision to sail. A cyclone over the South East Gulf could be expected to produce a tidal surge. The long-standing advice of the Regional Harbour Master (Cairns) was for vessels to leave their normal moorings when the threat of a cyclone existed. Small vessels were advised to go to more sheltered locations within the creeks and waterways off the Norman River, with mangrove areas offering the best shelter. Under the Port of Karumba Cyclone Contingency Plan ("CCP") the anchoring of large vessels upstream was not recommended due to tidal surges that could inundate the area, which, with high winds, might strand vessels inland of the river system, making any salvage extremely difficult. The CCP stated that the Harbour Master's requirements for clearing the port of large vessels would generally be that wind speeds must not have

reached 30 knots. In any case, if the *Wunma* was to go to sea, it had to do so before winds reached such a speed. The width of the channel meant that the ship could only safely enter or leave the Port if winds were less than 25 knots.

[5] The tropical low pressure system that became Tropical Cyclone Nelson was not named as a cyclone until shortly before 0739 hours on 6 February 2007. But on 5 February 2007, forecast cyclonic activity in the Gulf required the Master of the ship and others responsible for her safe operation to consider whether the ship should leave the Port and where she should go.

[6] The ship had not been designed to sail into cyclonic conditions and remain in open waters with a load. There was no facility to unload her cargo in port, and the conditions that prevailed at sea made it very unlikely that she would be able to transfer her load onto the export vessel.

[7] The ship departed the Zinifex wharf at 1900 hours on 5 February, and after clearing the Fairway Beacon at 2030 hours headed North. The events on the voyage are more fully described in later Chapters. A critical decision was made by the Master at 1140 hours on Tuesday 6 February to reverse course and head South, based upon his understanding of the path of the cyclone and appropriate cyclone avoidance measures. During the afternoon and evening of 6 February a large volume of water, both rainwater and seawater, collected in the aft well deck and the cargo hold. How the ship accumulated water and the steps that were taken to remove it will be described later in the report. At around 2010 hours on 6 February water mixed with zinc concentrate that had entered the emergency generator room through a radiator vent affected the emergency switchboard. The ship lost all power. Some power was restored through the endeavours of the Chief Engineer. But the loss of power had a serious impact on the ship's communications systems. Difficulties were experienced in communicating information and advice to the ship during the night of 6 February and the morning of 7 February. The continuing ingress of water and the information available to the ship's Master about its consequences led to a decision to abandon ship. The crew were rescued by two successive helicopter lifts at 1130 hours and 1300 hours on 7 February.

[8] The Board is not concerned simply with what occurred on 6 and 7 February 2007, after the ship went to sea. The Board must inquire into the probable *causes* of the

marine incident and is asked to consider whether there were any systemic or regulatory arrangements that contributed to the incident.

[9] To report on these issues it will be necessary to first give an account of the history and operation of the ship prior to the incident. Chapter 4 outlines the concept of the transfer vessel, her intended operation in carrying concentrate from the Karumba port facility to overseas bulk carriers anchored between 12 to 20 nautical miles (22 to 37 kilometres) offshore and the fact that originally a cyclone mooring was planned as an essential element in her intended operation.

[10] The existence of the cyclone mooring buoy at Investigator Road, Sweers Island and the risks associated with the ship using it in cyclonic conditions became a matter of ongoing controversy. Representatives of Gulf communities sought its removal. The owners and operators of the ship developed proposals to allow the ship to go into open waters in the event of a cyclone, rather than use the cyclone mooring. These proposals culminated in the upgrading of the ship's registration to Class 2B in September 2005 and the non-renewal in December 2005 of the cyclone buoy mooring authority. By early 2007 the cyclone mooring buoy had effectively been abandoned and it was probably not in an operational state.

[11] The ship's operations are described in Chapter 5. Because the ship's water management system was a significant cause of the incident, its design and operation are described in Chapter 6.

[12] Chapter 7 describes the findings of the Thompson Clarke Operational Review, which in December 2006 made a number of recommendations about the operation of the ship, including the need to urgently review its cyclone procedures. Unfortunately those procedures were not changed before the incident, permitting the ship to be caught in a loaded condition when a low pressure system that had been in the Gulf since 1 February 2007 produced sea and wind conditions that prevented the ship discharging the cargo that she loaded on 3 February 2007.

[13] Chapter 8 analyses load line and related design issues.

[14] Chapter 9 identifies a number of systemic and regulatory arrangements that existed prior to the incident, and contributed to it.

[15] In addition to considering whether any systemic or regulatory arrangements contributed to the incident, the Board was asked to inquire into what can be broadly described as compliance issues. The Board inquired into the structures, policies and procedures that were in force or implemented by the owners and managers of the ship and those on board at the relevant time. It also inquired into the extent to which persons associated with the ship performed their duties. These matters are reported in Chapters 10-13.

[16] The adequacy and effectiveness of the response to the incident, including search and rescue procedures, salvage arrangements and the provision of a port of safe haven are addressed in Chapter 14.

[17] Chapter 15 deals with the remedial response to the incident. Chapter 16 discusses the impact of the incident on the marine environment.

[18] Chapter 17 contains the Board's findings about the causes of the incident.

[19] Chapter 18 contains a number of recommendations.

[20] Chapter 19 makes some concluding observations.

WUNMA BOARD OF INQUIRY

CHAPTER 2: THE INQUIRY

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CHAPTER 2: THE INQUIRY

2.1 THE ESTABLISHMENT AND TERMS OF REFERENCE OF THE BOARD OF INQUIRY

[1] The Board of Inquiry was established under Part 12 of the *Transport Operations (Marine Safety) Act* 1994 ("*TOMS Act*"). The role of a Board of Inquiry is to:

- inquire into the circumstances and probable causes of the relevant marine incident; and
- give the Minister a written report of the Board's findings.[1]

The Board's report may contain such recommendations as the Board considers appropriate and other relevant matters.[2]

[2] The Board was established by a notice in the *Queensland Government Gazette* on 16 March 2007. The "marine incident"[3] was the abandonment of the ship on 7 February 2007. The notice stated:

> "The Board of Inquiry is to inquire into the circumstances and probable causes of the incident, with special reference to:
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> 1. The operational factors which contributed to the incident;
> 2. The environmental factors which contributed to the incident;
> 3. Whether any systemic or regulatory arrangements contributed to the incident;
> 4. Whether the relevant persons were appropriately qualified and experienced in their roles on the *Wunma*; with special reference to tropical revolving storms;
> 5. The command structure, policies, procedures, training, equipment and workplace environment procedures in force or implemented on board the *Wunma* at the relevant time, including any hazard identification, risk assessment, contingency plans and consideration of appropriate control measures;
> 6. The management structures, policies, procedures, training, and emergency procedures in force or implemented by the owners and managers of the *Wunma* at the relevant time, including any hazard

1 *TOMS Act* ss.132(1).
2 *TOMS Act* ss.132(2).
3 *TOMS Act* s.123

identification, risk assessment, contingency plans and consideration of appropriate control measures;

7. The extent to which persons associated with the *Wunma* performed their duties (whether on board the ship or ashore, and whether supervisory or otherwise) in accordance with the policies and procedures in force at the relevant time and, if applicable, the extent to which personnel failed to perform their duties (whether supervisory or otherwise) and the reasons (if any) for such failure;

8. The adequacy and effectiveness of the response to the incident, including search and rescue procedures, salvage arrangements and the determination and provision of a port of safe haven;

9. Whether any breach of a requirement under the Queensland maritime legislation occurred, and if so, whether any person should be charged with an offence against the Queensland maritime legislation."

[3] The Board's members were appointed on 20 April 2007.

[4] Counsel from the independent Bar, Mr Martin Burns, was appointed as Counsel Assisting on 8 May 2007 and, prior to the commencement of the Board's public hearings on 13 August 2007, he was joined by Mr Sydney Williams of Counsel.

[5] The Board first convened for a planning meeting on 15 May 2007.

[6] Administrative support to the Board was provided by the Queensland Government which employed persons to assist in that regard as well as to occupy the position of Secretary to the Board.

[7] A website – www.boiwunma.com – was established to provide information to the public about the course of the Inquiry and, later, to provide the means by which the transcripts of proceedings, rulings and exhibits of the Board could be downloaded.

2.2 INVESTIGATIONS ON BEHALF OF THE BOARD

[8] Investigations on behalf of the Board were under the direction of Counsel Assisting and, ultimately, the Board. An experienced investigator, Mr Paul Campbell, was seconded from his duties as a Sergeant in the Water Police section of the Queensland Police Service and appointed as Chief Investigator. Later, he was assisted by Ms Mandy Nixon who was seconded from Queensland Transport to assist in the investigation and preparation of the evidence for the hearings.

[9] Both Mr Campbell and Ms Nixon were, and are, shipping inspectors under the

TOMS Act.[4] During the course of their investigations, each was required to exercise their powers as inspectors in obtaining documents and information.[5]

2.3 THE COURSE OF THE INQUIRY

[10] Written notice of the Inquiry was given under section 137 of the *TOMS Act* to various persons or entities that the Chairperson believed ought to be given the opportunity to appear at the Inquiry, including the Master and owner of the *Wunma.*

[11] On 16 May 2007, a Practice Direction[6] was issued to regulate the proceedings including the hearing of applications for leave to appear, the modes and forms of evidence, the course of evidence during the public sittings, the making of submissions and allowances to witnesses. The fact that the Board was to convene was also advertised in the media and on the Board's website.

[12] On 22 May 2007, the Board was convened for a Directions Hearing which included the hearing of a number of applications for leave to appear. As with the subsequent public hearings of the Inquiry, these proceedings were recorded in accordance with Section 140 of the *TOMS Act.*

[13] The following parties applied for and were given leave to appear during the course of the Inquiry:

- Zinifex Limited and two of its wholly owned subsidiaries, Zinifex Group Treasury Pty Ltd and Zinifex Investment Co Pty Ltd trading as the SIA Partnership that owned the ship (collectively, "Zinifex");
- Inco Ships Pty Ltd ("Inco"), the ship's manager at the relevant time and formerly named Intercontinental Shipping Management Pty Ltd ("ISM");
- Captain Dean Seal, the Master of the ship at the time of the incident;
- Maritime Safety Queensland ("MSQ"), an entity established under the *Maritime Safety Queensland Act 2002*;
- Australian Maritime Safety Authority ("AMSA");
- Australian Fisheries Management Authority ("AFMA");
- Environmental Protection Agency ("EPA"), an entity established under Queensland law.

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4 Pursuant to Part 13 of the *TOMS Act.*
5 Sections 135, 155 and Division 3 of Part 13.
6 Exhibit 3.

[14] Certain other parties, including the ship's designer, were given the opportunity to seek leave to appear but did not avail themselves of this opportunity. Whilst those parties did not seek leave to appear, the Inquiry was assisted by their cooperation and evidence.

[15] Because a Board of Inquiry is required to act as quickly as is consistent with a fair and proper consideration of the issues, the Board's investigators and its Counsel Assisting were required to assemble and analyse a large volume of documents in a relatively short time. They also were required to seek and prepare over 70 witness statements from 57 separate witnesses which, under the Board's Practice Direction, stood as the witnesses' evidence in chief in the interests of reducing the duration of the hearing time.

[16] The efficient conduct of the hearing was facilitated by the preparation of a "core bundle" of documents that consists of 217 separately tabulated documents consisting of reports, correspondence, charts and other records. In addition, during the course of its hearings the Board received in excess of 130 separate exhibits. These exhibits include substantial expert reports about matters such as ship design, ship operations, and environmental issues.

[17] The public sittings of the Board occupied 11 days on various dates between 13 August 2007 and 6 September 2007. This involved the examination of numerous witnesses either in person or by telephone, where appropriate. The examination of witnesses during this period generated 941 pages of transcript.

[18] The fair and proper consideration of the issues necessitated a review of the large volume of documentary evidence and the transcript of evidence, and resulted in the formulation and circulation of written submissions by Counsel Assisting followed by written submissions by the parties. The parties were also offered the opportunity to supplement their written submission with oral addresses, but that offer was not taken up by any party.

[19] Between 16 and 18 October 2007, Counsel Assisting forwarded to several persons and entities written notice of the possibility that the Board might make adverse findings concerning various matters. This was done to afford those persons and entities an opportunity to respond by way of submissions.

[20] Written submissions were received from, or on behalf of, the following:

- Carpentaria Land Council Aboriginal Corporation ("CLCAC")
- MSQ
- Inco
- AFMA
- Captain Seal
- Mr Tonkin
- AMSA
- Zinifex.

2.4 THE BOARD'S INDEPENDENCE

[21] The Queensland Government provided administrative and financial support to the Board so that it could carry out its functions. Inevitably, it was necessary for the Board and Counsel Assisting to communicate with officers of the Department of Transport about administrative matters. Because MSQ was a party before the Board it was important that the Board both be independent of MSQ and appear to be independent of it.

2.5 PUBLIC ACCESS TO THE INQUIRY

[22] Under section 138 of the *TOMS Act*, an Inquiry must be held in public unless a direction is given to the contrary, and such a direction may only be given if the Board is satisfied that it is proper to make the order in "the special circumstances of the Inquiry".

[23] The Board's Practice Direction made provision for parties to apply for the preservation of certain confidential information contained in exhibits and the like, such as commercially confidential information. In some instances proper claims to confidentiality in respect of certain financial matters justified portions of a small number of exhibits being redacted. However, those few exceptions apart, the evidence before the Inquiry was accessible to the public. Public access was facilitated by the uploading of transcripts and exhibits on the Board's website.

2.6 DURATION OF THE INQUIRY

[24] The Board was required to act as quickly, and with as little formality and technicality, as is consistent with a fair and proper consideration of the issues. The Board's Terms of Reference raised issues of some complexity as will appear in the

later Chapters of this report. The Board was required to consider a large volume of documentary and other evidence.

[25] A full exploration of this material might have occupied weeks of public hearings. With the assistance of the parties, the public hearings of the Inquiry were able to be completed in 11 sitting days. The need to report on the circumstances of the incident and its probable causes means that the Board's report must be delivered whilst certain investigations by parties and their consultants into remedial matters continue.

2.7 THE BOARD'S OBJECTIVE

[26] When the Honourable Paul Lucas MP, the then Minister for Transport and Main Roads, announced that there would be a Board of Inquiry he told the Parliament:

> "Boards of Inquiry are not about playing a blame game; they are not established with a purpose of pointing fingers at individuals. The primary role of the Board will be to look at all of the facts leading up to, during and after the marine incident, and make recommendations that will hopefully have benefits for the whole of the marine industry operating in far-north Queensland and the Gulf."[7]

[27] The Board shares the view that the Inquiry was not about playing "a blame game". The Board has the benefit of hindsight concerning the causes of the incident. Its focus was not to apportion blame, and it does not determine issues of legal liability. The Board is not a court of law. Its essential function is to inquire into what happened and why it happened. In addition, a Board of Inquiry may make recommendations that the Board considers appropriate.

[28] The Board's report includes recommendations. The need to conclude the Board's inquiry means that its recommendations could not await the completion of ongoing investigations into matters such as the precise location, design and engineering requirements for a suitable cyclone mooring in the Norman River. The Board's recommendations are based on the information available to it at the time its report was written.

[29] Those recommendations are ventured in the interests of assisting the future safe operation of the ship and avoiding a repetition of the incident. However, acting within the necessary time and resource constraints, the Board was never going to be

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7 *Hansard* 15.3.07 p.1086.

in a position to devise complex engineering solutions or detailed operating procedures for the ship's future operation. These matters depend upon the completion of ongoing investigations into matters such as the design and installation of cyclone moorings in the Norman River, design modifications to the ship and the development and refinement of operating procedures in the context of contractual arrangements between the ship's owners and her manager.

[30] That said, the Board hopes that its recommendations will inform decisions to be made by the owners and operators of the ship, regulatory authorities and others with an interest in the safe operation of the *Wunma* and marine safety in general.

WUNMA BOARD OF INQUIRY

CHAPTER 3: SUMMARY OF REPORT

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CHAPTER 3 SUMMARY OF REPORT

3.1 A HISTORY OF THE SHIP: CHAPTER 4

[1] When the *Wunma* was designed in the late 1990's, classed by Lloyd's Register in 1999 and registered in Queensland in 1999, a cyclone mooring was intended as an essential component of the ship's operation. The option of sending the *Wunma* to sea in cyclonic conditions was said in sworn evidence to be not viable. The safety of the ship and her crew was said to require a cyclone mooring.

[2] This Chapter outlines the events that led to the decommissioning of the cyclone mooring at Sweers Island and no new cyclone mooring taking its place. A fundamental change was made in the ship's authorised operations in the event of a cyclone. The option of heading into open waters, which once had been rejected as not viable and unsafe, became authorised in terms of the ship's registration and incorporated into her operating procedures.

3.2 THE SHIP'S OPERATIONS: CHAPTER 5

[3] The practice of not loading when there is a low pressure system in the Gulf was adopted over the years by certain Masters. It was an appropriate precaution. But it did not form part of the ship's written operating procedures. This was a major shortcoming in them.

[4] Despite Zinifex's obvious commercial interest in ensuring as many loads as possible were transferred to export vessels anchored or expected at the Roadstead, there is no reliable evidence that it adopted the practice of pressuring Masters to load and to undertake voyages when it was unsafe to do so. The evidence is that it did not adopt such a practice.

[5] The relevant members of the crew at the time of the incident were appropriately qualified and experienced. The Chief Mate, through no fault of his own, had limited experience in the use of the ship's communication systems, and limited experience of the ship in general, consisting of a four week period of induction between mid-December 2006 and 15 January 2007.

[6] The evidence was of a hard-working crew with many demands on their time.

[7] Programmed maintenance was displaced by the priority of going to and from an export vessel each day. This and other operational issues later identified in December 2006 by the Thompson Clarke Operational Review were not comprehensively addressed by the owners and the ship manager over the years. The focus of the ship's manager was on maintaining daily operations and doing its best to "live with" the materials handling plant and the ship as she was. This included a water management system that was prone to being blocked with ore concentrate.

[8] At the time of the incident, the ship was subject to three different cyclone procedures:

- the Cyclone Procedure in the ship's Safety & Quality System (SQS);
- the Zinifex Cyclone Procedure;
- the Port of Karumba Cyclone Contingency Plan.

[9] Each procedure was based upon a system of alert conditions. Although in general terms, the system of alerts have similar objectives in preparing the vessel to depart port and then proceed to sea, there is no consistency between the different alert conditions.

[10] The SQS Cyclone Procedure contained three options:

- Anchor off Karumba.
- Proceed to Weipa.
- Head for the open sea and remain in open waters until the cyclone has passed.

Each option had its limitations, and the second and third required the ship to take cyclone avoidance procedures in what has been described as "a marine cul-de-sac".

[11] Even more fundamental issues arose in the case of the *Wunma*:

- She was not designed to head into open waters during a cyclonic event, especially when in a loaded condition.
- The design and operation of her water management system made it unsafe to do so.

3.3 THE WATER MANAGEMENT SYSTEM: CHAPTER 6

[12] In theory, the ship was supposed to operate so that rain washed down dust from the canopy cover and any ore concentrate that was on the decks, with the "dirty water"

going into the dirty water tank, following which "clean water" was diverted into the sea. In practice, this was not possible because:

- the port deck below the conveyor belt was particularly prone to accumulate concentrate which depended for its removal upon crew shovelling and sweeping concentrate and generally cleaning the decks and drains of concentrate;
- the starboard deck tended to accumulate concentrate, although in smaller quantities than the port deck;
- the side deck drains and the valves which, if opened, would divert water to the sea, regularly became blocked;
- procedures to unblock them, if undertaken, were unlikely to be successful for very long;
- even if the side deck drains were free of concentrate, it is questionable whether they had the capacity to capture the large volume of water that might drop onto the deck through several, large downpipes, with the result that water that could not go directly down the drains was redirected to the aft well deck, which typically had concentrate on it.

[13] The operation of the ship's water management system should have been reviewed when consideration was being given to the proposal for the ship to voyage into open waters in order to avoid cyclones. The existence of blocked drains and valves on side decks and the limited capacity of those side drains to direct large volumes of rainwater to sea inevitably would lead to the accumulation of large quantities of water in the aft well-deck once the dirty water tanks were full. They could be expected to be full after a relatively short period of torrential rain.

[14] In the end result, the ship was granted a Class 2B certificate in September 2005, and her cyclone procedure was revised, to enable her to head into the open waters in the Gulf in cyclonic conditions without any proper analysis of the risk of the ship becoming, in effect, a receptacle for the large volume of rainwater that her water management system would collect during a long voyage in cyclonic conditions.

3.4 THE OPERATIONAL REVIEW BY THOMPSON CLARKE SHIPPING: CHAPTER 7

[15] The Thompson Clarke Operational Review Report in December 2006 posed some penetrating questions about the operation of the water management system in

cyclonic conditions. Unfortunately, it took the voyage of the *Wunma* on 6 and 7 February to answer them.

3.5 LOAD LINE AND RELATED DESIGN ISSUES: THE INGRESS OF WATER AND THE MEANS TO FREE IT: CHAPTER 8

[16] Compliance with statutory requirements for load line provided the occasion for "conditions of assignment" to be imposed to ensure the watertight integrity of the ship and to clear water that accumulates on decks. The process by which the ship was partially certified by Lloyd's Register in respect of its hull and machinery, but not certified by Lloyd's Register in respect of load line, permitted these issues to be neglected during the process of registration in 1999 and when the ship's registration was upgraded in 2005.

[17] These matters are directly relevant to the incident. One of the factors that led to the abandonment of the ship on 7 February 2007 was the loss of power and emergency systems following the flooding of the Emergency Generator Room. This flooding took place through a radiator vent that did not comply with the *USL Code*. The location of this vent and its potential to compromise marine safety seems to have been missed by all concerned prior to the incident.

[18] Insistence upon the installation of freeing ports so that the ship's conditions of assignment complied with the requirements of Section 7 of the *USL Code* would have brought into stark focus the competing objectives of:

(a) shedding water that may accumulate in the aft well deck via freeing ports in the interest of marine safety; and

(b) keeping water mixed with concentrate out of the marine environment.

[19] Those competing objectives remain to this day. So does the need for design solutions to address them. But regulatory arrangements that permitted the ship to be registered in circumstances in which its conditions of assignment did not comply with Section 7 of the *USL Code* meant that these issues were addressed by the Queensland registration authority after the incident, not before it. The fact that it took the incident to highlight the need to address the loading conditions for operating during cyclone seasons and the operation of the ship's water management system highlights significant shortcomings in regulatory arrangements at the time the ship was first registered in Queensland in 1999 and at the time her registration was upgraded in 2005.

3.6 SYSTEMIC ARRANGEMENTS AT THE TIME OF THE INCIDENT: CHAPTER 9

[20] As at February 2007, systemic arrangements jeopardised the safe operation of the ship in cyclonic conditions:

- A ship that was designed and initially intended to operate by having access to a cyclone mooring had no operational cyclone mooring to protect the ship, her crew and the marine environment.
- The ship's operating procedures did not reflect the sound practice of not loading when a low pressure system was in the Gulf in "cyclone season".
- The ship's SQS Cyclone Procedure and the Port of Karumba Cyclone Contingency Plan did not provide the option of the ship remaining alongside the Zinifex wharf with extra mooring lines, or the more contentious option of heading upstream in ballast and anchoring there.
- They required the ship to head to sea, but only after a certain alert status was declared when wind and tide conditions may have rendered it unsafe for the ship to navigate the channel, and in any case, when there may be insufficient time and searoom to engage in cyclone avoidance procedures against a cyclone heading in the direction of the South East part of the Gulf.
- The ship's water management system did not operate as it was designed to operate: her deck drains and valves were prone to being blocked with concentrate and, once blocked, the valves to sea could not be made operational without a major and time-consuming effort.
- The ship's design and equipment did not allow her to quickly rid herself of water that accumulated in the aft well deck.
- The ship was at risk of becoming, in effect, a receptacle for the large volume of rainwater that her water management system would collect during a long voyage in cyclonic conditions, and any seawater that she might take on board in heavy seas.
- If the ship was caught in a loaded condition when the cyclone threat eventuated, the risk to the safe operation of the ship was acute. As Mr Bundschuh explained in his evidence:

> "In a full load condition if you have a water management system that relies on keeping water on board, you are then in serious danger of actually overloading the vessel. That is the context in which the water management system has to come

> into play to make sure that when operating in full load you are not going to keep on water that immerses the load line."[1]

[21] A ship that had been designed to operate in coastal waters in fair weather was authorised to go into open waters in foul weather. Without an overhaul of her water management system and loading conditions, any such voyage carried the risk of the ship having her load line immersed in cyclonic seas.

3.7 TROPICAL CYCLONE NELSON AND THE *WUNMA* AND THE COURSE OF EVENTS: CHAPTERS 10 AND 11

[22] These Chapters detail the course of events prior to incident that resulted in the ship being loaded when a tropical low was in the Gulf, being unable to discharge that cargo and having to undertake a voyage to avoid Tropical Cyclone Nelson. They give a basic account of decisions and events on the voyage, culminating in the abandonment of the ship on 7 February when her cargo hold was filled with water.

3.8 CRITICAL OPERATIONAL DECISIONS PRIOR TO THE VOYAGE: CHAPTER 12

[23] The decision to load on the morning of 3 February was made, and agreed to by her Master, when her Master and Inco's then Operations Manager at Karumba knew that a low was still over the Gulf, but predicted that it would cross over land. Such a prediction took inadequate account of the known erratic behaviour of cyclones in the Gulf.

[24] Inco's "minimum requirement" in the SQS to cease loading in the case of a Blue Alert simply was not good enough. Its prohibition on loading came far too late. The absence of a written operating procedure that would have prevented the ship from being loaded when a low pressure system, with the potential to develop into a cyclone, was in the Gulf, contributed to the loading of the ship, and therefore to the incident.

[25] The decision to return to Port to empty the ship's "dirty water tanks" significantly delayed the attempt to avoid the threatened cyclone. The practice approved by the ship's manager and owners was to return to port once the dirty water tanks were full. In the circumstances that prevailed on 4 February 2007, Captain Seal cannot be said to have acted inappropriately in following that practice.

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1 T.767; see also T.770.

[26] The decision to depart Port and go to sea was a reasonable course of action in the difficult situation in which Captain Seal found himself on 5 February 2007. He cannot be fairly criticised for deciding to depart Port on the evening of 5 February 2007. His reasons for sailing the included predicted tidal surges. The course of going to sea in the event of a cyclone threat was encouraged by the ship's SQS cyclone procedure and the Port of Karumba Cyclone Contingency Plan.

[27] General preparations on 5 February were undertaken without the presence on board of a Chief Mate or a Second Mate. They came on board an hour or two prior to the ship's departure on 5 February. Their presence earlier in the day may have assisted in general preparations for the voyage into cyclonic conditions, and prompted questions about whether preparations contained in the SQS Cyclone Procedure, including its fuel requirements, had been met.

[28] Captain Seal failed to inform the Chief Engineer in sufficient time of the planned voyage North to enable additional fuel to be bunkered. Early consideration of the need to increase fuel reserves by Captain Seal or other members of the crew would have allowed additional fuel to be bunkered.

[29] Additional steps could and should have been taken to check whether the side deck drains were operational. Whether they were blocked or not could not be ascertained simply by looking at the control panel. To check them required the valves to be directed overboard and water run through the drains. Captain Seal was understandably reluctant to do this, due to the risk of sending concentrate into the marine environment. But even if this check had been done, and the valves found to be blocked with concentrate, it is unlikely that they could be serviced in time due to the time-consuming and difficult process of gaining access to them.

[30] The *Wunma* went to sea on 5 February with a number of side deck drains blocked, but this was principally due to shortcomings in the design and operation of its water management system. Systemic problems with the design of, and operating procedures for, the water management system prevented the ship being able to direct overboard the large the rainwater that the ship would encounter on the voyage.

3.9 THE VOYAGE: CHAPTER 13

[31] Prior to the critical decision at around 1140 hours on 6 February to turn South:

- There was an inexcusable failure to regularly obtain, record and analyse weather information.
- There was a consequential failure to plot the cyclone's position and path, and the ship's position in relation to the cyclone in order to assess appropriate cyclone avoidance measures.
- Only infrequent observations of wind direction and barometric pressure were made and recorded, and these inadequate observations did not facilitate the application of cyclone avoidance rules in the SQS.
- There was a failure to engage onshore assistance.

[32] The decision to turn South was a crucial decision that was made without obtaining adequate weather information, without plotting the path of the cyclone based on that information, without prior consultation with the Chief Mate or the Second Mate and without adequate consideration of its consequences. It was a decision that was made under pressure. But much of that pressure was self-imposed by Captain Seal's failure to obtain at an earlier stage on the morning of 6 February weather information from readily-available sources or to seek advice or assistance from the Designated Person Ashore.

[33] At around 1130 hours on 6 February 2007 the arrival of a "threat map" and a quick comparison between it and the one he had obtained before leaving Port led to a hasty assessment by Captain Seal of his position relative to what he understood to be the cyclone's path to be and a quick decision to turn South. The decision taken by Captain Seal to turn to the South was not an informed one.

[34] A decision was required about the merits of heading North as against turning South, re-crossing the cyclone's path at some stage and hopefully making enough distance to be sufficiently South of the cyclone's path to be able to avoid its impact.

[35] Even with the inadequate information in his possession at 1140 hours Captain Seal should have analysed the available information and the consequences of turning South. He was able to ascertain on the basis of the information in his possession that he was a substantial distance North of the cyclone's expected path. Turning South risked being pooped by following seas and the ingress of seawater into the well deck. The cyclone was predicted to move East-South East while intensifying and it might recurve even further to the South, as it in fact did later on 6 February. Turning

South involved turning back into what has been described as a "marine cul de sac". Last, but not least, turning South did not apply the cyclone avoidance procedures contained in the SQS or other publications.

[36] The decision to turn South came to be made at around 1140 hours because the need to make a decision about continuing North or turning South had not been confronted by Captain Seal much earlier. A decision to either continue North or to turn South with the main engines engaged having not been made much earlier on 6 February 2007, Captain Seal made a hasty decision at 1140 hours without adequate information, without adequate assessment of competing choices, without consultation with the other navigation officers and without adequate consideration of the consequences of the ship having a following sea.

[37] The decision at about 1140 hours on 6 February 2007 to turn South was a significant cause of the incident.

[38] The decisions later that afternoon to turn to the South South West and then to the West compounded the problems that had been produced by earlier decisions.

[39] Captain Seal can hardly be criticised for his decision to abandon ship, given his reasons for doing so. No party or witness has suggested that he should be. His reasons included the information conveyed to him by the *Eastern Star* which, if accurate, meant the ship and her crew were in serious danger. His decision to abandon ship on the basis of the information known to him, his evaluation of the situation and his concern for the safety and lives of his crew accorded with the SQS's guidance on the decision to abandon ship. It was a reasonable decision based on the information known to him at the time the ship was abandoned.

[40] The information that was conveyed to him from the *Eastern Star* made a significant contribution to his decision to abandon ship. Accordingly, it was *a* cause of the incident.

3.10 THE IMMEDIATE RESPONSE TO THE INCIDENT: CHAPTER 14

[41] The response to the incident including search and rescue procedures, salvage arrangements and the determination and provision of a port of safe haven was adequate and effective.

3.11 THE REMEDIAL RESPONSE TO THE INCIDENT: CHAPTER 15

[42] The remedial response to the incident was generally satisfactory. But there has been an unacceptable delay in satisfying two important conditions of class concerning modification of the emergency generator and the development and submission of a new stormwater management plan.

[43] Zinifex initially looked to Inco to progress these matters, and there were discussions between them and some basic engineering drawings were prepared. The lengthy delay in gaining Lloyd's approval to a matter as fundamental to the safety of the ship as her water management system cannot be justified.

[44] An application for a cyclone mooring buoy authority in the Norman River has only recently been made by Zinifex.

3.12 ENVIRONMENT: CHAPTER 16

[45] The expert evidence of Dr Mortimer and Professor Parry, as supported by a CSIRO study and a CSIRO Peer Review respectively, is that the incident did not cause any significant environmental impact so far as spillage of zinc concentrate is concerned. It is also the view taken by the EPA.

[46] The preservation of the Gulf as a unique and relatively pristine body of water serves a variety of private interests and the public interest. The public interest in preventing the spillage of cargo into the marine environment is reflected in both international conventions and domestic law. Spillage of the cargo of the *Wunma* into the marine environment should be avoided. The importance of that objective is not diminished by the fact that the spillage in February 2007 has not been shown to have produced any significant impact on the marine environment.

3.13 CAUSES OF THE MARINE INCIDENT: CHAPTER 17

[1] The Board's function is not to apportion responsibility for the incident, or make findings in terms of culpability. It is required to report on the causes of the marine incident.

[2] The following list of causes does not attempt to rank causes as major or minor, direct or indirect. The following list does not include contributing factors that played an insignificant part in the course of events.

(1) The absence of a cyclone mooring in the Norman River to replace the decommissioned cyclone mooring at Sweers Island.

(2) The absence of operating procedures to prevent the ship from being loaded when a low pressure system, with the potential to develop into a cyclone, was in the Gulf.

(3) The design and operation of the ship's water management system that enabled a large volume of water to accumulate in the aft well deck and cargo hold during a voyage in cyclonic conditions. In particular:

- the operation of the system so that rainwater that fell on the ship's canopy during heavy or prolonged rain would collect in the aft well deck rather than being directed overboard;
- the blockage of side deck drains with ore concentrate;
- the blockage of valves in side deck drains that might have been operated to direct water overboard after an initial "first flush" of dust from the canopy into "dirty water tanks";
- in general, the design and operation of the system so that it did not operate as a "first flush" system, namely with waste water from rain run off from the canopy being collected in "dirty water tanks", following which rainwater that fell on the ship's canopy would be directed overboard.

(5) The registration of the ship in 1999, and the upgrading of her registration in 2005:

- without adequate consideration of her compliance with Section 7 of the *USL Code,* particularly in respect of the entry of water into the well deck, arrangements to free water from the well deck, the location of the emergency generator room and the entry of water into the emergency generator room via its radiator vent;
- without adequate consideration of the need to store or discharge the volume of water that might accumulate in the hold during tropical downpours, in circumstances in which the ship was treated, for the purposes of assessing her stability, as having an open hold.

(6) The upgrading of the ship's registration in 2005, and the revision of her cyclone procedures to permit her to undertake voyages in the open waters of

the Gulf in the event of a cyclone, without a comprehensive risk analysis being undertaken of the ship's seakeeping properties in cyclonic conditions.

(7) The upgrading of the ship's registration in 2005, and the revision of her cyclone procedures to permit her to undertake voyages in the open waters of the Gulf in the event of a cyclone, without the imposition of loading conditions and a review of her water management system.

(8) The loading of the ship on 3 February 2007 when a low pressure system was in the Gulf.

(9) The practice of returning to port once the ship's "dirty water tanks" were full, which led to the ship returning to port on 4 February 2007, thereby delaying her departure until the "tidal window" on the night of 5 February 2007.

(10) The failure to take adequate steps on 5 February 2007, or beforehand, to prepare the ship and her crew for a prolonged voyage in open waters during cyclonic conditions, including:

- bunkering sufficient fuel to enable the ship to remain at sea for an extended period whilst operating all three of her engines;
- unblocking deck drains to permit, so far as possible, rainwater to be directed overboard through deck drains;
- familiarisation by navigation officers of procedures in the ship's Safety & Quality System to avoid cyclones at sea.

(11) The failure during the voyage that commenced on 5 February 2007, and particularly during the period prior to the decision at around 1140 hours on 6 February to turn South, to obtain current weather information by email or satellite phone. The consequential lack of plotting of the cyclone's position and path, and the ship's position in relation to the cyclone. The making and recording of only infrequent observations of wind direction and barometric pressure.

(12) In general the failure to apply the procedure to avoid cyclones at sea contained in the ship's Safety & Quality System (SQS 06; D 220) or similar procedures to avoid cyclones at sea.

(13) The decision of the Master at approximately 1140 hours on 6 February 2007 to turn South without:

- adequate current information about the cyclone's position and path;

- adequate analysis of the limited information that was on hand at 1140 hours;
- adequate consideration of the consequences of turning South;
- consultation with the Chief Mate, the Second Mate, the Designated Person Ashore or other persons ashore about the proposed course of action.

(14) The operation of the water management system during the ship's voyage that allowed a large volume of water to accumulate in the aft well deck and cargo hold.

(15) The absence on the aft well deck of freeing ports, thereby allowing the accumulation of a large volume of water in the aft well deck during the voyage in cyclonic conditions. Alternatively, the absence of an active pumping system appropriate to an open hold ship to rid the well deck of accumulated water.

(16) To a lesser extent, the blockage of a small drain in the aft well deck that prevented water that had accumulated in the aft well deck being directed overboard.

(17) The absence of adequate pumps to discharge water overboard.

(18) The failure of pumps to operate or to operate effectively due to blockages caused by concentrate.

(19) The entry of seawater over the stern, including through openings on either side of the stern ramp.

(20) The entry of seawater through holes in the portside canopy that had been caused by the impact of waves in cyclonic seas on materials that were incapable of withstanding the impact of waves.

(21) In general, the ingress of water into the ship's well deck whilst she was in a loaded condition at a rate greater than the capacity of pumps to discharge it overboard.

(22) The position of a radiator vent in the emergency generator room that permitted water that had accumulated in the aft well deck to enter the emergency generator room.

(23) The entry of water through a door to the emergency generator room which was not securely dogged.

(24) The shorting of a switchboard following the ingress of water into the emergency generator room.

(25) The total loss of power to the ship following the ingress of water into the emergency generator room.

(26) The consequent loss of power to various primary systems on the ship, including damage to and loss of power to certain communication systems.

(27) Difficulties experienced in the communication of advice and information that was relevant to the Master's decision to abandon ship.

(28) The communication of advice to the Master of the ship at around 0600 hours on 7 February 2007 to the effect that if the water level was higher than halfway up the stern ramp, the eventual loss of the ship was probable and that he should make preparations to abandon ship.

(29) The Master's evaluation of the situation on the morning of 7 February 2007 and how it was expected to develop, and his judgment that the safety and lives of the crew necessitated abandonment of the ship.

3.14 RECOMMENDATIONS: CHAPTER 18

[47] Numerous recommendations are set out in Chapter 18.

[48] They include the installation of a suitably engineered and suitably located single point cyclone mooring in the Norman River, cyclone contingency plans that address loading conditions and other matters in relation to the design and operation of the *Wunma*.

[49] Legislative and administrative changes are required to enhance the regulatory role of MSQ.

[50] Legislative and administrative changes should be made to end what was described as the "mix and match" system with "partial class approvals".

[51] A more comprehensive approach to assessment of the safe operation of a ship should be undertaken at the registration stage.

[52] Beyond the registration stage, MSQ has a restricted view of its powers as regulator. This is apparent in the view taken by its officers in 2005 that it was powerless to insist that the safe operation of the ship in the cyclone season required the ship to have access to an operational cyclone mooring. This approach is pressed in MSQ's submissions. If the safe operation of the ship required it to have a cyclone mooring in the Norman River or some other sheltered location, then MSQ as regulator should

have exercised its powers as regulator to enforce the safety obligation of the ship's operators. If there is any doubt about the power of MSQ to take steps to enforce what its officers consider is necessary in the interests of marine safety, then that doubt should be removed by legislative amendments.

[53] MSQ should revise its "hands off" approach to regulation.

[54] The Queensland Government should consider whether legislative, administrative and financial arrangements have led to a system of self regulation, and, if so, whether such a system serves the public interest.

3.15 CONCLUDING OBSERVATIONS: CHAPTER 19

[55] The focus was on strength and stability when the ship was designed. It remained the focus when the proposal was approved to permit the ship to ride out a cyclone in open waters. Strength and stability are vital. But they do not guarantee the safe operation of a ship such as the *Wunma* in cyclonic seas. The focus on strength and stability meant that little or no attention was given to the design and operation of the ship's water management system. Her design and operation turned the ship into a large water receptacle.

[56] Plenty of strength and stability did not make the ship seaworthy in the open waters of the Gulf. It certainly did not stop the water rising in the well deck on 6 February as the ship's crew battled to stop rising water levels. Plenty of strength and stability was not enough to ensure the safety of the ship or her crew.

[57] The crew deserve recognition. The engineering crew, and Mr Fisher in particular, deserve commendation for restoring power to the ship in extremely difficult circumstances after the blackout that occurred at the height of the cyclone. Criticisms are made in the report about certain operational decisions made by Captain Seal. But the evidence indicates that his composure and leadership at the height of the incident enabled the crew to remain calm and attend to their duties. During those hours the water level in the cargo hold was at one with the sea. The Chief Mate, the Second Mate and the Bosun observed flexing in the hull. Having seen this the Chief Mate feared that the ship might quickly sink. Despite the difficult situation in which they found themselves the crew remained calm, including crew members with little seagoing experience.

[58] This Report attempts to identify the systemic failures that permitted a ship with a dysfunctional water management system to venture into the open waters of the Gulf in a cyclone. The installation of a dedicated cyclone mooring in the Norman River and other remedial measures should ensure that the *Wunma* is not placed in that situation again. But unless the systemic arrangements that allowed the incident to happen are addressed, the lives of crew on other ships will be placed at unnecessary risk.

WUNMA BOARD OF INQUIRY

CHAPTER 4: A HISTORY OF THE SHIP

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CHAPTER 4 A HISTORY OF THE SHIP

4.1 THE CONCEPT OF A TRANSFER VESSEL

[1] The Century Mine at Lawn Hill was developed by Pasminco Century Mine Limited ("PCML"). Since 2004 it has been operated by Zinifex. The mine is situated about 250 kilometres north-north-west of Mt Isa. Lead and zinc ore is extracted from the mine and processed into concentrates. Approximately 200 tonnes of lead bearing concentrate and 2,500 tonnes of zinc bearing concentrate are produced daily by the mine.

[2] During the study phase of the project, a variety of road, rail, pipeline and shipping options to convey the concentrate to export vessels was evaluated by PCML. The most economic solution to emerge during the study phase of the project was for a slurry pipeline to the Gulf of Carpentaria.

[3] A submission by PCML to the Institution of Engineers Australia – Queensland Division "2000 Engineering Excellence Awards" summarises the selection of the Port of Karumba and the choice of a specially designed transfer vessel:

> "The port of the Karumba, situated in the southeast corner of the Gulf of Carpentaria, is the nearest established port to the mine that allows access to overseas markets. However, it is a shallow draft port and to berth 50,000 dwt bulk carriers required for exporting the concentrate, either a mothership concept, a several kilometre long conveyor or deep-water channel had to be constructed to allow product transfer to ocean vessels. None of these options were chosen for both technical and financial reasons, influenced strongly by consideration of cyclone conditions. A fourth option was to build a transfer vessel(s) which could carry smaller parcels of concentrate from a Karumba port facility out to overseas bulk carriers anchored anywhere between 12 – 20 nautical miles (22 – 37 kms) offshore. Design proceeded on this basis introducing an unusual feature into a mine development, namely that of a specifically designed special purpose vessel."[1]

[4] The various transfer vessel options considered by PCML included using tugs and dumb barges, multiple units of self-propelled, mini bulk carriers or a single, larger self-loading and self-discharging bulk carrier. The concept of a transfer vessel was not new. The *Aburri* serviced the McArthur River Mine in the Northern Territory.

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1 Exhibit 49; CB47, p.2.

[5] A proposal to use self-propelled, self-discharging vessels to transfer lead and zinc concentrate was described in Impact Assessment Study Reports for the Century Mine project in late 1994 and early 1995. In a draft Impact Assessment Study Report dated October 1994 reference was made to the use of two barges:

> "The proposed barges are likely to be 3,000t capacity self propelled, self-discharging vessels (90m long by 18m wide and a draught of 3.5m) (Figure 10.8) (While 3,000t capacity barges are likely, other barge sizes are still under consideration). Unladen craft will have a draft of 1.5m."[2]

[6] The IAS continued:

> "When not needed for cargo transfer, one barge will be moored at the loading facility. Additional facilities will be required for mooring of the second barge, and it is proposed that a swing mooring be provided in the Norman River upstream of the loading facility where adequate depth and river width exist."[3]

[7] In a March 1995 Response to IAS Submissions the following was stated in respect of cyclone contingency measures:

> "Barges would not proceed to sea if a low-pressure system (less than 1000Hpa) was developing, nor would export ships come into enclosed waters. Barges would be tied up at the wharf with extra lines, and the vessel would be ballasted down by flooding. The Norman River, with its deep water is a relatively 'safe haven' so barges within it are well placed in the event of a cyclone."

[8] The Impact Assessment studies published in late 1994 and early 1995 did not consider the risks associated with a single, larger transfer vessel, or the risks associated with any vessel being required to go to sea in the event of a cyclone.

[9] The original concept of having two vessels arose from considering the annual tonnage of concentrate to be conveyed from Karumba and comparisons with a similar barging operation on the McArthur River in the Northern Territory. The use of two vessels of a similar size to those used in the McArthur River operation was perceived to provide advantages of interchangeability. In August 1995, PCML undertook more detailed studies on the optimum number and size of transfer vessels. It was decided to use one larger vessel rather than two smaller vessels. The operating and capital costs of two vessels was substantially higher than a single

2 IAS para 10.4.2; quoted in Exhibit 49, CB30; para 5.5 CB38.
3 IAS p.210; *ibid* para 5.6.

vessel and, accordingly, it was decided to proceed with a single vessel of 5,000 tonnes.

[10] The decision assumed that the larger, single transfer vessel would be able to use a cyclone mooring in the Norman River in the event of a cyclone.

4.2 THE DESIGN OF THE VESSEL

[11] The design of the transfer vessel commenced in 1996. The design brief specified that the design would need to provide for a draft that would enable the vessel to handle 1,000,000 tonnes per annum by transferring 5,000 dwt of zinc or lead concentrate to an export vessel anchored up to 20 nautical miles from the mouth of the Norman River in a maximum 18 hour cycle. A channel was to be dredged. Even with dredging, the entrance to the Norman River did not allow deep draft vessels to enter it. The transfer vessel would have to steam in a channel only 60 metres wide with a maximum draft of 3.85 metres fully laden.

[12] The ship's designer - ASDMAR Pty Ltd trading as Sea Transport Solutions ("ASDMAR") - concluded that the most suitable hull shape was a well deck ship with the following parameters:

Length	110.00 metres
Breadth	21.00 metres
Summer Loaded Draft	3.85 metres
Loaded Displacement	7,400 tonnes
Cargo Deadweight	5,050 tonnes

To meet these objectives it was necessary to keep the hull structure as light as possible within established criteria of weight, height and pressure heads.

[13] The vessel design incorporated a double hull to prevent spillage in the event of a stranding or collision. The distances between the inner and outer shells are approximately 3.5 metres port and starboard (producing void spaces) and 4.2 metres below (with the space being taken up with salt-water ballast tanks, void spaces, engine room and a pipe tunnel beneath the centre line of the hold). Its cargo hold is relatively small compared with the overall dimensions of the vessel. The void spaces enhance the vessel's stability. Studies undertaken by the designer prior to the construction of the ship are said to have indicated that the cargo hold could be filled with water but the vessel should remain afloat, provided no hull spaces were flooded.

[14] The design of the ship also incorporated features to minimise damage to the environment. One of these was an enclosed canopy over the hold space to prevent the escape of dust and also to protect the concentrate from rain. The canopy was designed to be constructed of lightweight material. An air circulation and dust scrubber system was incorporated to control dust.

[15] Another aspect of the design to prevent spills of concentrate, fuel and waste material was for rain and washdown water to be held in a collection water tank ("the dirty water tanks") and then discharged to the water treatment plant at the port facility.

[16] Because of its "clearly defined area of operation", Lloyd's Register of Shipping "Lloyd's Register") advised the designer on 14 January 1998 that a "reduced service notation of 0.8" would be accepted in association with the suggested service notation of "Coastal Service in the Gulf of Carpentaria".[4] Lloyd's Register's standard definition of "Coastal" is not generally exceeding 21 nautical miles offshore unless another definition of coastal is provided by local marine authorities.[5]

4.3 CONSTRUCTION AND DELIVERY OF THE SHIP

[17] Construction of the ship commenced in China in July 1998. The *Wunma* was launched on 16 April 1999 and named the *MV Wunma*. *Wunma* (pronounced "Woodma") is a word in the Lardil language group for a frigate bird that inhabits the waters of the Gulf.

[18] PCML took delivery of her in China on 22 August 1999. The ship sailed to Karumba, arriving on 18 September 1999. The first transfer of zinc concentrate was completed on 19 December 1999.

4.4 THE SYSTEM FOR REGISTRATION OF COMMERCIAL SHIPS IN QUEENSLAND

[19] The Queensland maritime safety legislation requires ships operating in Queensland waters, with some exceptions, to be registered.[6] Ships are registered according to their type: recreational, fishing or commercial.

4 Exhibit 49, CB1.

5 Exhibit 96; Statement of Mr Bundschuh - 1 August 2007; Exhibit 94; para 65.

6 Section 56 of the *TOMS Act*; *Transport Operations (Marine Safety) Regulation* 2004 ("*TOMS Regulation*") Part 3, Division 4, s.60. One of the exceptions is a ship that must be, and is, registered under the *Shipping Registration Act* 1981 (Cth), and for which there is a current certificate of survey under the law of the Commonwealth.

[20] The *Wunma* was required to be registered as a commercial ship. Under Queensland legislation an application to first register a commercial ship must be accompanied by:

- Certificates of compliance for the whole ship from:
  - an accredited ship designer; and
  - an accredited ship builder or an accredited marine surveyor; or
- A design approval certificate and any other certificates of compliance for the design not covered by the design certificate, and certificates of compliance from an accredited ship builder or an accredited marine surveyor; or
- A current certificate of survey,[7] or an equivalent certificate issued by a law of the Commonwealth or another State or by a "classification society".[8]

[21] In essence, before a commercial ship can be registered in Queensland, an application for registration must be accompanied by certificates from accredited persons, or a current certificate of survey or a certificate that is equivalent to such a certificate that is issued under Australian law or by a "classification society". MSQ may become involved with a ship long before an application for registration is received. In this regard, Part 3 Division 3 of the *TOMS Regulation* provides for a person, typically a ship builder, to give notice to MSQ of the intention to build a ship, and to provide a certificate of compliance for design. In such a case, MSQ will create a file for the ship upon receipt of the notice of intention to build, even though it may be a substantial period before an application for registration with supporting documents is received in respect of the ship that has been constructed.

[22] The Queensland legislation creates an accreditation system that is administered by MSQ.[9] In summary:

- MSQ accredits appropriately skilled and qualified people as ship designers, ship builders or marine surveyors;
- The accreditations are limited to the categories of materials and systems used on board ships in which the person is qualified and skilled;

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7 Issued under s.70 of the *TOMS Regulation*. Such a certificate of survey may only be issued by the General Manager if the application is accompanied by, amongst other things, certain certificates for the design of the ship.

8 *TOMS Regulation*, 2004 s.65. In 1999 when the *Wunma* was first registered, the requirements for first registration of a commercial ship were contained in s.43 of the *Transport Operations (Marine Safety) Regulation* 1995, which is in similar terms.

9 Part 5, Division 4 of the *TOMS Act* and Part 3 of the *TOMS Regulation*.

- An accredited person may issue a certificate of compliance for a ship in the category for which the accredited person is accredited;[10]
- Such a certificate of compliance may be relied upon to support an application for first registration of a commercial ship, and the conditions specified on the declarations are generally transferred to and included as conditions on the registration certificate.

[23] The intent of the accreditation system is to ensure that accredited persons are appropriately skilled and qualified. Written applications are made by persons wishing to be accredited, followed by interviews and vetting of applications. An audit system for accredited persons exists in which their records are checked for compliance with the legislation. MSQ then relies upon certificates of compliance issued by accredited persons to satisfy the design and survey requirements to first register a commercial ship. Generally registrations are issued upon receipt of relevant certificates of compliance from accredited persons. An alternative registration procedure involves acceptance of certificates issued by a "classification society".

[24] Classification societies are international non-government organisations that promote the safety of ships and offshore structures. This is achieved by setting technical rules, confirming that designs and calculations meet these rules, surveying ships and structures during the process of construction and commissioning, and periodically surveying vessels to ensure that they continue to meet the rules. Vessels are classified according to the soundness of their structure and design for the purpose of the vessel within the intended area or areas of operation.

[25] All nations, including Australia, require that ships flying their flag meet certain standards. In most cases these standards are deemed to be met if the ship has the relevant certificate from a member of the International Association of Classification Societies. Classification societies may be authorised to inspect ships and other structures and issue certificates on behalf of the state under whose flag the ships are registered.

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10 Generally speaking, an accredited designer will issue a certificate of compliance for design and/or stability; accredited builders will issue a certificate of compliance for building of hull, superstructure and/or machinery, and accredited surveyors will issue a certificate of compliance for survey and/or safety equipment.

[26] There are numerous classification organisations. The more significant ones that are recognized under Australian law are American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd and Lloyd's Register of Shipping.

[27] Under the Queensland system, a ship owner or ship builder may elect to use a classification society to certify not only the structure and machinery of the ship but also statutory matters such as load line. It is up to the ship's owners and builders to decide whether to use a classification society for one or other aspects of the ship and, if they do so, they are not obliged to use the society for all aspects.[11] In practice, a classification society certificate can be accepted for every aspect of the ship's design and construction except where a provision is displaced by a legislative requirement. For instance, the *TOMS Act* creates safety equipment requirements.

[28] If a commercial ship is over 24 metres in load line length (as defined in Section 7 of the *Uniform Shipping Laws Code* ("USL Code") then a load line certificate is also required for the purpose of registration. In addition, with the exception of fishing ships and sheltered water passenger ships, all Queensland commercial ships that are over 24 metres in length require a load line certificate.

[29] Classification societies may issue International load line certificates on behalf of flag state administrations or a local load line certificate on behalf of Queensland which is not a flag state and, once issued for a Queensland ship, the certificate replaces the need for a load line certificate to be issued under the *TOMS Regulation*.[12] Section 118 of the *TOMS Regulation* applies the relevant parts of Section 7 of the *USL Code* to the assignment of freeboard.

4.5 REGISTRATION OF THE SHIP IN QUEENSLAND

[30] In 1998 the Maritime Safety Branch of Queensland Transport[13] had a separate unit headed by a Senior Naval Architect who handled ship design approval matters. On 1 April 1998 the designer of the ship, ASDMAR, wrote to the Senior Naval Architect and advised:

> "This vessel will be registered in Queensland, Class 2B and will operate mainly in the Gulf of Carpentaria. The vessel's function is to load zinc ore at the port of Karramba and carry it to an overseas Bulk Carrier anchored approx. 10 miles offshore. This vessel will then tie

11 Statement of Werner Bundschuh – 3 August 2007; Exhibit 94; para 36.
12 *TOMS Regulation*, s.115(2)(b).
13 The predecessor in name to MSQ.

up to the overseas vessel and the unloading process will take place. There is one such cycle per 24 hours (loading 3hrs, steaming out 5 hours, unloading 4 hours, steaming back 5 hours, and waiting time in between).

> The vessel will be built to Lloyd's Register Class, who will approve the hull, machinery and electrical items (as well as any cargo gear)."[14]

[31] On 11 September 1998 the Executive Director (Maritime) advised the Principal Surveyor of Lloyd's Register in Shanghai of certain requirements for the ship to be registered in Queensland. At that stage Queensland Transport contemplated that certificates would be issued by Lloyd's Register including an International Load Line Certificate.[15]

[32] On 14 January 1999 the Senior Naval Architect corresponded with Captain Bruce Green, who was involved in supervising the vessel's construction in China, in relation to requirements for the ship's delivery voyage to Australia. This voyage required certificates and exemptions from AMSA. The letter also advised that, for Queensland Transport to register the vessel for use in Queensland, it would require the certificates listed in Queensland Transport's letter dated 11 September 1998 and an AMSA MARPOL Certificate.[16]

[33] Following telephone discussions between Lloyd's Register in Sydney and the Maritime Division of Queensland Transport, Lloyd's Register advised Queensland Transport on 16 February 1999:

> "… it is our understanding that as the vessel is not intended for international voyages, the requirements of the International Convention on Loadlines 1966 are not applicable in this case and therefore Lloyd's Register will not be issuing the International Load Line Certificate.
>
> Consequently, it is assumed that the vessel will be required to comply with the USL Code in respect of Loadlines and that the Loadline Certificate will be issued by Queensland Transport without any involvement from Lloyd's Register."[17]

[34] On 9 March 1999 the Senior Naval Architect advised various parties associated with the ship about the requirement for the vessel to obtain a load line certificate for Queensland waters. In summary, he advised that the system revolved around the

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14 MSQ registration file, folio 1; Exhibit 118.

15 MSQ registration file, folio 6; Exhibit 118.

16 MSQ registration file, folio 12; Exhibit 118. The same advice had been conveyed in a facsimile of 9 November 1998; MSQ registration file, folio 11; Exhibit 118.

17 Exhibit 49, CB6.

issuing of certificates by accredited people and that an accredited designer might issue a certificate of compliance for load lines. His letter included the following:

> "The accredited person can make decisions about what is an appropriate freeload (sic) deck for this ship based on calculations illustration (sic) that stability and damaged stability etc are acceptable. Previous similar ships may set precedents.
>
> If the ship is ever to operate outside of Queensland waters a Queensland "Certificate of Survey" will be required to
>
> (a) Gain AMSA approval for the voyage
>
> (b) Allow registration in another state.
>
> Any non compliances of the ship from the USL Code will need to be detailed on the "Certificate of Survey". The more non compliances, the harder it is to achieve a) and b). Thus non compliances should be kept to a minimum and so making the rear door watertight etc is a good investment."[18]

[35] AMSA advised the owner's representative on 26 March 1999 about its requirements for an exemption for the delivery voyage from China. AMSA stated:

> "As this vessel has a somewhat novel design, we will also need class to verify that means of preventing water entering the cargo well deck are adequate or that freeing arrangements are adequate (Jerry mentioned you have bilge arrangements in the cargo deck?) for the voyage. Additionally, we will need confirmation from class that the scantlings are adequate for the open sea voyage (Has vessel been designed for restricted sea conditions?)" [19]

"Class" is a reference to the classification society, in this case Lloyd's Register.

[36] What was described by AMSA as the ship's "somewhat novel design" and the need to verify that "means of preventing water entering the cargo well deck are adequate or that freeing arrangements are adequate" raised issues requiring consideration by AMSA in respect of the ship's delivery voyage and by the Maritime Division of Queensland Transport in connection with the proposal that the ship be registered for use in Queensland.

[37] In June 1999 Queensland Transport was requested to make a "policy decision" in relation to a load line certificate for the ship.[20] The policy issue related to the

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18 MSQ registration file, folio 20; Exhibit 118.

19 Exhibit 49, CB16.

20 MSQ registration file, folio 23; Exhibit 118.

acceptance of the concept of an “equivalent deck” for determining the freeboard to be assigned for load line purposes. The concept of an “equivalent deck” was not contained in the *USL Code* and Queensland Transport was asked whether it would accept such a concept as the registration authority that would receive the load line certificate. The policy decision was referred to the then Principal Advisor (Vessel Standards and Compliance), Mr Werner Bundschuh, who advised the Senior Naval Architect that the approach was reasonable.[21]

[38] An application for registration of the ship as a “transfer vessel” for Class 2C (rather than Class 2B, as previewed in April 1998) was made in August 1999.[22] A Certificate of Registration for Class 2C was issued on 25 August 1999.[23] The registration was issued following receipt of:[24]

- a Provisional Interim Certificate issued by Lloyd’s Register in Shanghai on 18 August 1999 that certified the hull and machinery of the ship;[25]
- a Certificate of Compliance for Loadline issued by an accredited designer, ASDMAR, on 17 August 1999;[26]
- a Certificate of Compliance for Stability issued by ASDMAR on 18 August 1999;[27]
- a Certificate of Compliance for Safety Equipment issued on 20 August 1999.

[39] The Certificate of Compliance for Stability included a declaration that the ship had been assessed to be seaworthy for stability for the purpose of the “delivery voyage only” and in “restricted offshore waters”. The Certificate of Compliance for Loadline similarly declared that the ship was seaworthy for load line for “restricted offshore waters”.

[40] The Certificate of Registration that was issued on 25 August 1999[28] included a limit “not more than fifty (50) nautical miles from the coast”. This reflected the standard limit of operational area for a Class 2C commercial ship.[29] The Certificate of Registration did not include as a condition compliance with the “conditions of class”

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21 Exhibit 94; paras 26 and 59.
22 Exhibit 49, CB25 and 26.
23 Exhibit 49, CB28.
24 Exhibit 49, CB25, 26, 27, 28; Exhibit 95; Exhibit 94, Part 4, p.5 Exhibit 118.
25 Exhibit 95; Exhibit 94, Part 4, p.5.
26 MSQ registration file; Exhibit 118.
27 MSQ registration file; Exhibit 118.
28 Exhibit 49, CB28.
29 *TOMS Regulation* 1995, s.79(3); *TOMS Regulation* 2004, s.108(4). These provisions define a different operational area if the ship is operating within the Great Barrier Reef Region or Torres Strait zone.

imposed by the classification society. This was treated by Queensland Transport as the owner's obligation and not stated on the registration certificate as a condition of registration. MSQ has subsequently adopted the approach of stating a requirement in a certificate of registration that the ship operate in accordance with the limits of class set by a classification society.[30]

4.6 THE "MIX AND MATCH" APPROACH TO REGISTRATION

[41] In 1999, prior to its registration, representatives of Queensland Transport liaised with Mr Stuart Ballantyne, the Managing Director of ASDMAR, and the ship's prospective owners about how the ship would be certificated and subsequently operated in Queensland. According to Mr Bundschuh, he made it clear that Queensland Transport preferred the ship to be classed and certified by Lloyd's Register to the fullest extent possible. This was to avoid some of the difficulties Mr Bundschuh said he has encountered with the "mix and match" approach that can happen with "partial class approvals".[31]

[42] The owners of the ship decided not to have Lloyd's Register issue a load line certificate.. Mr Bundschuh gave evidence concerning his "dismay" that Lloyd's did not issue a load line certificate such that Lloyd's Register was used "to only partially certify the ship".[32]

[43] The Provisional Interim Certificate issued by Lloyd's Register in Shanghai on 18 August 1999 was "for the purpose of the vessel's registration by the flag state administration only".[33] It contemplated a report being forwarded to the Committee of Lloyd's Register in London recommending the following class notation being made in its register book on completion of the construction survey:

> "Open hold Self Discharging Zinc Ore Carrier; Strengthened for Heavy Cargos; Coastal Services in the Gulf of Carpentaria." [34]

[44] The freeboard that was assigned by ASDMAR for the purposes of the load line certificate relied upon the concept of an "equivalent deck", which the Queensland registration authority accepted as a matter of policy. The classification society,

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30 Exhibit 94; paras 56 and 59.

31 Exhibit 94; para 56.

32 Exhibit 94; para 58.

33 Exhibit 95.

34 As already noted, Lloyd's Register defines "Coastal" as not generally exceeding 21 nautical miles offshore unless another definition of "Coastal" is provided by a local marine authority; Exhibit 96.

Lloyd's Register, had advised that it would not be issuing an International Load Line Certificate. It assumed that the ship would be required to comply with the *USL Code*. But the owner of the ship did not request Lloyd's Register to issue a certificate declaring that the ship complied with the *USL Code*. As a result, Lloyd's Register, as the classification society, was not required to address whether the ship's design and, in particular, its arrangements to free water entering the cargo well deck complied with the *USL Code*, and did not do so.

[45] Interestingly, the designer of the ship, Mr Ballantyne, assumed that the ship had been constructed with freeing ports at the stern ramp. In his witness statement he stated that there were about four of them, with a combined area of approximately two or three square metres that had flaps so that water could discharge freely into the sea, but so that water from waves could not wash into the well deck.[35] But freeing ports, either in that form or in some other form, were not installed in the aft well deck near the stern ramp. Presumably this was principally out of a concern that water being discharged through such freeing ports would be mixed with concentrate with adverse consequences for the environment. Further, the absence of freeing ports was said in July 1999 by Mr Dion Alston, a naval architect employed by ASDMAR, and who signed the Certificate of Compliance in August 1999, not to be essential to the ship's stability.

[46] The extent to which the requirements of the *USL Code* necessitated the installation of freeing ports in the aft well deck will be addressed later in this report.

4.7 THE INVOLVEMENT OF AMSA

[47] As already noted, in March 1999 AMSA had questioned in connection with the ship's delivery voyage whether the means of preventing water entering the cargo well deck and the freeing arrangements were adequate. It also raised issues concerning stability conditions for the delivery voyage.

[48] On 1 July 1999 Mr Alston advised the ship's manager, ISM, about these matters in a facsimile, a copy of which was sent to AMSA. Mr Alston's advice was that freeing ports in the well deck were not essential to the safety of the ship and that adequate margins of stability existed should the well deck become swamped. He advised that the hold was modelled with spill points at the top of the watertight seal on the stern

35 Exhibit 97; para 25.

door "allowing the liquid level to fall to this height". He advised that stability conditions were satisfied "with wide margins".[36]

[49] Mr Alston's facsimile further advised that Lloyd's Register had accepted a reduced service notation of 0.8 for Coastal Service in the Gulf of Carpentaria and had noted that delivery voyages required special consideration. Mr Alston advised that the main concern during the delivery voyage was the occurrence of slamming since the forward bottom strengthening requirements had been waived. He stated:

> "The delivery voyage should only be made in fair weather and caution should be exercised with regards speed, heading, and trim of the vessel to maintain immersion of the forefoot thereby avoiding slamming. The voyage plan is obviously of great importance in this matter also. Should conditions become extreme, the vessel should seek shelter, or the Master should take action to limit the effects of the weather as far as is practicable."[37]

[50] Preliminary delivery voyage conditions were prepared and Mr Alston noted that no deck cargo had been included. Subsequently, the Certificate of Compliance for Stability dated 18 August 1999 issued by him noted that the quantity of cargo the ship was to carry on its delivery voyage was limited to two deck containers of 10 tonnes each.

[51] A fax from Lloyd's Register to AMSA dated 19 August 1999 on the subject of *Report/Delivery Voyage Exemption* under the heading "*Load line and closing appliances*" includes the statement:

> "The shipyard is adding the gasket to the bottom of the stern ramp, and thus will be finished soon, we report to you immediately after the completion." [38]

[52] The voyage conditions that AMSA imposed upon the ship's delivery voyage are not in evidence but it seems likely that the exemption granted by AMSA was on the basis of the ship carrying little or no cargo and that the delivery voyage be undertaken in the kind of weather conditions advised by Mr Alston.

[53] AMSA's involvement was limited to the initial delivery voyage. It did not need to concern itself with the registration and seaworthiness of the ship when operating in

36 Exhibit 49, CB16.
37 Exhibit 49, CB16.
38 Exhibit 49, CB24.

Queensland waters. Indeed, when reviewing the ship's stability data for the purpose of issuing an exemption for its delivery voyage, AMSA recorded concerns about the standards applied in the inclining experiment report and noted that if the ship's owner was to bring the ship under AMSA's survey, it would need to be re-inclined.[39]

4.8 OVERVIEW CONCERNING REGISTRATION

[54] The ship was registered initially on 25 August 1999 on the basis of certificates for stability and load line that contained declarations concerning its seaworthiness in "restricted offshore waters".

[55] The fact that the ship's initial registration in Queensland was achieved on the basis of a Lloyd's Register Provisional Interim Certificate that contemplated a class notation "Coastal Services in the Gulf of Carpentaria" is significant. This class invoked a Lloyd's Register definition for service not generally exceeding 21 nautical miles offshore. Lloyd's Register did not alter its class notation at any time prior to the incident.

[56] Accordingly, so far as the classification society was concerned, the ship was classed at all material times for service in a restricted offshore area not exceeding 21 nautical miles.

4.9 A "FAR FROM A TYPICAL SEAGOING EXAMPLE"

[57] The ship's limited operating profile was not only reflected in the Provisional Interim Certificate issued by Lloyd's Register in 1999 and the conditions of its registration, it featured in communications and decisions concerning the crewing of the vessel.

[58] On 30 March 1999 ISM wrote to Queensland Transport concerning crewing certificates. It advised that the operation of the ship was "far from a typical seagoing example". The letter stated that the vessel's operation was "within a geographic area no more than 26 miles offshore and no more than 18.5 miles outside of Karumba Port limits" and that its operations would be conducted on up to 200 operational days per annum "undertaking an identical passage and schedule" of approximately 16 hours' duration.[40] ISM sought a "Safe Manning Certificate" with the Master and the mate each having a Master Class 4 certificate and the Chief Engineer holding a Marine Engine Driver Class 2 certificate.

39 Exhibit 49, CB24.

40 MSQ registration file, folio 22; Exhibit 118.

[59] This application for an exemption from crewing requirements became the subject of internal communications within the Maritime Safety Division of Queensland Transport. For instance, the Regional Harbour Master (Cairns), Captain Alan Boath, agreed that the vessel's normal area of operation within 30 nautical miles of the port performing identical round voyages of only 16 hours duration required "skills suited to masters with ship handling knowledge, and restricted inshore navigational skills, more generally found in holders of lower classification state issued certificates".[41] In addition, reliance was placed upon the fact that the crew had experience in similar operations in the Northern Territory and that a cyclone mooring had been located at Sweers Island.

[60] On 12 October 1999 the Director (Maritime Services), Captain Arthur Diack, forwarded a Memorandum to Captain Boath concerning the proposed crewing exemption. The Memorandum reviewed previous advice concerning qualified engineering staff and concluded with the following pertinent observation:

> "From a more general standpoint, it is clear that this proposal to reduce the crewing standards has important implications for the safety of the vessel and also for the general application of the regulation. The very limited area of operations severely restricts the options available to the vessel in emergency situations. For example, with the formation of a cyclone options other than going to a cyclone mooring may be preferable, i.e., proceeding to Weipa or to shelter in Northern Territory waters. Both of these would be precluded. To address these and other concerns, I believe that ISM should provide **an overall risk assessment of the proposed operation** showing clearly how safety standards will be preserved, what conditions would be imposed to compensate adequately for the reduced crewing standards and how foreseeable risks will be prepared for."[42] (Emphasis added)

[61] In the end result, changes to the qualifications of Masters in subsequent years and prior to the incident lead to the appointment of a Master Class 1. This meant that the specific concerns raised in Captain Diack's Memorandum concerning the operational limitations placed upon certain classes of Master did not apply in the circumstances of the incident. However, Captain Diack's general observations concerning the restricted options available to the vessel in emergency situations were apposite. His suggestion that ISM should provide an "overall risk assessment for the proposed operation" was not taken up at the time or subsequently.

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41 Exhibit 90; para 9; Exhibit 49, CB15.
42 Exhibit 49, CB31.

4.10 CYCLONE MOORINGS

[62] Because the ship's area of operation was in a cyclone area, a cyclone mooring was intended as an essential part of the vessel's original operation.

[63] PCML's submission to the "2000 Engineering Excellence Awards" of The Institution of Engineers Australia – Queensland Division outlined the following matters in connection with a cyclone mooring:

- Karumba is prone to cyclones.
- Based on a mine life of 20 years, it is reasonably certain that Karumba would have several cyclones during that period.
- The Department of Transport insists that all large vessels should proceed to sea in the event of a cyclone.
- The shallow water and unsurveyed areas around the Gulf Region make it dangerous for small vessels if they become trapped by a cyclone in the southern part of the Gulf.
- The long lead-time required running north to escape a cyclone may cause frequent closure of the mine, particularly if the stockpile is close to capacity.
- The wharf was designed for normal operations and not over-designed to cater for cyclone events.
- A cyclone mooring was originally planned for the Norman River upstream from the wharf but subsequent surveys indicated there was insufficient depth in the river for the required swing circle.
- Investigator Road between Bentinck and Sweers Islands, being approximately 70 nautical miles from Karumba, is within 12 hours steaming of the Port.
- In the event of a cyclone warning reaching Category 1 (cyclone expected within 24 hours), the vessel will cease operations and proceed to the mooring.[43]

[64] It will be necessary to address a number of these matters in greater detail.

[65] By mid-1998 consultants to PCML were engaged in discussions with Queensland Transport about a suitable location for a cyclone mooring in the Norman River. On 29 July 1998 Captain Watkinson, Captain Boath, Captain Diack and Mr Rod Ridley

[43] Exhibit 49; CB47.

(Manager, Hydrographic Services, Department of Transport) met at Karumba with PCML's consultant, Mr Campbell Smith, to discuss PCML's proposed location for a cyclone mooring in the Norman River.

[66] At this meeting. Mr Smith advised that PCML had decided to use only one vessel for its transfer operation. He explained that the ship would have a length of 110 metres and a draught of 3.8 metres. On learning this, issues arose about whether a cyclone mooring in the Norman River for such a ship was feasible because:

- a hydrographic survey of the Norman River produced in October 1997 showed that the shallow water extended further into the river than previously indicated in a 1967 hydrographic survey;
- a cyclone mooring in what had previously been the proposed position - some 240 metres upstream from the proposed wharf - was not possible because there was insufficient swing room during cyclonic conditions;
- the positioning of a cyclone mooring adjacent to the proposed wharf would require the cyclone mooring to be positioned in the middle of the channel and that would create a potential marine hazard;
- an alternative proposal to moor the ship fore and aft in deep water approximately 4.6 nautical miles up the Norman River would not require any swing room, but this option created the risk that the ship would be exposed to weather conditions from all directions with an increased likelihood of damage to the vessel.[44]

[67] Captain Boath gave evidence in the Inquiry that one of the locations for the cyclone mooring considered at that time was sufficient if the ship was in an unloaded state.[45] However, according to Captain Boath, the consultants to the project did not know whether they would be able to provide the ship in a light condition within sufficient time.[46] In a loaded condition, the ship was at risk of grounding in a shallow area that protruded about 35 metres into the swing circle of a single point mooring.[47] There was also discussion about a facility to discharge the vessel at the wharf once loaded, but no such facility has ever been established.

[68] Further investigations identified another possible site for a piled mooring closer to

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44 Affidavit of Captain Diack dated 3 November 1999; Exhibit 49, CB34, para 8.
45 Captain Boath; T.713; T.738.
46 Captain Boath; T.714–715.
47 Exhibit 49, CB4.

the wharf. Approval was obtained from the Department of Environment and Heritage on 15 February 1999 to install a single point mooring. However, a hydrographic survey of the area commissioned by PCML in February 1999 showed that, in the event of a cyclone, the swing circle of the ship could create a potentially serious safety problem.[48] The water was of sufficient depth in this position but the swing circle would bring the stern of the vessel to within 20 metres of the wharf. There was an additional issue of whether other vessels would be able to bypass her in the river.[49]

[69] Another site that was identified was located a substantial distance upstream from the wharf at the mouth of Russell Creek, where there was a relatively deep hole. The proposal in this case was for a two point mooring which would have required the ship to be held by lines secured from the bow to one mooring and from the stern to the other. This proposal did not require the swing room required by a single point mooring because the ship would be essentially held in the direction of the current.[50] But the disadvantages of a two point mooring was the risk of cyclonic winds coming beam on and concerns that the dust canopy might be damaged. Although Captain Diack, considered this to be a viable option, he recalled that PCML's preference was that the ship should be on a swing mooring so that its bow could be kept to the weather.[51]

[70] In the end result, PCML identified a location in the Wellesley Islands group between Bentinck and Sweers Islands called Investigator Road. The history of that location and the enduring relationship of indigenous Australians with it is described in detail in other places.[52] It was described by Justice Cooper of the Federal Court of Australia in a decision delivered on 23 March 2004 which recognised that native title existed over areas of sea surrounding the Wellesley Islands group.[53] Justice Cooper's 2004 decision was the culmination of a process that began on 12 March 1996 when a claim was lodged with the National Native Title Tribunal.

[71] An account of the history of European encounters with the place that was named

48 Affidavit of Mr Smith - 2 November 1999; Exhibit 49, CB33, para 29(e) and CS4 to that affidavit; see also Exhibit 49, CB4.

49 Statement of Arthur Diack - 13 August 2007; Exhibit 80; para 5; Captain Diack; T.899–900.

50 Exhibit 80, Part 2, para 6; Captain Diack; T.900.

51 Statement of Captain Diack - Exhibit 80; para 14.

52 These include Memott and Channells *Living on Saltwater Country: Southern Gulf of Carpentaria Sea* Country *Management, Needs and Issues*; National Oceans Office (2004).

53 *The* Lardil *Peoples v State of Queensland* [2004] FCA 298.

"Investigator's Road" by Captain Matthew Flinders is also beyond the scope of this report. Flinders anchored there in the *Investigator* on 21 November 1802 and described it in his journal as "well sheltered".

[72] The extent to which the anchorage at Investigator Road provides an accessible and safe mooring during extreme weather remains a subject of controversy. In 1999 *The Australian Pilot* described the anchorage at Investigator Road as being:

> "the only secure anchorage at the head of the Gulf of Carpentaria for vessels throughout the year. It is sheltered from prevailing winds, E by Sweers Island and W and N by Fowler and Bentinck Islands. The roadstead to it is spacious and easy of access from S, having a broad and clear passage leading to it".[54]

[73] Others have questioned its safety. For instance, the Board received a letter from a long time resident of Karumba, Mr Bill Rutherford, President of the local Progress Association and Secretary of the Karumba Volunteer Marine Rescue Unit. Mr Rutherford recounted an experience in 1976 when he went to the anchorage for shelter and "found it unsafe and dangerous".[55]

[74] Ms Kelly Osmand visited the location on occasions between 1999 and 2003 when working on fishing boats. She described the area in which the cyclone mooring buoy was located as quite narrow with a number of rocks. Having moored there in fishing boats, she said that it could be quite an exposed mooring.[56]

[75] A former Master of the *Wumna*, Captain Frank Thomson, described the location as "not the best of places" and not as good as having a cyclone mooring in the Norman River, but at least providing protection in every direction except if a cyclone was coming back off the land.[57] He explained that wind coming from that direction came over land and shallow water and would not get much fetch. But he explained that from the bridge of the *Wunma* you could look back and see the reef and it looked "awfully close". Like many other witnesses, Captain Thomson had not been in the anchorage during a cyclone and could not comment on the strength of the mooring, but he observed "if you moved, you did not have much time to get out of trouble".[58]

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54 Annexure "CS5" to the affidavit of Mr Smith; Exhibit 49, CB33.
55 Exhibit 121
56 Exhibit 38; paras 61 and 62.
57 Statement of Captain Thomson – 8 August 2007 - Exhibit 9; para 27.
58 Captain Thomson; T.31.

[76] In 1999 PCML chose Investigator Road as the most suitable location for a cyclone mooring for the *Wunma* during a cyclone because:

- it was marked on Australian Chart Aus303 as a safe anchoring area and was also described in *The Australian Pilot* as a safe anchorage;
- PCML's consultant, Mr Smith, was informed by Captain Peter Oestreich, from the Australian Reef Pilots, that the anchorage had been used in the past by cargo vessels unable to enter Karumba because of bad weather and that Captain Oestreich had used the anchorage in the past;
- the mooring was to be sheltered from heavy seas from all directions and whilst greater swells could be expected from the south, if they had persisted from that direction, the distance from the mainland was such that large swells were not anticipated;
- the location was the closest to Karumba that could offer a safe mooring, being 70 nautical miles north-west of Karumba and taking the *Wunma* approximately 12 hours to mobilise travel and make fast to the mooring. The next closest locations for a mooring were:
  - the Sir Edward Pellew group of islands, approximately 260 nautical miles north-west of Karumba; or
  - Weipa, approximately 310 nautical miles to the north;

  which were both too far in the event of a cyclone approaching;
- Investigator Road met the criteria of safety and proximity having deep water, a large swing circle, reasonable shelter from wind and sea and being within 12 hours standing of Karumba.[59]

[77] On 12 July 1999 PCML applied to Queensland Transport for a buoy mooring authority at Investigator Road.[60] In support of the application PCML advised that the wharf facility was not sufficiently strong to allow the vessel to stay alongside in a cyclone, there was insufficient swing room in the Norman River for the vessel to anchor or place a mooring and that proceeding to sea may put the ship and crew in danger.[61] The mooring application was processed and a restricted buoy mooring authority, CK-005, was issued on 6 August 1999.[62] On 12 August 1999 Captain Boath agreed to the extension of time within which to lay the mooring.

59 Affidavit of Mr Smith, Exhibit 49, CB33, para 31.
60 Affidavit of Mr Smith, supra, para 40; [1999] FCA 1633 para [3]; CB125.
61 Exhibit 49, CB125.
62 CB125; [1999] FCA 1633 para [5].

[78] On 25 October 1999 claimants to native title rights and interests in part of the seas and submerged lands at the Gulf of Carpentaria who were applicants in the Federal Court proceedings filed a notice of motion seeking certain orders including that the restricted buoy mooring authority be declared invalid, that PCML and its contractors be restrained from constructing or authorising the construction of the cyclone mooring and that the State of Queensland be restrained from extending, renewing and/or re-issuing the restricted buoy mooring authority.

[79] The determination of the application for injunctive relief turned on technical issues concerning the procedural rights conferred by the *Native Title Act* 1993 on native title claimants.[63] Because the application for injunctive relief was determined on that basis, Justice Cooper did not address in his judgment factual matters concerning the safety and necessity of the cyclone mooring proposed at Investigator Road. However, PCML and the State of Queensland filed affidavits in relation to those issues that are relevant to the issues about which the Board is required to inquire.

[80] On 2 November 1999 Mr Smith, swore an affidavit in support of the location of a cyclone mooring at Investigator Road. He detailed other options that had been considered and rejected by PCML. These included:

- The Karumba Wharf was rejected because, under the Cyclone Contingency Plan at the Port of Karumba issued by the Department of Transport, the ship would have to put to sea when the cyclone was forming.
- The Roadstead was said to offer "no protection for the *Wunma* in the event of a cyclone".
- There were no sites along the route between Karumba and the Roadstead that were suitable for anchoring in the event of a cyclone.
- A suitable position for a buoy mooring in the Norman River could not be found, for the reasons previously outlined.

[81] The following sworn evidence was given by Mr Smith about the option of going to sea:

> "The option of sending the *Wunma* to sea is not viable due to:
>
> (i) the shallow waters in the Gulf and the substantial unsurveyed areas in the southern part of the Gulf;

[63] *Lardil People v State of Queensland* [1999] FCA 1633; for a commentary on the decision see Beckett "Federal Court Strikes Blow to Protections for Native Title Claimants" [2000] ILB 40.

> (ii) the inherent risks such as running aground or colliding with another vessel, associated with the vessel being subjected to cyclonic winds and high seas in open water."[64]

[82] Captain Diack, who was then the Director (Maritime Safety) employed in the Maritime Division of Queensland Transport, swore an affidavit on 3 November 1999. In it, he explained that the *Wunma's* planned response to the threat of a cyclone was limited because:

- investigations of a cyclone mooring in the Norman River had not revealed a feasible location;
- there was no place within the Port of Karumba where a vessel the size of the *Wunma* could be safely anchored or moored to ride out a cyclone because of the need of the vessel to swing through 360º to lie head to wind at all times;
- the Port Cyclone Contingency Plan required large vessels such as the *Wunma* to proceed to sea in the event of a cyclone;
- cyclones form in the middle of the Gulf and their direction of travel was frequently between easterly and southerly, placing Karumba and consequently any ship leaving Karumba potentially in the dangerous quadrant of the cyclone. He explained that, to avoid a cyclone, a ship leaving Karumba would need to travel around behind the cyclone, either by going west and then north, or going directly north, depending on the predicted movement of the cyclone, but the *Wunma's* Class 2C classification inhibited her ability to move clear of the dangerous semi-circle of the cyclone.[65]

[83] Captain Diack concluded:

> "It is highly desirable for the *Wunma* to have an established cyclone mooring in a relatively sheltered position."

[84] Because of the application for an injunction before the Federal Court, PCML voluntarily suspended the installation of the cyclone mooring. However this meant that the mooring was not placed within the period allowed for in the original authority, the authority lapsed. A further application was lodged and notification of the application was given to interested parties under the *Native Title Act* 1993. On 7 December 1999 representatives for the native title claimants in the Federal Court

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64 Affidavit of Mr Smith; Exhibit 49, CB33, para 29.

65 Affidavit of Captain Diack dated 3 November 1999; Exhibit 49, CB34.

proceedings and the CLCAC made extensive submissions in writing concerning the proposed issuing of a restricted buoy mooring authority.[66]

[85] On 9 December 1999 Captain Diack provided a Memorandum to the Acting Executive Director (Maritime) that recommended that a restricted buoy mooring authority issued on the grounds of the safety of the vessel.[67] In it, Captain Diack advised that, without the availability of the mooring, the vessel would be constrained to seek shelter, probably within the island group which is the nearest shelter to the operating area, and lie to anchor, "a much less secure situation with a much higher potential to cause adverse impact to the environment". He considered that the vessel should be able to use the mooring in any state of loading "as the formation of a cyclone can happen very rapidly" and that the best situation in fact would be for the vessel to be loaded as it would be easy to control and would lie better at the mooring and be less affected by wind. Alternatively, he said, the ship should be deeply ballasted. This advice was accepted and on 16 December 1999 a restricted buoy mooring was issued.[68] The authority expired on 16 December 2000.

[86] The cyclone mooring was installed by the end of 2000, and it remained a matter of controversy.

[87] An application to renew the authority was made by PCML on 11 December 2000.[69] On 15 December 2000 a new restricted buoy mooring authority was issued. The Statement of Reasons dated 15 December 2000 served to highlight the necessity for a cyclone mooring buoy in order to ensure the safe operation of the *Wunma*. [70] The findings on material questions of fact expressed in the Statement included that the area of operation of the *Wunma* was prone to cyclone activity, that mooring the vessel in the river would pose a significant risk to marine safety and that much of the south-eastern section of the Gulf is inadequately surveyed. It noted the classification limits of the vessel to 50 nautical miles off the coast. It stated that alternative cyclone mooring locations at Weipa and the Sir Edward Pellew group of islands were significantly more distant from the vessel's area of operation. Investigator Road was said to be recognised as a suitable site for a cyclone mooring.

66 Exhibit 49, CB38.
67 Exhibit 49, CB40.
68 *Ibid*, CB44.
69 *Ibid*, CB52.
70 Exhibit 49, CB54.

[88] The Reasons for the decision to renew the buoy mooring authority included the following statements:

- "Cyclone activity in the *Wunma's* area of operation represents a clear threat to the safety of the vessel, crew and to the marine environment";
- "To provide an adequate level of safety during a cyclone the vessel must have a suitably constructed and located mooring to which it can be secured";
- "The Port of Karumba and the Norman River do not provide adequate space to safely site a mooring of the *Wunma* where it can be safely anchored or moored to ride out a cyclone";
- "The cyclone contingency plan for the Port of Karumba requires large vessels including the *Wunma* to proceed to sea when it is evident a cyclone is forming and to head north to place their vessel in the northern quadrant of the depression forming the cyclone";
- "The current status of surveyed areas in the south eastern section of the Gulf of Carpentaria restricts a vessel's ability to avoid a cyclone by moving out to sea"; and
- The "*Wunma's* capacity is further restricted by the limit placed on the distance it can move from the shore".

[89] In subsequent years, further applications for a cyclone buoy mooring authority were made and granted for similar reasons.

4.11 OVERVIEW – THE NEED FOR A CYCLONE MOORING

[90] The sworn evidence given on behalf of PCML and the Department of Transport in the Federal Court proceedings serves to highlight that a cyclone mooring was considered essential for the safe operation of the ship. In granting a restricted buoy mooring authority in December 1999 and in renewing it in subsequent years, Queensland Transport officials emphasised that:

- Cyclone activity in the *Wunma's* area of operation represented a clear threat to the safety of the vessel, its crew and to the marine environment.
- To provide an adequate level of safety during a cyclone the vessel had to have a suitably constructed and located mooring to which it could be secured.

[91] During this period the representatives of PCML and Queensland Transport did not regard the option of sending the ship to sea in the event of cyclonic activity as

viable. In fact, the option of sending the ship to sea was treated as carrying risks that necessitated a cyclone mooring for the ship in a relatively sheltered position.

[92] Their position that a cyclone mooring was needed in the face of the "clear threat to the safety of the vessel, crew and to the marine environment" from cyclonic activity in the ship's area of operation provides a background against which to review proposals that later emerged to discontinue the use of the cyclone mooring at Sweers Island and to permit the ship to go to sea in the open waters of the Gulf during a cyclone.

4.12 PROPOSALS TO DISCONTINUE THE USE OF THE CYCLONE MOORING AT SWEERS ISLAND AND TO ALLOW THE SHIP TO HEAD INTO OPEN WATERS IN A CYCLONE

[93] As the following account of events indicates, pressure to discontinue use of the cyclone mooring at Sweers Island was exerted through two channels by representatives of indigenous communities; first, by direct representations to PCML and subsequently Zinifex seeking the removal of the mooring and, secondly, by representations to the EPA.

[94] On 30 November 1999 the legal representatives for the native title claimants and the CLCAC wrote to the EPA requesting, among other things, that the EPA require PCML to carry out an environmental investigation into the construction and operation of the cyclone mooring.[71] They contended that the establishment and use of the mooring at Investigator Road, Sweers Island, in cyclonic conditions by a vessel carrying lead and zinc concentrate was an activity likely to cause serious and/or material environmental harm. The submission referred to the general sensitivity of the marine environment and the special significance of the area to Aboriginal communities. The operation of a barge in cyclonic conditions, with the consequential risk of spillage of concentrate, was said to create more than a remote possibility of harm to an area of high conservation value and special significance, and affect the cultural, social and economic well-being of the local Aboriginal community.

[95] PCML was offered an opportunity by the EPA to comment on the matter and responded through its lawyers in February 2000.[72]

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71 Statement of Mr O'Connor – 27 July 2007 – Exhibit 44; para 4.

72 *Ibid*; para 5.

[96] In mid-2000 the lawyers for the native title claimants and the CLCAC provided two substantial reports to the EPA. The first was titled "Submission to Queensland Environmental Protection Authority concerning Pasminco's Cyclone Mooring in Investigator Road" and was prepared by Associate Professor Paul Memmett.[73] The second was a report dated September 2000 by Dr Peter Cowell titled "Assessment of information on the cyclone mooring and its operation: Investigator Road, Wellesley Islands, Gulf of Carpentaria".[74]

[97] In response to these submissions the EPA commissioned two reports as to the potential impacts of the cyclone mooring buoy. These reports were prepared in October 2001. The first was entitled "Potential Impact of Cyclone Buoy Mooring on Cultural and Heritage Values of Indigenous People: A Risk Based Approach" by Mr Peter Bindon.[75] The second was entitled "Potential Impact of Cyclone Buoy Mooring on Resource Quality in a Channel between Bentinck and Sweers Island in the Gulf of Carpentaria – A Risk Based Approach" by Dr Krishna Srivastava.[76]

[98] On 7 December 2001 the EPA decided that it would not be reasonable to require PCML to carry out an environmental investigation pursuant to s.323 of the Act.[77] However, based on legal advice, the EPA later revoked that decision. The effect of the revocation was that the EPA was taken not to have made a decision as to whether PCML was required to undertake an environmental audit or environmental investigation of its cyclone mooring buoy. This change of the EPA's position was communicated to the representatives for the native title claimants and CLCAC in March 2002, who were invited to make further submissions regarding the reports that the EPA had commissioned.

[99] On 11 July 2002 the legal representatives for the native title claimants and the CLCAC lodged further submissions with the EPA requesting that PCML be required to undertake an environmental impact assessment and a social impact assessment in relation to the cyclone mooring. These submissions relied upon the following reports:

- *A Critique of a Cultural Heritage Impact Assessment of a Cyclone Buoy Mooring, Investigator Road, South Wellesley Islands* prepared by Associate

73 Ibid; para 6.
74 *Ibid*; para 7 and Exhibit GJO-01.
75 *Ibid*; para 9 and Exhibit GJO-02.
76 *Ibid*; para 9 and Exhibit GJO-03.
77 Exhibit 49, CB60.

Professor Memmett in April 2002.[78]

- *Errors and Misconceptions in Queensland EPA Risk Analysis of the Wunma Cyclone Contingency Plan: Investigator Road, Wellesley Islands, Gulf of Carpentaria* prepared by Dr Cowell in June 2002.[79]

[100] A lengthy period elapsed in the EPA's consideration of the matter. The reasons for its delay are unexplained. In the meantime, representatives of Gulf Aboriginal communities raised their concerns directly with PCML.

[101] On 29 November 2002 the Managing Director of ISM, Captain Andrew Dally, forwarded an email to the Regional Harbour Master, Captain Boath in relation to the cyclone mooring, in which he stated:

> "This issue has arisen as a result of Gulf Communities representatives conducting a sit-in at Century Mine. The present cyclone mooring for MV Wunma at Sweers Island was tabled as an issue and the Gulf Communities representatives are seeking the mooring be removed from its present location.
>
> To determine alternative contingency plan in the event of a cyclone Pasminco has contracted Intercontinental to develop a full plan. Campbell Smith will be assisting Intercontinental with the proposal. Note that account must be taken of statements in Court proceedings between various parties. The following options are to be explored:
>
> 1. Relocate the mooring to a position in the river that was previously considered plausible provided the vessel was in ballast.
>
> 2. Modify the existing wharf in Karumba with additional moorings if necessary to ensure suitability in a TRS.
>
> 3. Develop a contingency plan that may include point 1 or 2 and consider a variety of options including actions to outrun or seek a port of refuge like Weipa.
>
> The proposal will consider the most recent data available from Bureau of Meteorology and explore the need to conduct environmental impact studies."[80]

[102] On 17 December 2002 Captain Dally again wrote to Captain Boath about "possible options available to PCML to move the current cyclone mooring in Investigator

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78 *Ibid*; para11 and Exhibit GJO-04.

79 *Ibid*; para 11 and Exhibit GJO-05.

80 Exhibit 49, CB66. The restricted buoy mooring authority was renewed on 12 December 2002: Exhibit 49, CB63.

Road to some area close to Karumba". The most favoured option was said to be in the Norman River as close to the buoys as possible, and it was noted that Captain Boath had recommended a survey of the river to be undertaken to ensure that there was sufficient water in the river to allow for the mooring at full ballast draft.[81]

[103] The evidence indicates that such a survey was not able to be undertaken. Although Captain Boath contacted the Hydrographic Survey Section which provided a quote for its services and this was passed on to ISM, unfortunately, the Hydrographic Services Unit ran out of time and personnel, did not have a suitable vessel to conduct the required surveys in the river, and the surveys were not progressed.[82]

[104] In late August 2003, the EPA sought advice from PCML on the operation of the *Wunma* under cyclonic conditions and its use of the cyclone mooring buoys.[83] PCML's Manager of External Affairs, Mr Kent Quigley, responded by letter on 15 September 2003.[84] Remarkably, in that response, Mr Quigley claimed that "Extreme weather patterns were taken into account during the design of the vessel" and that the ship had a "Totally enclosed cargo hold to prevent escape of mineral concentrate". The letter enclosed extracts from ISM's Safety and Quality System which, at the relevant time, provided for the ship to depart for the cyclone mooring at Sweers Island in the event of a Red Alert. Curiously, it attached a PCML Cyclone Procedure for the ship which contemplated, in addition to heading to the cyclone mooring, the option of "heading to sea".

[105] The status of this PCML Cyclone Procedure in 2003 is unexplained and the document itself describes its status as a draft. It is difficult to reconcile with the cyclone procedure in the SQS and equally difficult to know whether the option of "heading to sea" could be reconciled with the ship's Class 2C registration insofar as the option of heading to sea contemplated cyclone avoidance navigation in open waters which might take the ship more than 50 nautical miles from shore. In any event, if the PCML Cyclone Procedure was operative in late 2003, it was replaced in May 2004 by a Cyclone Procedure issued by Zinifex[85], which likewise gave the alternatives of either heading to sea or to the cyclone mooring depending on the position and direction of the Tropical Revolving Storm.

81 Exhibit 49, CB64.
82 Captain Boath; T.715.
83 Exhibit 44; para 12.
84 Exhibit 49, CB67.
85 Exhibit 11.

[106] On 10 December 2003 Mr Smith wrote to Captain Boath. He described himself as having been directly retained by ISM as operators of the *Wunma* and indirectly by PCML as owners of the *Wunma* “to review vessel operational procedures in the event of a cyclone approaching Karumba”.[86] Copies of the letter were sent to Mr Quigley, Captain Dally, and to ISM’s Operations Manager at Karumba, Captain Heath Daniel. The contents of Mr Smith’s letter are to be contrasted with his sworn evidence in the Federal Court proceedings before Justice Cooper concerning the necessity of a cyclone mooring and the safe operation of the ship.

[107] In the letter, Mr Smith asserted that, in the four years in which the vessel had been in operation, ISM had gained very valuable experience in her handling characteristics in the river, channel and at sea. He continued:

> “ISM believe that their operational experience now precludes the necessity to utilise the cyclone mooring as they are confident that, with new procedures to be included in the Shipboard Safety Manual, they will be able to handle any cyclone event either by anchoring in the river, anchoring outside the river, proceeding to Weipa or riding out the cyclone in the Gulf of Carpentaria”.

[108] Mr Smith also noted that the Department of Transport filed an affidavit in the Federal Court proceedings and that its support was based on safety concerns, including the lack of space in the Norman River to lay a suitable mooring. Mr Smith said that with four years’ experience of operating in the area, the operators believed that alternative arrangements could be made.

[109] Mr Smith attached three draft procedures. The first was described as a standard wet season procedure and had the objective “to ensure that the vessel will have nil cargo on board in the event of a cyclone occurring in the Gulf of Carpentaria”. It involved monitoring weather conditions and assessing if conditions were worsening. The second was a sailing procedure in the event of a cyclone. The third was a procedure for avoiding cyclones at sea.

[110] Mr Smith’s assertion that operational experience precluded the necessity to use a cyclone mooring is difficult to reconcile with the contents of his affidavit in the Federal Court proceedings which clearly put that a cyclone mooring was an essential feature of the ship’s safe operation. There had been no suggestion there that the need for a cyclone mooring would cease once the crew obtained operational

86 Exhibit 49, CB68.

experience. It might be said that operational experience entitled Mr Smith to change his mind about the necessity of a cyclone mooring but, if it did, his letter did not explain what this operational experience was. The letter did not refer to operational experience gained in cyclonic conditions. In fact, the letter reported that no cyclone events had occurred which necessitated the ship proceeding to the cyclone mooring.

[111] It is impossible to reasonably conclude that the ship's daily routine of going to and from the Roadstead in conditions that usually were suitable for discharge operations provided the kind of operational experience that precluded use of a cyclone mooring, and which equipped the ship and its crew to ride out cyclones in the Gulf.

[112] On 9 February 2004 Captain Boath met with Mr Smith to discuss the cyclone mooring and PCML's interest in removing it. Captain Boath advised Mr Smith that he would not be prepared to endorse such a course without some certainty that the vessel's procedures were effective and that experience to date indicated they were "severely deficient". Captain Boath cited the example of the episode in March 2003 when, during cyclonic activity, the *Wunma* returned to port due to a lack of fuel when the relevant cyclone alert did not permit it to do so.[87] Captain Boath also said he believed sustained operations placed too much of a burden on the crew and needed to be reviewed.[88]

[113] By April 2004 Zinifex had become impatient about Captain Boath's failure to provide a written response to the draft procedures that had been sent to him.[89] In due course, a meeting was arranged with Captain Boath in Brisbane on 14 July 2004. The day after that meeting Mr Smith circulated to Captain Dally and Captain Daniel his thoughts on the meeting with an invitation to change or add to this account of it. The record of the meeting is illuminating in terms of the advice which Captain Boath gave concerning the need for a cyclone mooring. Its contents were reflected in a subsequent letter to Captain Boath which the Board finds to be a fair and accurate account of the state of play in mid July 2004.

> "1. As close as a week ago, Alan was still somewhat 'hostile' although acknowledging that Management had changed. He brought up the March 2003 incident and also fatigue

87 Exhibit 49, CB73, T.736.
88 Exhibit 49, CB73.
89 Exhibit 49, CB76.

management as the two main issues, as well as his problem with previous management.

2. I think the face to face meeting yesterday, although late in the piece (after all the attempts to set it up) was none the less very encouraging as there was a definite move on Alan's part to offer a compromise. This was the way we worked together in the days of the Wunma project and hopefully will be maintained in the future.

3. He foresees a problem with the Wunma having no cyclone moorings as there will have to be an extremely strong case that not only would safety not be compromised, but in fact would be improved.

4. He feels the best solution is for Zinifex to have a mooring in the Norman River, a discharging system at the wharf to cater for those times when the Wunma may be caught with product on board when a cyclone is approaching, and procedures in place to move to the mooring in the river.

5. He acknowledges that it may be a rare occasion when the vessel is caught with product on board especially if the Met Office supply adequate warnings as per their custom today. In this case, I think the compromise will be that they will not push for a discharge system but will rely instead on the mooring plus adequate procedures.

6. If Zinifex give up the buoy mooring permit, QDOT will insist on the current moorings being removed. They could not be left for local population to use as they would need a buoy mooring permit, and to get that they have to nominate a vessel which will use it.

7. Zinifex will have to put up a good case in the first instance not to use a cyclone mooring to ensure that it is not ditched at the first approach. In other words the approach to QDOT must be made with safety in mind and a case must be argued clearly for change.

8. If the mooring permit is just allowed to expire, QDOT may not be able to do anything in the first instance (reactive legislation, not proactive). However if ever there was an incident, then they would hit ISM/Zinifex with everything. He does not advise following this method as that would put everyone offside immediately.

9. Other matters were discussed such as crew rosters, fatigue management, however he did not seem to have as much problem with this matter as obviously changes had been made to operations.

10. It is suggested that the first step is for Zinifex to write to QDOT re changes required and giving reasons. They in turn will review

> affidavits presented to Native Tribunal to see where the major areas of concern lie. They are very conscious of the fact that they made representation to the Court based on safety (there were three separate affidavits) and it will be very difficult to argue for changes to their earlier arguments about safety unless it can be shown that, after 5 years operating experience, the method proposed is shown to be safer and is acknowledged by QDOT that that is correct.
>
> 11. He mentioned that no doubt an EIS will have to be completed and the local residents placated if a mooring was to be placed in the River."[90]

[114] Captain Boath's advice in July 2004 was vindicated by subsequent events. In July 2007, some three years after Captain Boath gave his advice concerning the need to have a mooring in the Norman River, a discharging system at the wharf to cater for those times when the *Wunma* may be caught with cargo on board when a cyclone is approaching and adequate procedures, Zinifex appointed the Australian Maritime College ("AMC") to investigate and report on these matters. The AMC, in its report following the first phase of its investigation, reached much the same conclusion, namely that the safest place for the ship, her crew and the environment was a dedicated cyclone mooring in the Norman River.[91]

[115] However, in July 2004, Captain Boath's advice was not exactly what Zinifex wanted.[92] Its then Operations Manager, Mr Walter Newton, said as much in an email to fellow Zinifex employees on 17 July 2004.[93] On 19 July 2004, Mr Quigley, the Group Manager – Stakeholder Relations & Reputation Management for Zinifex recommended to other Zinifex personnel that Zinifex continue to progress the removal of the mooring. His email stated:

> "The State Government maintains a high level of nervousness with possible exposure to compensation on cultural and environmental grounds. I will arrange a meeting with EPA and Crown Law to look at pathways forward that provide a level of comfort with the Government."[94]

[116] At this time, the EPA was still considering the request made by lawyers acting on behalf of the native title holders and the CLCAC to require an environmental investigation under the *Environmental Protection Act* 1994 concerning the use of the

90 Exhibit 49, CB77.
91 Exhibit 124.
92 Exhibit 49, CB77.
93 Exhibit 49, CB77.
94 Exhibit 49, CB77.

cyclone mooring buoy at Investigator Road in cyclonic conditions. On 28 July 2004 the EPA engaged Captain Dale Cole of Dale Cole & Associates Pty Ltd to undertake a "Maritime Risk Assessment" for use by the EPA in determining the likely impact on the environment associated with the use or non-use of the cyclone mooring buoy at Investigator Road.[95]

[117] On 6 September 2004 Captain Watkinson and Captain John Ellyett of MSQ attended a meeting at the offices of the EPA at which Mr O'Connor and Captain Cole provided an overview of the request made of the EPA along with an outline of Captain Cole's work. An EPA minute of the meeting records that MSQ emphasised the need to ensure that operational procedures were protective of the *Wunma* crew and that, if written procedures were revised, MSQ would expect Zinifex to obtain advice from the vessel's designer on the adequacy of the changed procedures.[96] Captain Watkinson advised the meeting that Captain Cole's advice was "generalist" and that he could not agree with it because of the survey limitations on the ship and the nature of the voyages that the ship performed, namely operating in the Gulf of Carpentaria.[97]

[118] A week later – on 13 September 2004 – a meeting was held at MSQ's offices in Brisbane. Those present included Mr Bundschuh, Captain Ellyett, Mr Quigley, Captain Dally and Captain Daniel.

[119] The outcome of that meeting was a commitment by Captain Ellyett to respond to the draft operating procedures. Mr Ballantyne is said to have agreed to provide Mr Bundschuh with design information to allow a change to the vessel's registration certificate that would allow it to proceed into the Gulf waters outside its Class 2C classification.[98] Mr Ballantyne's evidence is that he did not attend the meeting that day at MSQ's offices, but that he met with Captain Dally, Captain Ellyett and Mr Quigley at a restaurant where the main discussions were between Mr Quigley and Captain Dally.[99]

[120] The outcome of the meeting on 13 September 2004 was that Zinifex perceived that, with the new arrangements in place, MSQ had "no issues with the cyclone mooring

95 Exhibit 49, CB80.
96 Exhibit 49, CB85.
97 Exhibit 119; para 27.
98 Exhibit 49, CB88.
99 Mr Ballantyne; T.813-816.

buoy and its removal from the vessel's operating procedures" in a cyclone.[100] An email written the day after the meeting recorded:

> "All parties agreed to fast track this process to allow the new procedures to be endorsed and ratified before the start of the new cyclone season."[101]

[121] On 13 September 2004 and after the meeting with MSQ, the representatives of Zinifex met with the EPA in relation with the mooring buoy issue and advised of their progress with MSQ. It seems that this advice found favour with the EPA as it would "negate actions" placed on them by the legal representatives of the native title holders.[102]

[122] As anticipated, Captain Ellyett wrote to ISM about the draft procedures which had been tabled at the meeting on 13 September 2004. MSQ noted that its comments should not be viewed as an endorsement of the procedures but that MSQ was able to "add to the value by providing constructive criticism of supplied documentation"[103]. Amongst Captain Ellyett's comments was an observation about an apparent inconsistency between a draft procedure that required nil cargo to be on board and another procedure that had the objective of ensuring that the vessel's cargo did not present a risk to the environment. There were various other comments following which the letter concluded:

> "In MSQ's opinion, if the following conditions are met there is no requirement for the vessel to utilize the dedicated cyclone mooring:
>
> - Class and the Naval Architects are satisfied that the vessel can deal with a cyclone at certain speed and so on.
> - If the vessel is to travel outside the 2C operational area it is appropriately registered or exempted for such operation.
> - The vessel is manned in accordance with a vessel that may temporarily operate outside its normal 2C operational area.
> - The vessel's owners and managers advise MSQ that the above requirements prior to the vessels (sic) being required to ride out or avoid a cyclonic event have been met."

[123] On 10 September 2004 Lloyd's Register in Singapore issued a Certificate of Class

100 Exhibit 49, CB89.
101 *Ibid*.
102 Exhibit 49, CB88.
103 Exhibit 49, CB90.

which again assigned the class "Coastal Service in the Gulf of Carpentaria". The certificate was issued on 10 September 2004 and was said to be valid until 31 August 2009. [104]

[124] In October 2004, the ship's manager – which on 23 September 2004 had changed its name from Intercontinental Shipping Management Pty Ltd to Inco Ships Pty Ltd ("Inco") - negotiated with Lloyd's Register in Sydney about changes to the operating parameters. However, the scope of Lloyd's appraisal was limited to an assessment to verify, or otherwise, that the vessel's global strength was adequate for the intended service, and a local strength assessment.[105] The Lloyd's appraisal did not include an assessment of the ship's manoeuvring or powering. Rather, it was concerned with the strength of the vessel, including whether its structure could cope with slamming into waves. In the course of engaging Lloyd's Register to conduct a "global strength assessment" and a "local strength assessment", Inco informed Zinifex:

> "The original design of the vessel was based on sea condition data supplied by WBM/Sea Transport. In the event of a cyclone it was intended the vessel would use the mooring buoy and be protected."[106]

[125] On 15 November 2004, Lloyd's Register in Sydney issued its report.[107] Its analysis was based on the assumption that the ship had a draft forward of 3.8 metres. It concluded:

> "If the Owner should decide to keep the ship sailing during the cyclone event, it would be the Master's decision to maintain the course and range from the shore assuming that the ship will sail in the Gulf of Carpentaria."[108]

[126] Inco advised Zinifex that the Lloyd's report was "good news" that enabled it to work towards "gaining final approval to remove the mooring".[109] These and other references in the contemporaneous documents indicate that the purpose of seeking an amendment to the ship's registration certificate from MSQ to enable the ship to go into open waters to avoid a cyclone and was not to provide an option in addition to use of the cyclone mooring at Sweers Island. Rather, it was sought for the purpose of removing the mooring.

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104 Exhibit 49, CB87.
105 Exhibit 49, CB91.
106 Exhibit 49, CB92.
107 Exhibit 49, CB98.
108 Exhibit 49, CB98.
109 Exhibit 49, CB94.

[127] On 8 December 2004 a meeting was held between Captain Diack, Captain Boath and Captain Daniel to discuss the draft cyclone procedures. At that meeting, Captain Boath recorded his disagreement with the contents of Captain Ellyett's letter of 17 September 2004.[110]

[128] In December 2004 the restricted buoy mooring authority was renewed.[111]

[129] On 16 December 2004 Lloyd' Register provided further advice by email to Inco in connection with the proposed changes to the ship's operating parameters. This was necessary because, during subsequent discussions with Sea Transport Solutions ("STS"), it was mentioned that it was unlikely that the ship would be fully loaded during a cyclone, there being "a much greater probability that she would be in ballast". Lloyd's Register therefore agreed to rerun its calculations using a draft forward of 2.493 metres corresponding to the ballast condition (as against the loaded draft of 3.8 metres).

[130] Lloyd's Register's reported by way of a letter to Inco dated 25 January 2005.[112] It stated that two independent methods were used to assess local strength. The first found that the bottom of the bow did not need to be strengthened for impact. The second showed that in the ballast condition there was a marked increase in the value of the relative vertical motion of the bow which, when taking into account the reduced draft forward, would result in an increased probability of the bottom slamming in the forward region. The letter advised Inco:

> "… As previously advised, our analysis shows that under slamming conditions the most affected area is in the region of FR55, with the plating and longitudinal stiffening being approximately 15% under the Rule requirement. It should be noted that again no problem was found with the strength of the primary structure.
>
> One solution would be to add additional intercostal longitudinal stiffeners between and parallel to the existing longitudinals from Frames 50-55, however as the vessel has just completed a docking it is appreciated that this probably isn't an option.
>
> Taking into account the review findings, a more acceptable alternative may be to trial the Wunma during the cyclone period at the reduced draught, on the understanding that the vessel could experience environmental conditions that cause bottom slamming fwd, with the

110 Exhibit 49, CB95.
111 Exhibit 49, CB96.
112 Exhibit 49, CB99.

possibility that this may result in permanent deformation of the plating (particularly in the vicinity of FR55). However on the basis of the reserve of strength of the primary members, it is considered unlikely that the setting in of the plating would result in damage that would render the fwd structure unseaworthy.

Notwithstanding the above we would remind you that it remains the responsibility of the owner to operate the vessel in a safe manner under all environmental conditions and should it be decided to operate the vessel as detailed above they should be made aware of the associated risk of damage to the bow." (Emphasis added)

[131] On 2 February 2005 STS forwarded each of the Lloyd's Register assessments to Queensland Transport in two separate facsimiles.[113] Its first facsimile of 2 February 2005 confirmed that STS had been contacted by ISM regarding "the proposal to heave to in the Gulf of Carpentaria in the event of a cyclone". This was said to be Inco's preference "to retreating to a fixed cyclone mooring, due to a number of external factors". The facsimile noted that this was outside the original conditions of the Lloyd's Register design approval, but the Lloyd's Register assessment of 15 November 2004 was provided for the consideration of Queensland Transport. This facsimile concluded:

"As you can appreciate this is a special case, outside the scope of our Queensland Transport Accreditation. As such we seek your guidance, and trust that you can assist in determining a way in which the vessel's registration may be modified, to allow the vessel to operate outside its normal service conditions, under ballast in the special circumstance of a Cyclone."[114]

[132] In its second facsimile of 2 February 2005, STS forwarded a copy of the Lloyd's Register letter of 25 January 2005 concerning its review of the ship's local strength in a ballast condition.[115]

[133] On 14 February Mr Bundschuh sent a facsimile to Captain Boath in which he noted the proposal of the operators of the *Wunma* to "take the ship further off shore than is currently permitted by the ship's Class 2C operating limits". The facsimile advised:

"This is also outside the conditions of this ship's Certificate of Class from Lloyd's Register."

[134] Mr Bundschuh proposed an amendment to the Class 2C registration conditions to

113 Exhibit 49, CB98 and CB99.
114 Exhibit 49, CB98.
115 Exhibit 49, CB99.

allow voyages beyond 50 nautical miles from the coast to avoid cyclone conditions subject to the following conditions:

- Operation beyond 50 nm limited to Gulf of Carpentaria.
- Operate in accordance with limits of class set by Lloyds Register.

[135] Mr Bundschuh's proposal is difficult to understand. The limits of class set by Lloyd's Register were for an operation in "Coastal Service" which meant in waters not exceeding 21 nautical miles from the coast. Therefore, an amendment to the Class 2C registration that required the ship to operate within the limits of class set by Lloyd's Register would not permit her to operate beyond 21 nautical miles in the Gulf of Carpentaria.[116]

[136] In any event, Captain Boath responded by advising Mr Bundschuh in writing on 25 February 2005 of his "strong opposition to any extension of operating limits for this vessel in a cyclone event".[117] Captain Boath noted that he had discussed the matter with Captain Diack who would be taking it up with Mr Bundschuh directly.

[137] On the morning of 25 February 2005 a meeting was held at MSQ's offices in Brisbane. It was attended by Captain Watkinson, Captain Diack, Mr Bundschuh, two representatives of the EPA and Captain Cole. The purpose of the meeting was for the EPA to provide a background in relation to the matter prior to Mr Cole finalising his risk assessment on the use of the buoy at Sweers Island.

[138] The EPA's minutes of the meeting record that issues in relation to the safety of the vessel and its crew were emphasised by Captains Watkinson and Diack. It records that MSQ considered that the most appropriate course of action would be to reclassify the ship to Class 2B and that, under such a classification, "the cyclone buoy mooring would no longer be required, the ship would head to sea under approaching cyclonic conditions". Mr Bundschuh is reported as having advised the meeting that Zinifex would need to apply for the change and that a naval architect would need to certify the change. He advised that these matters were "relatively straight forward".[118]

[139] Captain Diack recalls that the basis of the meeting was that Captain Cole had

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116 Exhibit 49, CB121.
117 Exhibit 49, CB101.
118 Exhibit 49, CB100.

undertaken a risk analysis of the *Wunma* going to sea to ride out a cyclone, and determined that he had determined that it was an acceptable risk. The meeting was told that Lloyd's Register had reviewed the strength of the ship's hull and determined that she could operate at reduced speed in cyclonic conditions at sea. However, Captain Diack's view was that this was not an acceptable risk.[119]

[140] On 25 February 2005 Mr Bundschuh responded to Captain Boath's advice. He advised that he had not pursued the option of amending the Class 2C registration but indicated the alternative course of having the owner formally apply to upgrade the vessel from Class 2C to Class 2B service. The restricted Class 2B service category was said by Mr Bundschuh to "give the Master more options (within the formal limits of the vessel's certification by MSQ) for responding to a cyclone warning." Mr Bundschuh anticipated that this would not alleviate Captain Boath's concerns that led to his advice to not extend the Class 2C certificate.[120]

[141] Captain Diack gave evidence that in 2005, through dealings with Captain Daniel, he became aware that Inco and Zinifex wished to discontinue the use of the cyclone mooring at Sweers Island and that, in lieu thereof, strengthening the hull of the ship so she would be able to go to sea to ride out a cyclone. Captain Diack said that he was completely against the proposal, as was Captain Boath. He considered that the cyclone mooring at Sweers Island should remain an integral part of the ship's cyclone contingency plan and that this opinion was made very clear to Captain Daniel.[121] Whilst Captain Diack and Captain Boath believed that a cyclone mooring was essential, the view was taken that MSQ did not have the power to require any specific action to be taken by a ship's Master or owner, including the use of the cyclone buoy. The view was taken that all MSQ could require was that the ship have an adequate plan for all contingencies that the ship may encounter.[122] This is a narrow view of MSQ's power to enforce the general safety obligations of the ship's owners and operators. If, as MSQ had stated over the years in affidavits and other official documents, the safe operation of the ship required her to have access to a cyclone mooring if the need arose, then MSQ should have taken the stand that the owners and operators were required to have an operational cyclone mooring, whether at Sweers Island or some other location. But at the time, the view was taken

119 Exhibit 80; para 17.
120 Exhibit 49, CB102.
121 Exhibit 80; para 50.
122 Exhibit 80; para 16.

by MSQ that it did not have the power to insist that a cyclone mooring be established for the safe operation of the ship.

[142] On 11 May 2005 a letter, prepared by Mr Bundschuh and signed by him on behalf of Captain Watkinson, was sent to Inco in response to STS's facsimiles of 2 February 2005. It sought advice regarding alterations to the certification of the ship that would allow her "to heave to in the Gulf of Carpentaria in the event of a cyclone". The letter noted that the advice Lloyd's Register of 25 January 2005 indicated that the ship's current Lloyd's classification for coastal service in the Gulf of Carpentaria was adequate in terms of the strength of the vessel, and the environmental conditions that could be experienced, but that bottom slamming could result in "permanent deformation of the plating (particularly in the vicinity of FR55)". The letter advised that MSQ had given careful consideration to the registration options and concluded that the most appropriate course was to upgrade the ship by adding *USL Code* Class 2B Service, restricted to offshore operations within the Gulf of Carpentaria, and then outlined the certificates of compliance that were required for the upgrade. It also reminded Inco of the obligation on the owner and the Master to operate the vessel in a safe manner.

[143] The conclusion of the letter identified an important division of responsibilities within MSQ's administration. It advised that matters in relation to the upgrade in registration and load line issues were to be directed to Mr Bundschuh. Any operational issues or options arising from the suggested registration changes were to be discussed with Captain Boath.[123]

[144] In late August 2005 the ship registration section of MSQ received an application to "upgrade" the registration of the ship to Class 2B. The application to change the ship's registration particulars stated:

> "Upgrade Class 2B (restricted to offshore operations within the Gulf of Carpentaria)"

The Certificate of Compliance for Loadline that was submitted by STS for the purpose of obtaining the upgrade in registration included a declaration that the ship was seaworthy for load line in accordance with the *TOMS Act* on the condition:

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[123] Exhibit 49, CB106.

> "Class 2B Restricted Offshore operations within the Gulf of Carpentaria."

[145] The term "Restricted Offshore" usually applies to a Class 2C rather than a Class 2B operational area. Mr Bundschuh's evidence was that this reference should have been referred back by MSQ to the accredited designer for clarification in processing the application.[124] The obvious intent of the application was for a Class 2B registration that was subject to conditions. The reference to "Restricted Offshore operations" may have been intended to refer to operations that were restricted to the Gulf or restricted to certain conditions.

[146] In any event, the registration section of MSQ processed the application without seeking or obtaining a Certificate from Lloyd's Register that extended the ship's conditions of classification beyond "Coastal Service in the Gulf of Carpentaria". Instead, the registration section appeared to treat the reports from Lloyd's Register that it had received via the STS of 2 February 2005 concerning the global and local strength of the ship as, in effect, a certificate from Lloyd's Register that certified the ship beyond "Coastal Service". Lloyd's Register had not issued such a certificate. The certificate granted on 10 September 2004 was for "Coastal Service in the Gulf of Carpentaria".[125] MSQ, and Mr Bundschuh in particular, treated the global and local strength assessments undertaken by Lloyd's Register as having given an assurance "that the ship was structurally up to standard".[126]

[147] Emails that circulated between Inco and Zinifex on 25 August 2005 advised that MSQ had all that was needed to issue the new Class 2B registration. One noted that, once the Class 2B registration was issued, "we are free to remove" the cyclone mooring.[127] These records serve to confirm that the Class 2B registration upgrade was not intended by ISM and Zinifex to provide an option in addition to going to the cyclone mooring buoy at Sweers Island. It was a precursor to its removal.

[148] On 8 September 2005 Mr Bundschuh issued a Certificate of Registration for Class 2B. The Class 2B registration was as follows:

124 Statement of Mr Bundschuh - 3 August 2007; Exhibit 94; para 69.
125 Exhibit 49, CB87.
126 Statement of Mr Bundschuh - 3 August 2007; Exhibit 94; para 65.
127 Exhibit 49, CB108.

> "To operate within the Gulf of Carpentaria only and restricted to voyages undertaken to avoid cyclonic conditions. To operate in accordance with the limits of class set by Lloyds' Register."[128]

[149] The limits of class set by Lloyd's Register remained for operation not exceeding 21 nautical miles from the coast, notwithstanding the strength assessments undertaken by Lloyd's Register for the vessel in cyclonic conditions. If the condition on registration was to be subject to a 21 nautical mile limit, there would have been no point in granting the Class 2B registration. The intent of the 8 September 2005 registration was to permit the ship to undertake voyages in the open waters of the Gulf to avoid cyclones and, if required, to voyage well in excess of 50 nautical miles offshore in order to do so.

[150] On 20 September 2005 Captain Daniel sent an email which updated Captain Boath on the current status of the *Wunma's* use of the cyclone mooring buoy. This included an account of the global and local strength assessments completed by Lloyd's Register and that the ship's registration had been reassigned to reflect Class 2B requirements such that the ship was registered as Class 2C for normal operations and 2B "for the purpose of undertaking voyages in the Gulf to avoid cyclonic conditions". The email went on to refer to the fact that Mr Smith had completed a draft of new procedures that would be incorporated in the vessel's SQS.[129] The email noted that the EPA had been consulted and "are happy with Zinifex to remove the mooring buoy and attachments".

[151] Captain Boath responded by email and asked for copies of the cyclone procedures. These were supplied under cover of an email dated 22 September 2005. Relevantly, that email advised:

> "Over the upcoming cyclone season Inco will manage any approaching cyclone as per the previous two seasons. Using current procedures the Wunma will cease all cargo operations well in advance of any approaching low pressure system and be on standby to exit the Port if required."[130] (Emphasis added)

[152] The grant in September 2005 of registration for Class 2B to operate for the purpose of avoiding a cyclone was a critical matter which, so far as Zinifex and Inco were concerned, enabled them to remove the option of going to the cyclone mooring buoy

128 Exhibit 49, CB109.
129 Exhibit 49, CB110.
130 Exhibit 49, CB112.

at Sweers Island as an option in its procedures. Further, indications from Zinifex and Inco that the cyclone mooring buoy at Sweers Island would no longer be used effectively relieved the EPA of having to determine the long-standing request concerning an environmental investigation that had led to the appointment of Dale Cole & Associates to undertake a Maritime Risk Assessment.

[153] On 28 November 2005 Dale Cole & Associates Pty Ltd provided a short final report which noted that MSQ had issued a Class 2B registration that enabled voyages to be undertaken to avoid cyclone conditions. Dale Cole & Associates Pty Ltd expressed the opinion that the adoption of the new operational procedures was in keeping with international best practice for the management of risk to vessels from cyclonic conditions and that the cyclone mooring buoy could be removed without adversely impinging on the safe navigation of the *Wunma* during cyclonic occurrences. It concluded that the adopted operational procedures removed the requirement for the vessel to ever use the cyclone mooring buoy in Investigator Road and consequently eliminated any risk that may have been associated with its use including the transit of the *Wunma* to or from the cyclone mooring buoy.

[154] In his evidence to the Inquiry, Captain Cole stated that he did not consider matters such as the capacity of the ship to effectively discharge water to sea during cyclones, its seakeeping properties or power because he assumed that they were things that MSQ would look at in granting a Class 2B Certificate.[131]

[155] On 15 December 2005 the EPA advised the representatives of the Kaiadilt People and the CLCAC of "significant changes to the operations of the *Wunma* namely the grant of Class 2B registration to enable the *Wunma* to proceed to sea to avoid cyclones and revised written procedures that did not require or involve the use of the cyclone mooring buoy in Investigator Road". In summary, it advised that "the removal of the need to use the buoy has eliminated any risk that may have arisen from its use. This outcome would appear to be consistent with the interests of your client and would appear to have effectively provided a conclusion to the matter".[132] The EPA correctly perceived that these matters relieved it from having to make a decision concerning the risks associated with use of the cyclone mooring buoy in

131 Captain Cole; T.699.
132 Exhibit 49, CB117.

Investigator Road. [133]

[156] The grant by MSQ of a Class 2B registration may have facilitated the "decommissioning" of the cyclone mooring buoy at Sweers Island so far as Zinifex, Inco and the EPA were concerned. However, the matter remained of concern to Captain Boath and to Captain Diack.

[157] Zinifex did not renew the cyclone mooring authority that expired on 16 December 2005. A letter from Captain Boath to it on 13 January 2006[134] noted the expiry of the authority on 16 December 2005 and requested Zinifex's prompt attention to the matter.[135]

[158] In February 2006 MSQ left messages with Inco's Operations Manager at Karumba about the expiry of the mooring buoy. On 7 February 2006 the matter was brought to the attention of Captain Boath who in turn emailed Captain Diack. Captain Boath remarked in an email to Captain Diack on 7 February 2006 that it would be "nigh impossible for them to be granted a renewal, although it was obviously their intention to allow it to lapse". Captain Boath suggested that a letter be written noting the following points:

- The Port of Karumba will be closed to the *Wunma* in the event of a cyclone.
- Inco as operators are responsible for the safety of the vessel.
- Their cyclone plan should take these factors into account.[136]

[159] On 7 February 2006 Captain Diack wrote to Captain Boath to advise that, in light of earlier discussions with Captain Watkinson on the issue, he wanted to get Captain Watkinson's opinion on the development before responding. Captain Diack agreed with Captain Boath that there was no prospect of renewing the cyclone mooring authority and continued "that it leaves us with a major safety issue in respect of the ship's crew".[137]

133 On 15 February 2006 the EPA was advised by the legal representatives of the Kaiadilt People and CLCAC that their clients were supportive of the revised operational procedures but remained concerned that the buoy mooring was located in the immediate vicinity of sites of significance. They sought advice concerning procedures to decommission the buoy mooring and remove it, whereupon they would consider the matter satisfactorily concluded; Exhibit 49, CB122. It is not apparent that any such advice was subsequently given..

134 Exhibit 49, CB118.

135 Zinifex was later to state in a letter dated 20 October 2006 to have only recently become aware that the cyclone mooring authority had expired; Exhibit 49, CB134.

136 Exhibit 49, CB119.

137 Exhibit 49, CB119.

[160] The status of the cyclone mooring buoy was then the subject of a meeting between Captain Boath and Captain Diack on 8 March 2006. A note of that meeting records discussions about the history of the matter, the "dangerous" situation that existed without a cyclone mooring and the belief that MSQ had "no power to enforce ships to use buoy mooring".[138] On the same day, Captain Boath made his own file note about the matter. Relevantly, Captain Boath recorded the fact that the original application for a cyclone mooring buoy authority was advanced on the basis that proceeding to sea may put the ship and crew in danger such that the safest option was to locate a cyclone mooring between Bentinck and Sweers Island. He also noted the subsequent course of events including evidence given in the Federal Court proceedings that it was unsafe for the vessel to proceed to sea in a cyclone and that the only safe option was for the ship to use the buoy mooring.

[161] On 14 March 2006, Captain Boath forwarded a copy of his file note because of his concern that MSQ was exposed to liability because of its dealings in relation to the buoy mooring. Captain Boath's email of 14 March 2006 succinctly identifies the difficult situation in which MSQ had placed itself:

> "The crux is, I believe, with the GM; DGM and myself all having put our hands to our hearts in High Court proceedings declaring the mooring was necessary to provide safety of the vessel and crew in the event of a cyclone, and in fact this safety would be compromised if the ship was sent to sea, how do we now reconcile the fact that they have allowed the authority to expire, and our cyclone contingency plan would direct them to proceed to sea?"[139]

[162] In due course, Captain Boath was provided with advice concerning the legal position of MSQ. In summary, the legal advice was that MSQ had the option of either having the buoy mooring removed or leaving it in place for the *Wunma* to use during a cyclone and that MSQ had to decide the best option to achieve its primary objective of ensuring maritime safety.

[163] It is unnecessary to dwell upon the contents of the legal advice or its correctness. The matter highlighted in Captain Boath's email of 14 March 2006 and earlier opposition to the grant of a Class 2B registration raised more than a problem about potential legal liability. It identified a matter central to the safe operation of the ship and highlighted the apparent inconsistency between MSQ's position before the

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138 Exhibit 49, CB124.
139 Exhibit 49, CB126.

Federal Court to the effect that a cyclone mooring was necessary to provide safety for the ship and her crew in the event of a cyclone and the maintenance of a Cyclone Contingency Plan that directed the ship to proceed to sea in the event of a cyclone. MSQ was aware that proposed procedures removed the use of the cyclone mooring buoy at Sweers Island as an option under the ship's operating procedures, and that the new Class 2B registration facilitated the ship travelling into open waters during cyclonic conditions.

[164] Rather than insist upon the construction of a new cyclone mooring in the Norman River as Captain Boath had recommended in July 2004 and the renewal of the cyclone mooring at Sweers Island pending such a development, MSQ acquiesced in the decommissioning of the cyclone mooring buoy at Sweers Island.

[165] On 12 October 2006 a meeting occurred in the office of the EPA in Brisbane between representatives of MSQ, Zinifex, the EPA and the Department of Primary Industries and Fisheries the purpose of which was to seek advice from relevant government agencies on their requirements for the removal of the buoy.[140] Under the *Transport Operations (Marine Safety) Regulation* 2004 there was an obligation to remove the buoy and this was noted at the meeting.

[166] Subsequently on 20 October 2006, the General Manager of Zinifex, Mr Greg McMillan, wrote to MSQ in connection with the meeting and stated, surprisingly, that Zinifex "only became aware recently" that the buoy mooring authority had expired.[141] The letter noted that the cyclone mooring had in fact never been used, that Zinifex had no intention of using it at any time in the future and that it would comply with any directions of the Regional Harbour Master in relation to its removal The letter confirms:

> "The company has been in discussion with local communities in the area for several years about the removal of the buoy mooring, owing to certain cultural sensitivities in the area and an unfortunate history of Federal Court litigation commenced by registered native title claimants against the former holders of the buoy mooring authority and the State Government over the initial granting of the authority and installation of the buoy."

140 Exhibit 49, CB132.
141 Exhibit 49, CB134.

It advised that discussions were continuing and that the company was reluctant to commence removal of the buoy mooring until such time as agreement was reached with the communities. A copy of the letter sent to the EPA, DPI and the Harbour Master at Cairns.[142]

[167] On 1 November 2006, MSQ responded, noting that it was aware of the history of issues associated with the mooring and understood that Zinifex was in discussion with local communities in respect of the removal of the buoy mooring. MSQ stated that it was anxious for the obligations relating to removal of the buoy be met. It noted that it was almost six years since the original buoy mooring authority had been granted and that, during this time, the mooring apparatus would have been subjected to significant wear and tear, and that without regular and adequate maintenance the mooring buoy and apparatus could be a danger to navigation. The urgent advice of Zinifex was sought in respect to the present condition of the mooring apparatus as well as specific details of any maintenance works that had been undertaken since its initial placement.

[168] This letter does not appear to have been the subject of a response prior to the incident.

[169] In any event, it is unlikely that the mooring buoy was operational beyond 2005. Little, if anything, had been done to maintain it and an inspection of the mooring buoy in May 2007 showed that it was not operational.

4.13 SUMMARY

[170] When the ship was designed in the late 1990's, classed by Lloyd's Register in 1999 and registered in Queensland in 1999, a cyclone mooring was intended as an essential component of the ship's operation. The option of sending the *Wunma* to sea in cyclonic conditions was said in sworn evidence to be not viable. The safety of the ship and her crew was said to require a cyclone mooring.

[171] By the time of the incident in February 2007 the ship had no access to an operational cyclone mooring. Although Lloyd's Register's notations still limited her operations to "Coastal Services" (meaning not in excess of 21 nautical miles offshore), MSQ had granted a Certificate of Registration for Class 2B to undertake voyages in the open waters of the Gulf to avoid cyclones. The ship's operator and a consultant to

[142] Exhibit 49, CB134.

the ship's operator and owners had produced written cyclone procedures that enabled her to head for the open sea and remain there in the event of a cyclone.

[172] The events outlined in this Chapter that led to the decommissioning of the cyclone mooring at Sweers Island and no new cyclone mooring taking its place, effected a fundamental change in the ship's authorised operations in the event of a cyclone. The option of heading into open waters, which once had been rejected as not viable and unsafe, had been authorised in terms of the ship's registration and incorporated into her operating procedures.

4.14 GALLERY

Figure 1 - Satellite Photograph of the Port of Karumba and the Roadstead (Anchorage)

Figure 2 - The Wharf and Storage Shed

Figure 3 - The *Wunma*

Figure 4 - The *Aburri*

Figure 5 - The Sweers Island Cyclone Mooring

Figure 6 - The Stern

Figure 7 - The Stern Ramp Fully Closed

Figure 8 - Aft Well Deck, Stern Ramp Fully Closed, Hot Workshop

Figure 9 - The Canopy Roof

Figure 10 - Side of the Canopy

Figure 11 - The Bridge

Figure 12 - The Conveyor Belt

Figure 13 - The Cargo Hold

Figure 14 – The Bucket Wheel Reclaimer

WUNMA BOARD OF INQUIRY

CHAPTER 5: THE SHIP'S OPERATIONS

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CHAPTER 5 THE SHIP'S OPERATIONS

5.1 INTRODUCTION

[1] The operation of the ship at the time of the marine incident was governed by agreements, laws, systems, procedures and practices. These included:

- **The Vessel Operations Management Agreement**

  This agreement governed the relationship between Zinifex and Inco in relation to the operation and management of the ship. It conferred contractual rights and imposed contractual obligations on those parties.

- **Legislation**

  The *Transport Operations (Marine Safety) Act* 1994 ("the *TOMS Act*"), the *Transport Operations (Marine Safety) Regulation* 2004 ("the *TOMS Regulation*") and other legislation regulate marine safety and related marine operational issues. This legislative framework is derived from international conventions developed within the International Maritime Organisation;

- **The Ship's Safety & Quality System**

  The Ship's Safety & Quality System ("SQS") created a system for the safe operation of the ship and allocated responsibility to various individuals. Some parts of the SQS, including its cyclone procedure, have a special relevance to the marine incident. Many parts of the SQS are relevant to the ship's daily operations. The SQS imposed responsibilities on the Managing Director of Inco, the Operations Manager/Designated Person, the Operations Superintendent – Karumba, the Master, the Chief Engineer and other members of the crew. The SQS outlined precautions, including a review of the latest weather reports and synopses, and inspection and securing of the ship's seaworthiness in each department.

- **Practices that govern the ship's operations**

  These include operational issues such as when the ship is loaded, when she sails, the conditions in which she is able to discharge her load into export vessels, the operation of the ship's water management system, maintenance and cleaning.

- **Seafaring Practices**

  Underpinning safety quality systems and legal requirements are well-established seafaring practices, including how to avoid cyclones.[1] Cyclone avoidance rules also appear in the ship's SQS. In short, they require the possible path of the cyclone to be plotted and the implementation of avoidance rules having regard to the dangerous and navigable semi-circle within a tropical cyclone.

- **Port of Karumba Cyclone Contingency Plan**

  This plan is activated once the threat of a cyclone exists. Its objective is to organise the orderly removal of vessels from their normal moorings to more sheltered locations or, in the case of large vessels, to sea. Its objective is to have the Port evacuated at least six hours before destructive winds commence. The plan includes requirements of what is to be done when destructive winds are forecast within 24 hours (Yellow Alert), within 16 hours (Blue Alert) and within 6 hours (Red Alert) whereupon the Port is closed. One of the requirements upon a Yellow Alert is to suspend the loading of all ships. Upon a Blue Alert all ships are to sail. The stated objective of the plan is that all large ships will have left the Port before winds reach 30 knots. The Cyclone Contingency Plan states that the anchoring of large vessels upstream is not recommended due to tidal surges that could inundate the area, which, with high winds, may strand vessels inland of the river system, making any salvage extremely difficult.

- **The Zinifex Century Mine Port Site Cyclone Procedure**

  This procedure defines the procedures developed by Zinifex in the event of a possible cyclone at its port facility and extends to aspects of the ship's operation.

5.2 AN OVERVIEW OF THE SHIP'S OPERATIONS

[2] Before addressing these systems, procedures and practices in greater detail, it is appropriate to give an overview of the ship's normal operation prior to the incident as well as the management and command structures that applied at the relevant time.

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[1] See, for instance, *Australian Seafarers Handbook*, Australian Hydrographic Service, 2004, pp.49-51; *Small Ships: Training and Operational Manual* 5th Ed; Maritime Safety Queensland (2007) pp.190-195.

[3] The ship forms an essential part of Zinifex's process for the distribution of concentrate, requiring coordination and interaction between Zinifex personnel and the ship's manager on a daily basis. The ship's daily operation is largely under the control of the ship's manager. At the time of the incident this was Inco.

[4] Zinifex operates a dewatering facility at Karumba. A slurry of mineral concentrate and water is pumped to it from the Century Mine by a 306 kilometre underground pipeline. The dewatering facility at Karumba implements a process that reduces the moisture content of the concentrate to about 12%. This is the maximum transportable moisture limit to avoid the concentrate acting as a liquid and thus adversely affecting the stability of the ship in which it is carried.[2] The concentrate is then stored in a concentrate shed for reclaiming and loading onto the *Wunma*. Inco was responsible under the Vessel Operations Management Agreement to reclaim the concentrate and to load the ship. Thus there were two connected command structures at the time of the incident. The first involved the operation by Zinifex of the dewatering and production facility, which is headed by Zinifex's Port Operations Manager at Karumba. The second was Inco's conduct of the reclaiming, loading and shipping operation. Inco's personnel included an Operations Superintendent based at the facility and the Master of the ship.

[5] When it is not at sea or in the channel, the *Wunma* is berthed at the Zinifex wharf at Karumba. The ship's cargo capacity is approximately 5,000 dead weight tonnes ("dwt"). Generally she takes a full load to an export vessel. The export vessels to which she unloads are generally called "handimax" and "handisize" ships, and their cargo capacities vary between 30,000 and 45,000 dwt. The actual load carried on individual voyages of the *Wunma* may vary depending upon tides and the salinity of the water in the Gulf, which in turn affects her buoyancy and her load line.

5.3 LOADING THE *WUNMA*

[6] Loading takes between five and eight hours. It takes about four hours to sail to the export vessel at the Roadstead, although times can vary significantly due to weather and tidal conditions and the position of the export ship within the Roadstead. If the ship is not carrying a full load the time taken can be considerably less than four hours. Generally, the time taken to sail to the export vessel is between three and five

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2 IMO Resolution MSC.193(79) *Code of Safe Practice for Bulk Cargoes, 2004* adopted 3 December 2004.

hours. Discharging from the ship to the export vessel takes about three to four hours. Thus, once the *Wunma* has been loaded, she takes on average approximately twelve hours to sail to the export vessel, discharge and return to port.

[7] The duration of the voyage to and from the export vessel depends on weather and the tide. There is only one tide per day in the Gulf of Carpentaria. The maximum draft for *Wunma* to sail is 3.95 metres. There is only sufficient depth during a narrow window at high tide in which the ship can leave or enter the port when loaded.

[8] Because the ship's departure is dependent upon the diurnal tides at Karumba, the ship usually takes one load per day to an export vessel. If there are export vessels waiting to load their cargo, it is possible for the ship to complete a loading every day, seven days a week. The crewing of the ship is based on a continuous operation.

[9] The ship sometimes may be unable to sail due to weather conditions or maintenance requirements. The narrow channel and the large canopy above the ship's hold affect her ability to safely navigate the river channel. Typically, she is unable to safely do so if winds exceed 25 knots. Wind and sea conditions affect her ability to safely discharge into export vessels.

[10] Zinifex's plan is to export one million tonnes per year. With the ship's cargo capacity of about 5,000 dwt this approximates 200 loads per annum. Due to the varying capacities of the export vessels, there are occasions where only a part load can be transported, so generally the vessel needs to operate approximately 240 days in the year to reach the planned export levels.

[11] The timing and number of loads depends upon the arrival and scheduling of export vessels. Zinifex is responsible for negotiating the sale of its product, and the terms of charterparties that determine the voyage of export vessels and the amount that is to be shipped by each of them. The scheduling and arrival of an export vessel leads to the development of a load plan in conjunction with the ship's manager.

[12] Whilst the reclaiming of concentrate and loading was the responsibility of Inco and the decision about when to sail that of the Master, coordination between Zinifex and Inco was essential. This was facilitated on a daily basis by a morning Port Operations Review Meeting that was attended by key operating personnel from

Zinifex's port facility and Inco's Operations Superintendent. The Operations Review Meeting reviewed the previous day's operations, addressed production, safety, health and environmental issues and agreed a plan for that day. The outcome of the meeting was recorded in a form headed "Port Daily Coms meeting".[3] The form recorded whether or not there was compliance with the plan from the previous day. If, for instance, the ship did not sail the previous day or was not sailing that day and an export vessel was waiting to be loaded, Zinifex would raise the issue at an Operations Review Meeting.

[13] The Master of the ship did not usually attend the Operations Review Meeting. Instead, information from the ship and its Master was typically received via Inco's Operations Superintendent who spoke to the Master prior to the Operations Review Meeting or received documents from the ship such as the minutes of the Positive Action Safety System ("PASS") meeting that was held by the ship's crew each morning.

[14] In summary, the presence of an export vessel at the Roadstead prompted the activation of an anticipated load plan. The load plan included details about anticipated loading times, departure times, amounts to be discharged on each voyage and discharge times. These plans were issued by the Master and circulated to Inco and Zinifex, and could be amended. If and when a load was discharged into the export vessel, this was detailed into a report in the form of a shipping summary.[4]

[15] Loading practices at the time of the incident generally were governed by these procedures, namely:

(a) the scheduling of an export vessel;

(b) planning processes leading to the development of an anticipated load plan that would be the subject of consideration by Zinifex and Inco at a daily Operations Review Meeting;

(c) the implementation of that plan by the activation of the re-claiming and loading plant by Inco unless the Master decided it was inappropriate to load.

In some respects it may be difficult to pinpoint by whom and when a decision to load was made under such a process. The Master of the ship issued an anticipated

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3 The date appearing at the top of this document is the day prior to the meeting so as to record matters such as production levels that day, and what is planned for the day upon which the meeting occurs appears in the lower part of the form.

4 See, for example, Exhibit 26.

load plan for review by Zinifex and Inco personnel, and it was the Master who could decide that a planned load not be taken on board.[5] As a result, it can be said that the Master decided whether and when the ship would be loaded. Expressed differently, once a loading plan had been circulated and adopted, the Master could decide to not load in accordance with that plan.

[16] The provisions of the Cyclone Procedure in the SQS and the Port of Karumba Cyclone Contingency Plan (to be discussed in further detail below) contained provisions whereby once a certain alert status was reached loading operations would cease. Notably, neither procedure prevented the ship from being loaded on 3 February 2007.

[17] Unless such an alert status was triggered, there was nothing specific in the SQS or any other written procedure governing the ship's operation that prevented loading when a low pressure system was in the Gulf. No written procedure existed prior to or at the time of the incident that incorporated the practice described in Captain Heath Daniel's email to Captain Boath of 22 September 2005 which stated:

> "Over the upcoming cyclone season Inco will manage any approaching cyclone as per the previous two seasons. Using current procedures the Wunma will cease all cargo operations well in advance of any approaching low pressure system and be on standby to exit the Port if required."[6]

[18] The existence of such a practice was addressed by a former Master of the *Wunma*, Captain Thomson, in his evidence:

> "28. I understood that the *MV Wunma* was not designed to go out in cyclonic conditions. My understanding was that *MV Wunma* was to operate in the Gulf of Carpentaria in sheltered waters, not to try and withstand the rigours of a cyclone.
>
> 29. From my association with those involved in the construction at the time it was constructed, I believed that the strength of the ship would be okay. But the concern about going to sea in cyclonic conditions was whether we would get pooped or not. There was probably less chance of getting pooped in an unloaded state than when loaded, but you could not be sure. (Pooped is when you are in a following sea and the wave catches up to the vessel and breaks over the stern.)

5 Captain Dunnett; T.339.
6 Exhibit 49; CB112.

30. Because we had these reservations about whether the ship was able to operate in a loaded state in a cyclone, if there were any cyclones threatening, we did not load. We would stay at the wharf waiting to see which way the weather system went.

31. If there a tropical low down low in the Gulf, we would not load. If it was a cyclone forming on the east coast or up off the tip of Cape York or Gove, we would probably keep working and closely monitor the movement of the system. Those systems were not going to affect us unless they started to move into the Gulf. But if there was something moving into the Gulf, then we did not load."[7]

[19] Evidence to like effect was given by Captain Thomson in his oral evidence[8] and also by Captain Gordon Dunnett, who was a Master and Relief Master on the *Wunma* between July 2003 and November 2006.[9]

[20] The practice of not loading the ship if there was a tropical low in or moving into the Gulf was not passed on to new Masters, including Captain Seal, as part of their training. However, evidence was given by Captain Dunnett of an occasion in early 2006, when Captain Seal was Master, of a low pressure system coming from the East coast when it was decided that there would be no point in loading the ship and she was tied to the berth with extra mooring lines.[10]

[21] In short, although the practice of not loading when there is a low pressure system in the Gulf may have been adopted over the years, it did not form part of the ship's operating procedures.

[22] The absence of such an operating procedure in the ship's SQS or other written operating procedures had the potential to leave the ship in a loaded condition in the event of the low pressure system developing into a cyclone. This is because there is no discharging facility in the port and deteriorating sea and wind conditions may make it impossible to discharge into an export vessel. Unloading the ship in port by using earthmoving equipment is not a practical option since it would take literally days to unload it.[11]

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7 Exhibit 9; paras 28-31.
8 Captain Thomson; T.33–34; T.36.
9 Captain Dunnett; T.324–325; T.329; T.332; T.338.
10 Captain Dunnett; T.324–325; T.329.
11 Statement of Frank Thomson, Exhibit 9; para 33.

[23] The practice of not loading when there is a low pressure system in the Gulf during the cyclone season, as described in Captain Daniel's email of 22 September 2005 and in the evidence of Captain Thomson and Captain Dunnett, is an appropriate precaution.

[24] Its omission from the ship's SQS or other written operating procedure is largely unexplained. In the first years of the ship's operation the view may have been taken that the ship should be able to travel to the cyclone mooring buoy at Sweers Island even in a loaded condition, and that there was no need for an operating procedure to ensure that she was unloaded before going to the cyclone mooring.[12] If this view was taken, it did not conform with the views of the ship's Masters at the time, who were concerned about the ship's seakeeping properties in a loaded condition.[13]

[25] Emerging concerns in later years about the utility of the cyclone mooring at Sweers Island and the risks posed to the marine environment by the ship being at sea in cyclonic conditions when loaded, as identified by Dr Cowell and others, should have led to the practice of not loading the ship when a low pressure system was in the Gulf being incorporated into the ship's written operating procedures.

[26] Finally, the "decommissioning" of the cyclone mooring, the removal of the cyclone mooring as an option in the ship's SQS cyclone procedure and the inclusion of the option of the ship going to sea to "ride out" a cyclone necessitated a review of the ship's operating procedures to ensure that she was not caught in a loaded condition during a cyclone. The designer of the ship had not contemplated that she would go to sea in cyclonic conditions in a loaded condition,[14] and the Lloyd's Register review of her strength in cyclonic seas assumed that it was unlikely that the ship would be fully loaded during a cyclone.[15] Masters of the ship like Captain Thomson sensibly adopted the practice of not loading the ship if a low pressure system was in the Gulf.

[27] The omission of their practice from the ship's written operating procedures was a major shortcoming.

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12 For instance, Captain Diack considered in December 1999 that the ship should be able to use the mooring in any state of loading as cyclone can form very rapidly, and that a condition that the concentrate be removed from the ship before she proceeded to the mooring would delay and limit the ship's use of the mooring, and significantly interfere with marine safety: Exhibit 49; CB40. Captain Diack; T.911–912.

13 Captain Dunnett; T.333.

14 Statement of Mr Ballantyne, Exhibit 97; paras 36, 37 and 50. Mr Ballantyne; T.801.

15 Exhibit 49; CB99.

[28] The first draft of the new cyclone procedures appeared in December 2003.[16] At that stage it was in three parts. The first part had as its objective to ensure that, where reasonably possible, the ship "will have nil cargo on board in the event of a cyclone occurring in the Gulf of Carpentaria".

[29] This draft procedure did not, in terms, prohibit loading whenever a low pressure system was in the Gulf of Carpentaria during the cyclone season. But it did provide for the ship to not be loaded if the weather was likely to deteriorate, and it applied even if no cyclone alerts were in force. Paragraph 4.1.2(e) of the draft procedure applied when the ship was at sea. It stated:

> "If the medium to long-term assessment indicates that the weather is likely to deteriorate and thus, in the opinion of the Master it would not be feasible to undertake another discharge voyage, return to Karumba. **Do not** attempt to load another cargo."

Paragraph 4.1.3 of the draft procedure applied when the vessel was in port. It stated in paragraph 4.1.3(d):

> "**Do not** load the vessel if it is believed the weather is likely to deteriorate (see 4.1.2(d) above)."

[30] Paragraph 4.1.2(d) defined "worsening weather" to mean that conditions alongside the export vessel posed a danger of the loading chute striking some part of the export vessel or sea swell and wind patterns would make it dangerous for the *Wunma* to traverse the shipping channel, or a combination of both. If the reference in paragraph 4.1.3(d) to "weather is likely to deteriorate" was intended to include the kind of weather assessment in 4.1.2(e), then the draft procedure had a significant potential operation. This is because a low pressure system that develops in the Gulf will often make it not feasible for the ship to discharge into the export vessel. Captain Thomson explained:

> "…if there is a system developing, normally it will bring up 20, 25 knot, 30 knot winds in the lower part of the gulf. Normally from the north-west. It is very hard to go alongside of an export ship and discharge. So you are better off sitting…at the wharf unloaded because once you load you can't unload."[17]

16 Exhibit 49; CB69.
17 Captain Thomson; T.36.

[31] Evidence was given that a low pressure system in the South Western part of the Gulf will produce sea conditions from the North West that will take two to three days for seas to settle even if a cyclone does not develop, making it impossible to discharge to the export ship, and inappropriate to load.[18]

[32] The draft procedures of December 2003 were still the subject of discussion between representatives of the Inco, Zinifex, MSQ and the EPA in late 2004 and early 2005.[19] A further draft was circulated in September 2005. It was in two parts, and did not have the stated objective of ensuring that the ship had nil cargo when cyclones were in the Gulf.[20] Unlike the December 2003 draft, it did not provide that the ship should not be loaded in deteriorating weather conditions prior to any cyclone alert coming into force. The new draft generally reflects the procedures that existed at the time of the incident, namely having actions based upon different alerts. For reasons to be discussed, the requirement in those procedures to not load if a "Blue Alert" was declared comes too late to prevent the ship being caught in a loaded condition during a cyclone.

[33] The introduction and implementation of a procedure to prevent loading at an earlier time and well before a "Blue Alert", for instance, when a low pressure system was in the Gulf (the practice adopted by Captain Thomson and other Masters) or when such a system was in the Southern part of the Gulf, would have prevented the cargo being loaded on 3 February 2007.

5.4 COMMERCIAL PRESSURE

[34] A substantial body of evidence supported the existence of a commitment by Zinifex to a culture of safety in the operation of its port facility that extended insofar as Zinifex influenced the operation of the ship. One indicator of this is the weighting given in the calculation of the bonus component in Inco's management fee. For instance, in calculating Inco's bonus for 2005/06 various areas were weighted as 60% safety, 30% environmental and 10% operational.[21]

[35] The issue of commercial pressure inevitably arises for consideration in circumstances in which each voyage by the *Wunma* to an export vessel involves the

18 Captain Thomson; T.88.
19 Exhibit 49; CB90, CB100.
20 Exhibit 49; CB112.
21 Statement of Mal Mewett; Exhibit 47; paras 35 and 36.

carriage of millions of dollars worth of concentrate, and the ship is expected to take loads to the export vessels on about 240 days per year to reach planned export levels,.

[36] Captain Thomson's evidence was that the level of cargo activity for the *Wunma* was much higher than he experienced as Master of the *Aburri* where there was "a lot more time and a lot more flexibility".[22] A former Master, Captain Hadley, who was employed as Chief Mate and Relief Master on the *Wunma* in 2004 and 2005, gave the following evidence:

> "20. Whilst I was always well aware of the commercial pressure to proceed as quickly and as efficiently as we could, such pressure was not usually unreasonable. However, I do believe that on a number of occasions an opportunity to allow the crew to rest was ignored by the company in favour of getting on with the job of backloading the *Wunma*.
>
> 21. If however I decided that the sailing conditions were not suitable to leave the Port, my decision in that regard was never questioned by the owners or operators of the vessel. It is the Master who makes the assessment of conditions at sea and decides whether the *Wunma* puts to sea and/or is unloaded onto export vessels.
>
> 22. Nonetheless, the Master would have to justify why cargo was not loaded on to the *Wunma*. This pressure would increase markedly when the storage shed at Karumba was nearly full.
>
> 23. If the shed was full, no product could be received from the Mine and the whole conveyance process would stop. …"

[37] There is other evidence that on occasions when the Master decided not to load and the ship did not sail to the export vessel the Master would be asked to explain.[23] But their evidence is that their explanations were accepted.

[38] Zinifex's Port Operations Manager, Mr Mewett, gave evidence that during an Operations Review Meeting if the relevant performance targets were not being met and the vessel was not sailing that day whilst an export vessel was waiting to be loaded, Zinifex would query the situation. But if Inco could provide a satisfactory reason why she was not intended to sail that day, he would not press them to sail. Reasons for not sailing that he would not contest included any danger of the crew and vessel because of weather conditions, the risk of not being able to discharge

[22] Captain Thomson; T.52.

because of the swell or urgent maintenance requirements.[24] Mr Mewett's evidence was that if a decision was made not to sail, he would usually discuss the decision with the Master or other Inco personnel but he would never tell the Master that he had to sail. Mr Mewett's understanding, and those of other witnesses, was that the Master had the authority to decide whether and when the *Wunma* was to leave port and this authority was respected.

[39] Perceptions can differ from reality, and some Masters may have different perceptions to others concerning the commercial pressure to load in accordance with an existing load plan. The practice of the Master being called over to the office to explain why the Master decided to not load may exert a subtle pressure. Mr Mewett's evidence was that he had never rejected an explanation that was given to Zinifex on safety grounds and that, on the contrary, when a decision had been made to not load for safety reasons Zinifex had given "positive reinforcement" because it did not want people to think that they were under too much pressure.[25] The practice of going to the Master for an explanation as to why he has not loaded or left the wharf,[26] rather than relying on the advice given by Inco's Operations Superintendent, may be well-intentioned to better understand why a decision was made. But such a practice has the potential to influence the perceptions of a Master and apply subtle pressure to comply with a pre-arranged loading plan. That said, there is no acceptable evidence that the practice of Zinifex asking a Master why a ship had not been loaded in fact placed inappropriate pressure upon Masters in general or upon any particular Master.

[40] The commercial and operational environment in which the ship operates inevitably imposes a pressure upon those responsible for the operation of the ship to load and discharge into waiting export ships, if possible. This kind of commercial pressure is understandable and not unreasonable provided it does not affect the safe operation of the ship and the safety and welfare of her crew. There is no reliable evidence that it did. There was no claim by a present or former Master of the ship that he was required to load as a result of dictation or pressure from Zinifex to do so or that he was concerned that if he did not do so, there would be unpleasant or adverse consequences. The evidence indicates that although decisions to not load were

23 Captain Dunnett; T.329–330.
24 Exhibit 47; paras 51 and 52.
25 Mr Mewett; T.385.
26 Mr Mewett; T.423.

sometimes queried, provided there was a satisfactory explanation, those decisions were never challenged.

[41] Despite Zinifex's obvious commercial interest in ensuring as many loads as possible were transferred to export vessels anchored or expected at the Roadstead, there is no reliable evidence that it adopted the practice of pressuring Masters to load and to undertake voyages when it was unsafe to do so. The evidence is that it did not adopt such a practice.

5.5 MAINTENANCE

[42] Maintenance on the ship was planned under a computer system known by its proprietary name, AMOS. The system was based on a schedule of planned maintenance.[27] Some items of maintenance could only be undertaken when the ship was "laid up", and that would occur probably two and no more than three times per year.[28]

[43] The planned maintenance program that is generated by AMOS could be changed. An AMSA Auditor in August 2006 observed that amendments to the AMOS maintenance system appeared "uncontrolled",[29] which was taken by Inco's Operations Manager to mean that access rights were not restricted to certain individuals to change areas of planned maintenance, with the Chief Engineer having certain access rights, the First Engineer having different access rights, and so on.[30] The underlying issues in this context concern who should have access rights to change planned maintenance and the recording and reporting of changes to the system, including who made the changes and when they were made.

[44] Actual maintenance records were on computer. But unlike the majority of ships in Inco's fleet, access by Inco's head office to these records was limited because of a Zinifex computer "firewall". Inco's head office had to rely on the Chief Engineer and the Master to administer the system. It would be reviewed by the Fleet Technical Manager, or superintendents on visits to the ship and when an audit was being done.[31]

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27 Mr McDonald; T.441–442.
28 Mr McDonald; T.443.
29 Exhibit 32.
30 Captain Ives; T.474–474.
31 Mr McDonald; T.442.

[45] Captain Thomson's evidence was that, at times during his period as Master, due to a change in shipping schedules or "lack of manpower" the general maintenance program would be put on hold.[32] But any maintenance that was concerned with the safety of the ship or the crew was not put on hold.[33] Another former Master, Captain Hadley, gave evidence that the major problem with effecting repairs was Karumba's remote location and the short turnaround times between voyages. For a tradesman to attend the ship could cost thousands of dollars for the time spent travelling. Repairs were difficult to organise if they were not deemed an emergency or could not be attended to locally.[34] Some replacement parts were in short supply and maintenance jobs were cancelled on occasions.[35]

[46] In its 2006 Operational Review commissioned by Zinifex, Thompson Clarke Shipping was critical of the absence of scheduled maintenance downtime, with cargo transfer taking precedence and maintenance being "fitted in around cargo requirements".[36] This system with scheduled maintenance periods being displaced, was said by Thompson Clarke Shipping to have apparently grown up by default. Zinifex recognised that scheduled maintenance was "haphazard".[37] Insufficient resources were allocated to planned shutdowns and planned maintenance.[38] Improved planning of maintenance was said to require a "bipartisan effort" by Zinifex and Inco.[39]

5.6 SURVEYS

[47] Maritime safety legislation requires annual surveys of the ship. The fact that the ship is partially classed through Lloyd's Register (for hull and machinery) leads to a division of survey functions, with Lloyd's Register surveyors being responsible for surveys of hull and machinery. Records indicate that a Lloyd's Register survey of hull and machinery was certified on 16 August 2005 with a certificate due to expire on 31 August 2009, and an interim survey due August 2007.[40] That interim survey was overtaken by the surveys that occurred shortly after the incident and new certificates by Lloyd's Surveyors to which later reference will be made.

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32 Exhibit 9; para 54.
33 Captain Thomson; T.87.
34 Exhibit 75; para 36.
35 Exhibit 75; para 38.
36 See Chapter 6, para 12; Thompson Clarke Operational Review, Exhibit 49; CB137, para 9.1.2.
37 Mr Mewett; T.412.
38 Mr Mewett; T.412.
39 Mr Mewett; T.412.
40 Exhibit 31.

[48] Annual surveys are required of safety equipment, load line and matters such as structural fire protection. This requires an inspection of the ship's safety equipment including EPIRB's static safety releases, life rafts and fire fighting equipment. Fire fighting equipment may be certified by an independent, accredited testing body that certifies that the fire fighting equipment is serviceable.

[49] Surveys of load line rely upon the load line that is calculated and certified by a naval architect. The certificate of load line identifies in the form of a diagram the dimensions and location of the load line. The surveyor ensures that the load line is at the right height and has the right dimensions. The surveyor inspects the ship to assess "down flooding" to guard against the risk of water being retained on the vessel and immersing the load line. This, in effect, involves an audit of closing devices on watertight doors and hatches.[41]

[50] Annual surveys of the ship were undertaken. The last of these prior to the incident was on 31 August 2006. It included a safety equipment survey. The surveyor also conducted a "superficial hull and machinery survey" that day, notwithstanding that hull and machinery were surveyed by Lloyd's Register.[42] The 2006 survey did not involve a re-measuring of pipes or an inspection of scuppers. According to the surveyor, these would be inspected during the load line renewal survey that was required every five years.[43]

[51] The survey on 31 August 2006 included an audit of the ship's load line and stability documents. This revealed that Sea Transport Solutions had undertaken work that resulted in the load line mark being raised by 100 mm. The inspector inspected the plimsoll marks from a dinghy and confirmed their location.[44]

[52] The principal of Sea Transport Solutions, Mr Ballantyne, gave evidence that its 2006 load line review was to allow for the carriage of more cargo. Approximately 100 tonnes of cargo was not being collected on each voyage and, as a result, shipments were not reaching the required average 5,000 tonnes. As a result, Sea Transport Solutions was asked to review matters to see if the ship could have slightly deeper drafts.[45]

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41 Exhibit 111, Part 1, paras 4 and 5.
42 Exhibit 111, Part 1, para 10.
43 Exhibit 111; para 6.
44 Exhibit 111, Part 2, para 4.
45 Mr Ballantyne; T.854.

5.7 CREWING

5.7.1 Crew Structure, Command and Responsibilities under the SQS

[53] The ship's command structure places the Master in overall command. The shipboard organisation consists of a "deck department" and an "engineering department".

[54] The Crew Manual section of the SQS details the responsibilities of the Master and others. It records that the Master is fully responsible for the implementation of the SQS on board. This is confirmed by the Fleet Operating Manual section of the SQS which states:

> "The Master has overriding authority, and responsibility to make decisions with respect to safety and pollution prevention, and to request the Company's assistance as may be necessary."[46]

This Manual also imposes a responsibility on the Master to report to the Company without delay, such defects and other matters which could affect the safe operation of the ship or present a risk of pollution.[47]

[55] The Crew Manual section of the SQS is largely a generic document that generally describes shipboard organisation, reporting lines and responsibilities. Many of its provisions are equally applicable to other ships in the Inco fleet with larger crews than the *Wunma*. The Manual refers in some places to officers of the Deck Department as "First Officer", "Second Officer", "Third Officer", etc. Rather than adopt these terms in describing the responsibilities, it is appropriate to refer to the positions by the name that was commonly used on the *Wunma*. In the case of the Deck Department, this consisted of a Chief Mate and a Second Mate.

[56] The reporting lines under the SQS are for the Chief Mate to report to the Master at all times. The Chief Engineer reports to the Master at all times. Deck officers report to the Master at sea at all times when not under the direct supervision of the Chief Mate. The First Engineer reports to the Chief Engineer at all times.

[57] Relevantly, under the SQS the Chief Mate is responsible for preparing a loading and discharge plan which is then discussed with the Master. The Chief Mate, under the direction of the Master, is responsible for all matters pertaining to cargo.

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46 Fleet Operating Manual, p.33, para 8.1.2.

47 *Ibid*, para 8.1.1.

[58] The Crew Manual of the SQS states that the Second Mate is responsible to the Master at all times, but indirectly when under the direct supervision of the Chief Mate in the course of performing cargo duties, and deck maintenance. The SQS describes the Second Mate's primary task as that of "navigation, watch keeper at sea, and as a Duty Cargo Officer when in port". The Second Mate is responsible for the maintenance of charts and publications, passage planning, providing, prior to departure, a plan for the Master's verification, and the maintenance of radio publications.

[59] The Crew Manual provides that every Master and seaman has a personal duty to be properly rested when commencing duty, particularly before watch at sea and in port, and to obtain adequate rest during allocated rest periods. Normal hours of duty for day workers are 0800 to 1630 hours seven days a week. The hours for watchkeepers under the SQS are the Chief Mate 0400 to 0800 hours and 1600 to 2000 hours and the Second Mate 1200 to 1600 hours and 0000 to 0400 hours. Although the SQS anticipates a "Third Officer" having watch keeping duties from 0800 to 1200 hours and from 2000 to 2400 hours, in the events that transpired leading up to the incident, this watch was undertaken by the Master.

[60] Section 5.1.5 of the Crew Manual deals with personnel in port and requires a minimum of five crew members to be on board at all times to enable the vessel to depart in an emergency. The Fleet Operating Manual specifies the duties of the Officer on Watch in Port. These include being responsible for entries in the deck logbook that include weather information.[48]

[61] One section of the SQS Crew Manual which is specific to the *Wunma* concerns a lead monitoring program to ensure that each crew member's blood lead level is below the recommended level.

[62] The Fleet Operating Manual part of the SQS contains extensive provisions in relation to shipboard management and shipboard meetings including a Committee of Management which is to meet monthly and consists of the Master, the Chief Engineer, the Chief Mate, the First Engineer and the Bosun/CIR. Section 12.7 of the Fleet Operating Manual provides that ship inspections are to be conducted by the Master, accompanied by appropriate officers, at least once a week. Section 12.8

48 Fleet Operating Manual, p.50, para 12.9.4.

contains inspection guidelines and stresses the importance of weekly rounds. Section 12.6 requires the submission of a ship's monthly report (no longer than two to three pages) at the end of each month that is jointly submitted by the Master and Chief Engineer.

5.7.2 Changes in Crewing Arrangements

[63] The ship's original Master was Frank Thomson who became its Master in December 1999 after gaining a Restricted Master Class 3 qualification and a Pilots Exemption for the Port of Karumba. Prior to his arrival in Karumba Captain Thomson had been the Master on the *Aburri* for approximately four years. The *Aburri* is a self-discharging ore carrier which transfers zinc and lead concentrate from the Port of Bing Bong in the Northern Territory to export ships anchored offshore. In September 2003 Captain Thomson acquired his National Standard of Commercial Vessel Certificate of Competency Master Class 3. He remained a Master on the *Wunma* until early 2006 when he took three months leave. Subsequently he became employed by MSQ but maintained an association with the ship and, on occasions, was consulted by Inco in respect of aspects of her operation.

[64] In late 2005 a decision was taken by the then Zinifex Port Operations Manager to upgrade the qualification required of the Master of *Wunma* from a Master Class 3 to a Master Class 1.[49] Prior to this decision some Master Class 1s had been employed as Masters on the *Wunma*.[50] The decision, with which Inco agreed after discussions, to replace Master Class 3s with Master Class 1s was taken to "up-skill" the level of leadership and to have "more focus on the quality assurance systems".[51] Zinifex wanted to become "more system oriented" and to bring Inco into its culture and way of doing things, and felt that having a Master Class 1 was appropriate.[52] After the decision Captain Thomson trained about six or seven new Masters.

5.7.3 The "Swing" System

[65] The Master of the ship is placed on a rotation roster with equal time on and off. The term "swing" is used to refer to this practice. Typically, a Master will be on a rotation of three weeks on the vessel, and three weeks on leave off the vessel.

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49 Exhibit 9; para 22, Mr Mewett; T.422.

50 See for example Captain George Hadley, Exhibit 25, who was employed as Chief Mate and Relief Master of the *Wunma* in 2004 and 2005. Captain Seal was employed as Master of the *Wunma* after March 2006.

51 Exhibit 53; para 17, statement of Andrew Dally.

52 Mr Mewett; T.422.

[66] Other members of the crew operate on a swing. The period of each "swing" depends upon the relevant position. For example, a member of the deck crew may have a swing of four weeks on, and three weeks off. The system operates so that there are overlaps between the "swing" period of members of the crew in the interests of ensuring continuity. In other words, the swing system operates so that one crew does not hand over to another crew at the same time.

5.7.4 The Crew at the Time of the Incident

[67] At the time of the incident, the crew consisted of ten persons: the Master, the Chief Mate, the Second Mate, the Chief Engineer, the First Engineer, four other general crew and the ship's cook. The names and a short summary of the qualifications of the first five individuals at the time of the incident is as follows:

Position	Name	Qualifications
Master	Dean Seal	Master Class 1 (AMSA) GMDSS General Radio Operator qualification Pilotage Exemption Licence for the Karumba pilotage area
Chief Mate	Paul Davis	Chief Mate Certificate (AMSA) GMDSS General Radio Operator qualification Master Class 3 Certificate (MNSW)
Second Mate	Kelly Osmand	Mate Class 4 Certificate (MSQ) Master Class 5 Certificate (MSQ)
Chief Engineer	Geoffrey Fisher	Engineer Class 1 (Motor) Certificate (AMSA)
First Engineer	Andrew Leeson	Marine Engine Driver Grade 1 Certificate (MSQ) Master Class 5 Certificate (MSQ)

These crew members held additional qualifications which are not presently relevant. By way of preliminary observation it can be said that the Class 1 qualification held by the Master and by the Chief Engineer "over qualify" them for the daily routine of the ship in her normal area of operation.

[68] The other crew at the time of the incident were:

(a) Phillip White who held a position of Leading Hand on the deck crew. Mr White is a trainee integrated rating.[53]

[53] Exhibit 79.

(b) Troy Shepherd who performed general duties as part of the deck crew. Mr Shepherd is a trainee integrated rating who has held a Coxswain Certificate since 1992 from MSQ.

(c) Jamie Roll: Mr Roll worked as an integrated rating having qualified through an integrated rating course. He also holds qualifications as a fitter and turner.

(d) Ross Caletti: Mr Caletti's qualifications and experience consisted of trade qualifications as a fitter and turner and as a self-unloading ship fitter. He completed his basic shipboard induction for the *Wunma* on 26 September 2006.

(e) Matthew Rohrsheim: Mr Rohrsheim was the ship's cook.

[69] Captain Seal has had extensive experience at sea, having joined the Royal Australian Navy in 1987. He acquired various qualifications in the Navy and at the Australian Maritime College. His experience at sea included cadetships and various ranks on bulk carriers, tankers and container vessels. These included positions as Third Mate and Second Mate. During 20 years at sea he experienced two cyclones off the North West coast of Australia.[54] Prior to February 2007 he had not experienced cyclones in the Gulf. But he had been on board the *Wunma* in March 2006 when Tropical Cyclone Larry crossed the Queensland coast near Innisfail and headed west.[55] It tracked over land south of Karumba.

[70] Commencing in January 2004 Captain Seal became the Master of various A and B Class tugs in Sydney Harbour and Botany Bay. He held these positions until February 2006 when he became Master on the *Wunma*. Captain Seal's experience in charge of tugs gave him ship handling experience which made him a suitable candidate for appointment to the *Wunma*. Prior to the incident he had approximately 200 days on board the *Wunma*. Mr Fisher said that he found Captain Seal to be "very professional particularly with regard to pilotage and bridge resource management type issues".[56] In short, Captain Seal held the requisite qualifications, having been awarded a Master Class 1 Certificate of Competency in June 2002. He had seagoing experience including positions as Third Mate and Second Mate on large vessels.

54 Captain Seal; T.136-137.
55 For a description of the track and intensity of Tropical Cyclone Larry: http://www.bom.gov.au/weather/qld/cyclone/tc_larry

[71] Chief Mate Davis undertook four weeks induction as Chief Mate of the *Wunma* between mid-December and 15 January 2007. He rejoined the ship at about 1430 hours on 5 February 2007, a few hours prior to its departure. Before being appointed to the position of Chief Mate on the *Wunma*, Mr Davis had worked on the self-discharging bulk carrier *MV Alcem Calaca* between March 2006 and December 2006 in the positions of Second Mate and Third Mate.[57] Between November 2000 and February 2006 he was out of the industry taking care of a disabled child, following which he undertook a "revalidation" course at the Australian Maritime College. Mr Davis's seagoing experience commenced in 1976, after which he worked as a deckhand and coxswain on ferries, tugs and launches, as well as on foreign-going vessels. He rose through the ranks, acquired additional qualifications and served in roles, including Second Mate and Third Mate on trading vessels, principally in Australian waters. But his crossings include the American East Coast, Canada, Germany, Singapore, Thailand, Japan and Hong Kong. He estimates having travelled approximately 200,000 nautical miles during his seagoing career.

[72] During his period of induction on the *Wunma*, Mr Davis's priorities were on learning the paperwork which he described as "vast" and learning the pilotage.[58] He learned what he could about the ship. During this time the usual form of communications used by the ship was VHF.

[73] The Second Mate, Kelly Osmand, first went to sea in 1999 working on prawn trawlers out of Cairns and also on charter vessels and tourist boats. Her experience on fishing vessels out of Karumba included working as a crew member on the deck of trawlers and also on board a "mother ship" serving a fleet of trawlers. She joined the *Wunma* in December 2004 after obtaining her Master Class 5 qualification and worked as a leading hand on the ship until the end of January 2006. She then attended the Hunter Maritime College where she completed a diploma in Maritime Transport and Distribution. She rejoined the *Wunma* as Officer of the Watch in order to gain experience towards a Second Mate's qualification.

[74] Ms Osmand has had experience with cyclones in the Gulf of Carpentaria but had never been caught in one at sea because she worked on small ships that could moor

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56 Statement of Mr Fisher – 15 February 2007; para 23.

57 Mr Davis; T.670.

58 Mr Davis; T.678.

up the river for refuge. During her time on fishing boats between 1999 and 2003 she had been to Sweers Island on a number of occasions.

[75] The Chief Engineer, Geoffrey Fisher, has lengthy experience in a wide variety of vessels. His qualifications and experience proved to be invaluable in the circumstances of the incident in being able to restore power to the ship after a total black-out on the night of 6 February 2007. Mr Fisher joined the *Wunma* in August 2006. He commenced his fourth swing (of four weeks) as Chief Engineer on 22 January 2007.[59]

[76] The First Engineer, Mr Leeson, worked on the *Wunma* for about six months prior to the incident. Before that he worked for Quicksilver Connections for approximately seven years.

[77] It is unnecessary to detail or dwell on the qualifications and experience of other members of the crew who were not navigation officers. Some had a reasonable amount of experience at sea. For instance, Mr Shepherd's experience includes approximately 15 years of crewing on vessels including a research boat, tugs and tourist boats.[60] Others had less. This is not reflection on them. It is important to record the commendation that Mr Davis gave of them at the conclusion of his evidence. Mr Davis remarked upon their limited sea experience but said they were "very well trained and very good on this vessel".[61] He said that throughout the incident, and during a period when he did not think they would be able to get off the ship, everybody acted in a calm and competent manner. Mr Davis remarked that the "young people" on the ship, with limited experience, needed to be commended, along with everyone else, for the way they conducted themselves.

5.7.5 Overview of the Crewing of the Ship

[78] Before the ship went into operation, its managers in March 1999 described its expected daily operation as "undertaking an identical passage and schedule". This description in connection with crewing certificates supported a submission that the job of Master was suited to persons with ship handling knowledge and restricted inshore navigational skills that might be found in holders of lower classification certificates. The job of Master in 1999 was a demanding one. It remains so. It

59 Exhibit 40.
60 Exhibit 83.
61 Mr Davis; T.690.

entails management of a ship that plays a critical role in the Century Mine's export of lead and zinc concentrate. The Master must plan loading and departure to coincide with the "tidal window" and the discharge of loads in order to meet, if possible, the "load plan" for export ships. It is a job that requires the Master to attend to a volume of paperwork and to organise a relatively small crew to maintain, if required, a continuous operation.

[79] Masters require skill in handling and manoeuvring the ship due to the intricate nature of the discharge operation that requires the ship to berth alongside export vessels at the Roadstead. Pilotage skills are required to navigate the Norman River and the channel and to understand the run of the tide across the channel. Captain Thomson found that Masters who had experience in command and hands-on experience in the offshore or tug industry were the easiest to train. But very few new Masters or Mates have experience in the Gulf or the weather conditions that they were likely to experience in that area of operation.[62]

[80] The induction and training of new Masters inevitably focused upon the daily operations of the ship and there was much for any new Master or new Chief Mate to learn during the training period. Captain Seal made no complaint about the training that was provided to him by Captain Thomson and others. But this training could not impart all the knowledge that Captain Thomson had acquired through several years' experience as Master.

[81] The *Wunma* provides an opportunity for Masters to gain command experience before moving on to other positions. Captain Thomson's evidence was that since it commenced operation the *Wunma* has had "an unusually high turnover of Masters as they normally take up the position to get command experience before trying for positions as marine pilots".[63] The *Wunma* was not designated as a training vessel and a training program was not formally implemented as part of her procedures. But Captain Thomson observed that since 2004/2005 she had been a training vessel for Inco with engineers who wanted to advance, and for deck crew wanting to become integrated ratings, deck cadets or engineers. By contrast, the *Aburri* was not considered a training vessel for crew by its parent company, P&O.

62 Captain Thomson, Exhibit 9; para 24.
63 Exhibit 9; para 25.

[82] Just as the constant routine of the ship's normal, daily operations places substantial demands upon the Master, they place demands upon other crew. The Chief Engineer and those who assist him in the engineering department are required to undertake the daily operations of the vessel and to attend to maintenance and repairs in the course of these operations. But programmed maintenance may be displaced. During the ordinary operation of the vessel when she is required to go to and from an export vessel each day, there is limited time to undertake major maintenance. The schedule might include a period for maintenance. But on occasions this programmed maintenance had to be deferred. Evidence was given of occasions when there was a week of jobs to do but the crew would only get a few days into them before being told "there is a ship coming, we have to go".[64]

[83] Various members of the crew are required to undertake general ship duties including maintenance and cleanliness of the ship. Tasks include the maintenance of conveyor belts and other equipment and keeping decks and drains as clear as possible of concentrate. Deck crew have to shovel quantities of zinc concentrate that collects under the C1 conveyor belt on the port side deck. One member of the crew observed that they seemed "to be stretched pretty thin".[65] Overall, the impression that emerged from the evidence was of a hard-working crew with many demands on their time.

[84] The review undertaken by Thompson Clarke Shipping in the latter half of 2006 on behalf of Zinifex identified a number of issues in connection with crew employment and operational arrangements. These included:

(a) crew churn rates with a high turnover of crew which led to the question of whether the conditions and challenges of the work were being properly communicated to new entrants;[66]

(b) the responsibility imposed upon the Master/Assistant Master/Chief Engineer and Second Engineer to train new or inexperienced crew in circumstances where those officers had full time jobs and often worked long hours on rosters determined by commercial charters and tides;[67]

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64 Statement of Troy Shepherd; Exhibit 83; para 7.
65 Statement of Matthew Rohrsheim; Exhibit 48; para 6.
66 Exhibit 49; CB137; para 5.1.4.
67 *Ibid*; para 5.1.5.

(c) the difficulty of retaining senior officers: the vessel being virtually always "under pilotage" and thus by default, a good platform for a career path development leading to pilotage;[68]

(d) fatigue: Thompson Clarke noted that the extent of fatigue depends on shipping programs, that on occasions there are various slack periods, that only officer (not crew) fatigue is monitored, that during the visit of Thompson Clarke some extremely long (and probably excessive) hours were being worked by the engineers and that rest periods may have been inadequate. Thompson Clarke observed that fatigue "is a very difficult issue to address, measure/control and counter" but that the ship's staff were well aware of the issues and dangers involved and made every endeavour to minimise fatigue while maintaining optimal operations for Inco and Zinifex;

(e) personnel holding Class 1 Masters or Class 1 Engineering certificates are overqualified for the limited and repetitive work involved;[69]

(f) some of the crew may not have the ability, knowledge and experience to handle cyclones at sea.[70] This was posed as a question in the Thompson Clarke Operational Review relation to Cyclone Preparedness. The author of the Report, Mr Clarke, explained that it was not a question necessarily directed at all of the crew, and was not directed at the Masters. It was prompted by observations made in the course of the review about the experience and training of some members of the crew.

[85] Someone with a Master Class 1 may not have had experience of cyclones at sea. Whether they do depends on the area in which they train and their experience, and "the actual chance of getting practical experience is probably fairly small".[71] The incidence of cyclones is such that persons with experience in the Gulf may not have experience of operating a ship in a cyclone. For instance, Captain Thomson was on board the *Wunma* on a few occasions when there was the threat of a cyclone, but had not been in cyclonic conditions on the ship.[72] But the formal training of a Master Class 1, which includes study of meteorology and cyclone avoidance techniques,

68 *Ibid*; para 5.1.6.
69 *Ibid*; para 5.2, p.12.
70 *Ibid*, Attachment C, p.4.
71 Mr Clarke; T.868.
72 Captain Thomson; T.33; T.109.

coupled with their command experience should equip them to take appropriate cyclone avoidance action.[73]

[86] The Terms of Reference of the Inquiry ask the Board to have special reference to whether “relevant persons” were appropriately qualified and experienced in their roles on the ship, with special reference to tropical revolving storms. The Board considers that the “relevant persons” are principally the ship’s navigation officers. The Board considers that in general, those persons were appropriately qualified and experienced. Even experienced seafarers may have limited experience of tropical revolving storms/cyclones. But the holder of a Master Class 1 is appropriately qualified to undertake cyclone avoidance action.

[87] The qualifications and experience of the crew have been outlined above. Mr Davis, through no fault of his own, had limited experience in the use of the ship’s communication systems, and limited experience of the ship in general, consisting of a four week period of induction between mid-December 2006 and 15 January 2007. He re-joined the ship on 5 February 2007. During his induction period the ship was not outside the range of VHF communications, and he did not gain experience in the operation of all aspects of the ship’s communication equipment. He was suitably qualified, being the holder of a GMDSS General Radio Operator qualification, and experienced in the use of communications systems. But he was not familiar with the operating procedures of all of the communications systems on board the ship. During his period of induction he concentrated on matters of more immediate importance in becoming acquainted with the ship’s normal, daily operations. Unfortunately, this lack of familiarity with the ship’s communication systems proved to be a problem on the evening of 6 February 2007 when he was on watch. These matters are appropriately addressed in the context of the narrative of events on that voyage. Mr Davis’s lack of familiarity with the communications systems should have been addressed before he was required to undertake a voyage in open seas or before taking over the watch on 6 February 2007.

5.7.6 Crewing – Statutory Requirements, Minimum Crewing and Adequate Crewing

[88] The evidence before the Inquiry discloses some confusion about crewing requirements. For instance, the Thompson Clarke Shipping Operational Review in

73 Mr Clarke; T.868. Captain Dally; T.539.

December 2006 reported that Queensland Transport required the ship to be manned with a total of seven persons being:

[89]

Rank	**Certificate**
Master	Master Class 4
Mate	Master Class 4
Chief Engineer	Marine Engine Driver II
Second Engineer	Marine Engine Driver III
GPs (3 in number)	Coxswains Certificates

The same view was expressed in a report prepared on behalf of Zinifex for the Inquiry.[74]

[90] The Managing Director of Inco gave evidence that:

> "The mandatory requirement for operating the *MV Wunma* is a Master Class 3 Restricted."[75]

His witness statement of 1 August 2007 also stated:

> "Currently, and in February 2007, the number of crew of the *MV Wunma* is not mandated under a Safe Manning Certificate."

[91] It appears that for many years, the normal operation of the ship between the Port of Karumba and export ships at the Karumba Roadstead was conducted on the basis that an exemption had been obtained from Queensland Transport to permit the ship to have as her Master a Master Class 3 in that area of operation. It was on this basis that holders of Master Class 3 qualifications, such as Captain Thomson and Captain Dunnett, acted as Master or Relief Master. It will be recalled from Chapter 4 on the history of the ship that the issue of exemptions arose as a topic for discussion within the Maritime Services Branch in 1999. In a Memorandum dated 12 October 1999 the then Director (Maritime Services), Captain Diack, expressed his opinions concerning a proposal to grant exemption to operate the ship with a Master and officers holding qualifications less than required in the regulation. Captain Diack's view was that a reduction in qualification of the Master from Master Class 2 to

74 Report of Captain White; Exhibit 114; para 5.1.3.
75 Exhibit 53, Part 1; para 17.

Master Class 3 was considered reasonable with the contingent upgrade of the Mate to Master Class 3. The proposed reduction in the engineering qualifications was not supported by Captain Diack as a result of advice that the ship had complicated engineering systems that could easily present a safety issue.

[92] Draft notices of exemption were prepared in two different forms. The first option granted an exemption subject to the following conditions:

(a) The Master holds at least a Master Class 3 open certificate of competence; and

(b) the Chief Mate holds at least a Master Class 3 open certificate of competence; and

(c) the Chief Engineer holds at least an Engineer Class 3 open certificate of competence; and

(d) the Second Engineer holds at least a Marine Engine Driver Grade 1 open certificate of competence; and

(e) the ship operates as an ore transfer vessel within the Karumba port limits and in the most direct route to the designated ore transfer anchorage between the positions:

Latitude 17º 09.0 S Longitude 140º 30.0 E;
Latitude 17º 19.5 S Longitude 140º 39.0 E;
Latitude 17º 20.5 S Longitude 140º 38.0 E;
Latitude 17º 10.0 S Longitude 140º 29.0 E; and
the ship's cyclone mooring at –
Latitude 17º 07.5 S Longitude 139º 34.7 E.

[93] The second option was subject to conditions (a), (b) and (e). In other words, it included no conditions in relation to the qualifications of the Chief Engineer or Second Engineer.

[94] An application for exemption to reduce the Master Class 2 requirement to a Master Class 3 restricted to the ship's limited area of operation was supported by certain officers within MSQ. But the application for exemption was not finally determined and no exemption was ever gazetted. Remarkably, the matter was allowed to drift for years without the exemption to allow use of a Master Class 3 in the ship's limited area of operation being officially granted. From time to time individuals such as

Captain Thomson were granted an "interim certificate" of three months duration by the Regional Harbour Master which granted "Restricted Master Class 3" licences restricted to the *Wunma's* Karumba operations. A file note from February 2003 records a direction from the Acting Principal Advisor to not issue such certificates until the Master's exemption in respect of the ship had been finalised. Despite this, a further interim certificate was granted to Captain Thomson in March 2003. More importantly, the granting of an exemption to permit the ship to operate in her limited area of operation under the command of the holder of a Master Class 3 was never finalised and officially granted. The owners and operators may have assumed that it was.

[95] As matters transpired, at the time of the incident the ship was under the command of a Master Class 1 and its Chief Engineer held a Class 1 certificate. However, due to a failure by MSQ to resolve the exemption issue, the ship was permitted to be operated for a substantial period in breach of statutory requirements concerning the qualifications of her Masters. The operation of the ship during this period under the command of the holders of "Restricted Master Class 3" certificates exposed them, the operators of the ship and the ship's owners to the risk of adverse legal consequences and may have had insurance implications. The Board notes that an advertisement by the incoming ship manager on 8 September 2007 assumed that the position of Master could be held by the holder of a Master Class 3. However, a later advertisement published in the *Weekend Australian* of 22 September 2007 readvertised the positions for the holder of a Master Class 2.

[96] These matters were brought to the attention of MSQ by Counsel Assisting, and were also raised in the written submissions of Counsel Assisting. Those submissions made clear that at the time of the incident the *Wunma* was under the command of a Master Class 1 and, as a consequence, deficiencies in MSQ's processing of the application for an exemption were not a cause of the incident. MSQ submitted that these matters were outside the scope of the Board's term of reference. But under section 132 of the *TOMS Act* a Board of Inquiry's report may contain reference to relevant matters. The shortcomings in MSQ's failure to process the application for exemption, although not causative of the incident, are relevant matters about which the Board should report.

[97] Captain Boath was satisfied that the crew to whom he issued a Restricted Master Class 3 licence to operate the *Wunma* in her normal area of operation were competent to operate the ship. There is no evidence to the contrary and, in fact, individuals such as Captain Thomson were, and are, highly regarded mariners. But that is not the present point. The point is that an application to grant an exemption to permit a Master Class 3 to operate the ship in her normal area of operation was never processed. Captain Boath was unable to advise why the exemption was not processed and gazetted.[76] Mr Bundschuh could not explain why the exemption was not processed and gazetted.[77] Overall, the fact that the application for exemption was not processed to finality and gazetted is a matter that reflects adversely on MSQ's administration.

[98] The current statutory requirements and possible future requirements in the event that the provisions of the *USL Code* are replaced by provisions based upon the *National Standard for Commercial Vessels* are matters for the owners and operators to consider. In essence, section 88 of the *TOMS Regulation* 2004 requires a person to hold an appropriate licence to operate a commercial ship as her Master or act as a crew member. The appropriate licence is at least the class of certificate stated for the area in the *USL Code*, section 2, part 4, clause 37.[78] This USL provision is in the form of a table that specifies the required class of certification by reference to vessel size and operational area. For instance, a vessel over 80 metres and less than 120 metres operating in an offshore area requires a Master holding a Master Class 2. If a Chief Mate is required the Chief Mate must hold a Chief Mate Class 2 certificate. If a Deck Watchkeeper is required they must hold a certificate as a Second Mate Class 2 or a Master Class 3. The licenses required by engineers depends on a ship's propulsion power and operational area. In short, the minimum qualifications depend, in part, upon the operational area of the ship. It may be possible to apply for an exemption pursuant to section 18A of the *TOMS Act* 1994. But that exemption may be subject to conditions including the area in which the ship is to operate.

76 Statement of Captain Boath dated 26 October 2007, Exhibit 134.
77 Statement of Mr Bundschuh dated 25 August 2007, Exhibit 134.
78 *TOMS Regulation* 88(2).

5.7.7 Minimum Crewing and Adequate Crewing

[99] It is important to distinguish between:

(a) the qualifications required of a Master and other crew to operate the ship;

(b) the minimum number of crew;

(c) the adequacy of crewing in terms of both number and competence.

[100] The qualifications required of the Master and other crew under the relevant provisions of the *USL Code* which are picked up by section 88(2) of the *TOMS Regulation* do not dictate the minimum number of crew required to safely operate a ship, let alone to operate her as a commercial enterprise.

[101] The qualifications referred to in the Thompson Clarke Operational Review and the White Report reflect the contents of a letter from ISM which sought a "Safe Manning Certificate" in terms of those qualifications. No "Safe Manning Certificate" was issued. As Captain Dally stated, the number of crew of the *Wunma* at the time of the incident was not mandated under a "Safe Manning Certificate". The general safety obligations imposed by sections 41 and 43 of the *TOMS Act* may, in general terms, require a certain number of crew to safely operate a ship. Minimum crewing requirements essentially are concerned with the number of crew required to take the ship from one place to another and to be able to operate the ship, including her safety equipment. They assume that the crew will be in a good state of health, rested and free from fatigue. Crewing numbers should take proper account of the in-port workload of the crew and the intensity of the ship's "trade".

[102] Operation of a ship in accordance with an actual or perceived "minimum safe manning requirement" limits the scope for on-the-job training and supervision. It does not provide redundancy and a protection against overwork and fatigue. Minimum manning requirements do not address whether, in particular circumstances, a crew member is overworked or fatigued. For instance, the Thompson Clarke Operational Review in late 2006 apprehended, on the basis of its inspection of the ship, that some extremely long, and probably excessive, hours were being worked by the engineers and that rest periods may have been inadequate. As will appear from the account of events later given concerning the voyage prior to the incident, the Chief Mate re-joined the vessel at 1630 hours on 5 February 2007. He had been up since 0430 hours that day to catch a plane and did not rest until about 2300 hours.

[103] A *National Standard for Commercial Vessels* has been drafted to replace the *USL Code*. In relation to crewing it contains the following provisions:

> "*National Standard for Commercial Vessels Part D*
>
> CHAPTER 2 CREWING OF VESSELS
>
> **2.3 OBJECTIVE**
> To provide Authorities, owners and masters with requirements for determining both the minimum crew (in terms of number and certification levels), and the adequate crew required onboard a vessel for the safe operation of that vessel.
>
> …
>
> **2.5 MINIMUM CREW**
> A vessel must at all times when under way or operating carry sufficient competent and trained crew so that:
>
> a) The vessel can safely navigate, berth and unberth.
> b) The essential vessel systems can be operated and monitored safely.
> c) Immediate and appropriate emergency action can be taken when there is a failure of an essential system.
> d) Immediate and measured response can be provided in an emergency situation.
> e) The crew can safely abandon the vessel if required.
>
> NOTE: The minimum crew is not tailored to the nature of trade or particular activities, functions, or business carried out on the vessel.
>
> **2.6 ADEQUATE CREW**
> In addition to the minimum crew, a vessel must at all times when underway or operating, carry sufficient crew in terms of both number and competence to:
>
> a) Eliminate or control to acceptable levels risk associated with the nature of the activity conducted by the vessel.
> b) Provide a measured response to emergencies or risks that may threaten the vessel or persons onboard during normal or abnormal conditions when considering all facets of the vessel's operation.
> c) Facilitate the rapid and safe evacuation of all persons onboard the vessel.
>
> …
>
> **2.8 DETERMINATION OF ADEQUATE CREW**
> In determining the adequate crew required, the risks to the vessel and to the persons onboard (crew and passengers) shall be evaluated.
>
> The evaluation shall take into account, but it is not necessarily limited to, the following factors:

a) Task or employment (i.e. passenger carrying, fishing, etc.) of the vessel and any particular demands on the crew that the task imposes on the vessel in addition to its safe navigation.
b) Number of persons carried on the vessel.
c) Design characteristics of the vessel including its machinery and equipment.
d) Expected conditions including weather, climate and water temperatures.
e) Length of voyage.
f) Fatigue.
g) Foreseeable emergencies.
h) State and repair of the vessel and its machinery and equipment.
i) Safe and timely evacuation of all people from the vessel in an emergency.
j) Risks to the environment, and other persons.
k) Skills and experience of crew.
l) Support available to the vessel and its crew.
m) Any factors identified by an Authority as relevant to safe operation.
n) Any other identified factors, operational practices or known risks.

NOTES

1. The adequate crew for a vessel may change from day to day depending on operating conditions and other circumstances. For example the number of passengers on a particular voyage.
2. Part E of this Standard specifies requirements for emergency preparedness and safety management systems that will need to be taken into account when determining crewing.
3. Legislation may specify specific requirements for the determination of adequate crew.
4. Legislation may require an owner to identify the basis on which the adequate crew was determined. It may also require any owner to prove the effectiveness of the adequate crew and their training by conducting a drill simulating as closely as practicable to situations considered in the determination of the adequate crew." (Emphasis added)

[104] In *Marine Information Bulletin* dated 27 September 2007 MSQ stated "Under Queensland's current performance based legislation adequate manning levels to satisfy the General Safety Obligations is the responsibility of the Master and Owner". This contrasts to what is described by MSQ in the *Bulletin* as the "more prescriptive approach" where manning levels specified in NSCV Part D. The matter is the subject of ongoing discussion within the marine industry.

[105] At the time of the incident there were ten crew on board. By August 2007 it had increased so that at times there were up to fourteen crew on board. The manning of

the ship from her inception was about nine or ten crew. The crew are accommodated on board.[79]

[106] The intensity of the “trade” undertaken by the ship during her normal operations, combined with the system of “swings” warrants a review by MSQ, in conjunction with the owners and operators of the ship, to ensure that the ship has sufficient crew in terms of both number and competence to undertake her normal daily operations and, when required, to respond to other situations, including the threat of a cyclone.

[107] The intensity of the ship’s “trade” whereby she may be scheduled to operate continuously from the Port to the Roadstead each day, depending on the scheduling of export ships, has already been mentioned. It raises issues of crew fatigue and the adequacy of crew numbers to undertake routine tasks such as shovelling of ore concentrate from the portside deck, cleaning and maintenance.

[108] The “swing” system presents a number of obvious advantages including a structure to permit crew to return from a remote location to their normal place of residence at the end of each “swing”. It is understandable that employers and employees in remote locations favour such a system which allows employees to have a block of time away from work. But such an arrangement, which has the potential to have a crew member work on 28 consecutive days (assuming a “swing” of four weeks on) has implications in relation to fatigue, even allowing for normal rest periods each day and suitable accommodation on board to rest.

[109] The owners and operators of the ship are subject to a variety of statutory and common law obligations concerning the safety of the ship and the occupational health and safety of her crew, and can be expected to be conscious of these obligations. Still, it is appropriate that MSQ review the qualifications, competence and number of crew. A new operator took over the management of the ship as from 1 November 2007.[80] This provides a suitable occasion for MSQ to consider more than simply the qualifications of the crew and any application for an exemption relating to the appropriate licence for a person to hold in order to operate the ship. It provides the occasion for MSQ to consider the minimum crew required and that adequate crew are on the ship. The number of crew should take account of fatigue

79 Statement of Andrew Dally; Exhibit 53; para 20.
80 Exhibit 120; para 9.

issues that arise from the intensity of the ship's "trade" and the operation of a "swing" system.

5.8 MANAGEMENT STRUCTURES AND PROCEDURES

5.8.1 Inco's Management Structure in 2007

[110] Inco Ships Pty Limited is part of the Intercontinental Group. Prior to 23 September 2004 it was named Intercontinental Ships Management Pty Limited. It manages and operates the group's vessels and manages vessels for third parties. Management of the fleet does not distinguish between group-owned and third party vessels.[81]

[111] The ship management services provided by Inco for third party owners includes crew management, quality assurance systems, safety management systems, technical management and consolidation of accounts for owners. Full management consists of crew management, safety, quality, technical and accounts. Crew management involves placing appropriately certified and qualified individuals into positions. Inco also offers commercial services such as chartering.

[112] The Inco fleet initially numbered five ships. By early 2007 Inco managed eleven ships under full management and three ships under crew management and technical consultancy.[82]

[113] The management structure in February 2007 consisted of Captain Andrew Dally as Managing Director; Captain Ian Ives as Operations Manager with responsibility for employment and nautical matters; Mr Peter Iuliano as Quality and Technical Manager with responsibility for quality assurance procedures, safety, security systems and the provision of technical support for two vessels; Mr Dick McDonald, the Fleet Technical Manager with general responsibility for the fleet including the *Wunma*, and two other Technical Managers.[83] In addition to its main office at St Leonard's in Sydney, Inco had an office in Adelaide, an office in Whyalla associated with managing a Floating Offshore Transfer Barge and an office in Karumba. A manager was located in each of these offices. Captain Dally described these offices as "the coal face" of Inco's management and the main liaison with the vessel's owner.[84] The office in Karumba was run by Inco's Operations Superintendent.

81 SQS 05, Inco Ships Management Manual, p.1.
82 Exhibit 53, Part 1; para 8.
83 Exhibit 53, Part 1; para 9.
84 Exhibit 53, Part1; para 10.

5.8.2 Operations Superintendent - Karumba

[114] Under the SQS, the Operations Superintendent-Karumba is said to have "Operational Responsibility for *Wunma*" and also is responsible to:

- ensure good cooperation with ZCML management and staff;
- ensure that *Wunma* and Inco ship staff meet contractual agreements with ZCML.[85]

[115] The reference in the SQS to "Operational Responsibility for *Wunma*" is too broad a description since under the Crew Manual section of the SQS states:

> "The Master has overriding authority and is fully responsible for the conduct of the vessel"

[116] Nevertheless, the Inco Ships Management Manual section of the SQS places considerable responsibility on the Operations Superintendent. In terms of organisational relationships defined in the SQS, the Operations Superintendent reports to the Managing Director, liaises with the Operations Manager, the Engineer Manager and the Financial Controller and provides "supervision" to the Master and the Crew. In terms of cargo operations and vessel scheduling, the Operations Superintendent is required by the Management Manual to work closely with ZCML and the Master/Chief Engineer. The stated qualifications for the position was said to "ideally" be a current Master Class 1 or Engineer Class 1 Certificate with technical knowledge of self-discharging barge operations, shipping rules, regulations and technical factors.

[117] The holder of the position at the time of the incident was Mr Mark Tonkin. Mr Tonkin served in the Australian Navy Reserves for 12 years between 1973 and 1985 where he performed engine room duties. Before joining the Reserves he had completed an apprenticeship as a fitter and turner. After 1979 he worked in the cement industry as a maintenance foreman in charge of a plant. In 1985 he became the Operations Superintendent for a new cement plant. He commenced work with Inco as a Maintenance Supervisor in February 2006 at Karumba. It was Mr Tonkin's experience in maintaining plant and equipment, including maintenance on Inco's river ship's loading gear that led to him being approached by Inco to take up the position in Karumba. Although Mr Tonkin had experience in the Australian Naval Reserves, he did not claim to be an experienced mariner.

[118] Prior to May 2006 the position of Operations Superintendent had been held by Captain Heath Daniel, a former Master of the *Wunma* who was qualified as a Master Class 1. As appears from the previous account of the history of the ship, Captain Heath Daniel was involved in communications concerning cyclone procedures. Mr Tonkin's experience was principally in the maintenance and operation of plant. As Inco's Maintenance Supervisor he had experience in the management and maintenance of the Material Handling Plant onshore at the Zinifex port facility and the Self-Unloading Systems on board the *Wunma*. This made him suitably qualified and experienced in managing and maintaining the material handling side of the operation. It is understandable, given his relative lack of maritime experience, that he would defer to decisions made by the Master of the *Wunma* concerning decisions to load and to sail.

5.8.2 Inco's Operations Manager

[119] Under the SQS, the purpose of this position was the maintenance of high safety and environmental standards in an efficient and operational manner throughout all managed vessels.[86] The holder of this position reports to the Managing Director and acts as Deputy to the Managing Director.

[120] Between 2002 and June 2007 the position of Operations Manager was held by Captain Ian Ives, who had extensive maritime experience, including 18 years at sea during which time he mastered bulk carriers and container ships. Captain Ives is the holder of a Master Class 1. As Operations Manager Captain Ives' duties included managing safety audits of the *Wunma*. He was not involved with the technical management of the ship.[87]

[121] The Inco fleet initially numbered five ships. It grew to 14 ships. Even with an additional crew coordinator Captain Ives was not able to devote sufficient time to each vessel he was required to manage.[88] As a result, on 29 January 2007 there was a change in Inco's office structure and Mr Peter Iuliano became the Designated Person for Inco Ships Pty Ltd and had responsibility to attend to correspondence and other matters relating to SQS systems.[89]

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85 SQS 05, Inco Ships Management Manual, p.9.
86 SQS 05, Inco Ships Management Manual, p.6.
87 Exhibit 51; para 2.
88 Captain Ives; T.492.
89 Exhibit 37.

5.8.3 Designated Person Ashore

[122] Under the SQS, the role of the Designated Person (also referred to as the Designated Person Ashore) is to ensure the safe operation of the company's ships and to provide a link between the company and those on board.[90]

[123] The Designated Person's responsibilities include monitoring the safety and environmental aspects of vessels, ensuring that adequate resources and shore based support are applied. Although the SQS described the Operations Manager as the Designated Person/Designated Person Ashore,[91] as already noted Mr Peter Iuliano, Inco's Safety Quality and Technical Manager, assumed the role of Designated Person on 29 January 2007.

5.8.5 Fleet Technical Manager

[124] Under the SQS, the Fleet Technical Manager has responsibility to ensure that nominated vessels are maintained to standards that provide reliability and efficiency for the vessel's principals. The position reports to the Managing Director and liaises with Masters and Chief Engineers, external supplies, classification societies and customers. The position provides supervision to Masters and Chief Engineers. Under Inco's organisational structure at the time of the incident, the Fleet Technical Manager provided technical support for the *Wunma*.

[125] At all relevant times the Fleet Technical Manager was Mr Richard McDonald who has worked in the shipping industry since 1962.[92] His work as Fleet Technical Manager includes supervising the operation, maintenance and building of ships, work in dry docks and conversions.[93] When Mr McDonald became Fleet Technical Manager in March 1999 he understood that the *Wunma* was intended to operate in sheltered waters and that a cyclone mooring was intended to be an element in the ship's operations. But he did not play a significant role in those discussions at the time.[94] He had no direct input into the later change in the ship's registration from Class 2C to Class 2B because he was in Singapore from about November 2004 until October 2006 on a ship reconstruction project.[95]

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90 SQS 05, Inco Ships Management Manual, p.3.
91 SQS 05, Inco Ships Management Manual, pp.3 and 6.
92 Exhibit 50; para 2.
93 Exhibit 50; para 2.
94 Exhibit 50, Part 2; paras 2 and 3.
95 Exhibit 50, Part 2; para 4.

5.8.6 Managing Director

[126] This position carries a number of responsibilities in relation to the company's business. The Managing Director reports to the directors of the Intercontinental Group. Under the SQS, the position involves supervision of all management level office staff and the management of a team of 15 office staff in Sydney, the Operations Superintendent – Karumba and Project Managers, as required.[96] Naturally, the position involves the management responsibilities that would be expected of a Managing Director of any organisation including ensuring that the company remains profitable and grows. Responsibilities include operating vessels in accordance with company policies. The Designated Person is responsible to the Managing Director for Occupational Health & Safety, Quality and Environmental Issues. However, under the SQS the Managing Director is in charge of the emergency response team.[97]

[127] At all relevant times the Managing Director of Inco was Captain Andrew Dally. Captain Dally held a number of positions at sea after completing a four year officer cadetship in 1989. He became the holder of a Master Class 1 in about 1994.[98] In about 1996 he transferred to Intercontinental Ship Management ("ISM") where he served as a Master until 1998. In 1998 he became ISM's Operations Superintendent and in 2000 was promoted to Deputy Managing Director. He became Managing Director in about 2001. Captain Dally's seagoing experience included service on a number of tankers, being a relief Master on a 34,000 dwt bulk carrier and two years as Master of a 5,500 dwt general cargo ship.

5.8.7 Overview of Onshore Management of the Ship

[128] Inco is certified under the ISM Code as a management company. It has to meet certain criteria and its systems are audited by AMSA annually.[99] Its management at all relevant times included persons with extensive maritime experience and qualifications, including Captain Dally, Captain Ives, Mr Iuliano and Mr McDonald. Its SQS for the ship was audited, and found to comply with the requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention.

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96 SQS 05, Inco Ships Management Manual, p.4.
97 SQS 05, Inco Ships Management Manual, p.4.
98 Exhibit 6, Part 1; para 3.
99 Exhibit 53, Part 1; para 15.

[129] The operation of the ship involved an interaction between, on the one hand, Zinifex's production process and its Karumba-based management and, on the other hand, Inco's materials handling and shipping operations. Inco's Karumba Operations Superintendent was the point of contact between these two systems. The ship is a critical element in Zinifex's business. Without it, Zinifex's exports halt. Delays in transporting ore to scheduled export vessels come at a substantial cost and may jeopardise Zinifex's production and export program. Unsurprisingly, Zinifex, as owner of the ship and the wharf facility, has a vital interest in the ship's operations, and Inco's Operations Superintendent at Karumba had a significant responsibility in ensuring that Inco met its contractual obligations with Zinifex and was attentive to Zinifex's operational requirements. The Operations Superintendent at Karumba had a substantial responsibility for the operation of the *Wunma* and for the efficient operation and maintenance of critical plant and equipment. This included the reclaiming plant at the port and the on-board plant which is used to load and discharge concentrate. In short, substantial responsibilities were imposed upon the Operations Superintendent at Karumba.

[130] The remoteness of Karumba, and daily interaction between Inco's Operations Superintendent and Zinifex employees, meant that, in some respects, the relationship between Inco and Zinifex was not conducted strictly in accordance with the terms of the Vessel Operations Management Agreement ("VOMA"). For instance, the VOMA provided for monthly meetings of a coordination committee. Instead, there was no coordination committee. Its function was replaced by a quarterly review. In the eight years since it was written, operational experience and interaction on a daily basis at an operational level meant that the VOMA "morphed into a different beast".[100]

[131] The remoteness of Karumba meant that senior management and technical personnel from Inco's head office did not attend meetings with the client or visit the ship as often as they might if it were located in a larger city.

[132] The expansion of Inco's business meant that its Operations Manager, Captain Ives, was not able to give the operations of the *Wunma* the attention that he might otherwise have given. Nevertheless, if Captain Ives was unable to attend to matters, Inco was not short of persons with maritime experience. Captain Dally was

personally involved in the development of revised cyclone procedures and the upgrading of the ship's registration from Class 2C to Class 2B. For a substantial period, the Operations Superintendent at Karumba was Captain Heath Daniel, a former Master of the ship. However, as the 2006 review undertaken at Zinifex's request by Thompson Clarke Shipping indicated, significant operational issues needed to be addressed, including:

(a) crewing issues:

(b) the scheduling of maintenance on the ship;

(c) design issues;

(d) the cleanliness of the ship and the need to identify the root causes for the transmission of concentrate around the vessel and to improve cleaning processes;

(e) the operation of cargo handling arrangements.

[133] Mr Tonkin's background in materials handling made him a suitably qualified person to address cargo handling and maintenance issues.

[134] Inco agreed to a proposal to replace the position of Master Class 3 on the ship with a Master Class 1 to provide "more focus on the quality assurance systems".[101] This was despite the fact that a Master Class 1 was arguably "overqualified" for the ship's routine daily operations to and from export vessels at the Roadstead.

[135] The consequence of replacing Master Class 3s, such as Captain Thomson, who had extensive experience on the ship was the loss of their knowledge. Captain Thomson and other masters who trained new masters passed on the benefit of their experience and, even after he left Inco's employment, Captain Thomson continued to be available to give on advice. But with the "changing of the guard" practices known to individuals such as Captain Daniel and Captain Thomson, such as the practice of not loading the ship when there was a low in the Gulf, did not find their way into written operating procedures and did not become standard operating procedures.

[136] The demands placed upon Inco to ensure that the ship met Zinifex's contractual requirements and Zinifex's plan to export one million tonnes of concentrate annually meant that Inco management and head office and its Operations Superintendent at Karumba had to do their best to work with the existing system and equipment. The

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100 Mr Mewett; T.393.

101 Exhibit 53, Part 1; para 17.

objective of meeting planned exports meant that Inco and Zinifex worked cooperatively with the equipment and systems that they had, rather than undertake a major overhaul of those systems. There was limited time for major maintenance programs or overhauls of the ship or the materials handling plant.

[137] With the Operations Superintendent undertaking a demanding job, the Operations Manager busy with an expanding fleet of ships and the Fleet Technical Manager absent in Singapore for a period of approximately two years between 2004 and 2006, Inco staff probably did not have the personnel resources to undertake a major review of the ship's operations and her equipment. Nor was it requested by Zinifex to undertake such a fundamental review. Operational issues later identified in December 2006 by the Thompson Clarke Operational Review were not comprehensively addressed. The focus was on maintaining daily operations, implementing a system that had been developed over a seven year period and doing the best to "live with" the materials handling plant and the ship they had been given.

5.9 VESSEL OPERATIONS MANAGEMENT AGREEMENT

[138] Pasminco Century Mine Limited ("PCML") and Intercontinental Ship Management Pty Limited ("ISM") entered into a Vessel Operations Management Agreement ("VOMA") on 3 May 1999. It was varied by a Deed of Variation around February 2000. PCML later changed its name to Zinifex Century Limited. ISM later changed its name to Inco Ships Pty Limited.

[139] VOMA governed the contractual rights and obligations of Zinifex and Inco in relation to the operation and management of *Wunma* and the reclaiming system. It does not specifically address issues such as drills, emergency response procedures, compliance and documentation.

[140] Clause 4.1(a)(7) provided that Inco shall provide all labour, equipment, materials and supplies necessary to manage and operate *Wunma* and the reclaimer system. Clause 4.2(a) provided that Inco as principal shall engage and employ the Master, officers and crew of *Wunma* and ensure that the Master, all officers and crew of *Wunma* are in possession of all necessary endorsements for service in accordance with the requirements of the Queensland Department of Transport.

[141] Clause 4.1(b) obliged Inco to ensure that its work was carried out in accordance with applicable laws and directives, the Operating Procedures specified in clause 4.5 and good operating and maintenance practice.

[142] Clause 4.5(a) provided, amongst others, that Inco shall develop and keep current operating procedures in relation to:

- loading *Wunma* with concentrates;
- manoeuvring *Wunma* as required;
- transporting the concentrates to the offshore anchorage;
- manoeuvring the vessel alongside ocean going bulk ships;
- returning *Wunma* to the port; and
- cyclone management.

[143] Clause 4.9(a) provided that Inco shall:

- ensure all parts of *Wunma* are kept in good repair, efficient operating condition and are seaworthy in all respects except where otherwise agreement in writing by the parties;
- schedule all maintenance, overhauls, replacements and repairs necessary to *Wunma* and reclaimer system so as to minimise disruption to Zinifex's operations;
- carry out all maintenance, overhauls, replacements and repairs necessary to *Wunma* and reclaimer system in accordance with good operating and maintenance practice;
- keep *Wunma* with unexpired classification certificates, including all safety, radio, load line and such other certificates prescribed by applicable laws and directives.

[144] Clause 4.10 provided that Inco shall replace with reasonable promptness all parts which may from time to time become inoperative, damaged beyond repair or otherwise unusable for any reason for use by Inco with *Wunma*. Clause 4.12 provides that Inco shall ensure that proper books of record and accounts of Inco are maintained.

[145] Clause 5.10 provided that Inco shall:

- keep deck and engine room logbooks, maintenance and other records in relation to *Wunma*; and

- keep those logbooks, maintenance and other records current.

[146] Clause 6 set out the obligations of Zinifex. Clause 6.2 provided that Zinifex shall provide, amongst others, a safe wharf suitable for mooring with the Autodock System with *Wunma* always afloat. Clause 6.3 stated that Zinifex shall provide:

- a navigable dredged channel; and
- cyclone moorings.

[147] Under clause 8, Zinifex was responsible for reimbursing Inco its estimated outlays and expenses for the coming months as determined by the approved annual budget. Schedule 1 to the VOMA sets out an indicative annual budget and the types of expenses Zinifex pays for. These include wages and on costs of crew and other staff, crew expenses, insurance, stores, repairs and maintenance, fuel and oil, owner sundries and port facility costs.

[148] Zinifex also paid Inco a management fee calculated in accordance with clauses 8.2 and 8.3. This management fee included a bonus amount. The bonus amount was calculated taking into account a number of factors as follows:

(a) safety;

(b) satisfactory performance with respect to the operating procedures and the operator's Gulf communities agreement obligations management plan;

(c) environmental;

(d) availability and utilisation

(e) complaints;

(f) demurrage.

[149] Clause 12.3 required Inco to comply with, amongst other things:

- Inco's Safety and Quality System;
- the Karumba Safety Plan to be jointly prepared and agreed by Zinifex and Inco;
- the Karumba Environmental Management Plan to be jointly prepared and agreed by Zinifex and Inco.

Although Inco was required by clause 12.3(c) to maintain and furnish to Zinifex with a copy of its SQS, together with each subsequent amendment to it, at the time of the incident Zinifex did not hold a current version of the SQS.[102]

[102] Exhibit 47, Part 1; para 44.

5.10 THE REGULATORY ENVIRONMENT

[150] The ship's operation is governed by laws, including Queensland marine safety laws. It is also governed by systems that apply a quality assurance approach to ship management. The ship's Safety & Quality System ("SQS") reflects the International Safety Management Code or *ISM Code*. This section briefly describes the main provisions of Queensland marine safety laws that govern the ship's operation. There follows an outline of the regime that gave rise to the *ISM Code*. The development of written safety management systems, based on the *ISM Code*, should be viewed in its historical context, and as part of a broader process by which written quality assurance systems increasingly govern the operation of organisations. That background provides a context in which to consider the ship's SQS.

5.10.1 Legislation

[151] Shipping law Australia is regulated partly by Commonwealth law and partly by State law. The Commonwealth Parliament has extensive, but limited, powers to legislate with respect to shipping.[103] The Offshore Constitutional Settlement reached in 1979 agreed to give the States a general legislative power in respect of their territorial sea and sought to rationalize the allocation of legislative powers by reference to the type of voyage the ship was undertaking. As a consequence, the *Navigation Act* 1912 (Cth) does not apply in relation to certain voyages. For example, it does not apply in relation to "a trading ship proceeding on a voyage other than an overseas voyage or an inter-State voyage".[104]

[152] The principal piece of Queensland legislation is the *TOMS Act*. It regulates the maritime industry to ensure maritime safety and to enable the effectiveness and efficiency of the Queensland maritime industry to be further developed. The Act is primarily about marine safety but seeks to establish a system to achieve an appropriate balance between safety and cost.[105] The Act's objective of marine safety is advanced by imposing general safety obligations to ensure seaworthiness and other aspects of marine safety. A general safety obligation under the Act might be discharged by complying with a relevant standard or in some other appropriate way. General safety obligations are imposed on:

- ship designers;

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103 Davies and Dickey, *Shipping Law* (3rd Edition), Chapter 2.

104 The expressions "trading ship", "inter-State voyage" and "proceeding on a voyage" are defined in various provisions of the *Navigation Act*.

- ship builders;
- marine surveyors;
- ship owners (including operators);
- ship masters and crew;
- pilots.

[153] Section 41 imposes a general safety obligation on ship owners and masters about the condition of ships. It provides:

> "The owner and master of a ship must not operate the ship unless the ship is safe."

[154] Section 43 imposes a general obligation on persons involved with the operation of a ship to operate it safely. Subsections 43(1) an (2) provide:

> "(1) A person involved with a ship's operation (including the owner, master, pilot and crew members) must not cause the ship to be operated unsafely.
>
> …
>
> (2) Without limiting subsection (1), a person causes a ship to be operated unsafely if the person causes the ship to be operated in a way that -
>
> (a) causes a marine incident; or
>
> (b) contravenes -
>
> (i) conditions of the ship's registration about safety; or
>
> (ii) a provision of a regulation that is declared by a regulation to be a provision to which this section applies."

[155] The *TOMS Act* includes extensive provisions about the registration of ships, licensing, permits and accreditation. It confers powers upon Harbour Masters to give directions about the operation of a ship in a pilotage area if the Harbour Master considers it necessary to give the direction to ensure safety. The Act confers extensive powers upon shipping inspectors to board ships, to inspect ships, to require the production of documents and in certain circumstances to demand information.

[156] The *TOMS Regulation* deals with matters such as safety equipment, accreditation of ship designers, ship builders and marine surveyors, the building and registration of

105 *TOMS Act* s.29.

ships, licences to operate ships and ship operations. In relation to ship operations, Part 5 of the *TOMS Regulation* defines the operational area of a commercial ship by reference to its class. Section 111 of the *TOMS Regulation* provides that the Master of a registerable commercial ship must comply with Parts 1 and 2 of the *USL Code*, s.15 (emergency procedures and safety of navigation) when operating the ship. The Emergency Procedures in Part 2 of s.15 of the *USL Code* include emergency procedures, crew emergency practice procedures, crew fire drills and crew collision drills. Division 5 of Part 5 of the *TOMS Regulation* concerns load line certificates and, in essence, provides for the assignment of freeboard according to s.7 of the *USL Code*.

[157] Division 11 of Part 5 of the *TOMS Regulation* requires the person who is the owner or master of a particular ship to keep documents for the ship. Section 133 applies to a registrable commercial ship like the *Wunma* and requires the following documents to be kept on board:

(a) the operational manual for the ship;

(b) the technical manual for the ship;

(c) the maintenance and service manual for the ship;

(d) the marine occupational health and safety manual for the ship;

(e) the safety management plan for the ship for onboard emergencies;

(f) the manual of procedures for verification of passenger numbers.

The owner or master must also ensure that these manuals and plans are available to the ship's crew and that every person in the ship's crew has a working knowledge of those parts of the manuals and plan that are relevant to the person's role on the ship.[106]

[158] The view may be taken that the requirement to keep on board a "safety management plan for the ship for onboard emergencies" extends to a safety management plan that includes a planned response to the threat of a cyclone.[107]

[159] Other Queensland legislation, including laws governing occupational health and safety, applied to the *Wunma* at the time of the incident. This is because a commercial ship is a "workplace" and the provisions of the *Workplace Health and Safety Act* 1995 apply to it. In general terms, the obligations imposed by workplace

106 *TOMS Regulation*, s.133(3).

health and safety legislation reinforce safety obligations imposed under the *TOMS Act*.

5.10.2 The International Regime

[160] Internationally, maritime safety and environmental standards are set by the International Maritime Organization ("IMO") through a tiered framework of mandatory and non-mandatory instruments, ranging from conventions, resolutions, codes, circulars of information and guidance material.

[161] The Conventions are multilateral treaties that facilitate international trade, through mutual acceptance of and compliance with internationally agreed safety and environmental standards. Conventions that are relevant to inquiry include:

- The International Convention on Safety of Life at Sea, 1974, as amended (SOLAS'74)
- The International Convention on Load Lines, 1966 as amended by the 1988 Protocol (ILLC'66)
- The International Convention on Standards for Training Certification and Watchkeeping, 1978/1995 (STCW'95)
- The International Convention on Prevention of Pollution by Ships, 1973, as amended, including by the Protocol of 1978 (MARPOL'73/78)

[162] Each of these Conventions provides for amendment, generally by resolution of the relevant committee of IMO. For example, reference was made in the evidence to Resolution MSC.143(77) which amends the ILLC'66 by replacing its entire technical content with new text. Resolutions of IMO Committees may also contain standards or Codes comprising subordinate requirements that may be made mandatory by reference in the relevant Convention. A relevant example is Resolution A.741(18), the International Management Code for the Safe Operation of Ships and for the Safe Operation of Ships and for Pollution Prevention which is known as the International Safety Management or *ISM Code*, that is given mandatory effect through SOLAS Chapter XI. A further example is the Code of Safe Practice for Solid Bulk Cargoes, most recently adopted in 2004 through Resolution MSC.193(79), but which has not yet been given mandatory effect through SOLAS.

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107 This was the view taken by Captain Diack; Exhibit 49; CB34; para 11, and is also referred to by Mr Bundschuh in Exhibit 94, Part 1; para 74.

[163] MARPOL'73/78 is relevant because its Annex V deals with the discharge of garbage, which is defined to include cargo residues such as the concentrates carried by the *Wunma*.

[164] Another tier of IMO instruments are circulars which, amongst other things, provide guidelines on the interpretation and implementation of IMO mandatory instruments. One such guideline, which is used to overcome Convention impediments to the international acceptance of a new type of ship, is MSC/Circ.608/Rev.1, the Interim Guidelines for Open-Top Containerships. These requirements provide, among other things, for the probable maximum rate of water ingress from rain or in a seaway to be determined by model tests and, after application of a safety factor to the predicted rate, for redundant pumping systems to be fitted to the vessel for the overboard discharge of that water. Although non-mandatory and "interim", these guidelines have been used and accepted for about 15 years to facilitate the international operation of open-top containerships.

[165] The international maritime safety regime also gives explicit recognition to the standards that are set by classification societies.[108] For example, ILLC'66 deems that a ship complying with the requirements of a recognized classification society meets the load line provisions for structural strength. SOLAS'74 has similar provisions. The rules of the major international classification societies are consistent with the requirements of the conventions, while not necessarily embodying all of their requirements.

[166] In order to achieve the desired mutual recognition of ships and their safety standards, the relevant IMO instruments are generally of a prescriptive nature rather than performance-based, and provide limited scope for an authority to make a subjective judgment about whether the relevant standards have been met.

5.10.3 The ISM Code

[167] This Code originated during the 1980s as a set of guidelines to apply a quality assurance approach to ship management, and in particular to assure that a ship complies with classification society and statutory requirements and that appropriate procedures exist to deal with anticipated operational and emergency situations. The

108 Resolution A.647(16) *IMO Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention*, adopted October 1989.

guidelines were sufficiently successful in this regard to warrant their refinement and adoption as a Code that is given mandatory effect by SOLAS, Chapter IX.

[168] At the heart of the Code are Safety Management Systems ("SMS") to be applied in relation to both the "Company" managing the ship and the ship itself. Organisationally, two essential elements are that the master has over-riding responsibility for matters relating to the safety of the ship, and is required to have immediate access to a suitably qualified "designated person ashore" in the Company who, in turn, will have direct access to the highest levels of management ashore. Implementation of the Code is required to be audited, firstly through a master's review, then an internal audit by the Company and finally by the Administration or its delegated authority.

[169] Although subject to on-going refinement, the Code has been implemented using a set of guidelines for Administrations.[109] The International Chamber of Shipping in conjunction with the International Shipping Federation has from time to time produced a document comprising an updated compilation of the Code and Administration guidelines together with their unofficial interpretations for the information of interested parties.

[170] Notwithstanding attempts by some parties to have specific issues introduced into the Code, it has remained general in its content to enable the ship's Safety Management System to be tailored to meet the needs of the ship, her operators and trade.

5.10.4 The Development of Safety Management Systems

[171] The development of written safety management systems of the kind found in the *Wunma's* SQS should be viewed in its historical context.

[172] The *ISM Code* came into being because the world of merchant shipping changed after WWII. For many years up to the 1960's the fleets of the traditional maritime countries of Northern Europe dominated the shipping world. Generations of seafarers sailed in those famous fleets. It was not uncommon for both officers and seamen to sail in the same company all their seagoing career, as indeed their fathers did before them. In this environment, although each company had its own written

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109 Resolution A.647(16) *Guidelines on implementation of the International Safety Management (ISM) Code by Administrations*, adopted 1995.

rules and regulations, seafarers knew “the company way” of doing things largely by a process of oral learning.

[173] By the 1960’s the international shipping industry had changed and the traditional maritime countries came under pressure from the fleets of new emerging countries who set up their own merchant fleets and actively competed in the international shipping market. This included the provision of crews. Generally these ships had lower cost structures than the ships of their Northern European and American competitors and so had an advantage in the market place. The traditional shipowners, many with great reluctance, realised they had to lower their cost structures to survive. American shipowners, who had the highest cost regime of all, were amongst the first to adopt the strategy of registering ships in a country with a low cost regime. The “open registry” or “flag of convenience” was born. The old national influence was lost. A new type of company, the ship management company, began to emerge.

[174] Ships were still operated under the traditional flag state laws with regard to safety equipment and classification societies set class rules. However the safety standards on board the world’s merchant fleets began to decline. The issue arose as to why this should be the case since qualified people were operating the ships. One answer was that, although crew were properly qualified, the missing element was the structure previously provided in the old “company” framework. The matter was raised in the IMO. The result was the *ISM Code* that became mandatory for cargo ships from 1 July 2002.

[175] The “Code” was not well received amongst many ship’s officers. The traditional “oral” system was replaced by a written system of ensuring compliance to a safety management system. It meant an increase in paperwork and meetings. Instead of concentrating on the actual operational aspects of the ship, more time had to be spent in the ship’s office. Arguably, such a system does not encourage innovation, since changes in procedures require a re-writing of manuals. Many ship officers perceive manuals as a means by which the company can demonstrate its commitment to safety, whilst seeking to avoid responsibility should something go wrong. In that event, responsibility can be cast on a ship officer for failing to follow “the manual”.

[176] The advantages of a safety management system are many. In an era in which the largely, unwritten "company way" of doing things no longer prevails, there is a need for a structured system to ensure the safety and quality of shipping operations.

[177] The development of quality assurance systems are not confined to maritime activity. Quality assurance systems are a common feature of government and business organisations. Their operation has the potential to improve safety and reduce human error. But to be most effective, the system has to be accessible and "user-friendly".

5.10.5 The Australian System

[178] International maritime requirements have generally been translated into Australian national requirements through the *Uniform Shipping Laws Code* ("*USL Code*"). It takes account of the fact that the international requirements are not designed for the smaller vessels and local operations. An exception to this is MARPOL'73/78, concerning pollution of the marine environment.

[179] Provisions of the *USL Code* have been given effect through federal, state and territory legislation. In Queensland, this is through the *TOMS Act* and the *TOMS Regulation*.

[180] In conformity with international practice under SOLAS, maintenance of the ship in Lloyd's Register class (covering hull and machinery) has been deemed to meet the corresponding requirements statutory requirements. However, additional regulations exist in relation to load line, safety equipment, pollution prevention, qualifications/manning and operations as these are not covered by the classification society's rules and associated certification. For instance, section 7 (Load Lines) of the *USL Code* is given effect by sections 118 and 119 of the *TOMS Regulation*.

[181] The *USL Code* was adopted in 1979 and has generally not been updated with amended IMO requirements over the intervening period. It is currently undergoing a complete review by the National Marine Safety Committee with a view to reducing prescriptiveness. The revised technical standards are to be performance-based and named the National Standard for Commercial Vessels ("NSCV"). Survey and certification requirements are to be contained in the National Standard for the Administration of Maritime Safety ("NSAMS").

[182] Although SOLAS Chapter IX gave international effect to the *ISM Code* from 1 July 1996, there is no corresponding provision under the *USL Code*. The relevant national standard reflecting the *ISM Code* in general terms has been finalized as Part E of NSCV but, as far as the Board is aware, has yet to be given legislative effect in any State or Territory.

[183] As the *Wunma's* normal operations are short voyages in Queensland, the ship is not subject to the *ISM Code* for those operations. However, *ISM Code* compliance was required by AMSA for the vessel's 2004 voyage to Singapore for drydocking and audits of the ship's SQS were conducted against the *ISM Code* for this purpose. Inco have subsequently maintained the ship's *ISM Code* audits and certification by AMSA, the most recent of these external audits being conducted on 28th August 2006.

5.11 THE SHIP'S SAFETY AND QUALITY SYSTEM

[184] Although not required as a matter of law to have a system that conforms with the *ISM Code* in order to operate in Queensland waters, at the time of the incident the ship had an SQS that is based on the *ISM Code*. The SQS was one that has been developed by Inco as part of its operating systems, with certain modifications and inclusions that were specific to the *Wunma*.

[185] An AMSA *ISM Code* audit was conducted in August 2006. The SQS was found to conform with the requirements of the *ISM Code*. The auditor included eight observations, none of which were regarded by Inco as being of a major kind.[110]

[186] The SQS manuals are voluminous. They exceed 700 pages. Much of their content is generic in the sense that they are applicable to Inco's fleet. Some parts have specific application to the *Wunma*, for instance, the cyclone procedure. A review by Thompson Clarke Shipping in late 2006 found that the ship's SQS procedure manuals were excessive for the nature of the operation and should be simplified. Thompson Clarke Shipping were told that they were in the process of being simplified.

110 Exhibit 32. Captain Ives; T.474; see also *Thompson Clarke Operational Review Report*, December 2006 (Exhibit 49; CB137), p.20 which stated that most of the observations related to minor matters which, while not strictly complying with the code, were handled in a different manner given the *Wunma's* unique operations.

[187] The ship operates a computer-based maintenance system named AMOS. The ship's operating procedures presumably include many other manuals and documents in relation to the operation of its systems, including her loading and discharging operations. Given the purpose of an SQS and the need to limit its volume in the interests of being "user friendly", one would not expect the ship's SQS to be expanded to include procedure manuals for the operation of the materials handling plant onboard the ship. These might be in a "stand alone" operating manual for the material handling plant. But the SQS should address matters that impact upon its safe operation at sea.

[188] Two matters that are not contained in the SQS should be noted. First, the SQS does not contain a procedure reflecting the practice adopted over the years to not load the ship when a low pressure system is in the Gulf. Instead the Cyclone Procedure of the SQS (to be discussed below) provides that the ship will cease loading if a "Blue Alert" is effective (when the Bureau of Meteorology has advised the vessel that a Watch Alert is effective with gale force winds greater than 40 knots expected within 48 hours).

[189] Second, the SQS does not address the operation of the ship's water management system and the circumstances in which deck drains to sea should be opened. The operation of the ship's water management system is discussed in Chapter 6. The present issue is that her operation, which has significant implications for the safety of the ship and the environment, is not addressed in the SQS.

[190] One would expect the ship's SQS to include matters that are unique to the ship and that have the potential to impact upon the safety of her operations, such as the operation of her unique water management system. Alternatively, the operation of the ship's unique water management system should have been the subject of a procedure manual. The evidence indicates that it was not. This constitutes a significant deficiency in the ship's procedures.

[191] Because the SQS is so voluminous, necessarily only a brief summary can be given of those parts of it that are directly relevant to the incident.

[192] Section 13 of the Fleet Operating Manual part of the SQS concerns navigation and provides that the ship is to be navigated with caution, good seamanship and in

accordance with applicable laws. It requires "regular position checks" to be made when the ship is under way using all appropriate equipment.

[193] Under this section "the Master is to satisfy himself before taking the vessel to sea that it is in all respects ready for sea".

[194] The Master's Night Order Book is normally completed nightly at sea and is intended to assist Watchkeeping Officers with guidance about the action to be taken through the hours of darkness and when to seek assistance from the Master.[111]

[195] Section 13.10.1, page 55, confirms that the Second Officer is responsible for preparing the passage plan and has the task of preparing the detailed passage plan to the Master's requirements prior to departure.

[196] Section 16 of the Fleet Operating Manual of the SQS is concerned with "Navigation in Extreme Weather Conditions". It requires the following precautions in the event of rapidly falling barometer readings, threatening sky formations and other signs of abnormal meteorological conditions:

- review latest weather report and synopsis, and compare with actual conditions;
- if the actual conditions depart greatly from the weather reports, determine the direction of the low pressure area on the basis of wind direction, and consider if rules for cyclone navigation should be followed;
- make attempts to contact other ships or shore radio stations in the vicinity to obtain weather report;
- establish radio watch to receive possible security messages.

This section of the SQS details safety actions to be taken to secure the ship's seaworthiness, including inspection and battening down.

[197] SQS 06 consists of "Shipboard Checklists and Work Instructions". These include detailed checklists for preparation for arrival in port, arrival at the export vessel, departure from the export vessel and departure from port. The general requirements for departure from port[112] include taking account of latest weather reports, testing of navigational and communication equipment, ensuring hatches are closed and dogged

111 Fleet Operating Manual; para 13.3.
112 SQS 06, p.A6.

and that the bobcat is secured. Preparation for sea[113] includes weather tight doors, vents and other openings on weather deck secured and ready for sea. Bridge preparation[114] includes checking radios. It anticipates a voyage plan. Likewise there are Engine Room checklists that include checking bilges and pumps. The Safety and Environmental Manual section of the SQS[115] confirms the importance of weather reports and navigation warnings. It provides:

> "**1.19 Weather Reports and Navigations Warnings**
>
> Weather reports are to be regularly obtained and, when practicable, sea areas most affected by severe storms are to be avoided. Suitable shipboard precautions are to be taken whenever the ship may be expected to enter, or unexpectedly enters, an area affected by adverse weather conditions.
>
> Navigation and other warnings received are to be noted immediately by the Master and OOW and appropriate action taken to avoid any hazards to which they refer."

[198] Emergency procedures are addressed in a number of parts of the SQS. SQS 06 Shipboard Checklist and Work Instructions,[116] has emergency notification procedures. Major incidents require reporting by the Master to Operations Superintendent, Karumba, Operations Manager Sydney, Engineering Superintendent, Chartering and Administrator Manager. The person contacted becomes the Duty Manager. There is an identical reference to the responsibilities of the Duty Manager in Section 2 Safety and Environmental Manual.[117] This confirms that the Duty Manager is the person first contacted in the event of an emergency and is responsible for the activation of the Emergency Management Plan in accordance with the procedures in the Appendix Manual. Lloyds Ships Emergency Response System is used for advice on designated vessels. This ship makes initial contact with the office through Initial Report (SOPEP). The office will then contact SERS in London. All forms sent to SERS will go through the Emergency Response System at Sydney office.

[199] The Safety and Environmental Manual section of the SQS deals with abandoning ship.[118] It provides:

113 SQS 06, p.A7.
114 SQS 06, pp.A8-A9.
115 Page 22, 1.19.
116 SQS 06, p.D1.
117 SQS 06, p.4, section 1.3.
118 Pages 5-6, section 1.5.2.

"1.5.2 Abandoning Ship

The decision to abandon ship must be based on an evaluation of

- the current situation
- how the situation is expected to develop
- what are the possibilities of influencing the development in a positive manner
- what are the consequences if one does not manage to influence the development to a sufficient extent
- buoyancy characteristics and damage stability

The evaluation will be a probability calculation in which all known factors that may influence the development of the situation are taken into account. Actions must be concentrated on those aspects upon which it is possible to influence, and which are of utmost importance of the desired result – safety of lives."

5.12 THE SQS CYCLONE PROCEDURE

[200] Prior to the revision of the SQS to introduce new cyclone procedures, the SQS provided for the ship to go to the cyclone mooring at Sweers Island.[119] Under that procedure the required action to depart for the designated cyclone mooring at Sweers Island only arose upon a "Red Alert" which became effective when the Bureau of Meteorology had advised that a "Warning Cat 2 Alert" (Destructive winds greater than 70 knots were expected within 24 hours).

[201] The cyclone procedure that replaced it was introduced by a revision to the ship's SQS manuals in or about January 2006. A memorandum notifying the revision was sent to the Master of the *Wunma* under a Memorandum dated 12 January 2006. Their receipt was acknowledged by Master Simon McEvoy.

[202] The relevant procedure[120] appears as an Appendix to this report. Following the incident a copy of the cyclone procedure in a slightly different format was taken into the possession of Captain Thomson.[121]

[203] The procedure that was introduced into the SQS in January 2006 and that was in force at the time of the incident[122] states the following in respect of responsibilities:

119 Exhibit 53, Part 2, annexure AD3.
120 Exhibit 6; also attachment AD1 to the supplementary statement of Andrew Dally, Exhibit 53, Part 2.
121 Exhibit 10. This document is ten pages in length and apart from inconsequential formatting changes appears to consist of a duplication of the relevant pages of the cyclone procedure.
122 Exhibit 6.

> "The Managing Director is ultimately responsible for this procedure. The operation of the vessel is the responsibility of the Operations Manager in Karumba, and the operation of the vessel at sea is the responsibility of the Master."

[204] The procedure anticipates the receipt of cyclone watches, cyclone warnings and gale, storm and cyclone warnings for shipping from the Tropical Cyclone Warning Centre when a cyclone is expected. It also contemplates that the vessel will receive daily weather information by Satcom 'C', facsimile, VHF or MF/HF radio. It provides:

> "The Operations Superintendent will communicate on a regular basis with the Port Manager and will relay cyclone warnings received by the vessel.
>
> The Operations Superintendent will communicate with Head Office on a regular basis to keep them advised of cyclone activity in the region."

[205] The SQS Cyclone Procedure provides that the Operations Superintendent and the Master will monitor cyclone alerts and make a preliminary choice of action in the event a cyclone is imminent. Their choice of action is to take the form of one of the following:

- Anchor off Karumba "if the cyclone is not intended to intensify and is expected to pass over (50 kms??) of the Port".
- Proceed to Weipa if there is sufficient time to make the journey and the Port Authority of Weipa allocates a berth in an anchorage position.
- Head for the open sea and remain in open waters until the cyclone has passed. This action is to be undertaken if either there is no time to steam to Weipa, or permission to enter Weipa has been declined because of the prevailing conditions at that port.

The Master is said to have the final responsibility of choice of action taking into account prevailing weather conditions and any changes in forecast conditions that may occur, with choice of action relayed to the Port Authority and the Operations Superintendent.

[206] The SQS provides for various kinds of action to be taken when the Bureau of Meteorology issues Cyclone Watch Alerts and Warning Alerts. A "Blue Alert" is effective when the Bureau of Meteorology has advised the vessel that a "Watch

Alert" is effective, ie Gale Force Winds greater than 40 knots are expected within 48 hours, but not less then 24 hours. The required action in the event of a Blue Alert is:

- Recall crew and ensure everything is firmly lashed and secure. Specific attention is to be given to any material that may become airborne in extreme wind conditions.
- Ensure vessel has sufficient bunkers to be able to proceed to sea and steam for a minimum of four (4) days. This may require returning to Karumba if the vessel is at the transfer anchorage.
- Cease loading or discharging operations.
- Ensure sufficient ballast water is on board to maintain good stability in the event vessel proceeds to sea. Ensure that the vessel is not at a draft, which may prevent her from leaving Karumba, taking into account weather and tidal conditions.

Under the SQS a "Yellow Alert" is effective when the Bureau of Meteorology has advised the vessel that a "Warning Cat 1 Alert" is effective, ie Gale Force Winds greater than 40 knots are expected. The required action in the event of a Yellow Alert is:

- If berthed, run extra mooring lines and make appropriate preparations to depart the wharf and proceed to sea if the wind is expected to intensify further.
- Place engine room on stand by and maintain the vessel at an alert status for the passing of the cyclone.
- If alongside overseas ship, let go and remain in vicinity but be prepared to head either to open sea or to the anchorage point closer to Karumba if the wind is expected to intensify further.

Under the SQS a "Red Alert" is effective when the Bureau of Meteorology has advised that a "Warning Cat 2 Alert" is effective, ie Destructive Winds are expected greater than 70 knots within 24 hours. The required action is:

- If in port, depart the wharf and proceed to sea. Make preparations for navigating in heavy weather as per procedure safety actions.
- If at sea, either proceed to anchor off Karumba or proceed into deep water keeping in mind procedures to be followed in the event of encountering a cyclone.

- If the vessel is unable to proceed to sea for whatever reason, ensure sufficient mooring lines have been run, rig extra fenders if this is possible, and lay out the starboard anchor only if this is possible due to possible weather conditions and time constraints.

5.13 AVOIDING CYCLONES AT SEA

[207] The SQS Cyclone Procedure states what might be thought otherwise to be obvious: it is "imperative that the Master maintains a good track of the eye of the cyclone".

[208] It also states:

> "The Bureau of Meteorology will give information on a regular basis … however it is the responsibility of the Master to maintain a plot so as to determine if the vessel has sufficient speed to outrun the cyclone or it is more prudent to "heave-to" to allow the cyclone to pass."[123]

[209] The Master and other navigation officers are provided with instructions in the SQS as to how to plot the cyclone and as to how to take avoiding action. To plot the cyclone, the following is advised:

> "1. Plot cyclone centre on the chart.
>
> 2. Construct a circle to equal the cyclone radius.
>
> 3. Construct tangential lines to the cyclone circle at approximately 40º from the forecast path.
>
> 4. Construct the quadrant from the cyclone centre to equal one day's movement of the cyclone. This is known as the imminent danger area.
>
> 5. By projecting the cyclone's movement for an additional 24 hour period the "probable danger area" can be chartered."[124]

[210] The advice for "Taking Avoiding Action" is as follows:

> "1. Determine the semi-circle in which the vessel is situated.
>
> 2. If the wind is backing the vessels in the dangerous semi-circle, the Master should make the best speed keeping the wind on the port bow between 10º to 40º. Alter course to port to keep the wind on the port bow as the wind continues to back.

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123 Exhibit 6.

124 *Ibid*. Captain Thomson; T.80.

3. If the wind is observed to veer, the vessel is in the 'navigable semi-circle'. The Master should make all possible speed with the wind on the port quarter. Alter course to starboard to keep the wind on the quarter as it continues to veer.

4. If the wind is remaining steady, or nearly steady, the Master should alter course to obtain the wind well on the port quarter and proceed towards the navigable semi-circle. Once within this semi-circle alter course to starboard to maintain the wind on the quarter."[125]

[211] Captain Thomson explained that to follow this procedure the Master plots the Latitude and Longitude on the chart and then constructs a circle equal to the cyclone radius based on the information provided to the Bureau of Meteorology.[126] Then the position of the ship is plotted and, in that way, the Master can determine whether he is in the dangerous semi-circle of the navigable semi-circle.[127]

[212] Guidance is given in the form of a schematic as well as two tables of advice. Because of its importance, the SQS Cyclone Procedure, including the schematic and advice tables, is reproduced in an Appendix to this report.

[213] There are several publications available which detail the actions that mariners ought to take to evade a Tropical Revolving Storm ("TRS"), and which reflect the advice and rules contained in the SQS.[128] They include the MSQ's *Small Ships: Training and Operational Manual*, a copy of which was on board the *Wunma*. It contains useful instruction on tropical revolving storms, warning signs, action to avoid cyclones and schematics of TRS quadrants and TRS evasion.

[214] Another publication which the evidence indicates is commonly kept on board vessels is *The Mariner's Handbook* which is published by the UK Hydrographic Office.[129] It includes the following instruction:

"**Avoiding Tropical Storms**

In whatever situation a ship may find herself the matter of vital importance is to avoid passing within 80 miles or so of the centre of a storm. It is preferable but not always possible to keep outside a distance of 250 miles.

125 *Ibid*.
126 Captain Thomson; T.81.
127 Captain Thomson; T.82.
128 Some of them.
129 Report of Captain White - 5 September 2007; Exhibit 114; para 5.5.1.

…

If a vessel is in an area where the presence or development of a storm is likely, frequent barometer readings should be made and corrected. If the barometer should fall five hPa below normal or if the wind should increase to Force 6 when the barometer has fallen at least 3 hPa, there is little doubt there are storms in the vicinity. If and when either of these criteria is reached the vessel should act as recommended in the following paragraphs until the barometer has risen above the limit just given and the wind has decreased below Force 6. Should it be certain, however, that the vessel was behind the storm or even in the navigable semicircle it will evidently be sufficient to alter course away from the centre keeping in mind the tendency of tropical storms to re-curve towards North and North East in the Northern Hemisphere and South and South East in the Southern Hemisphere:

In the Southern Hemisphere

(a) If the wind is backing the ship must be in the dangerous semicircle. The ship should proceed with all available speed with the wind 10º to 45º, depending on speed, on the port bow. As the wind backs the ship should alter course to port thereby tracing a course relative to the storm as shown in diagram 5.32.

(b) If the wind remains steady in direction or nearly steady so that the vessel should be in the path of the storm or very nearly in its path, she should bring the wind well onto the port quarter and proceed with all available speed. When in the navigable semicircle act as at (c) below.

(c) If the wind veers the ship is in the navigable semicircle. The ship should bring the wind onto the port quarter and proceed with all available speed turning to starboard as the wind veers to follow a track as shown in the diagram. If there is insufficient room to run when in the navigable semicircle and it is not practicable to seek shelter, the ship should heave-to with the wind on her starboard bow in the Northern Hemisphere or on her port bow in the Southern Hemisphere."

[215] *The Mariner's Handbook* also contains the following advice:

However, it is sometimes difficult to identify the precise position of a storm centre, even with modern tracking facilities; and in view of the uncertain movement of storms, prediction of the future path of a storm maybe liable to appreciable error particularly when forecasting several days ahead. Appropriate allowances are therefore prudent when considering what action is necessary to avoid a storm. …

Ships should pay particular attention to their own observations when in the vicinity of a storm and act in accordance with advice given below.…

> Because of the importance of pressure readings it is wise to take hourly barometric readings in areas affected by tropical storms. …
>
> If a vessel is in an area where the presence or development of a storm is likely, frequent barometer readings should be made."[130]

5.14 WEATHER INFORMATION AVAILABLE TO THE *WUNMA*

[216] The Global Maritime Distress and Safety System ("GMDSS") provides for safety communications. It uses modern technology, including satellite and digital selective calling techniques. These systems enable a distress alert to be transmitted and received automatically over either short or long distances. The GMDSS also facilitates the dissemination of Maritime Safety Information ("MSI") such as navigational and meteorological information to ships.

[217] The Bureau of Meteorology provides meteorological forecasts, warnings and observations to mariners by various means including HF voice and facsimile, VHF voice, telephone voice and facsimile, Inmarsat C and through media outlets.[131]

[218] The communications systems on board the Wunma at the time of the incident are the subject of two statements to the Inquiry from Mr Peter Green[132] and Mr David Thomas.[133] At the time of the incident, the *Wunma* was fitted with:

- Two complete VHF installations;
- Two Inmarsat C systems;
- One HF/MF radio system.

[219] The *Wunma* complied with the minimum GMDSS requirements. In fact, it had one Inmarsat C system in excess of those requirements. The *Wunma* also was fitted with a Thrane and Thrane Sailor 33 satellite phone that is not required by the regulations.

[220] The *Wunma* could receive emails while at sea. This facility was available through AMOS system which was routed through an Inmarsat M unit. The Inmarsat M provides automatic low quality voice and medium speed data in real time mode.[134]

[221] AWA Marine held the Shore Base Maintenance Agreement for the vessel. Under that agreement, AWA Marine carried out six monthly inspections of the GMDSS

130 Chapter 5, Exhibit 16.
131 *Australian Seafarers Handbook* – Chapter Nine
132 Exhibit 82. AWA Marine held the Shore Based Maintenance Agreement for the vessel and carried out six monthly inspections. Mr Green conducted the last such inspection – in August 2006.
133 Exhibit 107. Mr Thomas attended on the Wunma on evening of 7 February 2007.
134 See: Statement of Captain White dated 5 September 2007; Exhibit 114; Para 5.7.3.

installation to ensure that compliance is maintained. The last such inspection was carried out on 14 and 15 August 2006 and the Service Reports of those dates[135] noted a number of deficiencies of which the following were critical:

- No receive signal was picked up on SatComm C 2. The technician suspected that a short circuit caused the fault in the transceiver and he concluded that a new transceiver or SatComm receiver was required.
- Fuses in the MF/HF DSC needed to be replaced.
- All ITU manuals were found to be out of date.

[222] Captain Seal gave evidence that the *Wunma* was fitted with:

- HF radio;
- 2 x VHF radios;
- 2 x SatComm C systems, one of which was not working;
- 3 x portable VH radios with backup lithium batteries;
- a satellite phone with connection for emails only;
- a CDMA phone;
- 2 x SART's;
- 1 x 406 MHz EPIRB. [136]

[223] The Sat Comms, the VHF radios and the HF radio were all powered by the ship's emergency circuit with a backup to a battery bank.[137] The satellite phone was similarly powered.[138]

[224] After the incident, Zinifex sent their communications technician, Mr Thomas, to the Wunma on the evening of 7 February 2007. On boarding, he noted that there was no power to the GMDSS equipment due to the fact that the batteries were run down.

[225] The battery charger was then rewired to the main power and the power supply to the GMDSS equipment was restored. Once that occurred, he noted that the two VH radios and SatComm C 1 were operational. SatComm C 2 was, of course, found to be inoperative. On examining the MF/HF radio, Mr Thomas found that an internal fuse in the main power supply module had blown, most likely due to a power spike

135 There are two dated 14 August 2006 and 15 August 2006, respectively. And see: Appendix J to the report of Captain White dated 5 September 2007; Exhibit 114.

136 Statement of Captain Seal dated 2 August 2007; Exhibit 18; p. 18.

137 *Ibid.*

138 *Ibid.*

which resulted from the submersion and ultimate failure of the emergency generator and switchboard.[139] Mr Thomas was also able to restore power to the Thrane and Thrane Sailor 33 satellite telephone.

[226] Mr Thomas also expressed the opinion that a changeover switch, which allows power to the GMDSS equipment to be switched from the 24 volt system to the ship's main power, was not something which the Master or crew was familiar with. Mr Thomas stated that had the Master and crew been aware of this switch, power could have been maintained on the VH radios and on the SatComm C 1 unit.[140]

[227] The *Wunma* had the capacity to receive weather forecasts and warnings in text format over the SatComm C Unit. Forecasts and warnings also were available over the MF/HF radio. Emails of weather information could be sent by email via the AMOS system through an Inmarsat M unit. But Mr Tonkin, the Operations Superintendent at Karumba, explained that he could not be send an email directly to the ship due to AMOS connection difficulties If he had to send an email to the ship in February 2007, he would have been required to contact Inco's Sydney office or the communications section at Zinifex Century Mine to arrange for the email to be sent.[141] These difficulties apart, e-mails could be sent to the ship at sea via the AMOS system, as was shown on the voyage when Captain Seal's wife emailed him certain weather information.

[228] When moored alongside the Zinifex Wharf, the *Wunma* had the capacity to network into the Zinifex communication system and, thereby, gaining full access to the internet. By these means, the *Wunma* was in a position to receive up to date weather information from the Bureau of Meteorology website as well as email bulletins from Zinifex with respect to the weather.

[229] An employee of Zinifex would disseminate information concerning "any lows or any whether predictions" via email and then these would "come to the ship".[142] That information would then be discussed at PASS meetings[143] either on the ship or ashore.

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139 Statement of Mr Thomas, Exhibit 107; para 16.

140 Statement of Mr Thomas, Exhibit 107; para 27

141 Mr Tonkin; T.605

142 Captain Dunnett; T.325.

143 Statement of Mr Gurr dated 10 August 2007; Exhibit 55 and the Annexures to that statement. Mr Gurr; T.586-589. Tonkin; T.597-598.

[230] Onboard the *Wunma* at the time of the incident was a publication entitled "Admiralty List of Radio Signals".[144] This was the primary reference work for the Master and crew of the *Wunma* so far as weather reports and information are concerned. It details the full weather services provided by the Bureau of Meteorology, including broadcast times, frequencies on which they can be received and faxback contact details and telephone numbers for the Bureau of Meteorology from which additional information can be received.

5.15 PORT OF KARUMBA CYCLONE CONTINGENCY PLAN

[231] This plan is activated once the threat of a cyclone exists. Its objective is to organise the orderly removal of vessels from their normal moorings to more sheltered locations or, in the case of large vessels, to sea. Its objective is to have the Port evacuated at least six hours before destructive winds commence. The plan includes requirements of what is to be done when destructive winds are forecast within 24 hours (Yellow Alert), within 16 hours (Blue Alert) and within 6 hours (Red Alert) whereupon the Port is closed. One of the requirements upon a Yellow Alert is to suspend the loading of all ships. Upon a Blue Alert all ships are to sail. The stated objective of the plan is that all large ships will have left the port before winds reach 30 knots. The Cyclone Contingency Plan states that the anchoring of large vessels upstream is not recommended due to tidal surges that could inundate the area, which, with high winds, may strand vessels inland of the river system, making any salvage extremely difficult.

[232] Some observations are appropriate in relation to the Port of Karumba CCP. First, the plan and the policies that underpin it are not new. Similar plans and advisory messages were issued and circulated to the general public in previous years. Second, such a cyclone contingency plan is not peculiar to Karumba. A similar plan exists for Weipa and other ports.[145] Third, the Port of Karumba CCP and similar plans appear to be based on a widely-accepted principle that in the absence of an appropriate cyclone mooring or safe haven[146] it is appropriate and safer for a "large ship" to go to sea in the event of a cyclone. This was the opinion of Captain Cole in

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144 Appendix L to the statement of Captain White dated 5 September 2007; Exhibit 114.

145 See Weipa plan Exhibit 92. Plans are accessible at: www.msq.qld.gov.au/Home/Waterways/Cyclone_contingency_plans

146 Defined in "The Mariner's Handbook" (1989) as a harbour or place of refuge for vessels from the violence of wind and sea. In the strict sense it should be accessible at all states of the tide and conditions of weather.

his advice to the EPA and was his evidence to the Inquiry.[147] Captain Cole's opinions were based, in part, upon his observations and experiences. This included being ashore in Hong Kong in August 1971 when a typhoon caused maritime havoc when its eye passed over the colony. Captain Cole also witnessed the damage caused to larger vessels that sought shelter in some of the bayous of the Mississippi River when a hurricane passed over the lower reaches of the Mississippi Delta in August 1969. Captain Cole observed "a number of vessels high and dry miles away from the Mississippi River".[148] Based on his observations and experience in the maritime industry, Captain Cole said he had a natural inclination to support any cyclone avoidance strategy that recommends a reasonably sized vessel sheltering in a restricted anchorage. However, in the case of a large ship such as the *Wunma* and the prospect of some environmental damage given its type of cargo, he considered that a proper risk assessment favoured it going to sea. It should be noted that Captain Cole acknowledged the risks in the vessel going to sea, but concluded that those risks were less than the risks posed by her going to the cyclone mooring at Sweers Island.

[233] Another view of the comparative risks of the *Wunma* being required to go to sea in the event of a cyclone was articulated by the ship's designer, Mr Stuart Ballantyne. Mr Ballantyne's preference is for the ship to stay alongside with her large fenders on the wharf side to avoid or minimise damage to the wharf and with the port anchor out to hold the ship a small way off the wharf.[149] Mr Ballantyne said that when the ship was designed he made recommendations to Pasminco and Inco regarding cyclone contingency plans. The recommendation was to stay in port or to go up the Norman River with full ballast so that if the ship was aground, she could always pump out the ballast and float off. Mr Ballantyne acknowledged the risks associated with going up the river, that in a bad flood the ship might find herself stranded inland.[150] Mr Ballantyne's evidence was as follows:

> "It does not matter if you are on a 40 foot catamaran or a 2000 tonne ship or a 5,000 tonne ship. You go up the creek. Don't go out to sea, especially in a marine cul-de-sac like the Gulf of Carpentaria."[151]

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147 Exhibit 88; paras 12 and 13. Captain Cole; T.705.
148 Captain Cole; T.705.
149 Exhibit 97; para 41.
150 Exhibit 97; para 40.
151 Exhibit 97; para 43.

[234] The Queensland Transport policy of requiring large ships to go to sea in the event of a threatened cyclone rather than remain in port does not reflect this approach. It reflects the approach and philosophy expressed by Captain Cole in his opinions to the EPA and in his evidence to the Inquiry. The policy of requiring a "large ship" to go to sea, rather than remain in port, in the event of a cyclone is intended to avoid damage to the ship, port infrastructure and other vessels and to enhance the safety of the ship's crew and other mariners.

[235] The policy is not so easily applied in the case of a ship like the *Wunma* (whose class restricts it to coastal service) in the geography of Karumba. Cyclone avoidance at sea requires sufficient sailing time and sufficient sea room to effect cyclone avoidance action, ideally in surveyed waters. It also requires a ship with sea-keeping properties and a design that will enable it to remain in open waters in cyclonic conditions.

[236] As events transpired during the incident, the ship left the Port of Karumba *before* it was required to do so under the Port of Karumba CCP. Had she used all three engines and not altered course, she may have been able to steam a substantial distance north of the path of Tropical Cyclone Nelson. However, if she had delayed leaving the port until she may have been required to do so under the Port of Karumba CCP then sufficient time may not have existed for her to steam north and avoid the cyclone.

[237] In any event, in circumstances in which cyclones behave unpredictably, it is questionable whether a ship such as the *Wunma* departing Karumba has sufficient searoom to avoid a cyclone that in, or heading in the direction of the South East part of the Gulf.

[238] The *Australian Seafarers Handbook* advises:

> "Ensure **plenty of sea room** in order to avoid being blown aground. This is particularly important, and will require early decision making if the ship is in coastal waters that have no tropical cyclone havens."[152]

[239] Captain Thomson, who travelled to China when the *Wunma* was being built there and who had dealings with those involved with the project at the time, understood that a cyclone mooring was intended as an essential element for the operation of the

ship.[153] Captain Thomson's evidence was that the ship was not designed to try and evade a cyclone in the Gulf and there "is not much searoom to do so". Captain Thomson pointed out that the way the Gulf is formed makes it hard to evade a cyclone. By contrast, in Western Australia you can go south and then west and then north outside of the cyclone. You cannot do that in the Gulf.[154]

[240] In a letter to the Board a Karumba resident, Mr Bill Rutherford, who is an experienced mariner and Secretary of the Karumba Volunteer Marine Rescue Unit, was critical of the practice of vessels vacating the port if and when a cyclone event is declared. As he said:

> "Because of the geography of the Southern Gulf it is certain that in the event of a cyclone being in the Eastern Gulf, there is no escaping it. …"

[241] The same essential point is made by critics of the Port of Karumba CCP in respect of a cyclone that is heading in the direction of Karumba or a cyclone, like Tropical Cyclone Nelson, which takes an easterly path and affects the waters of the Eastern Gulf. The point is that there is insufficient searoom to avoid such a cyclone. In a colourful phrase it is a "marine cul-de-sac". The ship cannot go South. Going North-West of Karumba in the direction of Sweers Island risks heading in the direction of a cyclone such as Tropical Cyclone Nelson. The only remaining direction is North and the risk exists of having insufficient time or searoom to avoid the cyclone. The fact that Tropical Cyclone Nelson was a category 1/category 2 and easier to avoid than a Category 3 or higher cyclone does not detract from the general hazard posed to large vessels leaving Karumba in the face of a cyclone affecting the South-East part of the Gulf. The point was well-made by Mr Campbell Smith in his affidavit in the Federal Court proceedings in 1999 when he stated that going to sea was not a viable option.

> "The option of sending the *MV Wunma* to sea is not viable due to:
>
> (i) the shallow waters in the Gulf and the substantial unsurveyed areas in the southern part of the Gulf;

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152 Exhibit 16(b), p.51.
153 Exhibit 9; para 27.
154 Exhibit 9; para 35.

(ii) the inherent risks such as running aground or colliding with another vessel, associated with the vessel being subjected to cyclonic winds and high seas in open water."[155]

[242] The Port of Karumba CCP is not clear in its definition of what is a "large vessel". However, it contemplates that smaller vessels will leave the port and go upstream and seek protection amongst mangroves.

[243] The direction or recommendation in relation to large vessels is informed by the risk of a storm surge leaving large vessels stranded. Evidence was given of a large vessel being stranded during a cyclone event in the mid-1970s. A storm surge is an increase (or decrease) in water level associated with a significant meteorological event such as a tropical cyclone. Typically it raises the level of the tide above the predicted level. But in some situations the actual tide level can be lower than that predicted, for instance when winds blow offshore. The storm surge height depends on a range of factors including:

(a) the intensity and size of the tropical cyclone;

(b) the shape of the seafloor – the more gentle the slope the greater the surge, and

(c) the speed and angle of approach of the cyclone to the coast.

The surge can be worsened by the funnelling effects of bays and estuaries – and river and local flooding caused by torrential rain.[156]

[244] The EPA operates a storm tide system comprising tide gauges along the Queensland coastline that allows real-time access to tide data during events to monitor the effects of coastal flooding from tidal surge. For Tropical Cyclone Nelson data was obtained from the Weipa and Karumba gauges. The EPA reports that the maximum surge value recorded at Karumba was 0.8 metres at 1210 hours on 5 February 2007. This did not exceed the Highest Astronomical Tide ("HAT") which is the highest water level which can be predicted to occur at a particular site under average weather conditions. But as the EPA observes, had the maximum surge recorded at Karumba occurred on the spring tide four days earlier (at 1730 hours on 1 February), the actual storm tide would have been 0.6 metres above HAT and this may have resulted in substantial flooding around Karumba.[157]

155 Campbell Smith affidavit; para 29; Exhibit 49; CB33.
156 EPA Fact Sheet: Tropical Cyclone Nelson.
157 EPA Fact Sheet: Tropical Cyclone Nelson.

[245] The storm surge experienced at Karumba as a result of Tropical Cyclone Norman is informative. But the extent of that surge does not dictate the extent of the surge that might be experienced during a different, more severe, cyclonic event.

[246] Evidence from an experienced mariner, Mr Bevis Hayward, accords with evidence given by meteorologists that cyclones in the Gulf are fickle by nature and their tracks uncertain. As was said:

> "Once formed into cyclones their tracks can be erratic and their progression speed is also virtually impossible to predict."[158]

[247] Mr Hayward has been at sea for all of his working life, beginning in September 1967 at the age of 16. His experience includes operating the 69 metre cargo ship, *Gulf Cloud*, during two wet seasons and he has spent another six wet seasons as the Manager Remote Area Service in Karumba for MSQ. He has studied tropical revolving storms (cyclones) in the Gulf region. His evidence was:

> "32. … I have witnessed storm systems lingering in the Gulf region for days on end and travelling in one direction before then changing direction and crossing the coast to form rain depressions. These are normally low category 1 & 2 storms. I also witnessed Cyclone Craig in March 2003, a cyclone that travelled from Cape Arnhem in the Northern Territory to the southwest of Cape York Peninsular near the Gilbert River in less than 15 hours. At one stage this system covered 240 nautical miles in 9 hours at a speed of 26 knots.
>
> 33. In my experience, the geographical position of Karumba works in favour of the town missing the full impact of tropical storms. This is because a storm, approaching from quadrants in the Northeast through to the West, produce mainly offshore winds as opposed to onshore winds which subsequently lessens the probability of substantial tidal surges in the Norman River. However, history tells us, a direct hit with a severe category 5 storm spares no-one.
>
> 34. In my experience, the fact that a tropical low or cyclone has crossed over from water to land does not mean it will not re-form and change track back to sea, and vice versa. An example in this regard was "Cyclone Ingrid" in March 2005."[159]

[158] Statement of Bevis Hayward; Exhibit 74; para 31.
[159] Statement of Bevis Hayward; Exhibit 74; paras 32-34.

5.16 COMPLIANCE WITH PORT CYCLONE CONTINGENCY PLANS

[248] Compliance with Port Cyclone Contingency Plans such as the Port of Karumba Cyclone Contingency Plan is an issue of contention amongst mariners. A similar issue of contention arose in respect of the *MV Warrender* which was unable to enter Weipa during a cyclone event.[160]

[249] Twice when Mr Hayward was Master of the *Gulf Cloud* he had a disagreement with the then Harbour Master in Cairns about being directed to go to sea. The port was closed and he was directed to sail but he declined to do so. He subsequently discussed the matter with the Harbour Master and explained his reasons for not taking the *Gulf Cloud t*o sea.[161]

[250] The cargo ship the *MV Warrender* remained in the Port of Karumba during Tropical Cyclone Nelson. The Board's inquiries indicate that she was not required to proceed to sea under the Port of Karumba Cyclone Contingency Plan or pursuant to a direction from the Regional Harbour Master. The *MV Warrender* proceeded up the Norman River without cargo and dropped anchor. She was in contact with the Cairns VTS during this period, and was not directed to go to sea by the Regional Harbour Master or any other MSQ officer.

[251] The history of compliance or non-compliance by the *Wunma* with the Harbour Master's requirements for clearing the port of large vessels was the subject of some evidence.

[252] One matter that arises in connection with the *Wunma* is that winds have to be below about 25 knots and tidal conditions suitable for the *Wunma* to negotiate the channel and go to sea. The Port of Karumba CCP has as its objective that large vessels will generally have cleared the port before winds reached 30 knots. But depending upon the circumstances, winds may reach 25 knots before a "Blue Alert" is declared under the Port of Karumba CCP requiring a vessel to leave port. This is because a "Blue Alert" requiring all ships to sail only becomes operative when destructive winds are forecast within 16 hours. The term "destructive winds" refers to wind gusts in excess of 125 kilometres per hour. Destructive winds are Category Number 2 winds. The Bureau of Meteorology defines them as consisting of sustained winds of

160 Statement of Frank Thomson; Exhibit 9; para 58.
161 Exhibit 74; para 25.

between 89 and 117 kilometres per hour with strongest gusts between 125 and 169 kilometres per hour. One kilometre per hour is approximately 0.54 knots.

[253] In short, although the Port of Karumba Cyclone Contingency Plan has as its objective that large vessels will clear the port before wind speeds have reached 30 knots, the system of alerts does not require ships to sail until a "Blue Alert" when destructive winds are forecast within 16 hours. This situation may permit a Master of the *Wunma* to remain alongside the wharf, notwithstanding the terms of the Port of Karumba CCP, and to explain that course of conduct because winds and tidal conditions did not allow the ship to safely negotiate the channel and go to sea. Such an explanation could be based upon past experience when the ship once was nearly caught in the channel when a cyclone threatened.[162]

[254] Any Master of the *Wunma* who takes the decision to remain alongside the wharf on the basis that it is a safer option than going to sea may be vindicated by events or, at least, able to justify that decision if, as matters transpire, the ship and the wharf infrastructure are not damaged. But if the cyclone intensifies and affects Karumba, with or without a tidal surge, such that the ship and the wharf are damaged, the Master is placed in a very different position.

[255] First, the Master and the Master's employer might be required to explain to the ship's owner why procedures to leave the port in the SQS and in the Port of Karumba CCP were not followed and there may be legal liability to the owner of the ship and the wharf infrastructure in respect of physical damage and substantial, consequential losses during the period that concentrate cannot be exported.

[256] Second, there is the risk of prosecution notified in the Regional Harbour Masters Advisory Message and the risk of being held accountable for damage caused to other vessels or other property. Although the Port of Karumba CCP does not have statutory force, non-compliance with a Harbour Master's directions to leave port would expose a Master to possible prosecution.

[257] In short, and as Captain Thomson agreed, a Master who decides to stay alongside may be taking a fair bit upon himself or herself if, in the course of events, damage is done to the vessel and the wharf.[163]

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162 Statement of Frank Thomson; Exhibit 9.
163 Captain Thomson; T.107.

5.17 THE ZINIFEX PORT SITE CYCLONE PROCEDURE

[258] This procedure[164] defines the responsibility of the Zinifex Port facility, the mine site and the "Wunma Teams" in the event of a possible cyclone. So far as it is relevant to the operation of the *Wunma* it is based on a system of alert conditions:

- Blue Alert — The Bureau of Meteorology has issued a Cyclone Watch for the area of Karumba. A cyclone has developed and may affect the area within 48 hours.
- Yellow Alert — The Bureau of Meteorology has issued a Cyclone Warning for the area of Karumba. The cyclone is moving towards the area, impact within a 200km radius is probable within 12 hours.
- Red Alert — Cyclone impact is imminent within a 50km radius.

[259] To ensure the management and implementation of the procedures there are five teams. Team A is responsible for cyclone coordination and is led by the Port Manager, the Emergency Services Incident Controller and the Site Administrator. Its areas of responsibility include maintaining communications with the *Wunma* and monitoring cyclone intensity.

[260] Team D is described as "Wunma Personnel". It includes Inco's Operations Superintendent in Karumba. The areas of responsibility of Team D are described as:

> "• Prepare vessel for departure for sea. Call in crew if necessary
> • Check fuel, water and sufficient food for two weeks at sea
> • Secure vessel inline with ISM Cyclone Procedures
> • Alert AMSA/Department of Transport Qld of situation
> • Ensure the vessel proceeds to sea or action is taken after communication with Ports Cooperation (sic) & Operations Manager."

[261] When a Blue Alert is raised the Team D (*Wunma* personnel) are required to:

> "• Prepare vessel for depart for sea. Call in crew if necessary.
> • Check fuel, water and sufficient food for 2 weeks at sea
> • Carry out checks on communications equipment
> • Review Cyclone Procedure – MV Wunma."

[164] Statement of Malcolm Mewett, Exhibit 47, Annexure 5.

[262] If a Yellow Alert is raised (the Bureau of Meteorology has issued a Cyclone Warning for the area of Karumba. The cyclone is moving towards the area, impact within a 200 kilometre radius is probable within 12 hours), the following action is stated:

> "• Wunma to proceed to sea if possible, if not possible because of strong wind or tidal flows the vessel will take action after communication with Ports Cooperation (sic) & Operations Manager.
>
> • The Starboard anchor will be put underfoot and the vessel ballasted to the maximum extent.
>
> • The Master will determine the number of crew to remain onboard, consistent with the INCO Cyclone Procedures.
>
> • The Master may make arrangements to repatriate other crew to a safe area away from Karumba.
>
> • Determine with Team A at what intervals communications is to be made to give status report. Ensure communications schedule is met."

[263] If a Red Alert is raised, Team D is required to maintain regular communication with Team A.

[264] Importantly, for present purposes, the March 2006 Zinifex Port Site Cyclone Procedures anticipate that when a Blue Alert is raised, the ship will be prepared for departure to sea, that fuel is checked, that the vessel is secured in line with ISM cyclone procedures, and that when a Yellow Alert is raised the ship proceeds to sea or other action is taken after communication with the Ports Corporation and the Operations Manager.

[265] An earlier edition of the Zinifex Cyclone Procedure was on the vessel at the time of the incident. It consists of a separate and detailed Cyclone Procedure issued in May 2004 in respect of the *Wunma*.[165] It is based on a similar system of alert conditions. In the event of a Blue Alert, the vessel is to "Finish off current loading or cease any further loading such that the *Wunma* is empty of any zinc or lead concentrate". It also includes provision for preparation for departure to sea and checking fuel and water. It contains a section on navigation action in the event that the Regional

165 Exhibit 11.

Harbour Master directs the ship to vacate port. In this event, the procedure advises there are two alternatives:

- heading to sea; or
- heading to the cyclone mooring, depending on the position and direction of the TRS.

It includes a section in relation to the Cyclone Mooring at Sweers Island, with detailed instructions in relation to connection to the cyclone mooring.

5.18 MULTIPLE CYCLONE PROCEDURES GOVERNING THE SHIP

[266] As can be seen, at the time of the incident, the ship was subject to three different cyclone procedures:

(a) the Cyclone Procedure in its SQS;

(b) the Zinifex Cyclone Procedure (and in that regard, the ship had an outdated version on board that contemplated use of the cyclone mooring at Sweers Island, rather than the March 2006 edition which made no reference to it);

(c) the Port of Karumba Cyclone Contingency Plan.

[267] Each procedure is based upon a system of alert conditions which are not identical. Although in general terms, the system of alerts have similar objectives in preparing the vessel to depart port and then proceed to sea, there is no consistency between the different alert conditions. For instance, the SQS has as the first stage alert a "Blue Alert" which is effective when the Bureau of Meteorology has advised the vessel that a "Watch Alert" is effective, i.e. gale force winds greater than 40 knots are expected within 48 hours, but not less than 24 hours. The action required upon such a Blue Alert includes "cease loading or discharging operations". The Zinifex Cyclone Procedure has a similar, but not identical, Blue Alert condition where the Bureau of Meteorology has issued a "Cyclone Watch" for the area of Karumba. The Blue Alert goes on to say "a cyclone has developed and may affect the area within 48 hours". This definition is open to the interpretation that it applies only once a cyclone has developed in respect of which a "Cyclone Watch" has been issued for the area of Karumba. In any case, the definition of "Blue Alert" under the SQS and under the Zinifex procedure is not the same. The definitions of Yellow Alert and Red Alert are not the same.

[268] More significantly, the Port of Karumba Cyclone Contingency Plan has as its first stage alert a "Yellow Alert" when "destructive winds" are forecast within 24 hours,

upon which, ships are to suspend loading. The “Yellow Alert” definition does not coincide with any cyclone alert condition in the SQS or Zinifex Port Cyclone Procedure. Under the Port of Karumba CCP a “Blue Alert” occurs when destructive winds are forecast within 16 hours, whereupon all ships are to sail.

[269] The existence of three overlapping cyclone procedures with different alert conditions is a potential source for confusion.

[270] As matters transpired, the ship departed the Port of Karumba without being required to by an alert condition under any of these procedures. As matters transpired, she departed the Port of Karumba too late to be well-clear of the cyclone’s path.

[271] The copy of the SQS that was on board at the time of the incident, by mistake, retained two pages about connection and disconnection procedures to the cyclone mooring at Sweers Island. The Inco SQS memorandum that was circulated on 12 January 2006 should have contained a direction to remove these pages and through an oversight this did not occur.[166]

[272] The inadvertent retention in the SQS of pages in relation to the cyclone mooring at Sweers Island was a potential source of confusion, even though proceeding to the cyclone mooring was not included as one of the options in the Cyclone Procedure section of the SQS. The presence on board of an outdated copy of the Zinifex Cyclone Procedure for the ship that also referred to the cyclone mooring at Sweers Island was a potential source of confusion.

[273] The mistaken retention of pages in connection with the cyclone mooring at Sweers Island in the SQS and the existence of an outdated version of the Zinifex Cyclone Plan for the vessel that contemplated the vessel going to the cyclone mooring at Sweers Island, did not affect the course of events in February 2007 leading up to the incident. Going to the cyclone mooring at Sweers Island was never a realistic possibility on 5 February 2007. It would have required the ship to steam in the general direction of the low pressure system, not away from it. Experience showed that it was difficult to connect to the cyclone mooring in high winds. Captain Seal had never been to the cyclone mooring and there had been no training drills in respect of it for some years. The authority to use it had expired on 16 December 2005. It apparently had not been maintained. An inspection of the cyclone mooring

on 31 May 2007 indicated that the mooring buoy was not in readiness for the *Wunma* to moor up to it and there was no mooring line or mooring hook in place.[167]

[274] But in different circumstances, the existence of documents on the ship's bridge that referred to the cyclone mooring had the potential for confusion. That this is so is demonstrated by a voyage plan prepared after the incident when the ship proceeded under a Restricted Use Flag after unloading to an export vessel near Weipa to Karumba. The voyage plan prepared by the Second Mate included the following:

> "During the voyage from the Export vessel to Karumba should a TRS evolve, we will depart from the passage plan and set course to the designated cyclone anchorage at Sweers Island. The vessel will make fast to the cyclone mooring."[168]

5.19 THE CHOICE OF ACTION PRESCRIBED BY THE SQS

[275] It should be recalled that the Cyclone Procedure that was introduced into the ship's SQS in January 2006 had its origin in draft procedures that had been prepared in previous years.

[276] The procedure that was introduced into the SQS in January 2006 and that was in force at the time of the incident[169] stated the following in respect of responsibilities:

> "The Managing Director is ultimately responsible for this procedure. The operation of the vessel is the responsibility of the Operations Manager in Karumba, and the operation of the vessel at sea is the responsibility of the Master."

[277] The procedure anticipated the receipt of cyclone watches, cyclone warnings and gale, storm and cyclone warnings for shipping from the Tropical Cyclone Warning Centre when a cyclone was expected. It also contemplated that the vessel would receive daily weather information by SatComm C, facsimile, VHF or MF/HF radio. It provided:

> "The Operations Superintendent will communicate on a regular basis with the Port Manager and will relay cyclone warnings received by the vessel.
>
> The Operations Superintendent will communicate with Head Office on a regular basis to keep them advised of cyclone activity in the region."

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166 Supplementary statement of Andrew Dally; Exhibit 53, Part 2; para 6.
167 Statement of Bevis Hayward; Exhibit 74; para 37.
168 Exhibit 49; CB204.
169 Exhibit 6; see also Exhibit 10.

[278] It provided:

> "The Operations Superintendent and the Master will monitor the cyclone alerts and will make a preliminary choice of action in the event a cyclone is imminent. Their choice of action is to take the form of one of the following:
>
> - Anchor off Karumba in position (Lat. Long). This action to be undertaken if the cyclone is not intended to intensify and is expected to pass over (50 kms??) of the Port. Have both anchors down at maximum scope of cable and engines should be employed to ease the weight on the anchors. The vessel will remain on full alert at the anchorage during the duration of the cyclone.
>
> - Proceed to Weipa. This action to be undertaken if there is sufficient time to make the journey (nautical miles??, /hours). Permission must be obtained from the Port Authority of Weipa who will allocate a berth of an anchorage position.
>
> - Head for the open sea and remain in open waters until the cyclone has passed. This action is to be undertaken if either there is no time to steam to Weipa, or permission to enter Weipa has been declined because of the prevailing conditions at the Port at that time.
>
> The Master will have the final responsibility of choice of action taking into account prevailing weather conditions and any changes in forecast conditions that may occur. Choice of action will be relayed to the Port Authority and to the Operations Superintendent."

[279] The content of this document suggests that it remained, to some extent, a work in progress at the time of the incident. The first option of anchoring of Karumba "in position" did not supply a location for that position. It might be said, with justification, that the selection of an appropriate location to anchor should be a matter for the choice of the Master in the prevailing conditions, since it depends upon an assessment of tide, swell, sea and weather conditions. If that was so, then words to that effect might have been included. The reference "in position (Lat. Long)" was incomplete.

[280] The entry "(50 kms??)" might suggest some uncertainty about the selected distance, or it simply could indicate that the distance was necessarily an approximate one. An earlier draft of the procedure had selected a distance of 75 kms.

[281] The impression that the newly-introduced cyclone procedure was not in a final form is supported by the inclusion in the option of proceeding to Weipa "(nautical

miles??, /hours)". There is no reason why the number of nautical miles between Karumba and Weipa could not have been included. The number of hours, of course, is dependent upon the speed of the vessel. When asked about these matters, the Managing Director of Inco, Captain Dally, initially said it was "very difficult to be prescriptive", but acknowledged that that the "gaps" in relation to distance were to be further dealt with.[170] Otherwise, the plan was fully completed, and was said to be the product of a lot of work between Mr Campbell Smith and him.

[282] Leaving aside the form in which these options are written, matters of substance immediately arise. The option of anchoring off Karumba is to be undertaken "if the cyclone is not intended to intensify and is expected to pass over (50 kms??) of the Port". The unpredictable nature of cyclones in the Gulf is well-recognised. Evidence was given to the Inquiry by a number of witnesses, including an internationally-recognised expert, Mr Jeffrey Callaghan who has been employed by the Bureau of Meteorology since 1965 and has been the Head of Severe Weather Section since 1996. His evidence included the following general description of tropical cyclones in the Gulf:

> "5. Tropical cyclones in the Gulf of Carpentaria mainly form in the monsoon trough. The monsoon trough is an area where the NW monsoon winds meet the SE trade winds and these colliding air masses provide an area of convergence necessary for the formation of thunderstorms. To cause heating of the atmosphere which can lead to surface pressure falls, the thunderstorms should remain nearly vertically upright. To do this the wind speed and direction around the circulation must not change too dramatically with height. This places a severe limitation on the number of tropical cyclones which can form and only about 80 form globally each year.
>
> 6. Tropical cyclones in the Gulf are similar to other areas of the globe except that they can develop very fast. Warm waters aid the development of tropical cyclones and the water in the Gulf is very warm and mostly over 30 degrees Celsius in summer. Tropical cyclones in the Gulf rapidly can reach category 3 intensity or higher under the right conditions."[171]

[283] By reference to the cyclone tracks over an 81 year period from season 1924/1925 to 2004/2005, Mr Callaghan observed:

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170 Captain Dally; T.515

171 Exhibit 77; paras 5 and 6.

> "… the tracks of tropical cyclones in the Gulf have no favoured direction of movement and can move in any direction being steered by prevailing weather systems at the time of its formation"

[284] Mr Callaghan's expert opinion reflects the evidence of a number of other witnesses. The track of the low pressure system that became Tropical Cyclone Nelson itself demonstrates the unpredictable path of tropical cyclones in the Gulf.

[285] In those circumstances, the first option in the ship's SQS cyclone procedure comes with its obvious limitations. In some cases it may be possible to say that the cyclone "is not intended to intensify", for instance, if it is over land. But even that prediction can be falsified. The fact that a tropical low or cyclone has crossed over from water to land does not mean that it will not re-form and change track back to sea.

[286] Next, given the unpredictable direction of tropical cyclones, a cyclone that, at one stage, might be "expected to pass over (50 kms??)" of the Port of Karumba may take a different direction and head for the Port. In that event, a Master who has taken the option of anchoring off Karumba faces the difficult choice of either remaining at anchor or pursuing some other option. The other options are few and unattractive, especially if the cyclone intensifies to Category 3 or higher.

[287] Despite these obvious limitations on the option of anchoring off Karumba, in the absence of a suitable cyclone mooring in the Norman River or some other location, the option of anchoring off Karumba has certain attractions. Local experience, reflected in the evidence of Mr Hayward is that, although history tells us that Karumba is exposed to "a direct hit" from a cyclone, the geographical position of Karumba tends to work in favour of the town missing the full impact of tropical storms.[172] The option of anchoring off Karumba rather than heading for the open sea and remaining in open waters enables VHF ship to shore communications to remain intact during severe tropical revolving storms. In a worst case scenario, the ship and her crew are in reasonably close proximity to Karumba if a rescue is required.

[288] The procedure of anchoring off Karumba in a designated position was incorporated in an Interim Cyclone Contingency Plan for the ship that was produced by MSQ at the request of Inco after the incident. In essence, in the event of a "yellow alert" the ship was required to steam to a designated cyclone anchorage about three nautical

miles to the North-West of the Fairway Beacon, drop her anchor and run twelve shackles of cable.

[289] The March 2007 Interim Cyclone Contingency Plan was drafted by Mr Hayward, the Manager Remote Area Services (Karumba) of MSQ, in consultation with Captain Thomson, a former Master of the *Wunma* and current MSQ employee. It was drafted at the request of the Regional Harbour Master (Cairns), Captain Alan Boath following an approach to Captain Boath by Inco. But Captain Boath's request to Mr Hayward did not include the option of the ship remaining in the Norman River. Captain Boath requested Mr Hayward not to make any allowance in the draft Interim Cyclone Contingency Plan for the Norman River and requested that the Interim Plan be based on the safest option or options for operating in the Gulf from the Port of Karumba. Accordingly, the development of the Interim Plan did not consider the option of the ship remaining alongside the Zinifex wharf or other options for remaining in the Norman River.

[290] On 2 March 2007 Captain Boath sent an email to various persons in MSQ concerning the reinstatement of registration of the ship and noted that there were two major issues that needed to be addressed:

(a) the condition of the ship including its classification, load line and survey; and

(b) the operating parameters/procedures specifically relating to cyclone contingency planning.

He recorded in that email his understanding of the position of MSQ shortly after the *Wunma* was disabled:

> "1. The ship in a lightship condition is susceptible to dangerous pounding;
>
> 2. The ship in a loaded condition is susceptible to swamping;
>
> 3. The Zinifex decision not to continue to renew the Buoy Mooring Authority at Investigator Roads off Sweers Island, leaves no safe cyclone contingency arrangements for the vessel;
>
> 4. The only viable solution would be to make arrangements for a cyclone mooring in the Norman River."[173]

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172 Exhibit 74; para 33.

173 Exhibit 41; CB205.

[291] In his oral evidence to the Inquiry, Captain Boath confirmed that his first preference was for a mooring facility in the Norman River.[174] He explained that the Interim Plan to anchor off Karumba was "not much of a plan at all" but was the only effective plan that could be developed based on the facts of the incident in circumstances where MSQ had yet to be satisfied that the ship could proceed to sea in the event of a cyclone.[175] If the ship was able to go to sea, then Captain Boath's second preference after having a facility in the Norman River would be for the vessel to try to outrun the cyclone and head North, subject to the vessel being able to withstand that type of voyage. Captain Boath noted that such a course of action depends on timing issues and, amongst other things, "an effective water management plan".[176] The third option was to anchor outside the channel in sufficient water.[177]

[292] Under the SQS Cyclone Procedure that applied at the time of the incident, the second option to be considered by the Operations Superintendent and the Master was to proceed to Weipa. The limitations on that course of action include many of the factors that pose risks in the ship heading into cyclonic winds and high seas in open water. In addition, the option depends upon permission being obtained to enter Weipa. The same cyclonic conditions that may trigger the closure of the Port of Karumba under its Cyclone Contingency Plan may lead to the Port of Weipa being closed under its comparable Cyclone Contingency Plan, depending upon conditions. The weather system may head away from Weipa. However, there can be no assurance that the Port of Weipa will remain open during the period in excess of 30 hours that it would take for the ship to reach it from Karumba.

[293] The final option under the SQS Cyclone Procedure at the time of the incident was to "head for the open sea and remain in open waters until the cyclone has passed". It is well to recall Mr Campbell Smith's evidence to the Federal Court in November 1999 that the option of sending the ship to sea is not viable due to:

(a) the shallow waters in the Gulf and the substantial unsurveyed areas in the southern part of the Gulf;

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174 Captain Boath; T.733.

175 Captain Boath; T.732–T.733.

176 Captain Boath; T.733.

177 Captain Boath; T.734.

(b) the inherent risk, such as running aground or colliding with another vessel, associated with the vessel being subjected to cyclonic winds and high seas in open water".

[294] Reference has already been made to the geographic limitations and limited searoom in which any vessel has to undertake cyclone avoidance procedures in the southern parts of the Gulf. But more fundamental issues arise in the case of the *Wunma*, namely:

(a) whether the ship was designed to head into open waters during a cyclonic event, especially when in a loaded condition;

(b) whether the operation of its water management system made it safe to do so.

[295] As to the former, the evidence indicates that the ship was not designed to proceed to sea and remain in open waters in cyclonic conditions. In summary:

(a) the designer of the ship, Mr Ballantyne, gave evidence that the ship was not designed to proceed to sea and remain in open waters in cyclonic conditions;[178]

(b) the ship's conditions of class were limited to "Coastal Service within the Gulf of Carpentaria" meaning not more than 21 nautical miles from the coast;

(c) a cyclone mooring was intended as an essential part of the ship's operation;

(d) despite her stability in the event that her cargo hold filling with water and the Lloyd's Register review of her global and local strength in cyclonic conditions, no expert or anyone else contended that the ship would be seaworthy or safe in a condition in which large quantities of water entered and remained in her aft well deck and cargo hold;

(e) in fact, as Mr Bundschuh explained in his evidence:

> "In a full load condition if you have a water management system that relies on keeping water on board, you are then in serious danger of actually overloading the vessel. That is the context in which the water management system has to come into play to make sure that when operating in full load you are not going to keep on water that immerses the load line."[179]

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178 Exhibit 97; para 36. Mr Ballantyne; T.801; T.804; T.807.

179 Mr Bundschuh; T.767; T.770.

(f) at no time was a risk assessment undertaken which evaluated the risk that the ship's water management system would operate so as to result in large quantities of water remaining on board during a cyclonic event with the risk of the ship being immersed below the load line and becoming unseaworthy.

[296] As to the latter issue, given its importance, it is appropriate to separately consider the design and operation of the ship's water management system.

WUNMA BOARD OF INQUIRY

CHAPTER 6: THE SHIP'S WATER MANAGEMENT SYSTEM

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CHAPTER 6 THE SHIP'S WATER MANAGEMENT SYSTEM

6.1 INTRODUCTION

[1] The operation of the ship's water management system is central to the Board's Inquiry. The retention of large quantities of water on board the ship on 6 February 2007 contributed to the incident.

[2] This chapter will address the design of the ship's water management system, and the operation of that system in the years prior to 1 February 2007. It is appropriate to discuss the operation of the system in February 2007 as part of the narrative of events in Chapters 11 and 13.

[3] The following issues emerge in relation to the design of the ship's water management system and her operation prior to 1 February 2007:

1. The design intent was that the waste water system operate, in effect, as a "first flush" system, with waste water from rain run off from the canopy and deck waste water being collected in "dirty water tanks", following which deck drains would be directed to the sea.
2. The system did not in fact operate as a "first flush" system: rarely was water discharged to the sea during the ship's normal operations.
3. An issue exists about whether the water management system is capable of operating as a "first flush" system since:
   (a) side deck drains, especially drains on the port deck and below the C1 conveyor belt, are prone to being blocked with concentrate;
   (b) valves which might be operated to direct water in these drains overboard are prone to being blocked with concentrate, and they are below deck such that they cannot be quickly and easily serviced;
   (c) it is questionable whether the side deck drains (if clear of concentrate and with valves to sea being operational) are capable of collecting and discharging to sea the large volume of water that falls during a tropical storm onto the side decks through several large downpipes from the canopy;
   (d) a small drain from the sump in the aft well deck, if opened to the sea, will discharge "dirty water" and is not part of the "first flush" system.

4. The operators and owners of the ship seemingly were aware of the fact that the system did not operate as a “first flush” system, necessitating return of the ship to port when her “dirty water tanks” became full during voyages.

5. There is a significant difference between:

   (a) the collection and retention of rainwater during the ship’s normal daily operations, whereupon the ship is *able to return to port*, and empty her dirty water tanks; and

   (b) the collection and retention of rainwater (and seawater) during a voyage in open seas in cyclonic conditions in circumstances where the ship is *unable to return to port*.

6. The operation of the ship’s water management system during a lengthy voyage in cyclonic conditions, when tropical downpours might be expected, does not appear to have been adequately considered by parties who promoted or sanctioned the option of the ship heading for the open sea and remaining in open waters during cyclonic conditions.

[4] Different witnesses used different terms to describe certain features. For instance, some used the term “scuppers” whilst others used “deck drains” to describe the drains that are flush with the side decks and which, if operational, drain water from the deck to the sea. “Scupper” is defined[1] as “one of the drains set in decks to carry off accumulation of rain and sea water”. The term “freeing port” is used to describe any opening in a vertical plate structure for the drainage of water, whether or not fitted with means of closure such as a shutter.

6.2 THE DESIGN INTENT

[5] Mr Stuart Ballantyne, a naval architect, was approached in or about January 1996 by Pasminco to design the transfer vessel. Mr Ballantyne is and was the Managing Director of a marine consulting, naval architecture and vessel survey business conducted by ADSMAR Pty Ltd that traded at the time under the name Sea Transport Solutions, and now trades under the name Sea Transport Corporation. He described the owner’s design intent as follows:

> “22. One of the owner’s design requirements included that there was to be no ore run-off from the vessel. To achieve that,

1 De Kerchove R, *International Maritime Dictionary*, Van Nostrand, New York, Second Edition, 1961, p.693.

water tanks were included to collect the dust and then, once the tank filled up, the water was to trickle away. Once it does fill up, the water does spill over.

23. The dirty water tanks were of limited capacity. They were only intended to collect the dust that had settled on the vessel from either the load operation or the discharge operation. Once the dust had been collected, the idea was for the runoff from the shed in particular to be turned into the sea. Such runoff would be clean by that point in time. The design never envisaged that all water that fell on the vessel would be collected in the dirty water tanks; they simply did not have that sort of capacity and, in any event, there was no need to store clean water in them.

24. As such, during extreme weather conditions, all that was required was a five-minute or ten-minute flush and, thereafter the ship was designed to keep operating with the water flowing directly out. In other words, at the start of the operation you would leave the tanks open until it had rained sufficiently to collect all of the dust that had previously settled on her. At that point, you were meant to close the tanks. The idea was to collect the first couple minutes of rainfall because that is the part that would contain all of the dust. Then you would close it off so that the clean rainwater would discharge overboard. That was the intent of the design anyway."[2]

It is convenient to refer to this design intent as a "first flush" system, and that term was used by various witnesses during the Inquiry.

[6] The operation of the water management system was described as an aspect of PCML's Environmental Management in its submission to the "2000 Engineering Excellence Awards" of the Institution of Engineers Australia - Queensland Division:

"**Water Collection:** Rain and wash down water is held in collection water tank and recycled to the port process plant."[3]

6.3 THE SYSTEM

[7] The *Dust Control Waste Water System*[4] collects and stores "dirty water", for instance water containing zinc or lead concentrate from the dust scrubbers located aft, cargo leachate or water from hold cleaning and wash down activities that may accumulate on the well deck. Water from the scrubbers is piped directly into the

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2 Statement of Stuart Ballantyne; Exhibit 97, paras 22-24.
3 Exhibit 49, CB47, p.50.
4 Exhibit 98; refer ASDMAR Drg No 4211-14/4A *Dust Control Waste Water System.*

"dirty water tanks". Other water drains to the well deck and drains aft when the vessel is trimmed by the stern. Scuppers on the aft decks also drain to the well deck. Water that enters the scuppers is piped directly into the "dirty water tanks", unless it is directed to sea through valves.

[8] Fitted into the well deck at the aft end, just forward of the stern ramp, is a small sump ($0.45m^3$) fitted with a removable metal grate.

[9] Water in this sump drains to a Washdown Water Transfer Tank[5] that has a volume of approximately $5m^3$ located in the engine room. The contents of this tank can be pumped up into a larger Dirty Washdown Water Tank[6] that has a volume of approximately $20m^3$ where the water can be stored until the vessel returns to port, where the contents can be pumped ashore for treatment or disposal.

[10] In an emergency, it should be possible to use the system that pumps out the dirty water tanks to shore to pump dirty water from the dirty water tanks to the sea. But it takes these pumps hours to empty the tanks. Therefore, this discharge system has a limited capacity to drain tanks which could fill in torrential rain in less than half an hour.

[11] It also is possible in an emergency to discharge water from the "dirty water tanks" through the ballast system into the sea.

[12] The "dirty water tanks" with an aggregate capacity of about $25m^3$ are probably adequate to collect leachate from the cargo, or water from hold cleaning and wash down activities. But they do not have the capacity to also handle the run-off from the canopy fitted over the cargo hold and water from the aft deck scuppers that drains into the well deck.

[13] The catchment area of the canopy (83 metres long by 19.2 metres wide) is $1594m^2$. An assumed rainfall of 125mm would result in approximately $200m^3$ of run-off; about 8 times the aggregate capacity of the dirty water system tanks.

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5 Identified on the General Arrangement drawing as a "Wash-down water transfer tank" located beneath the well deck on the starboard side between frames 5 and 6.

6 Identified as a "Wash-down water tank" located beneath the well deck near the centreline between Frames 0 and 2.

[14] The canopy and associated arrangements were designed by WBM separately from the ship itself. Two WBM drawings[7] of the canopy show drains from the roof gutters serving the forward section of the canopy being connected to a long sloping 125mm diameter drains leading forward, while those from the aft section of the canopy are shown as being drained aft through a similar long sloped drain labelled as being connected to the dirty water storage tank. However, the "as built" arrangement is different with an external vertical pipe from each canopy gutter on the starboard side that terminates approximately 150mm above the side deck. Therefore all rainwater collected from the canopy roof on this side drops onto the side deck where it is prevented from flowing overboard by the 100mm upstand formed by the side shell plating of the vessel. Provided the rainfall is not great, the water will flow outboard, due to the deck camber, then along the deck to one of the four 50mm diameter scuppers positioned along the side of the vessel, then into a 100mm diameter collector pipe and be led aft to the small washdown water transfer tank in the engine room. Providing the ship is trimmed by stern, any excess water that does not escape overboard will flow to the stern and gravitate down to the well deck via the normal deck scuppers.

[15] The main difference between the arrangements on port and starboard sides is that on the port side the side deck is that on which the C1 conveyor is located within the space enclosed by the canopy, whereas on the starboard side the rain water spills onto the deck on the fore-and-aft walkway outboard of the canopy. On the port side the canopy side therefore presents an additional barrier to the overboard drainage of rain water.

[16] The low capacity of the four 50mm scuppers relative to the larger number of 100mm downpipes would tend to indicate that the scuppers system was not designed to take run-off from heavy rain.

[17] The capacity of the "dirty water tanks" to handle both waste water and the rainfall collected from the roof of the canopy is limited. It cannot be expected to handle the volume of rainwater that would collect on the canopy during cyclonic conditions and any seawater entering the openings in the transom bulkhead and around the stern

7 WBM Drg. No. CY-430-03026 *Canopy General Arrangement* & WBM Drg. No. CY-430-03035 *Canopy Miscellaneous Details.*

ramp. The water that would accumulate in the aft well deck would flow forward into the cargo hold.

[18] The ASDMAR drawing[8] shows that there is in the line from each side deck scupper a valve that can be opened to allow water on the side deck to be diverted overboard. Valves were fitted in conformity with this drawing. These valves are remotely operated gate valves provided with manual override in case of actuator failure. However, the evidence establishes that these scuppers, particularly on the port side where they are located inside the canopy, became blocked with concentrate and do not allow water on deck to flow either down into the "dirty water tanks" or overboard (assuming the valves are operational and opened to the sea).

[19] During periods of high rainfall, such as may occur during a cyclonic event, much of the rainwater from the starboard side of the canopy would, after spilling onto the open deck might be expected to pour over the upstand and overboard and that only a smaller amount would drain via the deck scuppers into the "dirty water tanks". [9] Some might escape overboard through the freeing ports at the stern of the upper deck.

[20] On the port side where the pipes from the canopy gutters empty onto the side deck inside the canopy some water would flow to the deck scuppers and, provided they are not blocked with concentrate, drain into the "dirty water tanks". On the port side an additional ten scuppers have been fitted along the length of the hold to allow dirty water from washing down this deck to drain into the cargo hold. Wooden plugs are used to block these ten scuppers when they are not required for washing down.

[21] In summary, water that enters side deck drains can be diverted overboard provided the drains are not blocked or the valves jammed by concentrate.

[22] The 100mm upstand is designed to prevent water mixed with or concentrate from spilling overboard.[10] This "lip arrangement" directs water that does not enter the side deck drains to deck drains/scuppers on the stern quarterdeck that flow through

8 Exhibit 98; ASDMAR Drg. No. 4211-14/4A *Dust Control Waste Water System.*
9 Captain Thomson; T.25.
10 Captain Thomson; T.66; T.110-113.

to the well deck.[11] There are freeing ports on the stern quarterdeck that can be closed with a shutter.

[23] In short, drains on the foredeck or on the port and starboard side deck drain directly into the dirty water tanks.[12] Some water that is dumped onto the starboard deck might, if it was in sufficient quantities, go over the side or through freeing ports in the aft quarterdeck into the sea. But the design intent is for water that does not enter into deck drains to be kept on board where, depending upon the vessel's trim, it will drain through deck drains/ scuppers on the aft quarterdeck and into the well deck.

[24] By one means or other, unless deck drain valves are opened to the sea and are not blocked with concentrate, water that collects on the foredeck and port and starboard decks finds it way, either directly or indirectly into the dirty water tanks. Once these dirty water tanks are full, water "bubbles up" through the sump in the aft well deck and onto the well deck where, in the absence of freeing ports, it collects.

[25] A small drain from the sump leads directly overboard through a screw down non-return valve provided with remote actuation and manual override in case of actuator failure. Opening this valve would allow dirty water to directly flow overboard, however the size of this drain means it would not be able to quickly clear large quantities of water. The presence of concentrate in various parts of the ship, including the aft well deck, makes it unlikely that any water that is discharged through this drain will be clean. In practice, the small drain is unlikely to operate as part of the "first flush" system. In an emergency it might be opened to the sea. But its capacity to discharge large quantities of water is questionable, especially if the water contains a high level of concentrate.[13] The evidence supports the conclusion that even if free of concentrate this drain would not be able to quickly clear large quantities of water.[14]

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11 Captain Thomson; T.111.

12 Captain Thomson; T.111.

13 Captain Seal submitted a calculation in Exhibit 28 indicating that this drain, at 64mm nominal bore and under a head of 2.5m would (after verification of calculation) be able to drain 1200 m3 from the cargo and well decks in 888 minutes if it did not become blocked. Captain Thomson's evidence (T.31, ll6-20 and T.68, l30) indicated that the drain is of smaller diameter (for which a longer drainage time could be expected). The evidence variously described the pipe as being about 2.5 inches or 5 cm (Captain Seal; T.232) or 65mm (Mr McDonald; T.457).

14 Taylor Report, Exhibit 81, para 107

[26] The drain to sea could not operate as part of any "first flush" system. Any water going through it would not be clean. As Captain Thomson remarked:

> "Any water on the well deck is going to be highly contaminated. It doesn't matter if we had had gallons and gallons of water; because of the nature of the area down there it is very dirty. It is the dirtiest part in the ship and you are going to be just letting pure sludge go virtually …"[15]

[27] These concerns about permitting "highly contaminated" water to drain to sea through the sump drain might not apply in the event of an emergency when the drain might be opened to avoid water building up to an unacceptable level in the well deck. The potential for water to build up in the aft well deck during cyclonic conditions was realised during the incident when the absence of freeing ports in the aft well deck permitted water to build up to an unacceptable height. In the events that occurred, the sump drain was of no use because, unbeknownst to the Master and the Chief Engineer, it had been blocked from the outside. These aspects will be considered later in the course of describing the events in February 2007. For present purposes, the issue is that if the aft sump drain is operational, it has a limited capacity to discharge water to sea. That capacity is not enhanced by a pump. It depends upon gravity. Its capacity also depends on whether water or "sludge" (water mixed with a large amount of concentrate) is going through it. The aft sump drain lacks the capacity to discharge to sea more than a very small proportion of the water than is likely to accumulate on the aft well deck in a tropical downpour.

6.4 THE SYSTEM'S OPERATION IN PRACTICE

[28] The extent to which the water management system actually operated as a "first flush" system over the years was the subject of evidence. Practices appear to have varied between individual Masters and over time. Some Masters, like Captain Thomson, opened the deck drains when the water was "relatively clean". But this was the exception rather than the rule, and the practice of opening deck drains to sea caused discontent with some members of the crew.

[29] Other Masters adopted a different approach to opening the side deck drains. That approach is exemplified in the practice of Captain Seal who kept the deck drains closed because:

15 Captain Thomson; T.79.

(a) the Zinifex pollution plan; and

(b) discharging concentrate would involve garbage disposal at sea under MARPOL Annex V unless the ship was in distress.[16]

As a result, prior to the incident there was no occasion when Captain Seal discharged dirty water over the side. The practice of not opening side deck drains was not confined to Captain Seal. It appears to have been a widespread practice in recent years. The practice adopted by Captain Thomson and others of opening the side deck drains when the water was "relatively clean" does not appear in any written operating procedure. The practice probably was not the subject of instruction to new Masters in recent years. In the end result, the water management system rarely operated as a "first flush" system.

[30] To better explain how the water management system operated prior to 1 February 2007 it is necessary to give an account of the evidence of a number of relevant witnesses.

[31] Captain Thomson's evidence was:

> In a tropical downpour I think it would take about 30 minutes to fill up its water tanks. Once the tanks are full the water goes up into the well deck, and then into the cargo hold because the swing doors are not watertight.[17]

[32] The possibility existed at sea to use the pumps that were used to discharge waste water from the "dirty water tanks" to the recycling plant onshore in order to pump dirty water directly overboard. But the circumstances to do so did not arise prior to 1 February 2007. In any case, this pump discharge system took about 12 hours to empty the dirty water tanks.[18] Captain Thomson explained:

> "I was never in extreme weather where I had to pump water directly overboard. We kept it on board and came back to port and discharged it at shore. But on occasions we had water up into the cargo hold by the time we had come back."[19]

[33] Captain Thomson described his practice of opening side deck drains if the ship was in a storm and the dirty water tanks were full:

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16 Captain Seal; T.156-157.
17 Exhibit 9, para 34.
18 Captain Thomson; T.69.
19 Exhibit 9, para 39.

> "When I was on board, it was standard procedure (so as not to accumulate excess water on board and thereby endanger the safety of the cargo and the ship) that if we were in a storm, once the deck was washed, and once the roof was washed and the 25 tonne tank was full (which meant we have had a fair quantity of water over the deck), I used to open the scuppers to sea. This action caused discontent with some members of the crew but you'd get about 80% of the water then going over the side into the sea and the other 20% would still go down in to the well deck and into the 5 tonne tank. The 80% going overboard I would class as reasonably clean. The scuppers were always closed before entering the entrance channel and never opened at all while the vessel was in the Norman River or Entrance channel. This procedure was not contained within the Wunma's SQS."[20]

The 80%:20% ratio given by Captain Thomson in that evidence is an area of contention, and in his oral evidence Captain Thomson accepted that the apportionment may be different.[21] It is impossible for Captain Thomson, for any other witness or for the Board to reach any precise figure for the percentage of water that would be able to go over the side if the side deck drains were open to the sea. There are significant issues concerning the capacity of scuppers to carry the large volume of water which may collect on side deck drains from the several downpipes that drop rainwater from the canopy onto the side decks.

[34] The present issue is the practice which Captain Thomson describes of opening side deck drains[22] to sea. This practice was not in the ship's SQS or any other written procedure. In his evidence the Managing Director of Inco expressed surprise at the existence of this practice.[23] The former Operations Manager of Inco also was not aware of the practice.[24]

[35] Captain Thomson's evidence does not suggest that the practice of opening side deck drains to sea was a frequent occurrence in the normal course of events:

> "40. In the years I was master, there were probably a number of times, but not that many, perhaps one or two per wet season on average, that the *MV Wunma* went out to load in rainy weather but had to come back to pump out. For instance, we might have gone out, got into a storm on the way out and had to turn around and come back because the water was up

20 Exhibit 9, para 44.
21 Captain Thomson; T.69, T.89.
22 Referred to in many parts of the evidence as "scuppers".
23 Captain Dally; T.543.
24 Captain Ives; T.480.

> to the base of the cargo. You cannot unload in that state due to the fact that when you get to the stage of having apx 1000 WMT of cargo left in the hold you go down by the head and, the water will run foreward into the cargo. (Down by the head is a position where the vessel is deeper in the water foreward than it is by the stern)
>
> 41. It is not that common to have this problem because if you know that storms are around, you try not to go out. But the problem happens when you commit yourself to go, you go to sea and you get caught in rain. If you get caught with most of the cargo you can trim the stern as much as you can, to keep the bow high and keep the water out of the cargo.
>
> 42. If it starts to rain the export ships close their hatches. So you would not aim to go out to the export ship in rain.
>
> 43. But if you are caught in rain, once the tanks are full, there is no way we can stop water coming into the well deck. …"[25]

[36] Captain Thomson gave oral evidence about his practice on occasions when the dirty water tanks were full in the event of storms:

> "If it happened at sea you – there is a couple of different scenarios there. It depended on the scenario. If it happened at sea and you could you just stored it in and came home and pumped it ashore. If you were close to finishing the discharge and I will use a figure of 1000 tonne, it may not be a 1000 tonne, it could have been a bit more or a bit less, and you could try to keep the vessel – keep it out of the cargo hold by opening the deck drains and putting them over the side you would do that."[26]

The objective of this practice was to stop water from running up into the cargo during the final stages of discharging operations. At that stage the ship will "go down by the head",[27] and water in the well deck might run up into it, meaning that the product could not be discharged. To avoid this Captain Thomson adopted the practice that he described of opening the valves.

[37] The valves to open the side deck drains to the sea were controlled by three control panels: one in the control room at the rear of the bridge, one in the engine room control room and one in the machinery control room, and they were linked together.[28]

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25 Exhibit 9, paras 40-43.
26 Captain Thomson; T.26.
27 Captain Thomson; T.26.
28 Captain Thomson; T.26-27; T.66.

[38] The control panels that could be used to direct water to the sea would not necessarily indicate whether the drains were operational. They would indicate whether the valves were open or closed.[29] The valve might be open but the adjacent pipe might be clogged, and whether it was or not required a physical check on the drains' operation.[30] But if the valve was not operating properly then the light on the control panel would flash yellow which would prompt a direction to one of the engineers to inspect it. Otherwise, the light would be red or green.[31] In short, the control panel would indicate whether or not the valves were open to the sea but it would not necessarily indicate whether the drains were working.

[39] Incidentally, on his inspection of the ship on 10 February 2007 after the incident Captain Thomson found the side deck drains were blocked full of concentrate. Only one deck drain on the portside and only one on the starboard side were operating. The deck drains around the bridge were open and working.[32] How and when the side deck drains became blocked will require further consideration in connection with events leading up to and after the incident. But during his inspection on 10 February 2007 Captain Thomson observed that the "mimic screen" that controls the side deck valves were directed to the dirty water tank, suggesting that there was no attempt to put any water to sea.[33]

[40] When Captain Thomson inspected the ship after the incident the valves were closed to sea and open to tanks and a couple of them were flashing yellow on the control panel meaning that they either had not opened or had not closed and that a problem existed.[34]

[41] Captain Thomson's evidence was that the practice he adopted during the time he was Master of opening side deck drains to the sea if the ship was in torrential rain arose because, in Captain Thomson's assessment, it would take between 20 minutes and a half an hour for both dirty water tanks to fill in torrential rain.[35] The practice of opening side deck drains in such a storm was based on the belief that the water

29 Captain Thomson; T.67.
30 Captain Thomson; T.67.
31 Captain Thomson; T.67.
32 Captain Thomson; T.27.
33 Captain Thomson; T.30.
34 Captain Thomson; T.67.
35 Captain Thomson; T.53.

coming off the roof and the deck was "relatively clean".[36] This practice was worked out by the Masters in charge of the ship and the Operations Manager who first operated the vessel. The practice developed after they got caught a few times with a lot of water on board by keeping side drains closed and then having to come back to port to discharge dirty water. The procedure that they worked out allowed them to keep operating rather than having to return to port once the dirty water tanks were full.[37] The procedure did not find its way into any document.[38] Captain Thomson could not say that the practice was passed on to new Masters, including Masters he trained.[39]

[42] The practice adopted by Captain Thomson and other Masters was to discharge "relatively clean" water[40] in order to avoid cargo becoming wet, such that it could not be unloaded,[41] and, more generally, for the safe operation of the ship.[42] But his practice of discharging "relatively clean" water to sea caused discontent with some members of his crew who took a different view of how "relatively clean" the water was.[43] On the occasions when the deck drains were opened this would be entered in the logbook. This suggests, and Captain Thomson acknowledged, that the practice of opening deck drains to the sea was the exception rather than the rule. He explained:

> "… with the Zinifex's no spills policy, we tried to keep the deck drains closed. And it was only when let's say in storms and more severe storms that we did open them."[44]

[43] This evidence might be interpreted as suggesting that Captain Thomson and other Masters in effect, operated the system as a "first flush" system by opening deck drains during storms at about the time the dirty water tanks became full. Whether this practice accorded with the "first flush" system design intent is debateable. The presence of residue of concentrate on decks or in deck drains meant that, at best, the water being discharged was "relatively clean". It would be "relatively clean" if the

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36 Captain Thomson; T.53.
37 Captain Thomson; T.53.
38 Captain Thomson; T.54.
39 Captain Thomson; T.54.
40 Captain Thomson; T.53; T.70.
41 Captain Thomson; T.70.
42 Captain Thomson; T.70.
43 Captain Thomson; T.106-107.
44 Captain Thomson; T.107.

drains had been cleared of accumulated concentrate, either by a cleaning process or the flushing of the drains by large quantities of water in the event of a tropical downpour. The design intent may have been to discharge water which Captain Thomson and other Masters regarded as being “relatively clean”. But the phrase “relatively clean” is one of indeterminate reference, and opinions might reasonably differ as to whether water was “relatively clean”. Another view of the design intent would be that the water that Captain Thomson and others regarded as “relatively clean” would not be discharged to sea: only clean water was to be discharged to sea. Whether or not the practice described by Captain Thomson accorded with the design intent of the “first flush” system, neither the practice envisaged by the designer nor the practice adopted by Captain Thomson and other Masters was described in any written operating procedure.

[44] The evidence of a former Master of the ship, Captain Dunnett, served to highlight the need to maintain clear decks and drains in order to observe the practice described by Captain Thomson. Captain Dunnett described the practice with respect to “dirty water tanks” when he was on the *MV Wunma*, either as a Master or serving under another Master:

> “When I first started on the ship, when the new cyclone season was starting, Captain Thomson made sure that we always had clean decks as much as possible. So we either washed them off, hosed them off, but we kept them as clean as possible. Because you have a lot of showers going through, heavy showers, and tied up at the wharf was okay because you could discharge it once the tank was full, but once you were at sea you couldn't. What we would do because we knew the decks were clean and your first flush, they were then open to the sea.
>
> Can you just explain that in some greater detail, first flush?---First flush, because it had been raining, usually it had been raining, all the foredecks and that would be clean. The top of the canopy would be clean. Any water that had gone through and down to the aft well or to the first 5 tonne tank, the dirty water tank, would then be pumped in. If there is any more they just keep pumping until the aft well was free of water, and then the discharge pipes overboard were opened.”[45]

The “discharge pipes overboard” to which Captain Dunnett refers were the side deck drains to enable water to be directed overboard. The “first flush” of run-off water from the canopy and the decks was collected or pumped into the dirty water tanks.

In other words, the "first flush" system was able to operate if the decks were clear of concentrate. This required the crew to ensure that concentrate, particularly on the port deck near the C1 conveyor belt was clear of material. If it was not, the water would not be clean. Sometimes the port deck drains would not be opened, but the starboard side would be.[46] If the deck drains were not opened, then the aft well deck could quickly collect water in a tropical downpour. Captain Dunnett described occasions when the ship was at the Zinifex wharf and "within 15 minutes the bobcat wheels would be under water on that aft well, it would come down so fast, so it would take four to six hours to pump it out".[47] He estimated that in a heavy downpour the aft well deck could have a metre and a half of water in it after 15 minutes.[48]

6.5 MAINTENANCE AND CLEANING

[45] Captain Dunnett gave evidence of side decks being hosed down on a regular basis.[49] But there were problems with hosing down the concentrate, at least if there were large quantities of it. When it dries it hardens into a different state. Sometimes air hoses were used to clean our scuppers. In about early 2006 "an eel" was acquired and kept on board the ship to help clean out scuppers.[50] The biggest problem area remained the portside deck inside the cargo space along the C1 conveyor. Another problem area was on the starboard deck "around the tower" (the discharge boom).[51] The practice was to use shovels and brooms to remove the bulk of the product from the deck and then "the light stuff would be washed down the drains".[52]

[46] Captain Dunnett said that the system that Captain Thomson had in place to keep the decks clean worked well and was not a particularly difficult system.[53] Captain Thomson's evidence was:

> "We would have to regularly check that the scuppers were not blocked. I cannot say how often it was done towards the end of my time on board. The crew would clean them out. It was up the crew to tell you when they were doing their wash down that you had a

45 Captain Dunnett; T.336.
46 Captain Dunnett; T.336.
47 Captain Dunnett; T.336.
48 Captain Dunnett; T.337.
49 Captain Dunnett; T.336.
50 Captain Dunnett; T.337.
51 Captain Dunnett; T.337.
52 Captain Dunnett; T.337.
53 Captain Dunnett; T.342.

> blockage. The crew doing a wash down would know whether the scupper was working or not and they would normally let you know if there was a blockage."[54]

[47] Mr Richard McDonald, the Fleet Technical Manager for Inco, gave evidence concerning maintenance and cleaning. In general, the planned maintenance of the ship was based on a computer system with a proprietary name AMOS. Mr McDonald was unable to say how often scheduled maintenance of the deck drains was to occur, but he described the maintenance of deck drains as a continual problem area.[55] On visits to the ship he noticed that drains were blocked, with the port side being worse than the starboard side. When blockages were observed they would be reported and it would be left to the ship's personnel to take action to clear them. But that was difficult because it involved getting access to the void spaces. It was insufficient to check valves by reference to the control panel. Physically checking the operating valve required access to the void spaces and could not be done between cargoes because of the time that it takes to access the void spaces. It was an item of maintenance that Mr McDonald said could only be done when the ship was "laid up".[56] This would probably be only a few times per year. Even then, if it was addressed when the ship was laid up, it was more likely that the valve would become blocked again.

[48] Two related issues arise in this context. The first is the clearing of drains. The second is the testing, maintenance and rectification of valves. Mr McDonald explained:

> "They are essentially two separate things. But whilst it is necessary to gas prove (sic) [gas free ie fill with clean fresh air] the void space to do the valve, if the drainage system is flushed with water - air has proven previously to be ineffective totally and that was the original arrangement - if the piping system is washed out as soon as the piping system is clear in one area then the water takes the line of least resistance and the remaining part of the system is probably still blocked. So it is a bit inconclusive. The only effective way of doing it is to remove pipes which has been done on occasions to clear the pipes which requires not only access time to gas prove but also staging to get up to the pipes to remove them. It is not a simple straightforward exercise."

54 Exhibit 9, para 46; see also T.69.
55 Mr McDonald; T.442.
56 Mr McDonald; T.443.

[49] The practice of attempting to wash concentrate off the deck was problematic. A large amount of water was required to clear the deck of concentrate on a return voyage. With hoses it could be washed clear but in doing so the concentrate would probably block the scuppers.[57] Mr McDonald acknowledged that the "eel" had been used mainly in the long angled drains to aft, rather than in the vertical scupper pipes.[58] The use of compressed air was ineffective.[59] Compressed air might clear the lines, but, as soon as the first opening was clear and there was no back pressure, the crew using the compressed air system can deem it to be clear although the lines remain largely blocked.[60]

[50] Mr McDonald did not raise these problems directly with Zinifex.[61] The upshot of his evidence was that the problem of deck drains being blocked was a matter of concern but that it was something "that we have to live with because it is the environmental requirement that controls it".[62] If the deck drains were blocked the water ended up in the aft well deck where there is a sump through which the water enters the "dirty water tanks". If the deck drains were unblocked, the water went there directly. According to Mr McDonald, whether the deck drains were working or not, the water ended up in the same location, namely the dirty water tanks, with the same result, provided the sump drain was not blocked.[63]

[51] If the deck drains were blocked, entry of the water into the "dirty water tanks" depended upon its entry through a "3 inch line" from the sump to the 5 cubic metre tank and then pumped to the larger tank,[64] rather than through the various, ie 50mm, lines from the deck scuppers.

[52] In any case, Inco learned to live with the system over the years even though this required the ship to return to port on a number of occasions when the dirty water tanks were full.[65] Mr McDonald said that he was not happy with the stormwater retention system, but that it had not been an issue prior to the incident in February 2007. Environmental issues controlled the procedures. Environmental concerns

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57 Mr McDonald; T.447.
58 Mr McDonald; T.457.
59 Mr McDonald; T.458.
60 Mr McDonald; T.458.
61 Mr McDonald; T.444.
62 Mr McDonald; T.446.
63 Mr McDonald; T.444.
64 Mr McDonald; T.445.

were evident in the fact that the dust enclosure was constructed with overlapping sheeting arranged so that the water would run down the inside, rather than down the outside.[66] The by-product was that more water entered the ship.

[53] Practices in relation to the maintenance and cleaning of the drainage system were described by Mr Tonkin. He commenced employment with Inco in February 2006 as a Maintenance Supervisor to manage and maintain the Material Handling Plant on shore at the Zinifex port facility and the Self Unloading System on the *MV Wunma*. His primary job was in relation to material handling. In May 2006 the former Operations Superintendent, Heath Daniel, left employment with Inco and Mr Tonkin performed the duties of Operations Superintendent as well as Maintenance Supervisor. He was appointed Operations Superintendent in July 2006 and remained in this position until February 2007.

[54] In the course of his employment, Mr Tonkin, came to understand the problems in the operation of the water collection system that he was informed about by members of crew. He deferred to their knowledge about what needed to be done and how they attempted to manage the problem of drains being blocked.[67]

[55] This process was constrained by the amount of time that the crew could spend either in the hold or along side the C1 conveyor. The presence of lead concentrate meant that the crew could not work in the hold at all. In the case of zinc concentrate, heat was given off and crew could only spend about an hour there.[68] Within these constraints the crew attempted to clear concentrate and this included using water that would flow into the cargo hold and into the tanks, which would be pumped out each day.[69] Cleaning work by crew also was constrained by the fact that they had unloading and discharge duties to perform.

[56] The fact that drains would become blocked was the subject of regular reports from the Chief Engineer and would also be mentioned at PASS meetings. An on-shore contractor would be engaged on occasions to clear drains that had become blocked.[70] The problem of blocked drains was one of those things that would "never go away

65 Mr McDonald; T.446.
66 Mr McDonald; T.446.
67 Mr Tonkin; T.608-609.
68 Mr Tonkin; T.609.
69 Mr Tonkin; T.609.
70 Mr Tonkin; T.609-610.

while the vessel was handling the product it did".[71] Inco acquired a plumber's "eel" that could be used to run down various pipes and clear as much concentrate as possible. The Chief Engineer, the First Engineer and other crew were able to use it if they had the time.[72] But it came with its limitations and if there was a deadlock the pipe would need to cut out and a new pipe installed.[73] The task of installing new pipe could only be undertaken when the ship was laid up. Time was needed to enter the void spaces, and check the drainage system. Procedures to gas-free void spaces with fresh air before jobs could be done meant that these tasks could not be undertaken during the ship's routine operations. If there was a gap of at least 36 hours then the Chief Engineer would vent the tanks so that the work could be done.

[57] Mr Tonkin's evidence was that a report of a blocked drain would happen "every second day" and this would be the trigger to engage the local on-shore contractor or a plumber.[74] Maintenance and repair of gate valves, such as the gate valve in the sump drain in the aft well deck required the attention of a member of the engineering crew.[75] In general, Mr Tonkin thought that the "ship's husbandry" improved dramatically with blockages and similar problems beginning to disappear. The officers, including Captain Seal and Captain Richardson, and relieving Master Captain Dunnett were ship-proud and efforts to establish "a regular crew" meant that maintenance efforts became more routine.[76]

[58] Even with regular cleaning practices, there was a perception that concentrate would find its way into the side deck drains such that Masters were not prepared to "put water over the side".[77] Even if they were prepared to do so, valves had to be operational. If there were problems with the valves, fixing them was a major and time-consuming exercise. As Captain Seal explained:

> "… to fix them is an extremely large job. The sides, the void space hatches have to be removed. For the majority of them scaffolding has to be set up and men have to go in it and the ship has to be allowed

71 Mr Tonkin; T.610.
72 Mr Tonkin; T.611.
73 Mr Tonkin; T.610.
74 Mr Tonkin; T.611.
75 Mr Tonkin; T.612.
76 Mr Tonkin; T.612.
77 Captain Seal; T.236.

the time to be able to do that sort of job when it hasn't got other work as well."[78]

[59] Captain Seal could not say how often the valves to the deck drains to sea to sea were tested, since it was not his responsibility. Inco did not supply maintenance records of how often they were checked and serviced prior to the incident. As Captain Seal stated the product would find its way to the bottom of the pipe, and he did not consider that he was able to "flush" the zinc concentrate in it over the side.[79]

[60] In summary, any hope of having the ship's water management system operate according to its "first flush" design intent depended on decks, drains and valves remaining free of concentrate. This was likely to prove a difficult, if not impossible, task. It required practices and equipment to clear side deck drains of concentrate and to service and replace blocked valves so that they could, if activated, direct water to sea. Clearing decks and drains of concentrate depended on having crew with the time to do these tasks and the crew being directed to do so.[80] It also required them to have the equipment to clear drains of concentrate. The port side deck had to be cleared of concentrate by shovel and broom. The use of compressed air to clean deck drains came with its limitations. The use of high pressure water hoses on the return voyage to clean decks and drains carried the risk of some concentrate remaining in the deck drains, hardening and blocking valves.

[61] The creation of ten additional drains below the conveyor directed into the main cargo well to facilitate cleaning[81] was a recognition that the deck drains were inadequate to carry water into the dirty water tank. Inspection by the Board in July 2007 showed that the concentrate appeared prone to become caked in the drains that went into the cargo hold. This was Captain Dunnett's evidence. He said that with moisture sitting on top of them, "it would become like cement".[82]

[62] In circumstance where:

(a) side deck drains are prone to be blocked with concentrate, and there are questions about the utility of crew cleaning them; and

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78 Captain Seal; T.236.

79 Captain Seal; T. 236

80 Captain Thomson's evidence was that the crew would normally clear the port deck near the conveyor belt twice a day: for a couple of hours after the cargo was loaded and a couple of hours after its discharge: T.106.

81 Captain Thomson; T.106. These were installed in about 2004 when the ship docked in Singapore; Exhibit 114, para 5.12.1.

(b) the ship was being operated on the basis of a "no spills" policy under which the practice developed of not opening side deck drains to sea,

there may not have been much of an incentive to routinely and regularly unblock the drains. The attitude may have developed: if the deck drains are blocked and the water does not run down those dedicated drains directly into the dirty water tanks, then it will get there indirectly (via the drains in the stern deck, onto the aft well deck, through the sump and into the dirty water tanks). But the evidence indicates that prior to February 2007 the crew and, when required, outside contractors attempted to unblock deck drains. Use of a plumber's "eel" assisted their task. They were fighting a constant battle, and perhaps a lost cause. Large amounts of concentrate collected on the port deck beneath the conveyor. Quantities of concentrate collected in the aft well deck through ordinary activities, including the use of the bobcat. Some dust inevitably would be transported on the boots of crew to the starboard deck. Some dust would collect on the starboard deck during discharge.

[63] Even if port and starboard decks and the drains beneath them could be cleaned of concentrate, they would be unlikely to remain clear and clean for long. The inevitable accumulation of concentrate on these decks and in these drains meant that, at best, rainwater directed to sea through the side deck drains would be only "relatively clean". Whereas some Masters had been prepared to discharge "relatively clean" water to sea, the standard practice was for rainwater to be collected on the ship and, when the dirty water tanks were full, for the ship to return to port. This practice was informed by an appreciation of what was described in the evidence as a "no spills" policy.

[64] Rather than call for the design of a new water management system, the ship's operator decided to "live with" the system that it had. The operator, with the owner's knowledge, adopted the practice of having the ship return to port once its dirty water tanks were full. Rather than devise and implement a new water management system, the owner and the operator worked with a system that did not operate as a "first flush" system. The cost of having the ship return to port on occasions in a loaded condition with her dirty water tanks full was a cost to be borne.

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82 Captain Dunnett; T. 342.

6.6 THE CAPACITY OF THE SYSTEM

[65] It is questionable whether the side deck drains (if clear of concentrate and with valves to sea being operational) are capable of collecting and discharging to sea the large volume of water that falls during a tropical storm onto the side decks through the several large downpipes from the canopy.

[66] The *Dust Control Waste Water System* that was designed by Sea Transport Solutions in 1997[83] was described in evidence as a "schematic".[84] It did not specify the detail of the piping arrangements.[85]

[67] As constructed, a large number of downpipes was constructed that deliver rainwater onto each side deck. The number of downpipes vastly exceed the number of scuppers on the side deck. More importantly, each downpipe downpipes that drops rainwater onto each side deck is a 4inch/100mm pipe, whereas the deck drains or scuppers on these side decks are 2 inch/50mm and there are only four of them on each side deck.

[68] These deck drains do not have the capacity to carry the volume of water that would be deposited onto the side deck drains in a tropical downpour.

6.7 AN ALTERNATIVE DESIGN FOR A "FIRST FLUSH" SYSTEM

[69] In his evidence, Mr Ballantyne acknowledged that a better system than the one constructed on the ship would be to divert the clean water overboard before it hits the deck.[86] The waste water system that was designed in September 1997 depicted valves below the side decks and that is how it came to be constructed.[87] Mr Ballantyne and his company were not involved in the construction of the vessel or in her management. Although they continued to be consulted on occasions in relation to certain matters, including the upgrade of the vessel's registration from Class 2C to Class 2B and the provision of load line and other certificates, his company's involvement with the construction and operation of the ship was limited. Mr Ballantyne said that his company's involvement basically finished after the tender was given to the builder. The owner had other consultants working on the project. ISM became involved in the project and was appointed manager. Mr Ballantyne's evidence was that prior to April 2007 when he attended a workshop arranged by Zinifex he understood that there were freeing ports in the stern well deck and that the water management system operated as a "first flush" system.[88]

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83 Exhibit 98.
84 Mr Ballantyne: T.823.
85 Mr Ballantyne;T.821.
86 Mr Ballantyne; T.793; T.824.
87 Mr Ballantyne; T.855; Exhibit 98.
88 Mr Ballantyne; T.792.

6.8 The Operator's Knowledge that the System Did Not Operate as a "First Flush" System

[70] The manager of the ship, Inco (formerly ISM), was aware that the ship's water management system was not operated as a "first flush" system.

[71] It is appropriate to quote a lengthy passage of the evidence of its Managing Director, Captain Andrew Dally:

> "Now, do I understand from your answers to some of my questions earlier about the water collection system on the Wunma that you understood it was designed to collect all water and not be discharged in any circumstance into the ocean, save for an emergency?---The design of the vessel?
>
> Yes?---No, I think the design of the vessel was that those tanks would fill up and then any remaining water would go over the side at that point.
>
> As a first flush system?---I'm not sure I would call it first flush, but the vessel wasn't designed to hold an infinite amount of water. It was fill those two tanks up and then all water would go directly to sea as per a conventional vessel.
>
> So assuming the proper working operation of the valves to achieve that and assume that the drains, the scuppers, are clear to allow that to function in that way, did the Wunma in your experience and in your time - was it ever operated in that way?---Never.
>
> Is that solely because of the environmental concerns?---That's correct.
>
> Was that an edict from Zinifex?---Yes.
>
> Where is that edict?---I haven't confirmed it. One of the places it might be is the environmental management plan. Zinifex did the environmental management plan, we did the vessel side with the environmental management plan. I can't confirm it's in there, but I suppose why I know that that's the way we do - were to conduct the operation, after the vessel was built and arrived in Karumba we had meetings with Zinifex and it was quite clear to us - it was laid out how they wanted to operate their ships.
>
> These are meetings you were at?---Yes, these were in Karumba. When the ship first arrived in Karumba after being built in China I was up there maybe for three or four days before it arrived and some time after it did arrive.
>
> Yes?---And in that time we had meetings and some of those meetings may have just been myself from the Inco Ships side. We were informed they wanted to operate their ship. An incredible emphasis on safety and likewise the environment. And the outcome of that was that they didn't want one drop of contaminated water to go over the

side. That came up down the track as well, and eventually we said do you realise this means the vessel will have to turn around if those tanks fill up. And they said if that is what that means that's what we want you to do.

Who is "they"? Who is saying that?---There were several changes up there so I really can't state who it was. But it would have been the manager in the port site or their 2IC. The first meetings I had, which was with Gary Sutherland, and I can't remember his 2IC, sorry.

This is in late '99 or early 2000?---'99 I'd say?

THE CHAIRPERSON: Just to clarify, in 1999 it wasn't Zinifex?---Pasminco.

So that's just an easy point of reference to refer to the owner of the ship. Back in 1999 it was Pasminco Century Mine Limited or its parent company?---That's correct.

MR BURNS: Was that reinforced by different personnel from the camp of the owner over succeeding years?---Absolutely. The fact that the vessel - wouldn't say frequently but regularly returned because the drain tanks were full - and that cost them - you know, it cost money to turn the ship around. It cost the fuel, delays to the export vessel. Bring it in, discharge the waste water and then go back out. The fact that practice still continues if need be and it's never been raised as what are you doing, why don't you just let it go at sea, gave us comfort that that's what they wanted.

Because that particular procedure doesn't appear anywhere in writing?---Not that I can find, no, other than the environmental management plan, which I have not been able to find.

I would be surprised if you find language in there any stronger than an obligation to minimise the risk of environmental harm. And I don't suggest I've seen the document, but I would be surprised if it is any more stringent than that. The VOMA is not any more stringent than that?---No, it definitely wasn't raised in the VOMA.

The VOMA talks of an obligation on the part of Inco to minimise the risk of impact on the environment?---Yes.

That's in fact a Zinifex policy, which is Exhibit 36 in these proceedings, which contains an undertaking to minimise its impact on the natural environment. To do the best you can is the effect of that?---Yes.

So far as a procedure for the Wunma, you are not able to point to anything in writing on that?---No, I have never needed to look. It was very clear to us the way we were to conduct it. It was their ship and it was that policy, so I didn't have any reason to question it. That was our goal, to deliver what the client wanted provided it was safe.

I don't know whether you were here last week, but were you surprised to hear Mr Thomson, his practice?---Yes.

And Mr Dunnett?---Yes.

That's not something that you endorse?---Absolutely not.

It's not difficult, though, to imagine circumstances where a master would choose to turn any further runoff to the ocean when the well deck is full or getting full when there is water on the well deck?---I see it as a safety issue. So in the event they did that and they rang up and said this is what we need to do, in all likelihood I would have raised it with Zinifex but would have endorsed it on the grounds of safety. But that never took place."[89]

[72] Some significant points emerge from this passage of evidence. First is that Captain Dally understood that the ship never operated a "first flush" system because of environmental concerns by her owner. Her owner was prepared to have the ship return to port, once her dirty water tanks were full rather than direct water overboard. Captain Dally's evidence was, and there is no reason to disbelieve it, that he was surprised to hear of the practice adopted by Masters such as Captain Thomson and Captain Dunnett, and this practice was not something that he would have endorsed, unless discharging the water to sea was necessary as a matter of safety. The occasion to endorse that practice on the grounds of safety never arose.

[73] Captain Dally's evidence to the effect that the water management system was not operated according to the design intent as a "first flush" system was confirmed by other evidence. Captain Ives, the Operations Manager of Inco between 2006 and June 2007, gave evidence that he was not aware of any practice to turn drains to sea once the dirty water tanks were full, and understood that the practice was for the ship to return to port.[90] Mr Fisher, who became Chief Engineer in August 2006, gave evidence that the possibility that the system could be used after a "first flush" with the deck drain being directed to sea was never raised with him. He stated:

"As far as I'm aware, there was always the possibility of some sort of contamination can happen, even after allowing for first flush."[91]

89 Captain Dally; T.541-543.
90 Captain Ives; T.480.
91 Mr Fisher; T.313.

[74] He said this was the procedure and policy that was adopted and that had been adopted when he joined the ship in August 2006. This prompted the following question from Mr Derrington SC:

> "Why have valves directing deck drains to the sea if you are never going to use them?"[92]

That question lies at the heart of the matter.

[75] Mr Fisher's evidence was:

> "Possibly the original design of the ship was for this first flush arrangement but environmental policy dictated that that first flush never be used. That's my understanding of it anyway."[93]

6.9 SUMMARY: THE SYSTEM DID NOT OPERATE AS A FIRST FLUSH SYSTEM

[76] The extent to which the ship operated as a "first flush" system depended on the practice of individual Masters and, more generally, depended on whether decks and drains were clear of concentrate, either by virtue of the "first flush" effect of rainwater cleaning the canopy, decks and drains of concentrate, or the implementation and results of cleaning activities by the crew. The perception that decks and drains inevitably had accumulated or residual concentrate led to the widespread practice of not opening deck drains to sea lest water mixed with concentrate be discharged to sea in contravention of a "no spills" policy.

[77] Some Masters, including Captain Thomson and Captain Dunnett, adopted the practice of opening deck drains to sea if the water to be discharged was "relatively clear" and only when storms meant that the dirty water tanks had become full. Under that practice, opening deck drains to the sea was the exception, rather than the rule, and only occurred when the ship encountered rain from storms. Other Masters adopted the practice of never opening deck drains to the sea. In this respect, the design intent of the system operating as a "first flush" was never achieved. But if the design intent was that only clear water, and not what Captain Thomson described as "relatively clear" water, be discharged overboard, it is questionable whether the design intent was ever achieved.

92 Mr Fisher; T.313.
93 Mr Fisher; T.314.

[78] The practice adopted by Captain Thomson and others of opening the side deck drains when the water was "relatively clean" was not contained in any written operating procedure. It probably was not the subject of instruction to new Masters in recent years. In the end result, the water management system did not operate as a "first flush" system. As Mr Fisher stated, "environmental policy dictated that the first flush never be used".

[79] In theory, the ship was supposed to operate so that rain washed down dust from the canopy cover and any concentrate that was on the decks, with the "dirty water" going into the dirty water tank, following which "clean water" was diverted into the sea. In practice, this was not possible because:

- The port deck below the conveyor belt was particularly prone to accumulate concentrate which depended for its removal upon crew shovelling and sweeping concentrate and generally cleaning the decks and drains of concentrate.
- The starboard deck tended to accumulate concentrate, although in smaller quantities than the port deck.
- The side deck drains and the valves which, if opened, would divert water to the sea, regularly became blocked.
- Procedures to unblock them if, undertaken, were unlikely to be successful for very long.
- Even if the side deck drains were free of concentrate, it is questionable whether they had the capacity to capture the large volume of water that might drop onto the deck through several, large downpipes, with the result that water that could not go directly down the drains was redirected to the aft well deck, which typically had concentrate on it.

[80] The problems with the "first flush" system not operating as intended and deck drains being blocked with concentrate were long-standing problems. It raises the question why Inco as the ship's manager and Zinifex as the ship's owner did not alter the system, for instance, by devising a drainage system so that water coming off the roof did not continue to collect on board but, after a certain time, was directed straight overboard before it hit the deck. A probable reason is that the ship was only required to suspend a planned discharge to an export vessel and return to port a few times a year. She would not normally travel to the export vessel in a storm when it

would be impossible to discharge her cargo. The cost of suspending a small number of voyages each year once the "dirty water tanks" were full did not lead to changes to the design or operation of the water management system.

6.10 THE OPERATION OF THE SYSTEM IN CYCLONIC CONDITIONS

[81] Strict adherence to the "no spill" policy and the practice of retaining "dirty water" on board in torrential rain leads to the retention of large quantities of water on the ship, and its accumulation in the aft well deck, and possibly also in the cargo hold, once her dirty water tanks are full. Whatever justification may have existed to not adopt the "first flush" procedure during the usual operations of the ship in her normal area of operation because the ship was able to return to port once her dirty water tanks became full, did not apply to the retention of torrential rain in open seas during cyclonic conditions, as occurred on the voyage on 5 and 6 February 2007.

[82] There is a significant difference between:

(a) the collection and retention of rainwater during the ship's normal daily operations, whereupon the ship is *able to return to port* and empty her dirty water tanks; and

(b) the collection and retention of rainwater (and seawater) during a voyage in open seas in cyclonic conditions in circumstances where the ship is *unable to return to port*.

[83] The operation of the ship's water management system should have been reviewed when consideration was being given to the proposal for the ship to voyage into open waters in order to avoid cyclones. The existence of blocked drains and valves on side decks and the limited capacity of those side drains to direct large volumes of rainwater to sea inevitably would lead to the accumulation of large quantities of water in the aft well deck once the dirty water tanks were full. They could be expected to be full after a relatively short period of torrential rain.

[84] Parties considering the option of allowing the ship to voyage into open seas in cyclone conditions should not have assumed that deck drains would be clear of concentrate, not be blocked with concentrate and able to discharge water to sea. The operational experience of the ship was that side deck drains and valves became blocked with concentrate and could not be opened to the sea. The ship's manager

and others considering the risks association with the ship going into open waters in cyclonic conditions, should have known that:

(a) the system did not operate as a "first flush" system during her normal operations;

(b) the side deck drains and valves were prone to becoming blocked with concentrate.

[85] If the system had operated as a "first flush" system then it would not have been necessary for the ship to return to port on a number of occasions each year once her dirty water tanks were full. This practice was known to Inco and Zinifex. Inco understood that this practice accorded with the owner's environmental policy. The ship's operators and owners knew that the system did not operate as a "first flush" system.

6.11 THE ABSENCE OF A PROPER RISK ASSESSMENT

[86] The operation of the ship's water management system during a lengthy voyage in cyclonic conditions, when tropical downpours might be expected, does not appear to have been adequately considered by parties who promoted or sanctioned the option of the ship heading for the open sea and remaining in open waters during cyclonic conditions.

[87] Captain Ives, who was the Operations Manager of Inco Ships between 2002 and June 2007 was not directly involved in discussions about the upgrade of the ship to a Class 2B to allow her to avoid cyclones. His evidence was that the strength of the vessel would be one of a number of factors that would need to be looked at considering a proposal to take the ship to sea in cyclonic conditions.[94] He agreed that the factors would include the ship's watertight integrity because the ship in some respects operates on occasions as a receptacle for water.[95] Captain Ives thought that those and other issues about the performance of the ship in cyclonic conditions were appropriate for the designer. Issues of stability and free surface effect were said to be questions for a designer. But when the ship's water management was not able to be operated "as designed" so as to direct clean water overboard, her safe operation in cyclonic conditions presented a safety issue for her

94 Captain Ives; T.501.
95 Captain Ives; T.501.

operator. The question of overloading should have been considered by her manager, Inco, which knew of the problems with her water management system.

[88] But even if, as Captain Ives and other witnesses indicated in their evidence, the ship had sufficient stability and buoyancy because her design permitted water to go back over the stern when it reached a certain height, that gave rise to environmental issues that required consideration.[96] The performance of the ship in cyclonic conditions required consideration including her configuration and the effect of winds on her large canopy. In a review[97] consideration would be required of whether the ship's powering was sufficient to make headway in a cyclone and the behaviour of the ship if she had to "heave to". Captain Ives was not asked to consider these matters in the proposal to allow the ship to voyage into open seas in cyclonic conditions was under consideration. Captain Dally undertook the review, and in doing so had dealings with the ship's designer.

[89] The Technical Manager of Inco ships, Mr McDonald, was working in Singapore on a specific project during this period and was not consulted in relation to the matter.

[90] Captain Dally, who assumed principal responsibility on behalf of Inco for the conduct of the review and upgrade, did not adequately consider issues resulting from the retention of water, particularly when the ship was in a loaded condition.

[91] No proper risk assessment was undertaken by a consultant to the owner and operator of the ability of the ship to effectively discharge water to sea during cyclones. Mr Ballantyne was consulted and his company facilitated the provision of the Lloyd's Register global and local strength assessments for the purpose of the granting of a Class 2B certificate by MSQ. However, Mr Ballantyne assumed that the water management system operated as a "first flush" system.

[92] Captain Cole, who in 2004 conducted a risk assessment on behalf of the EPA in relation to the option of using the cyclone mooring buoy at Investigator Road and the option of going to sea, assumed that the ability of the ship to effectively discharge water to sea during cyclones would be looked at by a classification society or MSQ in the granting of a certificate:

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96 Captain Ives; T.502.
97 Captain Ives T.501.

> "… Did you consider things such as the capacity or the ability of the vessel to effectively discharge water to sea during cyclones? --- No, I didn't, simply because I looked – I look upon that as being part of what is a class – or the MSQ would look at in the granting of either a 2C or a 2B certificate.
>
> I see. So things like sea keeping, the power of the vessel, those sorts of things, you have assumed ---?--- Yes, my assumption was that those things were in order on the basis that the vessel would have a current survey certificate."[98]

[93] Captain Cole's assumption may have been based upon his experience in other jurisdictions and an understanding of what happens in "the big ship industry" rather than a knowledge of the practices of MSQ.[99] In fact, in granting the Class 2B certificate, MSQ did not adequately consider the operational performance of the ship's water management system and its capacity to discharge water to sea during cyclones. The involvement of Lloyd's Register in the upgrade was to provide a global strength and local strength assessment. It did not undertake a general review of the ship's seaworthiness in cyclonic conditions. The certificate from Lloyd's Register continued to contain a notation for "Coastal Service in the Gulf of Carpentaria" meaning not in excess of 21 nautical miles from the shore.

[94] In the end result, the ship was granted a Class 2B certificate in September 2005, and her cyclone procedure was revised, to enable her to head into the open waters in the Gulf in cyclonic conditions without any proper analysis of the risk of the ship becoming, in effect, a receptacle for the large volume of rainwater that her water management system would collect during a long voyage in cyclonic conditions.

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98 Captain Cole; T.699.

99 This was Captain Watkinson's assumption: T.921.

6.12 GALLERY

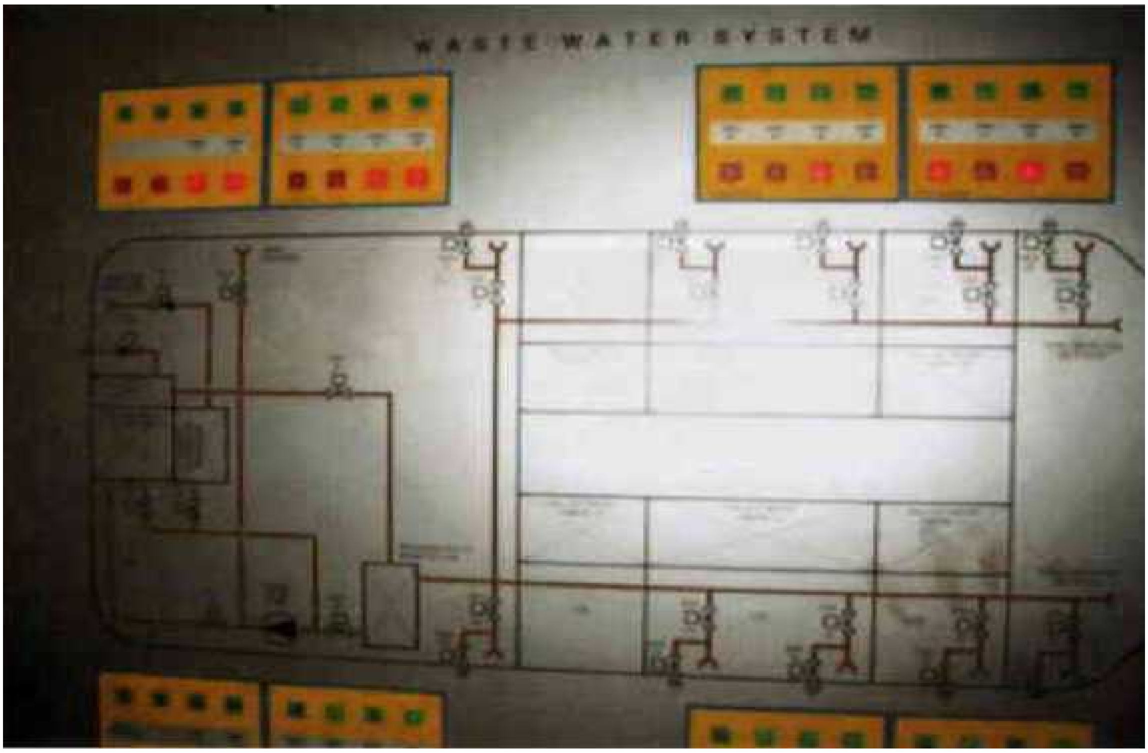

Figure 1 - Mimic Plate Showing Valve Arrangements for the Water Management System

Figure 2 - The Aft Well Deck and Emergency Generator Room

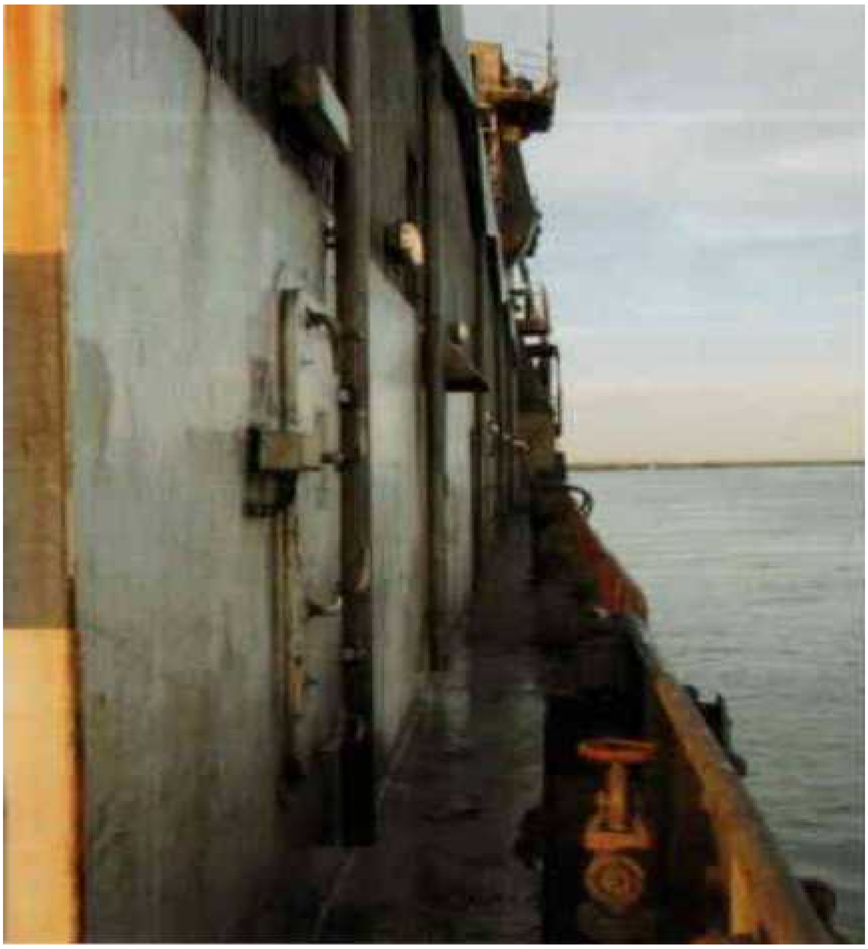

Figure 3 - Starboard Deck and Downpipes

Figure 4 - Deck Drain on Starboard Walkway

Figure 5 – Downpipe Extending from Roof Gutter on the Port Side Walkway

Figure 6 - Deck Drain on the Port Side Walkway

Figure 7 - Aft Well Deck Sump

Figure 8 - Washdown Outlets from under the Conveyor

Figure 9 – Blocked Washdown Ports under the Conveyor

Figure 10 - Conveyor Port Side Walkway Showing Concentrate Deposits on Port Deck

Figure 11 - Accumulated Concentrate on the Port Side Walkway

Figure 12 - Concentrate in the Cargo Hold in Typical Inclination

CHAPTER 7 THE OPERATIONAL REVIEW BY THOMPSON CLARKE SHIPPING

[1] Mr Malcolm Mewett took up the position of Port Operations Manager at Zinifex in early 2006. Prior to that he had been employed by both Pasminco and Zinifex in various positions in connection with operations at the Rosebery Mine and the Hobart Smelter. In the course of acquainting himself with the operations of the *Wunma* after he arrived at Karumba he found that he had "a bookcase of audits and documents".[1] But what he wanted was an overview of the entire operation.

[2] With the support of the Zinifex group office, Thompson Clarke Shipping was engaged to undertake an operational review. The existing Vessel Operations Management Agreement was due to expire in September 2007. The major objective of the Thompson Clarke review was to evaluate methods by which the next ship operations contract could be made more effective, both commercially and technically. To do this Thompson Clarke had to determine commercial and operational issues arising from the current contract.

[3] Its review was undertaken in the latter half of 2006 and consisted of a review of documents, interviews with Zinifex and Inco management in Sydney and Karumba, interviews with the ship's officers and crew, a voyage on the *Wunma* and observations of the ship and shore cargo handling systems. The result was a report dated 4 December 2006.

[4] The report identified a number of shortcomings with the ship's operation at that time. A copy of the report was made available to Inco in early January 2007 in advance of a meeting held in mid-January 2007.[2]

[5] The Thompson Clarke Operational Review addressed a wide range of issues, many of which are not of immediate relevance to the Inquiry. Accordingly, this Chapter does not purport to summarise the entire contents of the 4 December 2006 report

1 Mr Mewett; T.381.
2 Statement of Malcolm Mewett Exhibit 41, para 93. Mr Mewett; T.382.

which addressed various aspects of the commercial and contractual arrangements that governed the ship's operation and which might govern her operation under a new contract.

[6] The report raised a number of issues in relation to the crew including "crew churn rates", their employment conditions and issues of Occupational Health and Safety ("OH&S"). Some aspects of the Operational Review in relation to the crew and its management have been noted elsewhere. OH&S issues included the management of dust migration into accommodation areas which led to a recommendation that there be a root cause analysis of product spillage that might necessitate an ergonometric survey to determine effective cleaning methods around and underneath the conveyor belts and pullies. The report addressed an extensive number of crew issues.

[7] It also made findings concerning communications between Zinifex and Inco and suggested a review of the function and roles of Inco's Karumba Manager, including the Manager's role in liaising with Zinifex whilst at the same time having managerial responsibility for, or operational involvement in the *Wunma*. It recommended attendance at Zinifex meetings by the ship manager's operational and technical personnel from head office so as to improve communications and vessel management.

[8] In relation to cargo handling arrangements, the Thompson Clarke report made the following findings in relation to the process of cleaning spilled concentrate:

> "After loading, the cargo deck becomes very hot and humid. The air extraction system and scrubbers fitted appear to be ineffectual in addressing the build up of heat. We query whether the recent expensive replacement of the shed covering and its supports was in no small measure due to the humidity and heat problem. We also query the extent to which persons working in the cargo deck area are being subjected to OH&S risks."[3]

In connection with the passage to the export vessel the following findings were made:

> "During the passage to the ocean going vessel, the opportunity is taken to clean the spillage in the cargo spaces and at transfer chutes and along walkways. There is excessive heat and/or humidity problems in the cargo deck with the need to address heat stress

3 Thompson Clarke Operational Review, Exhibit 49, CB137, para 6.1.5.

management issues that lead to reduced productivity on the part of the crew. With the limited space available to work in, there is much manual shovelling of a heavy commodity during the clean up process. It is also a particularly dirty job and raises OH&S issues."[4]

[9] The following observations were made in relation to the return passage to Karumba:

> "Time on the return passage is used to clean the cargo deck using a small bob-cat to push the residual concentrate missed by the bucket wheel reclaimer into a pile for discharge to the ocean vessel on the next discharge run and to prevent the residual cargo from consolidating. Some cargo adheres to the sides of the cargo deck and is knocked down. A consequence of this is that the bob-cat which is running over the top of the concentrate in the deck transfers it to the after (sic) end. The concentrate can also be wet with water leeching from the cargo. Consequently the whole of the after (sic) end including the engineering workshops and stores are extremely dirty.
>
> The vessel is also washed down with fresh water on the return passage. With the WUNMA having to be on an even keel, the wash down water does not flow away easily especially as the drainage is poor. This wet mixture is then tramped over the ship as it is the main walkway from for'd to aft as well as providing one of the accesses to the cargo deck. When dry, a residue of concentrate remains which again can be spread all over the ship. There is a residue tank (located under the bob-cat) into which all wash down water flows. Anecdotal evidence suggests that the capacity of the tank is not large enough when there has been heavy rain."[5] (emphasis added)

[10] The report recommended a specialist task force be set up to address the fact that cleaning and cleanliness of the vessel was not satisfactory. The task force was to be representative of all parties including the ship manager, operating crews, Zinifex with technical advice as appropriate with short term and long term issues being addressed.

[11] The Thompson Clarke reported upon various aspects of the materials handling plant. One aspect of its findings was in relation to spillage from conveyors and included a recommendation that the reasons for spillage be established and corrective action implemented "for the short term and the longer term".[6]

4 *Ibid* para 6.1.7.
5 *Ibid* para 6.1.9.
6 *Ibid* para 7.2.

[12] In general, the report found the general cleanliness and cleaning of the vessel was "far from satisfactory", particularly around the stern region of the vessel and that the design of the vessel was not conducive to efficient cleaning processes.

[13] The report reviewed the repair and maintenance of the ship, and operational issues in connection with them. It posed a number of questions in relation to the functions of the crew:

> "To what extent are the crew an operating crew and/or maintenance crew? How many crew members are required and what qualifications and experience is needed? How are the functions best handled and time allocated? Cleaning is a major issue for consideration and with a new contract looming, it may be opportune to re-examine such issues. To what extent are 'Leading Hands' (qualified and experienced, with very limited experience or untrained) capable of undertaking equipment or engine maintenance or carrying out routine repairs?"[7]

[14] The report was critical of the absence of scheduled maintenance downtime. It observed:

> "Ocean going vessel transfer appears to take precedence to maintenance which is fitted in around cargo requirements. This does not allow maintenance to be programmed or for contractors to come in or spares to be sourced in time. The system appears to have grown up by default and lack of communication within INCO/Zinifex rather than by design. Scheduled maintenance periods need to be established."[8]

[15] In discussing maintenance issues the report reiterated that the aft well deck, the winch deck and the intermediate deck were extremely dirty "with exposed concentrate present".[9] It reported:

> "Access to the cargo deck is neither airtight or watertight and the doors separating the cargo deck from the well deck are ill fitting. This area is extensively used for mooring and cleaning of the cargo deck. The area is also open to the elements of rain, wind and sun. Concentrate is always and easily transferred on boots and clothing from here throughout the vessel."[10]

[16] Thompson Clarke conducted a desktop review of the vessel's design and raised a number of issues which were said to be of a major nature requiring consideration in

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7 *Ibid* para 9.1.2.
8 *Ibid* para 9.1.2.
9 *Ibid* para 9.1.2.

the near future on the assumption that work could be carried out at the 2009 dry docking. These issues included the fact that the main engines "generally lack power". Another issue was that the "cargo doors at the end of the vessel did not contain the dust within the well deck".[11] In relation to "EPA considerations" the report stated there was a need to be pro-active:

> "Wash down of decks is not effective. Scupper arrangements on deck are inadequate as vessel is on even keel and excessive water/concentrate mix occurs. Query if wash down water going overboard due to small sheerstrake retaining lips. Dust on canopy and elsewhere not washed down and can blow around the vessel. Holding tank capacity inadequate at times of heavy tropical rain. Major cleaning issues around the stern of the vessel."[12]

[17] The report also identified a need for Zinifex and Inco to be pro-active in relation to OH&S issues:

> "When cleaning, the crew are working in a very hot and humid environment in the cargo deck. Ventilation and air extraction improvements are required."[13]

[18] In connection with major works and their timing, the report recommended design work be undertaken between 2007 and 2009 on the wash down tank to increase its capacity. These works were proposed for the dry dock in 2009 and were required for "additional water from improved wash down systems and also rain". Scuppers were also to be designed to improve the cleanliness of the vessel, with improved scupper systems being constructed at the programmed dry dock in 2009. Well deck doors were to be redesigned to make them dust proof with new doors being fitted at the dry dock in 2009. It recommended improvements to the cleanliness of the stern of the vessel with ongoing cleaning and a possible redesign of the area.

[19] Although situated in the part of the report dealing with cargo handling arrangements, the Thompson Clarke report made the following significant findings in relation to cyclone preparedness:

> "There are different procedures outlined in the SQS Manuals as to actions to be taken in the event of cyclones. It appears to be unclear

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10 *Ibid* para 9.1.2.
11 *Ibid* part 10, p.25.
12 *Ibid* Part 10, p.25.
13 *Ibid Part* 10, p.26.

as what procedure will be followed under various cyclonic scenarios. With seven years experience having been obtained since WUNMA started, it is considered that INCO/Zinifex should be well prepared ahead of any cyclone heading for Karumba and that Zinifex should know well in advance what action is going to be taken to protect their vessel which is vital to their ongoing operations. A separate paper has been prepared on this issue – refer Attachment ‘C’.”[14]

[20] After reviewing the procedures/documents and after discussions with several personnel, it appeared to Thompson Clarke that there were a number of different views as to what will happen in a cyclone situation and what action should be taken. It noted that in the light of past experiences (eg Cyclone Larry):

> “… the vessel’s operations to date as well as other developments it is considered prudent to review cyclone preparedness for the WUNMA. Given the approach of the cyclone season, it is recommended that this review be undertaken as a matter of urgency.”[15]

[21] After reviewing the procedures in the vessel’s SQS and the three courses of action outlined in the cyclone procedure, it was noted there was no timeframe for those actions and they were not consistent with actions recommended in another part of the SQS which contemplated departure for the designated anchorage at Sweers Island. The Thompson Clarke report observed that while weather forecasting of cyclone activity is now pretty accurate “it is never really possible to determine the exact path of the cyclone until the last few hours”. It stated that given the operating history of the vessel, it should be possible to “refine and determine the preferred action to take, rather than leave the range of alternatives open, leaving the Master to decide which of the above alternatives to take and when to take it”.

[22] The review of the vessel’s cyclone preparedness then included the following significant paragraph:

> “It would therefore seem feasible to ensure that the WUNMA is not caught with a full cargo on board during the approach of a cyclone and the issue is at what point of time should cargo operations be suspended for safety reasons. This does not appear to be addressed in the operating procedures.”[16]

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14 *Ibid* para 6.1.10.
15 *Ibid* Attachment C, p.2.
16 *Ibid* Attachment C, p.4.

[23] As was pointed by Counsel for Inco at the hearing, the cyclone procedure in the SQS did address the time at which cargo operations should be suspended. It provided for loading to cease upon a Blue Alert (when a Watch Alert is effective, ie gale force winds greater than 40 knots expected within 48 hours, but not less than 24 hours). Mr Clarke accepted this point. He explained:

> "… what I was concerned about was that given the whole scope of those particular alerts it was too late to do anything with the ship that is perhaps constrained in how she might take action to avoid the cyclone. She is not a fast ship and it is matter of getting in and out of the port. So whilst it did say that it was my view that all of this was really coming too late, perhaps I may not have expressed myself very thoroughly in the aspect of my report that refers to cease loading cargo.
>
> So too late if it is within 48 hours but not less than 24 hours is referred to?---Yes. I believe it's too late and it would need to take much earlier action than what is actually set out in the procedures."[17]

[24] The Thompson Clarke review identified an alleged deficiency in the ship's operating procedures that, if not addressed, risked the ship being caught with a full cargo on board during the approach of a cyclone. Its observation warranted consideration. That further consideration might have provided the occasion for Mr Clarke to explain that his concern was that the procedure to cease loading in the SQS cyclone procedure came too late. Any such advice may have prompted the implementation of a procedure of the kind adopted in earlier years, as described by Captain Frank Thomson in his evidence or as described by Captain Heath Daniel in his email to the Regional Harbour Master of 22 September 2005. If not, it may have prompted the implementation of at least an interim procedure for loading to cease when a low pressure system was low in the Gulf during the "cyclone season".

[25] The Thompson Clarke report raised for consideration the alternative of remaining alongside the wharf. It did not observe that this alternative appeared to be precluded by the Port of Karumba Cyclone Contingency Plan. Instead, it noted the absence of this alternative in the ship's cyclone procedure and posed the question: "

> "… While going to sea during the approach of a cyclone is a conventional and safe approach taken by large vessels in port, an

[17] Mr Clarke; T.870.

issue is whether this option is applicable and safe for the WUNMA?”[18]

[26] It then noted the following operating characteristics of the ship that were said to be relevant to decisions to be made when cyclones are approaching:

> “The WUNMA is a shallow draft vessel especially in the ballast condition.
> She has very high sides and is extremely sensitive to wind effects.
> The canopy covering the well deck appears to be fragile.
> She has very limited power – only 3 x 780Kw or 2,340Kw in total.
> Her maximum speed in good sea conditions is about 10 – 11 knots.
> There is limited freeboard and non watertight openings around the stern ramp.
> She carries a very small crew – many of whom currently lack basic training or who are inexperienced.
> All the crew are located right forward – an uncomfortable location in rough seas.”[19]

[27] The review then posed a series of questions that arose as a result of the ship having those characteristics. They included the following:

> “What height of waves might be experienced in and around Karumba?
> Partial or total destruction of the canopy by wind, sea or unsecured objects?
> What objects might become unsecured? Boats? Loading boom? Safety rails? Other internal damage of canopy covering by wind through openings at stern or on top of canopy?
> <u>Ingress water into well deck over the stern?</u>
> <u>Ingress of rain into well deck?</u>
> <u>Ability, or otherwise, to rid well deck of water?</u>
> Free surface effect of water in well deck and effect on stability?
> Is tank capacity for excessive rain water adequate? Overflow arrangements?
> Ability or otherwise to control the vessel in high seas given likelihood of reduced power available to avoid engine racing (ie propellers coming out of the water)?
> Have some of the crew ability and knowledge and experience to hand cyclones at sea.”[20]
>
> (Emphasis added)

[28] The Thompson Clarke Review described the course of action contained in the SQS as “a set of standard generic solutions”. It recommended:

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18 *Ibid* Attachment C, p.4.
19 *Ibid* Attachment C, p.4.
20 *Ibid* Attachment C, p.4.

> "… Given the limited locality of WUNMA's operations and with considerable meteorological data available, it is considered that a risk assessment should be carried out to establish the level of risks involved under alternative scenarios by considering the factors outlined above (together with any other factors) and a risk minimization strategy drawn up. The objective is to ensure that WUNMA as a critical asset is best protected, that potential damage to the vessel can be avoided and that continuity of operations can be resumed as soon as the cyclone passes."[21]

[29] The Thompson Clarke Review advised that the risk assessment be undertaken "as a matter of urgency":

> "It is important that Zinifex should be prepared in advance of a cyclone and that any potential for confusion in the procedures is eliminated. As the cyclone season is fast approaching, it is considered that the preparation of a risk assessment and risk management strategy be undertaken as a matter of urgency involving all parties notably the Ships Masters and Assistant Masters, Zinifex, INCO, Ports Corporation of Queensland, Queensland Transport and others as necessary such as the vessel designers."[22]

[30] Finally, the Thompson Clarke Review pointed to a longer term solution:

> "For the longer term, it may be worth exploring the potential of laying a cyclone mooring buoy in the Norman River or alternatively for'd and aft cyclone moorings in the river. This option would be the closest and probably the most protected location and would also minimize any lead times required by other alternatives."[23]

[31] The suggestion that a cyclone mooring buoy in the Norman River be explored was precisely the suggestion made by Captain Alan Boath on 14 July 2004 when representatives of the ship's managers and owners raised the issue of discontinuing the cyclone mooring buoy at Sweers Island. It will be recalled that Captain Boath advised in July 2004 that there was a problem with the ship having no cyclone moorings. The record of the meeting with him was:

> "He feels the best solution is for Zinifex to have a mooring in the Norman River, a discharging system at the wharf to cater for those times when the Wunma may be caught with product on board when a cyclone is approaching, and procedures in place to move to the mooring in the river."[24]

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21 *Ibid* Attachment C, p.5.
22 *Ibid* Attachment C, p.5.
23 *Ibid* Attachment C, p.5.
24 Exhibit 41, CB77.

[32] Captain Boath's advice in July 2004 was not exactly what Zinifex wanted at the time. It chose not to follow it. More than three years later Thompson Clarke were giving Zinifex the same advice.

[33] But apart from this advice concerning a long term solution, the Thompson Clarke Report suggested that a risk assessment and risk management strategy be undertaken as a matter of urgency. The reasons for that urgent review were apparent from the questions which were posed concerning, amongst other things, the ingress of rain into the well deck, the ingress of seawater into the well deck over the stern and the ability of the ship to rid the well deck of water.

[34] The element of urgency injected at page 5 of Attachment C to the Thompson Clarke Report was not included in the Executive Summary to the report on the separate, short discussion of cyclone preparedness at paragraph 6.1.10. However, Mr Mewett gave evidence that he read the entire report and the annexures.[25] He explained that the issue of cyclone preparedness was one component of perhaps 30 or 40 issues that needed to be addressed.[26] The issue of cyclone preparedness was not elevated above other matters in the report and Mr Mewett had numerous discussions with the author of the report, Mr Richard Clarke. Issues of churn rate and other issues over labour were more of a concern and occupied a large part of their discussions.[27] The cyclone preparedness issue was "one amongst quite a few that had been elevated to high priority".[28]

[35] On the issue of cyclone preparedness, Mr Mewett gave evidence that in terms of timing, Zinifex tackled the issue with Inco as soon as it practically could and that, unfortunately, it ran out of time.[29] In addition, he explained that the issue of cyclone preparedness was not something that was going to be resolved in a couple of months.[30] That certainly is true in connection with the kind of study that Zinifex subsequently engaged the Australian Maritime College to undertake. If, for instance, Zinifex in December 2006 had engaged the Australian Maritime College to undertake a study, it would not have been prepared prior to the marine incident. It

25 Mr Mewett; T.418.
26 Mr Mewett; T.382.
27 Mr Mewett; T.418.
28 Mr Mewett; T.418.
29 Mr Mewett; T.382.
30 Mr Mewett; T.382.

also is unlikely that any kind of comprehensive risk assessment could have been undertaken over December 2006 and January 2007 if it was to involve, all the parties suggested by Thompson Clarke, including Masters, Zinifex, Inco, the Ports Corporation of Queensland, Queensland Transport and other necessary parties, such as the vessel's designers. However, some risk minimisation strategies could have been developed in the meantime. For instance, the Thompson Clarke Review reported on the risk of the ship being caught with a full cargo on board during the approach of a cyclone, and that the issue of at what time cargo operations should be suspended was not addressed in the ship's operating procedures. That matter could, and should, have been addressed as a matter of urgency in December 2006 and January 2007. It was not.

[36] It is possible to envisage steps that could have been taken after the receipt of the Thompson Clarke Report and prior to the incident, such as a procedure to ensure that the ship was not loaded if a low pressure system was in the Gulf during the cyclone season, and the provision of additional, pumping facilities to discharge water in the well deck in an emergency situation.

[37] In the circumstances that prevailed in January 2007, as explained by Mr Mewett, it was not unreasonable for Zinifex to refer the Thompson Clarke Report to Inco to address and to expect it to respond to the matters raised, including cyclone preparedness. Unfortunately, Inco did not take any interim measures prior to the incident to address the issues raised by the Thompson Clarke Operational Review in relation to loading conditions and the operation of the water management system in cyclonic conditions.

[38] The matter should have been addressed by Inco as managers of the ship in the first instance, and, failing that, by Zinifex itself. Inco were asked to comment on the Thompson Clarke Report.[31] But the meeting in mid-January did not address the cyclone issue. Inco prepared a seven page document which addressed the following topics:

> "1. Responsibility for the operation of the shore re-claimer and MHP systems
> 2. Employment and management of maintenance personnel

[31] Mr Mewett; T.419.

3. Crew issues
4. Vessel capacity to load 5000 tonnes
5. Vessel design
6. Commercial management to ensure Zinifex receive the most effective result for the operational budgets agreed."

The document was not provided to Zinifex, but was the basis for discussions between Inco and Zinifex at the January 2007 meeting.[32] Inco's written response did not address the issue of cyclone preparedness raised by the Thompson Clarke Report. Inco's written response acknowledged that the Thompson Clarke Report "does highlight some of the operational issues that need to be reviewed. However there are a number of comments and conclusions that we do not agree with". Its written response did not purport to be a detailed critique of the Thompson Clarke Report. Inco's document simply does not address Thompson Clarke's review of cyclone preparedness.

[39] Had Inco done so by addressing cyclone preparedness as a matter of urgency and considered the questions raised by Thompson Clarke about the ingress of water into the well deck of the ship in cyclonic conditions and the ability of the ship to rid herself of that water, the incident may not have happened.

[40] Inco was reasonably entitled to conclude that some aspects of the Thompson Clarke Report on cyclone procedures did not take account of recent developments in relation to the development of its new cyclone procedure. It was also entitled to reject the view of Thompson Clarke that the preferred action in the event of a cyclone be refined and determined, rather than leaving the Master with a range of alternatives. But there were important issues in the Thompson Clarke Report that arose under the current procedure, and which warranted attention and response.

[41] The Thompson Clarke Operational Review provided an opportunity for Inco and Zinifex to address both short term and long term issues in relation to cyclone preparedness. It was unlikely that long term solutions could be devised and implemented prior to the incident. But short term solutions were required as a matter or urgency. These included:

(a) improving procedures to ensure that the ship was not caught with a full cargo on board during the approach of a cyclone;

32 Captain Dally; T.548, T.579.

(b) procedures to prevent the ingress of water into the stern well deck and to ensure that the ship had either pumping or freeing facilities to rid the well deck of water;

The issues raised and questions posed by the Thompson Clarke Review in relation to cyclone preparedness proved prophetic. The opportunity to provide at least short term solutions to these problems prior to the incident was missed.

[42] As the manager of the ship, Inco inadequately responded to the issues raised in the Thompson Clarke Operational Review about the management of water on board the ship in cyclonic conditions, knowing what it did about the shortcomings of the water management system. Cyclone preparedness was one of many issues raised by the Thompson Clarke Review. But it was not addressed even in passing in Inco's written response, and there is no evidence that the concerns raised by Thompson Clarke about the management of water in a cyclone were referred to Inco's then Operations Manager or the Fleet Technical Manager for response, including recommendations to better manage water on the well deck if the ship went into open waters to avoid a cyclone.

[43] In January 2007 and prior to the incident, Inco simply did not address the substance of the issue that was raised in the Thompson Clarke Report about the risk of the ship being caught in a loaded condition. It simply did not address the pointed questions raised by Thompson Clarke about the ingress of seawater into the well deck over the stern, the ingress of rainwater into well deck and the ability, or otherwise, of the ship to rid the well deck of water. Captain Dally said that when he read these points he formed the view that when there was torrential rain the ship could pump water ashore.[33] But, of course, that was not an option in a cyclone. He thought that if it became a safety issue, then "they could release it".[34] He "felt the vessel could deal with it".[35] But he had no evidence or analysis to support that feeling. Inquiry into the operation of the water management system by him or other Inco management would have revealed that the design and operation of the water management system, particularly the constant blocking of side deck drains and valves with concentrate,

33 Captain Dally; T.549.
34 *Ibid*
35 *Ibid*

did not permit the ship to rid the well deck of the water that would accumulate in a cyclone.

[44] The problems with the design *and* operation of the water management system are well-summarised in Inco's Submissions in Reply to the Inquiry:

> "The evidence is overwhelming that the system as designed and built, coupled with the concentrate the vessel was engaged to transport, and the method by which it was loaded, meant that the drainage system would inevitably become blocked. Further, once a blockage was located and removed another or the same blockage would inevitably occur. Mr McDonald gave evidence that the deck drains could only be checked properly when the vessel was laid up which was two or three times a year.
>
> To place matters in perspective, the drainage system, free of blockages and with valves properly working and diverted to the sea, could not have coped with the volume of rain and sea water the Wunma experienced leading up to the incident. Most of the water falling onto the decks, canopy, or coming over the side, would find its way to the well deck. The water continually accumulating in the well deck could not possibly escape through the small sump drain even with the bung removed."[36]

[45] These problems were known to Inco at the time they received the Thompson Clarke Report and prior to the incident.

[46] The penetrating questions posed by the Thompson Clarke Report about the operation of the water management system in cyclonic conditions went unanswered by Inco in January 2007. Unfortunately, it took the voyage of the *Wunma* on 6 and 7 February to answer those questions.

[36] Inco Submissions in Reply, 9 November 2007, paras 1.3 and 1.4

WUNMA BOARD OF INQUIRY

CHAPTER 8: LOAD LINE AND RELATED DESIGN ISSUES: THE INGRESS OF WATER AND THE MEANS TO FREE IT

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CHAPTER 8 LOAD LINE AND RELATED DESIGN ISSUES: THE INGRESS OF WATER AND THE MEANS TO FREE IT

8.1 INTRODUCTION

[1] The questions posed by the Thompson Clarke Operational Review in December 2006 about the design of the ship, the ingress of water into the well deck and the ability to rid the well deck of water were questions that should have been asked by others much earlier. This Chapter reviews the process by which the ship came to be registered in 1999 and its registration upgraded in 2005 without these matters being adequately addressed. This will involve discussion of some technical issues concerning the ship's load line and compliance with the *USL Code*. Any discussion of these load line and design issues should recognise certain matters.

[2] The first is the inevitable tension between the objectives of:

(a) clearing water overboard that may accumulate in the well deck in the interests of marine safety; and

(b) keeping water mixed with concentrate out of the marine environment.

[3] The second is that the resolution of that tension in terms of the ship's design occurs in an anticipated operational context. For instance, in 1997 when the ship was being designed for service between the Port of Karumba and the Roadstead, it was not anticipated that the ship would encounter seas that would cause its well deck to flood. The ship was not expected to venture into those kinds of seas because it would be impossible to safely discharge its cargo into the export ship in such conditions. In the event of a cyclone, it was anticipated that the ship would use a cyclone mooring in the Norman River.

[4] The third is that assumptions that are made at the design stage about the operation of a ship may be falsified by experience. For instance, assumptions were made that the ship's water management system would operate as a "first flush" system and that its "dirty water tanks" were adequate to collect water that would accumulate in the aft well deck. These assumptions were falsified by experience.

[5] The fourth matter is that the system of registration in 1999 permitted the ship to be registered on the basis of a Lloyd's Register certificate and a Certificate of

Compliance for Loadline from an accredited person without the registration authority itself verifying that:

(a) the ship provided a weathertight barrier to the entry of water into the well deck of the ship; and

(b) arrangements existed for the ship to rid itself of water that accumulated on that deck.

These matters were not verified by the registration authority in 2005 when it upgraded the ship's registration.

8.2 BACKGROUND

[6] As previously noted, if a commercial ship is over 24 metres in load line length then a load line certificate is required for the purpose of registration in Queensland. In addition, with the exception of fishing ships and sheltered water passenger ships, all Queensland commercial ships that are over 24 metres in length require a load line certificate to operate legally. Classification societies can issue International load line certificates on behalf of flag state administrations or a local load line certificate. A classification society load line certificate replaces the need for a load line certificate issued under the *TOMS Regulation*.[1] The *TOMS Regulation* applies the relevant parts of Section 7 of the *USL Code* to the assignment of freeboard.

[7] The provisions of *USL Code* Section 7 are based on those of the *International Convention on Load Lines*, 1966, and have the objective of ensuring the safety of the ship by:

(a) providing a weathertight barrier to the entry of water into the ship;

(b) providing adequate reserve buoyancy; and

(c) implementing arrangements for the clearance overboard of water that could accumulate on deck.

[8] The first of these objectives is set by defining as the "freeboard deck" the "uppermost complete deck, exposed to weather and sea, which has permanent means of closing all openings in the part exposed to the weather and below which all openings in the sides of the vessel are fitted with permanent means of watertight closing", but permitting a lower deck to be used.[2]

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1 *TOMS Regulation*, s.115(2)(b).

2 *USL Code*, Section 7, paras 3.22.1 to 3.22.4.

[9] Reserve buoyancy is ensured by establishing a minimum freeboard below the freeboard deck that is required to be maintained at all times.

[10] The "conditions of assignment" detail arrangements for securing the watertight integrity of the ship, such as required coaming and ventilator heights, and for clearing water that could accumulate on a deck, such as the location and area of freeing ports. Requirements are based upon whether the relevant opening is located above or below the level of the freeboard deck.

[11] Section 7 Load Lines of the *USL Code* was enacted on 4 September 1989. The 1966 *International Load Line Convention* has been amended by the Protocol of 1988 and revised by further amendments to the Protocol of 1988 (Resolution MSC.143(77)).[3] However, Section 7 Load Lines of the *USL Code* has not been amended since it was first enacted, apart from amendments in 1996 in relation to vessels under 24m in length.

8.3 HISTORY

[12] It is necessary to recap some aspects of the history of registration of the ship in Queensland, and to supplement this history with further details in relation to load line and related design issues.

[13] In September 1998 Queensland Transport contemplated that certificates would be issued by Lloyd's Register including an International Load Line Certificate.[4] On 16 February 1999 Lloyd's Register in Sydney advised Queensland Transport:

> "… it is out understanding that as the vessel is not intended for international voyages, the requirements of the International Convention on Loadlines 1966 are not applicable in this case and therefore Lloyd's Register will not be issuing the International Loadline Certificate.
>
> Consequently, **it is assumed that the vessel will be required to comply with the USL Code in respect of Loadlines** and that the Loadline Certificate will be issued by Queensland Transport **without any involvement from Lloyd's Register**."[5]
>
> (Emphasis added)

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3 IMO Resolution MSC.143(77) *Adoption of Amendments to the Protocol of 1988 relating to the International Convention on Load Lines, 1966*.

4 MSQ registration file, folio 6; Exhibit 118.

5 Exhibit 49, CB6.

[14] In June 1999 Queensland Transport was requested to make a "policy decision" in relation to a load line certificate for the ship.[6] The policy issue related to the acceptance of the concept of an "equivalent deck" for determining the freeboard to be assigned for load line purposes. The concept of an "equivalent deck" was not contained in the *USL Code* and Queensland Transport was asked whether it would accept such a concept as the registration authority that would receive the load line certificate. The policy decision was referred to the then Principal Advisor (Vessel Standards and Compliance), Mr Werner Bundschuh, who advised the Senior Naval Architect that the approach was reasonable.[7]

[15] Mr Bundschuh explained in his evidence:

> "A group of Australians, including Don Gillies, pioneered the concept of operating large ships without hatch covers to protect them from ingress of water into the cargo holds. Some of his ships were built and operated in Europe and later on some of the European countries brought the design into general use. It took a number of years for class societies to incorporate rules for the concept and it wasn't until 2005 that the International Maritime Organisation (IMO) adopted rules that allow freeboard corrections for recesses in the freeboard deck. The policy approach I applied was to assume the ship's hold is open to the sea and to then determine if the ship still meets the safety standards. If the ship meets the relevant stability and water tight integrity standards then there is no safety issue and the design may be accepted as an equivalent arrangement. In 1999 requirements regarding this approach to freeboard correction were not included in the IMO Rules or in the USL Code."[8]

[16] On 18 August 1999, Lloyd's Register advised the ship's designer ("STS") that the load line marking had been applied to vessel in the Chinese shipyard as calculated by STS and based upon the concept of an "equivalent deck".

[17] An application for registration of the ship was made in August 1999.[9] A Certificate of Registration for Class 2C issued on 25 August 1999[10] following receipt of, amongst other documents, a Certificate of Compliance for Loadline issued by STS,

6 MSQ Registration file, folio 23; Exhibit 118.
7 Exhibit 94, Part 1, paras 26 and 59.
8 Exhibit 94, Part 1, para 50.
9 Exhibit 49, CB25 and 26.
10 Exhibit 49, CB28.

on 17 August 1999.[11] The accompanying Geometric Freeboard Calculation contained the following note:

> "The 'equivalent deck' is by distributing the side buoyant spaces above the cargo deck evenly across the width of the vessel. The freeboard deck is taken to be this equivalent deck."[12]

[18] On the 20 October 1999, the Maritime Safety Branch of Queensland Transport sought clarification from STS about the load line.[13] This request for clarification refers to the freeboard deck being at a height of 7.85 metres, notwithstanding that STS had previously prepared and submitted a Geometric Freeboard Calculation dated 18 August 1999 based on the "equivalent deck" concept that had been used as the basis for the freeboard markings that had been applied to the vessel in the shipyard in China in August 1999.[14]

[19] In response to the request for clarification STS sent a fax on 21 October 1999, explaining its calculation of freeboard and enclosing copies of its Geometric Freeboard Calculation dated 18 August 1999, a Loadline Marking Drawing and a sketch of the hypothetical deck position concept.[15] STS advised:

> "As requested Details on MV Wunma:-
>
> 1. Loadline Length – 96% of 108m = 103.68m
> 2. Freeboard Deck – hypothetical deck at 5.61m above Baseline, after redistribution of buoyancy in tanks above well deck, into cargo well.
> 3. The Deckline is the top of the well deck i.e. 4.5m + 0.01m = 4.51m above baseline.
> 4. Freeboard is 0.66m to the deckline.
> 5. The loaded draft is then 4.51 – 0.660 = 3.85m
> 6. GRT is calculated at 4868 tonnes.

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11 Exhibit 49, CB20; Exhibit 118.

12 Exhibit 49, CB21.

13 Fax dated 20 October 1999 from Werner Bundschuh to Dion Alston of ASDMAR: Exhibit 118.

14 Refer to fax dated 12 August 1999 from Lloyd's Register China to Dion Alston of STS advising that the load line markings had been verified that day as being in accordance with STS Drawing No 110MON98-L05/1.

15 Fax dated 21 October 1999 from Dion Alston of STS to Werner Bundschuh of MSQ.

> The loadline marking drawing, a sketch of the hypothetical deck position and the geometric freeboard calculation is attached for your information. I hope this helps to clarify the situation.
>
> The geometric freeboard is calculated to the theoretical deck giving a value of 1.601m, whilst the assigned freeboard of 1.764 exceeds this requirement. To the actual deck this is 0.660m, corresponding to a draft of 3.85 from the baseline, as per the stability book.
>
> The redistribution of buoyancy represents the equivalent deck of a conventional type ship to which the geometrical calculations of the USL section 7 could be applied. This approach is sound provided the stern door is watertight up to the hypothetical deck height. The cargo well is completely covered, and has an aft sump to remove liquid on deck as the vessel tends to trim by the stern. Water must displace the cargo to have any significant free surface effect. The stability with the cargo well flooded is adequate even with the large free surface experienced.
>
> A similar analysis was used on the similar ship 'Aburri', and I trust that you appreciate the principles used, especially considering the designated area of operation."

[20] The following passage from that letter assumes importance in the light of events:

> "This approach is sound provided the stern door is watertight up to the hypothetical deck height. The cargo well is completely covered, and has an aft sump to remove liquid on deck as the vessel tends to trim by the stern."

It is true that the cargo well was "completely covered" by a canopy, the purpose of which was to contain dust and to prevent rain from falling on the cargo. But in no sense was the canopy an "enclosed superstructure" in terms of load line requirements. This aspect was comprehensively addressed by an expert witness, Mr Taylor, in his report. In short, the bulkheads of the canopy were not of a structure that would comply with classification rules. The doors (referred to in the evidence as the "barn doors") at the aft end of the cargo hold were not designed to, and did not, prevent water from entering the cargo hold. In general, the canopy structure did not comply with the definition of "weathertight" in either the *USL Code* or the Lloyd's Register Rules for ships. That the canopy is not an "enclosed structure" in terms of load line requirements was accepted by other witnesses including Mr Bundschuh.[16]

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[16] Exhibit 94, Part 1, para 47.

[21] The quoted passage refers to the sump removing water from the well deck. For the reasons discussed in relation to the ship's water management system, the capacity of the sump to remove large volumes of water, either into the "dirty water tanks" or through the small drain to sea, was limited.

8.4 THE USL CODE AND THE CONCEPT OF AN "EQUIVALENT DECK"

[22] Clause 3.22.1 of Section 7 of the *USL Code* states:

> "A reference to the freeboard deck of a vessel, subject to this clause, shall be read as a reference to the uppermost complete deck, exposed to the weather and sea, which has permanent means of closing all openings in the part exposed to the weather and below which all openings in the sides of the vessel are fitted with permanent means of watertight closing."

It contemplates that the freeboard deck will be a physical deck fitted with actual closing devices. Clause 3.22.2 states:

> "In the case of a vessel in which the uppermost complete deck exposed to the weather referred to in paragraph 3.22.1 is a discontinuous deck, the reference to the freeboard deck of the vessel shall be deemed to be a reference to a line of reference formed by the lowest line of that discontinuous deck and the continuation of that line parallel to the upper part of that discontinuous deck."

[23] Both these clauses refer to a deck "exposed to the weather". The canopy over the cargo space is not a weathertight[17] enclosure, and should be disregarded when seeking to determine what is the "uppermost complete deck" exposed to the weather.

[24] Lloyd's Register Rules do not appear to include a definition of an "uppermost complete deck", and there is therefore some uncertainty as to whether 'complete' in this context means a deck that extends to both sides from the bow to the stern, or is in one plane, e.g. without steps, or is a reference only to watertight integrity. Lloyd's Register Rules Part 3, Chapter 1, Section 6 Clause 6.2.1 provide the following definition:

> "The freeboard deck is normally the uppermost complete deck exposed to weather and sea, which has permanent means of closing all openings in the weather part, and below which all openings in the

[17] Weathertight is not defined in Section 7 of the *USL Code*. However Resolution MSC.143(77) introduced in Sub-regulation 3(13) a definition of weathertight as meaning "*…that in any sea conditions water will not penetrate into the ship*".

> sides of the ship are fitted with permanent means of watertight closing."

This wording is identical to that contained in the ILLC and refers to an "uppermost complete deck" deck, although neither source provides a definition of the term.

[25] The various definitions refer to an "uppermost complete deck" exposed to the weather. In this regard the well deck could be considered as the freeboard deck since it extends longitudinally. However, transversely the well deck does not extend to the sides of the vessel, but stops at the intersection with the inboard sides of the two deckhouses that form the sides of the cargo hold.

[26] On one view, the only deck on the *Wunma* that meets the above criteria in the *USL Code* and can be considered as the freeboard deck is the well deck that is 4.5 metres above the baseline and which forms the bottom of the cargo space.

[27] An alternative approach to the assignment of freeboard is that adopted by STS. STS stated in its fax of 21 October 1999 that "This approach is sound provided the stern door is watertight up to the hypothetical deck height". But this approach encounters problems when regard is had to certain features of the *Wunma*:

- Any rolling of the vessel effectively lowers the height to the top of the watertight portion of the stern door (2.16 metres above the well deck) when measured from the waterline.
- There are two openings located one each side of the stern ramp. These openings have a sill height about 2.13 metres above the well deck and are not fitted with weathertight closing devices, thus allowing the entry of heavy seas into the aft part of the cargo space.
- The doors at the aft of the cargo hold are not watertight, so water can readily flow into the main cargo space.
- The construction of the canopy structure enclosing the cargo space is not weathertight to marine standards. Therefore the canopy cannot be considered to be a fully enclosed superstructure in terms of the *USL Code.*
- The capacity of the aft sump and associated piping, tanks and pumps is probably adequate for collecting and removing leachate from the cargo or wash-down water, but is not adequate to quickly clear away any water from heavy seas entering the aft end of the vessel.

[28] The ILLC 1966 (reflected in Section 7 of the *USL Code*) is based upon a conventional ship configuration that was common when the convention and the earlier 1930 Load Line Convention were first formulated; typically a vessel with two or three "islands" or superstructures, eg foc's'le, bridge and poop. Much of the terminology in the ILLC reflects these origins and, in the case of more recent non-standard ship designs, has prompted the need for amendments to the ILLC[18] and numerous IACS[19] Unified Interpretations.[20] These interpretations may offer possible ways of considering the configuration on the *Wunma*, but they are not part of the existing Section 7 of the *USL Code*.

[29] Section 7 of the *USL Code* provides a means for calculating a credit for any enclosed superstructure on the freeboard deck provided the superstructure meets the definition of in Clause 3.23.1 which defines a superstructure as:

> "extending from side to side of the vessel or with the side plating of the structure not being inboard of the shell plating by more than 4 per cent of the breadth of the vessel."

The two separate houses along the sides of the well deck on the *Wunma* do not fit within this definition. But, an allowance could be calculated based on the well deck being the freeboard deck, taking account of the enclosed houses along both sides of the well deck.

[30] The alternative approach adopted in the "equivalent deck" concept essentially treats the side deck as the freeboard deck, and makes adjustments downwards to take account of the well. This approach treats the well as, in effect, a recess, in the freeboard deck. If account was not taken of it, the assigned load line would be too high on the ship's side, allowing the ship to be loaded more deeply than was safe.[21] The approach adopted by the "accredited person", and accepted as a matter of policy by Queensland Transport, was to calculate the loss of equivalent volume represented by the cargo hold, reducing the actual deck height taken to be the freeboard deck from 7.85 metres to an "equivalent deck" height of 5.61 metres. If it is permissible to regard the side deck as the "freeboard deck" then this approach can be said to

18 The Protocol of 1988 relating to the ILLC and the revised protocol of 1988 (IMO Resolution MSC.143(77).

19 IACS – The International Association of Classification Societies.

20 There are currently about seventy two individual Interpretations of the ILLC, 1966 published by IACS.

increase the assigned freeboard, reduce the maximum loaded draft and, overall, increase the safety of the ship over that provided by a calculation that adopted the side deck as the "freeboard deck". However, for the reasons given by Mr Taylor in his report, there are good reasons to not treat the side deck as the "freeboard deck" within the *USL Code* definition.

[31] In any event, in June 1999 Queensland Transport was requested to make a "policy decision" in relation to the adoption of an "equivalent deck" concept. Mr Bundschuh considered that the approach was reasonable. He explained this in his evidence to the Inquiry:

> "In my mind this method is not a failure to comply with the USL Code; the ship could have been assigned a freeboard using the USL Code with all conditions of assignment complied with; but this would have resulted in an unseaworthy ship if fully loaded. Rather, by adopting the 'equivalent deck' method, the accredited person filled a lacuna in the Code for this type of ship; a lacuna that I note has since been filled in the International Convention in a very similar way to that adopted for this ship. Consequently, no exemption from the Code was sought, granted or even required."[22]

[32] In simple terms, one approach works from the "bottom up": it takes the well deck to be the freeboard deck, and makes adjustments upwards on account of the deck houses. The other approach works from the "top down": it starts with the side deck as being the freeboard deck, and adjusts down to take account of the "recess" constituted by the cargo hold . Each converges on a similar load line.

[33] In summary, the term "equivalent" deck is not used in the *USL Code,* yet, as a result of a policy decision by Queensland Transport in 1999, it was accepted in the freeboard calculations for load line purposes. As Mr John Kernaghan, a naval architect with over 40 years experience in the marine industries, stated in an expert report, although not specifically addressed in the rules, there is a "logical case" to be made for such a concept. However Mr Kernaghan stated:

> "This however needs to be fully supported by comprehensive submissions such that the full implication of using this dispensation are realised and the vessel and operating procedures can be set accordingly."[23]

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21 Statement of Werner Bundschuh, Part 4; letter 19.8.07; Exhibit 94, para 1.6.

22 Exhibit 94, Part 4, letter 19.8.07 to the Inquiry, para 1.9.

23 Exhibit 109, p.23.

[34] Another expert witness, Mr Graham Taylor, a naval architect with 35 years experience, observed:

> "…given the relatively few vessels under MSQ jurisdiction that have been assigned load lines, I consider that a more appropriate approach would have been for MSQ to have insisted on a conventional application of Section 7 of the USL Code or, if that proved unsatisfactory, sought guidance from LR on the correct approach to adopt for what is a vessel whose design differs markedly from that of a conventional vessel on which the original ILLC, and the USL code had been predicated.
>
> LR is one of the largest classification societies with a major portion of the world fleet and therefore vast experience in the application and interpretation of the ILLC and its amendments. This approach of seeking guidance from LR would also have been reasonable given that MSQ had originally anticipated that LR would be issuing a Load Line certificate to the vessel."

[35] Mr Kernaghan observed in this context that Lloyd's Register passed the responsibility to MSQ when it indicated that it expected a load line certificate to be issued by Queensland Transport without any involvement from Lloyd's Register:

> "It would appear that in 1999 there was reluctance by all involved to take responsibility for the use of the 'equivalent deck'. MSQ was the last in the line and had no-one left to pass it to."

Both experts also remarked on the fact that MSQ could have sought guidance from AMSA, which represents Australia at the IMO.

8.5 IMPLICATIONS OF ADOPTING THE "EQUIVALENT DECK" APPROACH

[36] The adoption of the "equivalent deck" approach required consideration of its implications in two major respects:

(a) The first was arrangements to free water.

(b) The second was to have regard to the terms and intent of *USL Code* Section 7 in providing a watertight barrier to the entry of water, and specific regard to the standard of watertight protection required by *USL Code* Section 7 for the emergency generator room, including its radiator vent. The extent of protection of spaces below the 7.85m side deck varied between "watertight" and "weathertight" according to whether the side deck or the well deck was nominated as the freeboard deck.

8.6 ARRANGEMENTS TO FREE AND DRAIN WATER

[37] IMO Resolution MSC.143(77) that was adopted by IMO on 5th June 2003, and entered force internationally on 1 January 2005. It allows freeboard corrections for recesses in the freeboard beck. In 1999 it was not included in the IMO Rules or in the *USL Code*. Nevertheless, reliance was placed upon it by Mr Bundschuh in his evidence as supporting the policy decision taken in 1999 to accept the "equivalent deck" concept. However, the recess constituted by the cargo hold on the *Wunma* is by definition in Regulation 3 (15) of Resolution MSC.143(77) a well:

> "A well is any area on the deck exposed to the weather, where water may be entrapped. Wells are considered to be deck areas bounded on two or more sides by deck structures."

[38] This gives rise to a need to meet the criteria in Clause 22 (Freeing Ports) of Section 7 of the *USL Code.* This clause defines the need for freeing ports and the methods for calculating the size and disposition of freeing ports on a vessel.

[39] The intent of the requirements for freeing ports in Clause 22 the *USL Code* is similar to that of the ILLC, namely to require freeing ports in any space where water may be entrapped. Clause 22.1 of the *USL Code* Section 7 states that a "well" shall have:

> "adequate provision……for rapidly freeing and draining the decks of water."

[40] *USL Code* Section 7 Clause 22.2 states that:

> "For the purposes of this clause, adequate provision for rapidly freeing and draining the freeboard deck of water shall be deemed not to have been made unless there is provided on each side of the vessel in each well on that deck:
>
> (a) a minimum freeing port area ascertained in accordance with the next seven succeeding sub-clause: or
>
> (b) if the assigning authority so directs a greater minimum freeing port area in respect of the vessel on the grounds that the minimum freeing port area so ascertained would be insufficient – a minimum freeing port area equal to the area so directed."

[41] Clause 22.12 states specifically:

> "In vessels having superstructures which are open at either or both ends, adequate provision for freeing the space within those superstructures shall be provided."

[42] It is helpful to quote the conclusion of Mr Taylor as to whether the arrangements of the aft well deck met the requirements of Section 7 of the *USL Code* in relation to freeing water:

> "127. The access way on the *MV Wunma* is, because of the openings in the transverse bulkhead in way of the transom a *well* that should be provided with freeing ports in accordance with the requirements of Section 7 Clause 22 *Freeing Ports* of the USL Code, or other adequate alternate means provided to effectively clear this *well* of the water that might enter as a result of heavy seas. The fact that rainwater collected from the canopy can also accumulate in the *well-deck* reinforces the need for adequate freeing and drainage arrangements.
>
> 128. The fact that rainwater drainage is not collected by a closed system but flows along the *side-deck* inside the dust-cover enclosure on the port side, and possibly through the additional scuppers into the cargo hold, potentially compromises the safety of the vessel and its cargo.
>
> 129. The height of the sill of each side opening in the aft transverse bulkhead is 2.13 metres above the well-deck and the watertightness of the stern ramp up to a height of 2.16 m effectively creates and defines the size of the *well*. At the same time the height of sills above the *well-deck* means they cannot be considered as freeing ports since they fail to meet the requirement in Clause 22.13 of Section 7 of the USL Code that states that the lower edge of freeing port openings to be as near as practicable to the deck.
>
> 130. The absence of any effective barrier to the flow of water in the access way moving forward into the main hold means that the whole of the cargo hold effectively becomes a *well* that needs to be adequately drained.
>
> 131. The entry of water into the hold will cause any zinc or lead concentrate cargo stored in the hold to exceed its TML (Transportable Moisture Limit) which, in conjunction with the movement of the vessel, will progressively liquefy the cargo with consequences for the vessel's stability due to the free surface created and the impact of sloshing loads on the structure.
>
> 132. Although there is a canopy over the cargo hold it does not meet the requirements of a weathertight enclosure as required by the USL Code and therefore the whole of the cargo hold should be considered as a *well*.

133. The waste water drainage system may be adequate for the handing of leachate from the cargo and wash down water from hold cleaning operation. However, it is extremely doubtful that it could adequately handle the additional rain water collected from the canopy roof and open decks or the water that may enter through the openings in the transom.

134. The type of vessel and the cargoes carried means that maintaining all the scuppers clear of cargo residue is difficult and there is likelihood that they may not be available when needed to clear large quantities of water.

135. The *Dust Control Waste Water System* cannot therefore be considered as a substitute for the provision of freeing ports to clear water from the access way *well*, as contemplated in Section 7 of the USL Code.

136. The *purpose* of freeing ports, their size and location is to ensure that entrapped water readily flows overboard. Conversely the waste water drainage system relies on a combination of gravity and pumping to transfer water.

137. Reliance on a system that requires activation of valves and pumping to clear accumulated water is contrary to the intent of freeing ports that do not require human intervention. Also on a vessel such as the *MV Wunma* cargo residue can accumulate throughout the vessel, raising the possibility of blockages and failure of valves to operate correctly."

[43] These views were generally supported by Mr Kernaghan, who stated that the intent of the *USL Code* is clear: a well is any space where water might accumulate, and that the accumulation of water in passageways should be minimised by freeing ports. Mr Kernaghan agreed that the waste water system was not a substitute for the provision of freeing ports to clear water, and that there should be adequate drainage that does not rely on mechanical means.[24]

[44] In summary, one important implication of the recognition of the cargo hold as a recess or well in the freeboard deck is the need to adequately drain it.

8.7 EMERGENCY GENERATOR ROOM ARRANGEMENTS

[45] At the aft end of the *Wunma* there are deckhouses on the port and starboard quarters, including one on the starboard side that houses the emergency generator room. A radiator for cooling the emergency generator is located in way of a vent opening. The height of the sill of this vent is about 600 mm above the aft intermediate deck

on which the emergency generator room is situated ie 5.50 metres above the baseline. There is no closing device fitted to this opening.

[46] The first aspect concerning compliance with the *USL Code* and Lloyd's Rules is the ventilation arrangements, and the position of a radiator vent. The Board adopts the evidence of Mr Taylor, with whom Mr Kernaghan agreed, that the radiator vent does not meet the relevant requirements of Sections 7 and 9 of the *USL Code*. The Board notes that the hull and machinery was certified by Lloyd's Register as complying with its rules, rather than the *USL Code*, but reference to the *USL Code* is apposite in connection with design issues that relate to load line issues, since Lloyd's Register and others anticipated that the ship would be required to comply with the *USL Code* in respect of load lines.

[47] Mr Taylor's evidence on this matter was as follows:

> "195. Clause 29.6.2 of Section 9 of the *USL Code* states that:
>
> > 'An emergency generator shall be installed in a space affording protection from the weather and such space shall be adequately ventilated to allow the generator to operate at full power.'
>
> 196. Clause 3.21 of Section 7 of the USL Code categorises openings (in the ship's decks and other structures) as being of two types for the purposes of determining the standard of sill heights and weathertight closures required. The more severe of these (Position 1) relates to the freeboard deck, raised quarter deck and all exposed superstructure decks in the forward quarter of the ship's length. Other openings on exposed superstructure decks are categorized as Position 2.
>
> 197. The ventilation openings of the Emergency Generator Room are required to be able to remain open in all weather and sea conditions, they are required by USL 7.17.6 to have coaming heights (above the deck on which they are situated) of at least 4.5 metres if in Position 1 and 2.3 metres for Position 2.
>
> 198. Whilst the deck on which the Emergency Generator Room is situated may strictly come within the definition of Position 1, in my view the protected location of the radiator ventilator opening should result in some reduction of requirements, and the Position 2 height of 2.3 metres should therefore be applied.

[24] Exhibit 109, p.27.

199. The radiator vent does not meet these requirements.

200. Incidentally, the same considerations outlined in the previous two paragraphs apply to the main Engine Room Ventilation openings, save that the openings would be in Position 1.

201. The arrangement of the radiator vent gives rise to a basic inconsistency in the arrangement of the emergency generator room, namely that access to the room from the alcove is through a watertight door yet just around the corner in the recess there is the vent which is not fitted with any means of closing.

202. Consistent with the foregoing, LR surveyor L. Porrett conducted a survey after the incident of the *MV Wunma* on the 17th February 2007 and issued an Interim Certificate which included a number of Conditions of Class. Included in those conditions was a requirement due by 05/07 (May 2007) that:

> 'Emergency Generator radiator intake to be modified by fitting steel trunking incorporated into natural vent approx 1m to port of current location thereby raising water ingress height 2.5m above current location. Plans of modification to be submitted for approval prior to commencement of work.'"

[48] The second issue is the location of the Emergency Generator Room. In that regard Mr Taylor concluded:

> "The location of the Emergency Generator Room would meet the requirements of the USL Code and Lloyds' Rules if the well-deck is treated as the '*uppermost continuous deck*'. But if the side deck at 7.85 metres above baseline were considered to be the '*uppermost continuous deck*', the arrangement of the Emergency Generator Room would fail to meet the requirement of the USL code and LR Rules that it be located above the '*uppermost continuous deck*'."

[49] His reasons for these conclusions are as follows:

"207. Clause 29 of Part 4 of the USL Code refers to the Emergency Electrical Installation. The required position for the Emergency Generator Room is set by USL clause 9.29.2.1, which states:

> 'The emergency source of power including any fuel supply shall be situated outside the propulsion machinery casing, not forward of the collision bulkhead and be above the uppermost continuous deck.'

208. In Section 3 of LR Rules, *Emergency source of electrical power* of Part 6, Chapter 2, Clause 3.2.2, refers to the location of the emergency source of power in similar terms to that in the USL Code, namely:

> 'The emergency source of electrical power, associated transforming equipment, if any, transitional source of emergency power, emergency switchboard and emergency lighting switchboard are to be located above the uppermost continuous deck and be readily accessible from the open deck.'

209. Both the USL Code and the LR Rules raise the question of which is the 'uppermost continuous deck'? Is it the *well-deck* located 4.50 metres above the baseline or the *side deck* that is 7.85 metres above the baseline?

210. If the latter case applies, then the arrangement of the emergency generator is contrary to the requirements of the USL Code.

211. Since the *MV Wunma* is classed with LR, I believe that they would, when approving the design and surveying the construction of the vessel, have applied their own Rules.[25] On that basis, I infer that LR treated the well-deck as the 'uppermost continuous deck', so that the location of the Emergency Generator Room complied with their rules."

[50] Mr Kernaghan agreed with these observations, and noted that an Emergency generator room is normally well above the waterline.

8.8 THE RELEVANCE OF THESE MATTERS TO THE INCIDENT AND THE INGRESS OF WATER INTO THE EMERGENCY GENERATOR ROOM

[51] During cyclonic conditions, a large volume of rainwater is likely to collect in the well deck from drains and deck scuppers that is in excess of the capacity of the dust control waste water drainage system to clear.

[52] Because the two openings side of the stern ramp are not provided with any means of closing, during heavy seas or storms, sea water could pass through these openings into the ship and pass into the vicinity of the Emergency Generator Room.

[53] Also, depending on the severity of the storm and heavy seas, additional water could enter the vessel via the upper part of the opening in way of the stern ramp that is not

25 Lloyd's Register *Rules and Regulations for the Classification of Ships.*

fully closed when the ramp is stowed in the at sea condition. This water would also flow into the well deck.

[54] This area is effectively a well without any freeing ports or other alternative means of adequately draining the space during storm and cyclonic conditions. Thus any water that accumulates in this well (whether sea water, rainwater or a combination of both) cannot escape other than to flow forward past the swing doors into the cargo hold.

[55] Mr Taylor concluded:

> "188. In my opinion the failure to recognise that the access way was a *well*, and therefore of the need to provide freeing ports in accordance with the requirements of the USL Code, contributed to the situation where significant quantities of water could accumulate in the *well* exacerbated a situation when water also entered the vessel through the openings in the transom bulkhead.
>
> 189. The arrangements for handling the run-off of rainwater from the canopy, in particular the provision to direct the water into the *Dust Control Waste Water System*, failed to adequately consider that this system would not be able to handle the additional quantities of water resulting from high rainfall during a cyclonic event.
>
> 190. The *Dust Control Waste Water System* relies upon manual intervention, e.g. operation of valves and a pump contrary to the philosophy of freeing ports that by their size and location allow for the natural drainage of a *well*.
>
> 191. The openings in the transom bulkhead that were not fitted with any means of closing meant that large quantities of water could enter the vessel. The location of these openings in way of the alcoves, in particular on the starboard side where the alcove is adjacent to the emergency generator room would, during storm and heavy sea conditions, allow water to enter the vessel in proximity to the emergency generator room.
>
> 192. The absence of appropriately sized freeing ports in the aft well deck or other appropriate means to efficiently remove water that did enter the vessel as required by the USL Code could have contributed to the ingress of water into the Emergency Generator Room, and ultimately to the ship being entirely blacked out."

[56] Mr Kernaghan commented on these conclusions. In respect of the opinion expressed in paragraph 188 of Mr Taylor's report, Mr Kernaghan observed:

> "I would generally agree with this statement, there does seem to be an issue regarding the freeing ports, although as stated previously the designer would expect the vessel to be operated in a suitable manner, and not have large amounts of water hitting the aft end on a regular basis. I would also have expected that there should have been procedures in place (by sea drains and scuppers etc) to ensure that water was expelled from the vessel before accumulating in the well deck area."[26]

[57] In relation to paragraph 192 of Mr Taylor's report, Mr Kernaghan agreed that the design of the ship should have prevented water entering the Emergency Generator Room. He observed:

> "However, the blackout was caused by having the switchboard in the EGR, if this was placed in another (higher) location the incident may not have happened."[27]

8.9 THE TAYLOR REPORT

[58] Mr Taylor was asked by the Inquiry to address:

(a) the Certification for Loadline of the *Wunma*, particularly compliance with Section 7 of the *USL Code* in respect of water-freeing facilities;

(b) the relevance of these matters to the ingress of water into the Emergency Generator Room;

(c) whether the arrangements for the Emergency Generator Room met with the requirements of the *USL Code* and Lloyd's Register Rules.

[59] Some passages of Mr Taylor's report have been quoted above in the course of discussing a number of discrete issues. It is appropriate to set out the conclusions to his report:

> "1. In Section 7 of the *USL Code* freeboard calculations are by reference to the freeboard deck, as defined in Clause 3.22.1. This is a reference to:
>
> > '… the uppermost complete deck, exposed to the weather and sea, *which has permanent means of closing* all *openings in the part exposed to the weather and below which all openings in the sides of the vessel are fitted with permanent means of watertight closing.*'

26 Exhibit 109, p.28.
27 Exhibit 109, p.28.

2. The term 'equivalent deck' is not used in the *USL Code* or in the ILLC. Yet it was a concept used in freeboard calculations that were submitted in respect of a Load Line Certificates, and was the basis for the original registration of the *MV Wunma*.

3. The canopy enclosing the cargo space in not an 'enclosed superstructure' as defined in Section 7 of the *USL Code*.

4. There was a failure to recognise that the access way was a *well* and therefore of the need to provide freeing ports.

5. Irrespective of the methodology applied to the vessel, there were requirements relating to freeing ports contained in the *USL Code* and the ILLC, that were not met in the design of the *MV Wunma*. In particular, adequate provision was required for rapidly freeing and draining water from the aft well deck.

6. The absence of any barrier that would prevent water that had accumulated in the access way *well* from flowing forward into the main cargo hold introduced a risk that the water would enter the cargo hold.

7. The provision to collect and retain rainwater from the canopy and the decks to avoid water contaminated with cargo residue going overboard unduly relied on using the *Dust Control Waste Water Drainage System.*

8. The *Dust Control Waste Water Drainage System* is not a substitute for the provision of freeing ports to clear the large quantities of water that can accumulate in the well deck aft and failed to adequately consider that this system would not be able to handle the additional quantities of water resulting from high rainfall during a cyclonic event.

9. In heavy seas and storm conditions the absence of closing devices on the two openings located each side of the stern ramp would allow large quantities of water to enter the vessel. In addition, the fact that the stern ramp opening is only watertight up to a height of about 2.16 metres above the well deck means that large seas could also enter the vessel through the upper portion of the stern ramp opening.

10. The absence of appropriately sized freeing port allows for the accumulation of rainwater and seawater during cyclonic conditions in the aft well deck in proximity to the Emergency Generator Room.

11. The Emergency Generator Room radiator vent does not meet the relevant requirements Sections 7 and 9 of the *USL Code*.

> 12. The location of the Emergency Generator Room would meet the requirements of the *USL Code* and Lloyd's Rules if the well deck is treated as the *"uppermost continuous deck"*.
>
> 13. The accumulation of water on the aft deck during cyclonic conditions due to the absence of appropriately sized freeing ports, and the location of the Emergency Generator Room radiator vent at an inadequate height above the well deck, permits the ingress of water into the Emergency Generator Room with severe consequences for the ship's operation."

8.10 THE KERNAGHAN REPORT

[60] Mr Kernaghan was engaged by the solicitors for Zinifex. Some passages of his report have already been quoted in connection with certain specific load line issues. However, Mr Kernaghan's report extended to a broader review of the design of the ship. Mr Kernaghan observed that for certain standard vessels there are "standard designs". But for designs such as the *Wunma*, where there are unique and very specific requirements in their trade, a design must be developed to satisfy specific requirements. These "specialist ships" are designed to well-established principles so that, as built, they can operate well within appropriate safety parameters. But to a large extent their successful operation depends upon appropriate operating procedures.[28] In design terms, the *Wunma* differs from a traditional bulk carrier design which has a totally enclosed cargo hold with watertight transfers, transverse bulkheads and cargo hatches. A traditional bulk carrier would have resulted in a relatively long cargo load and discharge times. To achieve the loading rates required of the *Wunma* an "open deck" vessel was designed with its main/cargo deck just above the design water line. The application of the provisions of the *USL Code* that are applicable to other vessels, if applied to the *Wunma*, would have reduced her cargo capacity. In general terms the assignment of a deeper allowable draft for vessels such as the *Wunma* assumes that she will not encounter seas that will be such that waves can cause flooding in the cargo deck. As Mr Kernaghan stated:

> "In operational terms this is achieved by either restricting such a vessel to waters, such as the Gulf of Carpentaria, that do not have storms for most of the year, where ingress of water would not be possible, or alternatively having the vessel powered such that they can avoid the extreme environmental events such as cyclones."[29]

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28 Exhibit 109, para 3.1.4.

29 Exhibit 109, para 3.2.3, p.11.

[61] Mr Kernaghan noted that MSQ required written evidence from Lloyd's Register at the time of the registration upgrade in 2005 that structurally the ship could perform beyond coastal voyages. However, as Mr Kernaghan observed:

> "For this to be effective the vessel must set sail well in advance of any cyclonic conditions such that it can clear the storms in a timely manner."

[62] In respect of load line issues, as already noted, Mr Kernaghan generally supported the use of the "equivalent deck" method of assignment for the load line as an acceptable approach from the design context. However, his support for such approach depended upon operational constraints on the vessel being set for its intended service within the Gulf of Carpentaria and that "suitable arrangements were in place for the vessel during severe weather events such as cyclones".[30] Whilst Mr Kernaghan generally supported the "equivalent deck" method, he agreed with Mr Taylor that a more rigorous approach to the matter was required by MSQ and would have expected other qualified agencies to have been consulted.[31] For instance, the issue of using an "equivalent deck" for the assignment of freeboard raised issues concerning the position of the Emergency Generator Room. If the uppermost continuous (freeboard) deck is set as the side deck and not the well deck, then the Emergency Generator Room should be positioned above the side deck and not below the deck as is the case of the *Wunma*.[32]

[63] Consistent with his approach to the link between design parameters and operating conditions, Mr Kernaghan concluded that a full analysis of the capabilities of the vessel in cyclonic conditions was required before it was permitted to proceed into cyclonic conditions with a full load. According to Mr Kernaghan:

> "Such an analysis would include considerations such as:
>
> - the ability of the vessel to expel water landing on the canopy and other parts of the vessel
> - the ability to expel water from the well deck;
> - the ability of the vessel to handle cyclonic seas in the Gulf of Carpentaria; and

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30 Exhibit 109, para 3.6.6.
31 Exhibit 109, para 6.2.1.
32 Exhibit 109, para 6.2.2.

- a consideration of the above in loaded, partially loaded and unloaded conditions."[33]

[64] In connection with the ingress of water and its collection in the cargo hold and aft well deck, Mr Kernaghan stated:

> "One would have assumed that the vessel's operating procedures should be such that the deck drains be turned to the sea so as to ensure that the water coming off the canopy and the deck was diverted to the sea and not into the well deck. This along with the release of water via the sump drain and the use of pumps from that area should have been sufficient to expel water to prevent flooding to the extent that water would breach the Emergency Generator Room. This assumes that the rainfall is not so heavy as to totally overwhelm the ability to expel water by the above methods and that the above systems are operational."[34]

[65] Mr Kernaghan's report made recommendations in relation to the design and operation of the vessel. It is appropriate, at this point, to record that Mr Kernaghan recommended a full risk assessment of the operation of the ship:

> "A full Risk Assessment of the operations of the "WUNMA" should be conducted. All present Masters and all those involved with "WUNMA" operations should be involved in the assessment procedure and play a full part in the development of mitigation strategies. The Risk Assessment should be undertaken by specialist independent consultants and cover the full operations of the "WUNMA" from loading the cargo through to offloading at export vessel and return to port. This Risk Assessment should be completed as soon as possible and no later than the start of the cyclone season in November 2007."

[66] Mr Kernaghan's report is a helpful reminder of the fact that ships are designed on assumptions that the ship will operate in certain conditions, and that operating procedures should be consistent with the design intent. The evidence establishes that the *Wunma* was not originally designed and not intended to operate in cyclonic conditions. Moreover, as Mr Kernaghan noted, one would have assumed that the ship's operating procedures would be such that the deck drains would be turned to sea so as to ensure that water coming off the canopy and the deck was diverted to the sea and not into the well deck and that rainfall was not so heavy as to totally overwhelm the ship's ability to expel water by drains and pumps and that those

33 Exhibit 109, para 7.3.14, p.37.
34 Exhibit 109, para 7.7.8, p.49.

systems would be operational. But such an assumption about the operation of the ship was falsified by experience in relation to the operation of its water management system whereby a large volume of water might accumulate in the aft well deck within 30 minutes of a tropical downpour.

8.11 ROLE OF MSQ IN RELATION TO LOAD LINE AND RELATED DESIGN ISSUES

[67] The Queensland registration authority in 1999, Queensland Transport's Maritime Safety Branch, relied, as previously noted, on a Lloyd's Register provisional interim certificate in relation to the ship's hull and machinery and a Certificate of Compliance for Loadline issued by an "accredited person", namely ASDMAR Pty Ltd. The Certificate of Compliance for Loadline assigned the ship's freeboard on the basis of a geometric freeboard calculation that employed the concept of an "equivalent deck". Although such a concept was not reflected in the *USL Code,* a policy decision was made to accept the assignment of the ship's freeboard on this basis for the reasons explained by Mr Bundschuh. Although Mr Bundschuh gave evidence about his "dismay" that the owners decided not to have Lloyd's Register issue a load line certificate,[35] no inquiries were made by Queensland Transport of Lloyd's Register concerning the assignment of the ship's freeboard or its conditions of assignment.

[68] The 2005 registration upgrade occurred without any new Lloyd's Register certificate, as such, but on the basis of reports from Lloyd's Register about its review of the strength of the vessel that assured Mr Bundschuh that the ship was "structurally up to standard".[36] No new Certificate of Compliance Loadline had been requested by MSQ's letter of 11 May 2005 as a requirement for the registration upgrade, but one dated 24 August 2005 was provided in conjunction with the application to upgrade the ship's registration.

[69] Under the Queensland system after a vessel is issued its initial load line certificate authorised surveyors make periodic load line inspections and load line surveys. MSQ normally issues a load line certificate for a period of five years so that a ship owner must obtain a new Certificate of Compliance for Loadline every five years and forward it to MSQ when applying to renew the load line certificate. Under the

35 Exhibit 94, Part 1, para 58.
36 Exhibit 94, Part 1, para 66.

Queensland system, in the absence of a certificate of load line from a classification society, a Certificate of Compliance for Loadline is issued by an "accredited person" who has the responsibility to certify that the ship is seaworthy for load line purposes. The relevant form includes a declaration in relation to the assignment of the ship's freeboard under the relevant section of the *TOMS Regulation*, that the ship has been marked for its load line and that the ship is seaworthy for load line under the relevant Regulation on conditions that are set out by the "accredited person" in the declaration. The Queensland system operates on the basis that compliance with the *USL Code*, strictly speaking, is not a consideration for MSQ as the registration authority, that compliance with Section 7 of the *USL Code* regarding load line is a matter for the "accredited person" in issuing the Certificate of Compliance for Loadline and that MSQ should not "look behind the certificates of compliance to verify that the accredited person has complied with the relevant provisions in the *USL Code*".[37] That said, in the case of the *Wunma*, Mr Bundschuh was approached in 1999 by the "accredited person" to ascertain whether the method being used to assign the freeboard for the ship was appropriate.

[70] In reviewing the involvement of the then Maritime Safety Branch of Queensland Transport at the time (later to become "MSQ"), it is important to distinguish between:

(a) the assignment of freeboard; and

(b) conditions of assignment.

[71] Mr Bundschuh's response in 1999 concerning the method to assign the freeboard of the ship appears to have assumed that the freeboard deck for the purpose of calculating load lines was the side deck situated 7.85 metres above the baseline. Applying Section 7 of the *USL Code* by reference to that deck resulted in a freeboard that was not appropriate in that the freeboard did not take into account the recess in the deck constituted by the cargo hold. If account was not taken of the cargo hold as a void, the load line assigned would have been too high up the ship's side, allowing the ship to be loaded more deeply than was safe.[38] The freeboard that is calculated under Part 5 of Section 7 of the *USL Code* is the "geometric freeboard". An assigning authority may increase the assigned freeboard above that of the

37 Exhibit 94, Part 4, letter Mr Werner Bundschuh to the Inquiry dated 19 August 2007 paras 1.2 – 1.5.

38 Exhibit 94, Part 4, para 1.6.

geometric freeboard for safety reasons. One reason is to ensure that the ship has adequate stability in all operating conditions including the deepest loaded draft. If the relevant assigning authority assigns a freeboard that increases the freeboard greater than the calculated geometric freeboard, it does not involve an exemption from the requirements of the *USL Code*.

[72] In relation to conditions of assignment in the case of the *Wunma*, according to Mr Bundschuh, Queensland Transport received assurances that the conditions of assignment of the ship were met in two ways:

> "First, by receiving a certificate of compliance for load line. Secondly, by noting that the ship was classed and approved by Lloyds which indicated that it had treated the main deck at side which was 7.85 metres above the base line as the freeboard deck."[39]

[73] As to other design issues, as previously noted, the Queensland registration authority operates a different regulatory regime from those in other jurisdictions. It does not itself approve designs, assign freeboard or survey ships. The system of registration is based upon the receipt of certificates of compliance from accredited persons or classification societies.

[74] The difference in the regulatory system is illustrated by the fact that, according to Mr Ballantyne, the designer of the *MV Aburri* which operated in Northern Territory waters, the relevant official from the Northern Territory government was directly involved in the issue of whether freeing ports should be installed in that ship. By contrast, in the case of the *Wunma*, the Queensland registration authority did not itself consider whether the *Wunma* required the installation of freeing ports in order to comply with the *USL Code*. In the case of the *Wunma*, the Queensland registration authority assumed that Lloyd's Register, as the classification society, had addressed conditions of assignment and it also relied on a Certificate of Compliance for Loadline from an accredited person.

[75] The extent to which the Queensland registration authority was removed from active consideration of the design of the ship, let alone the kind of operational procedures discussed by Mr Kernaghan and others, is illustrated by the fact that in the case of the *Wunma*, the design was approved and surveyed by Lloyd's Register and

[39] Exhibit 94, Part 4, para 1.21.

Queensland Transport/MSQ did not obtain a comprehensive set of drawings. As Mr Bundschuh explained:

> "We weren't really in a position to get into the details that would even enable us in some cases (to) even identify some of those particular issues."[40]

[76] In the advisory role that it played in mid-1999 in making a policy decision concerning the use of the concept of an "equivalent deck", the Queensland Transport did not see the need to obtain a complete set of drawings and to understand where, for instance, freeing ports were located. It assumed that these matters were being attended to by others. The matter for its consideration was the policy issue of the assignment of load line in the case of a ship with a cargo hold running along its length.[41]

[77] In 1999 the Queensland registration authority did not have an understanding that there was an intent that water be kept on board the ship for environmental reasons.[42]

[78] It was not until about 2005 when it was considering cyclone contingency planning that Mr Bundschuh first understood that this was an issue but then only "in a very general sense" arising from discussions in which parties expressed concerns about discharge of water overboard. It was only then that Mr Bundschuh became generally aware of the issue of water being kept on board the vessel for environmental reasons. But he did not ascertain specific details in relation to the matter until after the incident in 2007.[43]

8.12 OVERVIEW OF LOAD LINE AND RELATED DESIGN ISSUES

[79] The *USL Code*, like the *International Convention on Load Lines*, seeks to ensure the watertight integrity of ships by rules known as "conditions of assignment". This includes rules that are intended to clear water that accumulates on decks via freeing ports and other arrangements. The rules also deal with closing arrangements. Their requirements depend on whether the opening is above or below the "freeboard deck", with more stringent requirements for openings below the deck that is nominated as the freeboard deck. The requirements vary between "weathertight" (as for an

40 Mr Bundschuh; T.772.
41 Mr Bundschuh; T.772.
42 Mr Bundschuh; T.754.
43 Mr Bundschuh; T.754.

"enclosed superstructure") and "watertight". Accordingly, the determination of the "freeboard deck" on the *Wunma* assumed importance in relation to the assignment of freeboard and the "conditions of assignment".

[80] A ship's compliance with "conditions of assignment" is normally considered in the course of plan approval and the ship's survey following construction. In the case of the *Wunma* the designer assumed that freeing ports were to be installed near the stern ramp.[44] But they were not. Lloyd's Register, which certified the ship's hull and machinery, advised Queensland Transport in February 1999 that it would not be issuing an International Load Line Certificate, that it assumed that the ship would be required to comply with the *USL Code* in respect of load lines and that such a load line certificate would be issued by Queensland Transport without any involvement from Lloyd's Register. Lloyd's Register apparently was not involved in discussions with Queensland Transport about the selection of the "freeboard deck" for load line purposes, or whether adequate arrangements existed to free water from the well deck in compliance with the requirements of the *USL Code*.

[81] In granting the ship's registration in 1999, the registration section of Queensland Transport assumed that Lloyd's Register played a role in assessing the watertight integrity of the vessel. Mr Bundschuh stated that watertight integrity was "integrated into their (Lloyd's) rules".[45] He noted that correspondence from Lloyd's Register had nominated the side deck that was 7.85 metres above the base line as the "freeboard deck" for load line purposes and that the provisional interim certificate issued by Lloyd's Register on 18 August 1999 certified compliance with their rules.[46] Mr Bundschuh gave the following evidence about the scope of the survey conducted by Lloyd's Register:

> "Is not the certificate limited to hull and machinery?---Well, to certify hull and machinery, which is the general term used, they also covered off all the plan approvals and surveying of the vessel which covered all compliance with their hull. Now, I regard hull as including the steel structures including the watertight doors, things like this, and in fact you may notice in some of the correspondence that we were copied in on they even asked for us, that is the issuing authority, as to whether or not they could substitute I think a watertight door in lieu of a sliding door in one particular case below deck. So there is

44 Exhibit 97; para 25.
45 Mr Bundschuh; T.745.
46 Mr Bundschuh; T.745–746.

> evidence to indicate that they addressed those issues and there is also correspondence from Lloyds actually indicating that they assigned – that they applied their rules considering the freeboard deck at side at 7.85 metres."[47]

[82] The assumption on Mr Bundschuh's part was that Lloyd's Register had verified the adequacy of conditions of assignment. That assumption may not be unreasonable to the extent that rules that are designed to ensure watertight integrity are integrated into the Lloyd's rules and the provisional interim certificate was taken as certifying the watertight integrity on the ship's hull. However, any assumption that Lloyd's Register verified, let alone certified, conditions of assignment for load line purposes as complying with the requirements of the *USL Code* is not supported by relevant correspondence in early 1999.

[83] Lloyd's Register in Shanghai facsimile 5 February 1999 advised Lloyd's Register in Sydney that the designed freeboard deck was 7.85 metres above the base line.[48] It did not address conditions of assignment for load line, anticipated that any certificate of load line would be issued without any involvement of Lloyd's Register and advised that "the watertightness below the freeboard deck for the classification purposes would form the subject of separate communication". If there was any separate communication from Lloyd's Register about this topic it was not conveyed to Queensland Transport.

[84] A facsimile from Lloyd's Register in Sydney to Queensland Transport of 16 February 1999 advised that Lloyd's Register would not be issuing an International Load Line Certificate and that it was assumed that the vessel would be required to comply with the *USL Code* in respect of load lines and that a load line certificate would be issued by Queensland Transport without any involvement from Lloyd's Register. It is not unfair to say, as Mr Kernaghan said in his report, that Lloyd's Register passed the responsibility to others in connection with the issuing of a certificate in respect of load lines. Under the Queensland system this was principally to the "accredited person" who issued the Certificate of Compliance for Loadline and indirectly, Queensland Transport which received such a certificate for registration purposes.

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47 Mr Bundschuh; T.746.
48 Exhibit 49, CB3, para 6.

[85] The adoption by the "accredited person" of an "equivalent deck" concept for the purpose of geometric freeboard calculations and assigning the ship's freeboard can be defended as filling a "lacuna" in the *USL Code* for such a type of ship. That said, sound reasons existed to question whether the side deck was a "freeboard deck" within the meaning of the *USL Code*.

[86] The alternative of applying the *USL Code* and selecting the well deck as the freeboard deck and "working up" to take account of the buoyancy provided by deckhouses above the well deck (the approach favoured by Mr Taylor) reaches roughly the same practical result as to the appropriate full load draft as the "top down" approach reflected in the "equivalent deck" concept.

[87] Accordingly, it can be said that the "equivalent deck" concept, although not contained in the *USL Code*, represented a logical and defensible approach to the calculation of freeboard/the maximum draft at which the ship could safety operate. But if that approach is taken to the assignment of load line, it has significant implications for the "conditions of assignment". On either approach to the determination of the "freeboard deck", requirements in the form of "conditions of assignment" exist for openings beneath the deck to be closed, for spaces to be either "watertight" or "weathertight" and for the location of the emergency generator room and its radiator vent. Further, and critically, the *USL Code* included requirements for freeing ports.

[88] Lloyd's Register, the "accredited person" for the purpose of issuing the Certificate of Compliance for Loadline and Queensland registration authority, assumed that it was someone else's responsibility to ensure that "conditions of assignment" complied with the *USL Code*. In fact, they did not in certain important respects that are relevant to the incident:

(a) Once it is recognised that the cargo hold constituted a well, and a potentially large one at that, the *USL Code* requirements imposed a requirement for freeing ports to ensure that water would not accumulate on the well deck.

(b) If the side decks were treated as the freeboard deck, then the emergency generator room was located below it, contrary of the requirements of the *USL Code*.

(c) In any event, the radiator vent into the emergency generator room was at a height that did not comply with the requirements of the *USL Code*.

[89] This situation reveals a significant shortcoming in regulatory arrangements that permitted the ship to be registered in Queensland. They can be summarised as follows:

(1) The "mix and match" system by which Lloyd's Register only partially certified the ship led the regulator to assume that the Lloyd's Register certificate extended to matters affecting conditions of assignment for load line purposes.

(2) To the extent that this assumption was justified, the Queensland registration authority did not assume the role of checking that arrangements for freeing of water, the location of the emergency generator room and openings at the stern of the vessel complied with the *USL Code* or, more generally, of ensuring from the design perspective, that the ship was fit for its intended area of operation.

(3) The role of the "accredited person" for the purposes of issuing a Certificate of Compliance for Loadline was not limited to simply assigning the ship's freeboard. It extended to declaring that the ship was seaworthy for load line under section 85 of the *TOMS Regulation* 1995 in restricted off-shore waters. The certificate was relied upon by the Queensland registration authority as certifying that conditions of assignment were met. Just as the Queensland authority assumed that conditions of assignment had been addressed by Lloyd's Register as part of the process of surveying and certifying the ship, the "accredited person" may have adopted a similar assumption. That is not to overlook the significance of its own declaration that the ship was seaworthy for load line in restricted off-shore waters. However, it highlights the potential problems associated with the "mix and match" approach that permitted part of the ship to be certified by a classification society that did not issue a certificate for load line purposes. Under such a system erroneous assumptions can be made that certificates issued by a classification society cover conditions of assignment for load line purposes such as watertightness below the freeboard deck when they do not.

(4) Queensland Transport accepts Certificates of Compliance, and accepted the Certificate of Compliance for Loadline dated 17 August 1999, without

perceiving that it had any role to "look behind"[49] the certificate to satisfy itself that the ship was seaworthy for load line. Such an approach may reflect the legislative scheme which is based upon an accreditation system under which it is the accredited person, and not Queensland Transport, that certifies compliance with the relevant provisions governing the matter to be certified. But it raises the question of the circumstances in which Queensland Transport should "look behind" a certificate of compliance. In the case of the design of a non-standard ship which raised issues concerning the application of the "equivalent deck" concept, it was appropriate for MSQ to seek the views of others with greater experience in relation to the assignment of load line and its implications in the case of a vessel with a novel design. This should have involved reference to Lloyd's Register concerning the implications of nominating the side deck as the "freeboard deck" for load line purposes, particularly its implications in respect of conditions of assignment.

[90] The "accredited person" that issued the Certificate of Compliance for Loadline dated 17 August 1999 was ASDMAR Pty Ltd. Although its Managing Director, Mr Ballantyne, gave evidence that he believed the ship was constructed with freeing ports in its stern,[50] the naval architect employed by that company who signed the declaration on 17 August 1999 could not have, since he had advised ISM on 1 July 1999 that freeing ports in the well deck were not essential for the safety of the ship in connection with its delivery voyage.[51] Mr Ballantyne did not recall discussing the matter with the naval architect, Mr Alston, at the time.[52] Mr Ballantyne acknowledged that it is normal practice for an open well deck to have freeing ports.[53] His evidence was that his company's design was for the *Wunma* to have freeing ports with flaps in the stern with a combined area of two or three square metres.[54] Mr Ballantyne inferred that the decision not to install them was taken during the ship's construction on the basis that their absence was not detrimental to the safety of the ship.[55] Calculations had been undertaken by ASDMAR Pty Ltd on

49 Exhibit 94, Part 4, paras 1.4 and 1.5.
50 Exhibit 97, para 25. Mr Ballantyne; T.795.
51 Exhibit 49, CB16.
52 Mr Ballantyne; T.797.
53 Mr Ballantyne; T.795.
54 Exhibit 97, para 25. Mr Ballantyne; T.795.
55 Mr Ballantyne; T.795.

swamping the whole well deck, whether in ballast or a loaded condition, and, according to Mr Ballantyne, swamping the whole well deck "still would not sink the vessel".[56]

[91] The tension between the objective of keeping water mixed with concentrate out of the marine environment, and complying with the requirements of *TOMS Regulation* in relation to load lines was captured in the following remarks of Mr Ballantyne:

> "…if you wore your environmental hat you wouldn't have the freeing ports. If you had your surveyor's hat on and were working to the letter of the law, you would have to have them."[57]

[92] In issuing a Certificate of Compliance for Loadline on 17 August 1999, ASDMAR Pty Ltd, through its employed naval architect, knew that the ship did not have freeing ports as would normally be installed in a well deck, which would be required if you were "working to the letter of the law". In this case the law was section 85 of the *TOMS Regulation 1995* that applied the requirements of the *USL Code*, including its requirements for freeing ports.[58] Perhaps the Certification of Compliance for Loadline issued by ASDMAR Pty Ltd on 17 August 1999 was influenced by the "precedent" set in respect of the *Aburri* where, according to Mr Ballantyne, the authorities initially required the installation of freeing ports, but later directed that they be welded back up in the interests of environmental protection.[59] The belief of the naval architect who issued that the Certificate of Compliance for Loadline on 17 August 1999 that freeing ports were not essential to the safety of the ship may explain his preparedness to certify that the ship was seaworthy for load line under section 85 of the *TOMS Regulation* 1995 in restricted off-shore waters. But that section applied part of the *USL Code* that required the installation of freeing ports.

[93] Under a regulatory system that revolves around certificates of compliance from accredited persons, and in which the registration authority chooses not to "look behind" such a certificate, the Certificate of Compliance for Loadline dated 17 August 1999 provided an assurance to the Queensland registration authority that the

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56 Mr Ballantyne; T.795.
57 Mr Ballantyne; T.794–796.
58 Part 2 of Section 7 of the *USL Code* relates to conditions of assignment including freeing ports.
59 Mr Ballantyne; T.794.

ship's arrangements complied with the *USL Code* concerning conditions of assignment.[60]

[94] To the extent that the Queensland registration authority had regard to ships that operated without hatch covers and adopted the policy approach of assuming that the *Wunma's* cargo hold was open to the sea, the focus of attention was upon the ship's stability. The evidence indicated that the ship had adequate reserves of intact stability to survive, even if the cargo hold was flooded.[61] Whilst a ship's stability is an essential element of safety, it is not the only element. Safety is also ensured by meeting the intent and terms of provisions in relation to load lines. In simple terms, a ship like the *Wunma* might be treated as having an open hold that, even when flooded, does not compromise the ship's stability. But the objective is to avoid her hold being flooded in the first place.

[95] Reliance was placed by Queensland Transport in making its policy decision concerning the "equivalent deck" concept upon open container ships. The development of "open-top" containerships pioneered by Don Gillies among others resulted in IMO MSC/Circ.608/Rev.1 *Interim Guidelines for Open-Top Containerships*, dated 5 July 1994. The provisions of these guidelines require, among other things tank testing to determine the maximum ingress of water into each hold in seas of "approximately 8.5m" significant waveheight and the fitting of redundant pumping systems to each open hold capable of discharging the water overboard. Under this philosophy there is a safety issue if the ship is not capable of dealing with this water ingress.

[96] In his evidence, Mr Bundschuh made reference to container ships being constructed and allowed to go to sea without any covering on them.[62] But the relevant rules[63] provide for active pumping of water ingress at a rate faster than the ingress as an alternative that was developed to freeing water through freeing ports. No such active pumping arrangements have been fitted to *Wunma*, despite the relevant IMO document having been adopted before the ship was designed and constructed. Any

60 Exhibit 94, Part 4, para 21.
61 Mr Ballantyne; T.801; T.751; T.795.
62 Mr Bundschuh; T.749.
63 IMO MSC/Circ.608/Rev.1 *Interim Guidelines for Open-Top Containerships*, dated 5 July 1994.

pumping arrangements of this type would have needed to be capable of pumping cargo slurry as well as water.

[97] Mr Bundschuh made mention of open-hatch ships for local authority use being relatively common as they are often used for dredges and hopper barges.[64] However, such vessels are not comparable to *Wunma* and do not require freeing ports as they are generally built with bottom-opening doors or split hulls, such that their cargo and any water accumulating in the hold can be readily and quickly discharged by gravity if necessary to secure the vessel's safety.

[98] The ship was not fitted with either freeing ports or active pumping systems capable of freeing water ingress into the aft well deck or cargo hold. The level of water ingress had to reach the cut-outs at the side of the stern door or the openings in the stern, all of which are approximately 6.5 metres above baseline, before it went overboard.

[99] Mr Bundschuh stated that "the watertight integrity and freeing arrangements should be such that at no stage should the load line be actually immersed in water".[65] This concept was not reflected in the loading conditions in the ship's "Trim and Stability Booklet and Inclining Experiment Report"[66] which make no allowance in the loaded departure condition for any water, either in the dirty water tanks or on the aft well deck, despite the fact that the ship is arranged and operated to collect rainwater. The ship's arrangements were such that, during the incident, the ship became heavily overloaded due to the presence in the well deck and cargo space of some hundreds of tonnes of rain water and sea water. Mr Bundschuh stated that the arrangements for accumulation of water were unknown to him and, having come to his attention, "definitely has to be attended to".[67]

[100] The frank acknowledgment in his oral evidence and witness statement that these issues need to be addressed highlights the fact that regulatory arrangements in 1999 and 2005 permitted these issues to not be addressed by Queensland Transport in registering the ship. Even in 2005, when MSQ's registration section was generally

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64 Mr Bundschuh; T.772.
65 Mr Bundschuh; T.749.
66 Located in Folder 6(2), top 71 pages (Note that this is superseded version, presumably updated in current version to reflect revised maximum draft of 3.95m)
67 Mr Bundschuh; T.754.

aware of issues concerning the retention of water on board the vessel for environmental reasons, the concern of its registration section principally was upon the ship's stability and its strength. Having received assurance from Lloyd's Register that the ship was "structurally up to standard" and assuming that load line requirements were met, MSQ's registration section upgraded the ship's registration without investigating the respects in which the ship's water management system and the retention of water on board during cyclones might affect its safety. The continuing assumption appears to have been that the design of its water management system was appropriate to avoid the collection of large volumes of water on decks, that freeing ports existed as required by the *USL Code* and that the ship's operating procedures were adequate to avoid the retention of water on board. Those assumptions may have been based to some extent upon the previous receipt of certificates from Lloyd's Register in relation to the hull of the vessel and the Certificate of Compliance for Loadline. However, MSQ did not see its role as looking behind these certificates or testing the validity of assumptions that the design and operation of the ship's water management system ensured that the ship was fit for its intended operation, including its operation in open waters avoiding cyclones once its registration was upgraded.

[101] That MSQ regarded these issues as someone else's responsibility can be seen, in part, as a reflection on the regulatory arrangements which base registration in Queensland of a ship such as the *Wunma* upon the receipt by MSQ of relevant certificates from accredited persons and classification societies.

[102] The limited role played by MSQ is shown in its response to the incident and the registration of the *Wunma* after the incident. The registration of this ship was initially suspended by the Regional Harbour Master, following which certain Restricted Use Flags were issued which, in effect, granted an exemption from registration upon certain conditions. The notice suspending the registration issued on 16 February 2007 recorded that the ingress of water into the ship's Emergency Generator Room, shorting the emergency switchboard and resulting in power failure suggested that "the watertight integrity of the ship's hull and superstructure had been compromised and as a result the ship could not comply with the conditions of assignment of its load line". MSQ instructed its Senior Naval Architect to liaise with an accredited surveyor and through the accredited surveyor with Lloyd's

Register about its requirements for the ship. The Lloyd's surveyor introduced a condition of class in an interim certificate issued on 17 February 2007 that a stormwater management plan be prepared and submitted to Lloyd's Register Sydney Plan Appraisal Centre and Flag "detailing methods to control/store discharged water during monsoonal downpours and methods employed to prevent stormwater accumulation submerging the load line". It also imposed numerous other conditions of class including that the emergency generator radiator intake be modified by fitting steel trunking and raising its ingress height 2.5 metres above its current location.

[103] In his witness statement for the purpose of the Inquiry, Mr Bundschuh recognised that water being retained in the ship for environmental reasons, together with cargo on board, must not put the ship too low in the water and immerse the load line. One way to deal with that problem is for the ship to carry less cargo during cyclone seasons and that this could be reflected by the imposition of loading conditions for operating during cyclone seasons. Mr Bundschuh indicated that if Lloyd's Register amended the loading conditions he would state them explicitly in any future registration certificate. Mr Bundschuh recognised that the other way of dealing with the potential immersion of the load line was to "manage the stormwater that has not drained off the ship".

[104] The recognition of these matters after the incident begs the question of why loading conditions for operating during cyclone seasons and the management of stormwater were not considered sooner by the relevant classification society, the ship's designer, the ship's operator and MSQ itself. Those matters will be addressed in the next Chapter.

8.13 CONCLUSION

[105] Compliance with statutory requirements for load line provided the occasion for "conditions of assignment" to be imposed to ensure the watertight integrity of the ship and to clear water that accumulates on decks. The process by which the ship was partially certified by Lloyd's Register in respect of its hull and machinery, but not certified by Lloyd's Register in respect of load line, permitted these issues to be neglected during the process of registration in 1999 and when the ship's registration was upgraded in 2005.

[106] These matters are directly relevant to the incident. One of the factors that led to the abandonment of the ship on 7 February 2007 was the loss of power and systems following the flooding of the Emergency Generator Room. This flooding took place through a radiator vent that did not comply with the *USL Code*. The location of this vent and its potential to compromise marine safety seems to have been missed by all concerned prior to the incident.

[107] If a more rigorous approach had been adopted to the ship's compliance with the provisions of Section 7 of the *USL Code* for load line purposes, then the location of the Emergency Generator Room below what was taken to be the "freeboard deck" and the location of this radiator vent in breach of the *USL Code* may have been detected at the registration stage. Having gone undetected at that stage, subsequent surveys of the ship apparently assumed that both the Emergency Generator Room and its radiator vent complied with the *USL Code*.

[108] In August 1999 when Lloyd's Register issued its provisional interim certificate in relation to the ship's hull and machinery, certain assumptions may have been made by it and others about the operation of the ship's water management system as a "first flush system" and that the ship's "dirty water tanks" were adequate to collect water that would collect in the well deck. Those assumptions were negated by the later operational experience of the ship and, in any event, were not reflected in operating procedures. In 1999, these matters may not have been foreseen by those involved in the design and construction of the ship. However, reference to the provisions of Section 7 of the *USL Code* in 1999 would have led to the conclusion that the ship's cargo hold constituted a "well" and that the *USL Code* required the installation of freeing ports to rid the well deck of any water that would collect in it. Compliance with the *USL Code* in this regard required the installation of freeing ports in the stern ramp in the location that the ship's designer, Mr Ballantyne, assumed that they had been installed. If freeing ports were not appropriate, lest they allow water mixed with concentrate into the marine environment, then some other arrangements were required to address the risk that large volumes of water, in excess of the capacity of the dirty water tanks, might accumulate in the aft well deck

[109] Insistence upon their installation so that the ship's conditions of assignment complied with the requirements of Section 7 of the *USL Code* would have brought into stark focus the competing objectives of:

(a) shedding water that may accumulate in the aft well deck via freeing ports in the interest of marine safety; and

(b) keeping water mixed with concentrate out of the marine environment.

[110] Those competing objectives remain to this day. So does the need for design solutions to address them. But regulatory arrangements that permitted the ship to be registered in circumstances in which conditions of assignment did not comply with Section 7 of the *USL Code* meant that these issues were addressed by the Queensland registration authority after the incident, not before it. The fact that it took the incident to highlight the need to address the loading conditions for operating during cyclone seasons and the operation of the ship's water management system highlights significant shortcomings in regulatory arrangements at the time the ship was first registered in Queensland in 1999 and at the time her registration was upgraded in 2005.

8.14 GALLERY

Figure 1 - The *Wunma* under Power

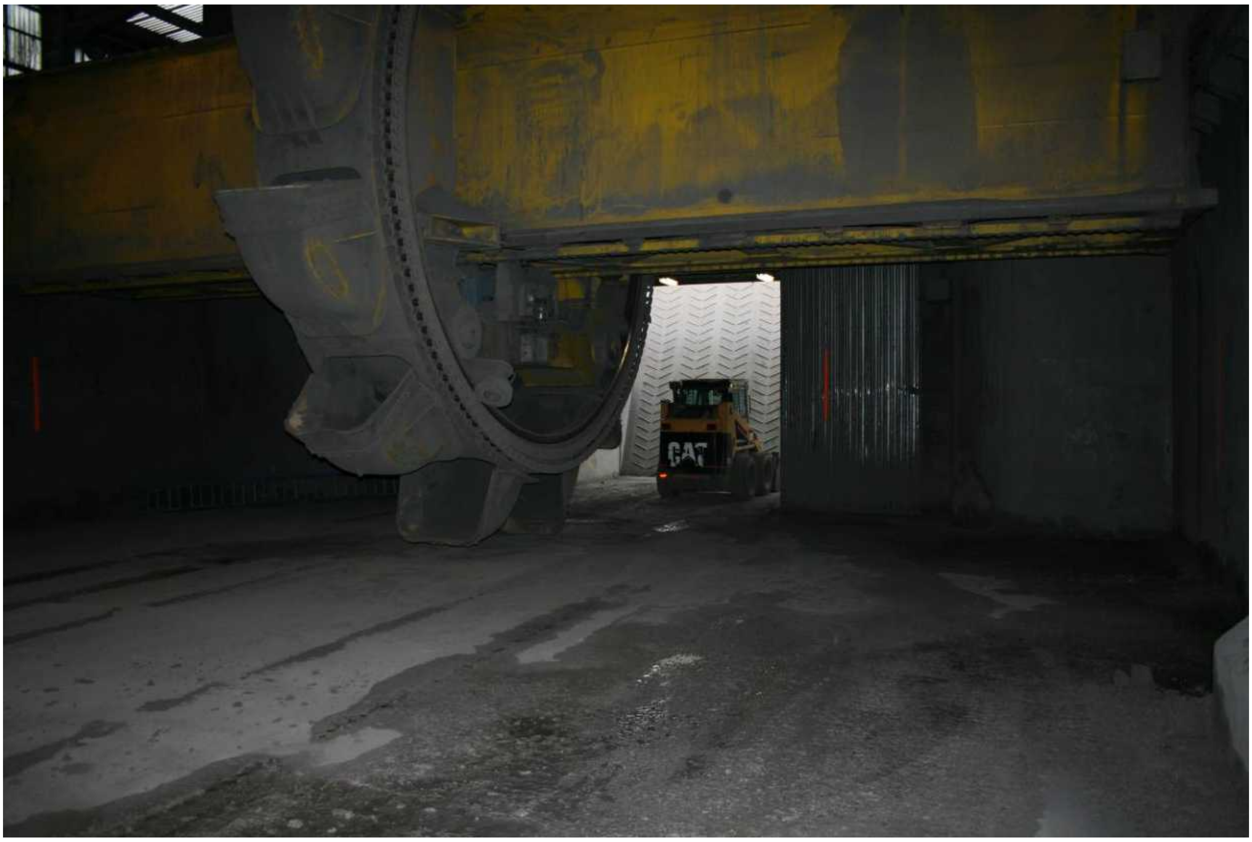

Figure 2 - View from the Cargo Hold to the Aft Well Deck

Figure 3 - The Load Line

Figure 4 - The Canopy Roof

Figure 5 - The Aft Well Deck Sump

Figure 6 - The Stern Ramp

Figure 7- The Emergency Generator Room

Figure 8 - Radiator Vent - Emergency Generator Room

Figure 9 - Emergency Generator Radiator adjacent to Vent

Figure 10 - Emergency Generator Switchboard

WUNMA BOARD OF INQUIRY

CHAPTER 9: SYSTEMIC ARRANGEMENTS AT THE TIME OF THE INCIDENT

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CHAPTER 9 SYSTEMIC ARRANGEMENTS AT THE TIME OF THE INCIDENT

9.1 OVERVIEW OF OPERATIONAL ENVIRONMENT

[1] Before addressing the events of the days immediately preceding the incident, it is appropriate to summarise the physical and operational environment in which these events were to occur.

[2] No cyclone mooring existed in the Norman River to replace or supplement the "de-commissioned" cyclone mooring at Sweers Island. In the event of a cyclone, the ship was unable to remain alongside the Zinifex wharf with extra mooring lines and other precautions, without exposing the ship's Master and the ship's manager to potential adverse consequences. These included civil liability in the event the ship or the wharf was damaged. The wharf had not been engineered to sustain the loads that might be placed upon it by the ship in the event of a cyclone. If the ship or the wharf was damaged her owner and the authorities could rely on the fact that remaining alongside the wharf after a Red Alert under the Port CCP was a breach of that plan, and that the SQS Cyclone Procedure did not include remaining alongside the wharf as an option.

[3] The option in the SQS Cyclone Procedure of anchoring off Karumba came with its limitations, given the inherent unpredictability of cyclones and the risk that a cyclone might intensify and head in that direction.

[4] The option of heading for open seas, and either proceeding to Weipa or remaining in open waters, confronted a number of difficulties:

Insufficient Searoom

- Depending on the location and path of the cyclone, there may be insufficient searoom to avoid the cyclone. The geography of the Gulf and the presence of unsurveyed areas in the Southern part of the Gulf, limited the scope for cyclone avoidance.

Insufficient Time

- Avoiding a cyclone required the ship to leave port in sufficient time. For instance, if the cyclone was expected to head towards the South East Gulf in an Easterly or South-Easterly direction, the ship had to leave Karumba with sufficient time to be well North of its expected path and the cyclone's "dangerous quadrant". The option of going to sea was only mandated under the Port CCP upon a "Blue Alert" (destructive winds forecast within 16 hours) and under the SQS Cyclone Procedure upon a "Red Alert" (when the Bureau of Meteorology has advised that a "Warning Cat 2 Alert" is effective, ie destructive winds are expected greater than 70 knots within 24 hours). If the ship waited for such an alert before leaving Port, winds might be such that the ship could not safely navigate the channel. If she could, there still may be insufficient time, given the ship's likely speed, to take effective cyclone avoidance steps.

Loading Conditions

- Ideally the ship should be unloaded to avoid the risk of being swamped. If the ship was fully loaded, the risk of seawater ingress into the aft well deck in a heavy, following sea was increased, and means to rid the ship of such water were essential. The retention of rainwater on board a fully loaded ship posed a danger of overloading. As Mr Bundschuh explained in his evidence:

> "In a full load condition if you have a water management system that relies on keeping water on board, you are then in serious danger of actually overloading the vessel. That is the context in which the water management system has to come into play to make sure that when operating in full load you are not going to keep on water that immerses the load line."[1]

Water Management System

- Similar, though not as acute, issues in relation to the discharge of water existed if the ship was not loaded. Without adequate means to store or discharge water, it would collect in the aft well deck, and enter the cargo hold.

9.2 "FIRST FLUSH" SYSTEM NOT OPERATIONAL

[5] Aspects of the ship's design, coupled with her operating practices, did not prevent water accumulating in the aft well deck. Her novel design directed rainwater onto the ship's side decks as part of an intended "first flush" system. The "first flush" system was not achieved in practice for two basic reasons. First, the presence of concentrate on decks and in drains caused side deck drains and valves to become

[1] Mr Bundschuh; T.767, T.770.

blocked, and they could not be easily unblocked. Second, even if decks and drains could be kept relatively clear of concentrate, the water that would be discharged to sea through side deck drains would be, at best, only "relatively clean". To discharge water mixed with concentrate was understood to contravene the owner's "no spills" policy, and the requirements of MARPOL. As a result, rarely were deck drains opened to the sea, and the practice was adopted of returning to port when the "dirty water tanks" were full. In any case, the capacity of side deck drains to discharge the volume of water that might be dumped onto the side decks in a tropical downpour was limited, resulting in water accumulating in the aft well deck once the "dirty water tanks" were full.

[6] The installation of freeing ports near the stern ramp, either of the kind the ship's designer, Mr Ballantyne, assumed had been installed or in some other form,[2] might have enabled the ship to rid the well deck of water. But freeing ports were not installed, presumably since the view was taken that the ship had sufficient stability without them and that open freeing ports near the stern ramp would allow "dirty water" to enter the marine environment.

[7] That the ship's water management system was unable to operate as a "first flush" system in accordance with its design intent may not have been appreciated in 1999 when the ship was first registered in Queensland. That the ship did not operate as a "first flush" system and adopted the practice of returning to port once the "dirty water tanks" were full was known by the ship's owner and operator when they sought and obtained a registration upgrade to Class 2B for the purpose of voyages into open waters to avoid cyclones.

9.3 NO RISK ASSESSMENT OF WATER MANAGEMENT SYSTEM

[8] No proper risk assessment was undertaken of the operation of the ship's water management system in open seas in cyclonic conditions, and its consequences for the seaworthiness of the ship. If they considered the operation of the ship's water management system at all, those who advocated or endorsed the proposal to allow the ship to head into open waters in cyclonic conditions seem to have assumed that the ship's water management system would be able to discharge the rainwater that

2 For instance a freeing port that could be closed with a shutter when cleaning/hosing down was in progress to contain "dirty water" on board and which could be open when required to free accumulated water that needed to be discharged to sea in the interests of safety.

the ship would collect on such a voyage and any seawater that might find its way on board in heavy seas.

[9] It may have been reasonable for some parties to assume that the ship's deck drains would be turned to the sea and that they would operate. As Mr Kernaghan stated in his expert report:

> "One would have assumed that the vessel's operating procedures should be such that the deck drains be turned to the sea so as to ensure that the water coming off the canopy and the deck was diverted to the sea and not into the well deck. This along with the release of water via the sump drain and the use of pumps from that area should have been sufficient to expel water to prevent flooding to the extent that water would breach the Emergency Generator Room. This assumes that the rainfall is not so heavy as to totally overwhelm the ability to expel water by the above methods and that the above systems are operational."[3]

[10] Inco, which managed the ship and knew that her deck drains were prone to being blocked with concentrate and that blocked valves could not be easily fixed, could not have reasonably assumed that the ship's water management system would be able to discharge the rainwater that the ship would collect on a voyage in cyclonic seas and any seawater that might find its way on board in heavy seas. Any assumption by Inco about the operation of the water management system was adopted without adequate consideration of how that system operated in practice, and how it might operate in open waters in cyclonic conditions without freeing ports or active pumping systems with sufficient capacity to remove water collecting in the aft well deck.

[11] Zinifex knew that in its normal operations the ship's water management system did not operate a "first flush" system, and that rather than direct rainwater to sea after her "dirty water tanks" were full, the ship returned to port. Further inquiries by Zinifex into the matter might have called into question any assumption that it made that the ship's water management system would be able to discharge the rainwater that the ship would collect on a voyage in cyclonic conditions. In 2004/2005 Zinifex was reasonably entitled to assume at the time of the registration upgrade that Inco and their maritime consultants had considered the design and operation of the water management system in the course of developing proposals to go to sea in cyclonic

3 Exhibit 109, p.49, para 7.7.8.

conditions, and that before upgrading the ship's registration MSQ would need to be satisfied that the ship's design and operating procedures were adequate to allow a lengthy voyage to be undertaken in cyclonic conditions.

[12] Any such assumptions on the part of Zinifex were challenged by the Thompson Clarke Operational Review in December 2006. At that stage, it was reasonable for Zinifex to rely on Inco to address these matters. There was inadequate time before the incident to implement the Thompson Clarke recommendation that a risk assessment be carried out to establish the level of risks involved under alternative scenarios and to consider the questions posed by Thompson Clarke (which included the capacity of the dirty water tanks, the ingress of water into the well deck and means to rid it). Thompson Clarke proposed that the risk assessment involve numerous parties, and such an assessment could not have been undertaken and completed prior to the incident.

[13] The registration section of MSQ in 2005 focused on the assurance received from Lloyd's Register about the strength of the ship. MSQ permitted the registration to be upgraded to enable the ship to go to sea in cyclonic conditions without adequate consideration of how the water management system operated in practice, and how it might operate in open waters in cyclonic conditions without freeing ports or active pumping systems with sufficient capacity to remove water collecting in the aft well deck. The registration section of MSQ treated this as an operational matter to be addressed by the ship's operators as part of their general safety obligations, and that such operational matters were the province of another section of MSQ.[4]

[14] Captain Cole's advice to the EPA about the relative risks of going to the cyclone mooring buoy at Sweers Island and of going to sea assumed that MSQ would look at the seakeeping ability of the ship, her power and her capacity to discharge water to sea during cyclones. His assumption was misplaced. The focus of attention of MSQ's registration section was on the ship's strength in cyclonic seas, and not her capacity to discharge water.

[15] The consultant directly engaged by Inco and indirectly engaged by the ship's owner to develop the proposal to discontinue use of the cyclone mooring at Sweers Island and to allow the ship to go into open waters does not appear to have addressed, or

been asked to address, the operation of the ship's water management system in cyclonic conditions. The operational experience that the consultant claimed justified the change in operating procedures did not include the ship's operation in cyclonic conditions.

[16] Neither Lloyd's Register nor the accredited designer, was engaged prior to the September 2005 registration upgrade to undertake an overall risk assessment of the ship's operation in cyclonic conditions**.**

[17] The review commissioned from Lloyd's Register in late 2004 was of global and local strength in cyclonic seas. There was no consideration of the operation of the ship's water management system in those conditions. The Lloyd's Register report of 25 January 2005 of the ship's strength was based on the assumption that it was unlikely that the ship would be fully loaded during a voyage in cyclonic conditions. But no written operating procedure required the ship to not load once a low pressure system that might develop into a cyclone entered the Gulf during "cyclone season".

[18] The continuing assumption from her designer seems to have been that if water entered the ship's well deck, it would not exceed the height of the "spill points" at the top of the stern door[5] and even with a swamped well deck the ship had sufficient stability. In short, the ship was strong enough and she had adequate stability even if her cargo hold was swamped. She would not sink.

[19] Mr Ballantyne agreed during his examination that the ship had the strength and stability to undertake a voyage in cyclonic conditions. [6] But his evidence was that his company did not design the ship to undertake such voyages, particularly when fully loaded.[7] He was highly critical of permitting the ship to go to sea fully loaded.[8] The role that his company played in late 2004 was to facilitate and transmit the Lloyd's Register review of the ship's strength.[9] It was involved in discussions with Lloyd's Register in late 2004 concerning the likely state of the ship in cyclonic conditions, and it is apparent that his company knew that the registration upgrade was being sought for the purpose of going to sea to heave to in cyclonic conditions.

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4 Exhibit 94, Part 1, paras 70-77.
5 The view taken prior to its delivery voyage in 1999: see Exhibit 49, CB16.
6 Mr Ballantyne; T.806; T.843-844.
7 Mr Ballantyne; T.801; T.804; T.807.
8 Statement of Stuart Ballantyne; Exhibit 97, para 50. Mr Ballantyne; T.809-810.

Mr Ballantyne was not asked to undertake an overall assessment of the ship's seakeeping capabilities in cyclonic conditions.[10] Prior to the incident he assumed that the ship's water management system operated as a "first flush" system.

[20] In August 2005 his company issued a Certificate of Compliance for Loadline and applied on behalf of ISM and the owner for the registration upgrade. The absence of any advice from Mr Ballantyne to Captain Dally and others when he was consulted in relation to the registration upgrade and attended a meeting with Captain Dally and others on 13 September 2004 about his reservations about the ship going into open seas to avoid cyclones is perplexing.

[21] Mr Ballantyne explained that if "they chose to go to a heave to that is their choice but personally I wouldn't do it."[11] He said he was not asked for his opinion and if he had been asked for his opinion he would have been quite vocal.[12] He said that the purpose of his attendance on 13 September 2004 was that the owners and Inco wanted to be upgraded to a Class 2B, and Mr Ballantyne's company was asked to check whether the vessel was "structurally capable of doing that"[13] He did not recommend that the ship should go to sea in the Gulf, whether loaded or unloaded.[14] Such a course was contrary to his original advice to the owners prior to the ship's delivery.[15] His evidence was that by 13 September 2004 a decision had been made that the ship was going to be sent to sea in the event of a cyclone, draft procedures had been prepared and submitted by Captain Dally and the only thing that was looked at for the purpose of the change was the structural aspects of the ship.[16]

[22] Inco did not adequately address the operation of the ship's water management system in cyclonic conditions. Its Operations Manager was not directly involved in the review. Its Fleet Technical Manager was overseas during the relevant period. Its Managing Director, who assumed the role of facilitating the registration upgrade and the development of new cyclone procedures, did not personally undertake any such

9 Mr Ballantyne; T.809.
10 Mr Ballantyne; T.808.
11 Mr Ballantyne; T.809.
12 Mr Ballantyne; T.817–818.
13 Mr Ballantyne; T.816.
14 Mr Ballantyne; T.807.
15 Mr Ballantyne; T.801-802.
16 Mr Ballantyne; T.808.

assessment, or a general risk assessment of the ship's seakeeping properties in cyclonic conditions.

[23] Inco had the Lloyd's Register reports on the ship's strength. The absence of expressions of concern to Inco from the ship's designer about the proposal to permit the ship to undertake voyages in cyclonic seas (which the designer assumed would be in an unloaded condition) may have induced Inco to conclude that Lloyd's Register and the ship's designers did not envisage a problem with the registration upgrade.

[24] But Inco was not entitled to assume that either Lloyd's Register or the ship's designer knew about the operation of the ship's water management system: that it was prone to being blocked with concentrate and did not operate in normal operations as a "first flush" system. There is no reliable evidence before the Inquiry that permits the Board to conclude that they knew about these things. Accordingly, Inco was not entitled to assume that either Lloyd's Register or the ship's designer had undertaken a risk assessment of the ship's performance, its water management system and its seaworthiness in cyclonic conditions.

[25] Inco may have derived support from the views that Captain Cole gave to the EPA about the relative risks of going to the cyclone mooring buoy at Sweers Island and going to sea, but further inquiry of Captain Cole would have revealed that he assumed that the capacity of the ship to effectively discharge water to sea during a cyclone was something that had or would be looked at by others in granting a registration upgrade.

9.4 NO COMPREHENSIVE RISK ASSESSMENT

[26] No-one assessed these things. More generally, no-one involved in the process of seeking and approving the registration upgrade undertook a comprehensive risk analysis of the ship's seakeeping properties in cyclonic conditions.

[27] The function of the Board of Inquiry is not to attribute or apportion blame for the fact that no comprehensive risk analysis of the ship's seakeeping properties in cyclonic conditions was undertaken. But the fact that none was undertaken and, if anyone considered the issue at the time, they assumed that it was someone else's responsibility, constitutes a systemic failure that contributed to the incident.

9.5 REGULATORY ARRANGEMENTS

[28] In part, that failure can be characterised as a regulatory failure. There is nothing inherently wrong with a system, like the Queensland system, that imposes general safety obligations and other specific obligations on those involved in a ship's operation, with the regulatory authority having the roles of registering ships on the basis of certificates from accredited persons and classification societies and enforcing the safety obligations of operators and other participants in the maritime industry.

[29] It is not the role of a regulatory authority like MSQ to draft operating procedures for ships like the *Wunma* and it lacks the resources to closely monitor the ship's daily operations. Absent matters raising concerns or suspicions to the contrary, MSQ might reasonably assume that the daily operations of a ship like the *Wunma* are being undertaken in accordance with the law, in accordance with procedures developed by a certified ship manager, and, in the case of the *Wunma*, in accordance with a safety management plan that was audited by AMSA.

[30] Shipping inspectors, including the Manager Remote Area Service in Karumba, did not inspect the ship, having many other tasks to perform, and if they had done so they probably would have deferred to the expertise of those who had developed the ship's operating procedures.

[31] MSQ's regulatory function under the relevant legislation is not to itself survey a ship, to devise the ship's operating procedures or to closely review her operations unless it has cause to do so. Its function in registering a ship does not constitute a guarantee that she will be operated safely. That obligation rests on those involved in her operation, including her owner, operator, Master and crew, and is enforced by MSQ. But the registration process should have ensured, in the words of Mr Bundschuh, "that from a design, structural and safety equipment perspective, the ship was fit to operate."[17]

[32] The issue that faced MSQ in 2004/2005 was not one concerning the normal operations of the ship between the Port of Karumba and the Karumba Roadstead. It was faced with a proposal that required MSQ's approval, namely the upgrading of

[17] Exhibit 94, Part 1, para 71.

her registration to permit her to go into open waters to avoid cyclones. Despite the advice that had been given to representatives of the ship's owners and operator in July 2004 by Captain Boath that they should consider a mooring in the Norman River and a discharge system at the wharf to cater for the occasions when the ship may be caught with cargo on board with a cyclone approaching, the ship's owner and operator had taken a different course. They had decided to discontinue use of the cyclone mooring at Sweers Island and not propose a cyclone mooring in the Norman River or anywhere else in its place. They had procured strength assessments from Lloyd's Register.

[33] MSQ was consulted and offered the opportunity to comment on proposed new cyclone procedures. The dynamic was that, under pressure from indigenous communities and representatives of native title holders who had legitimate concerns about the risks posed to the environment and their cultural, social and economic welfare by the ship's use of the cyclone mooring at Sweers Island, Zinifex had developed plans to discontinue its use, thereby relieving the EPA of the need to decide whether to require an environmental assessment. In some respects Zinifex, its consultants and Inco presented MSQ with a *fait accompli*. The owners and operators did not intend to use the cyclone mooring buoy at Sweers Island. Despite the concerns of MSQ officers such as Captain Boath, Captain Diack and Captain Watkinson about the danger this posed to the safety of the ship and her crew, those officers perceived that MSQ could not force the use of the cyclone mooring at Sweers Island. MSQ was faced with the fact that the operators and owners of the ship effectively had resolved not to use the dedicated cyclone mooring at Sweers Island, and was provided with evidence from Lloyd's Register that the ship had the strength to undertake a voyage in cyclonic seas in the Gulf. Faced with these facts, permitting the ship to voyage into open waters more than 50 nautical miles from shore can be said to have given her greater options and searoom to engage in cyclone avoidance.

[34] Ultimately, whether the ship should use the cyclone mooring at Sweers Island was a matter for the Master of the ship in the circumstances, including the prevailing sea and weather conditions, and the path and intensity of the expected cyclone. MSQ could not reasonably impose as a condition of the ship's registration, or by the proper exercise of some other power, an absolute rule that the ship had to use the

cyclone mooring in the event of a cyclone. To require her to use the cyclone mooring in some circumstances may have required her to head into trouble.

[35] MSQ acquiesced is the "decommissioning" of the cyclone mooring at Sweers Island without insisting that it be replaced by another cyclone mooring. Officers of MSQ concerned with operational matters, Captain Diack and Captain Boath, maintained their view that a cyclone mooring was essential for the safe operation of the ship. Despite their opposition to the upgrading of the ship's operation, her registration was upgraded by the grant of a restricted Class 2B registration in September 2005 by Mr Bundschuh. In doing so, the safe operation of the ship was left to the operators of the ship.

[36] If MSQ reached the view that it was unsafe for the ship to operate without a cyclone mooring buoy, then a preferable course would have been for it to insist on the owner investigating the construction of a cyclone mooring in the Norman River, and, depending on those investigations, to have a cyclone mooring installed there. If the owner refused to pursue that course and permitted the cyclone mooring at Sweers Island to expire or become inoperable, then MSQ could have contended that the ship's operators were in breach of their general safety obligation, and taken enforcement action.

[37] Instead, despite the opposition of Captain Diack and Captain Boath, the registration system administered by MSQ permitted the ship to be registered in Class 2B to undertake voyages to avoid cyclonic conditions, leaving the safe operation of the ship in open waters to those operating the ship. Given the concerns expressed by Captain Diack and Captain Boath, a different approach was called for.

[38] The registration section of MSQ should have been attentive to the operational conditions in which the ship might venture into open waters, conscious of what, if anything, prevented the ship from being caught in a loaded condition if required to do so and alive to the issue of whether an overall assessment had been undertaken of the ship's seakeeping ability in cyclonic conditions It was essential for MSQ to be satisfied that the ship had the strength to undertake a voyage in cyclonic conditions. It was equally essential for it to be satisfied that, if her cargo hold was swamped, she had sufficient reserve buoyancy and stability to remain afloat. But to be satisfied of these things was insufficient to be satisfied that the ship would be seaworthy and

safe in cyclonic conditions. For instance, the operation of the ship's unique water management system in cyclonic conditions, and its impact on the safe operation of the ship, were matters that warranted consideration. The very risk that the ship might be swamped if she went into cyclonic conditions fully loaded was another. The absence of freeing ports or an active pumping system in the aft well deck to discharge water was another. The registration section of MSQ should have considered all of these matters in deciding whether or not to upgrade the ship's registration to undertake voyages in open seas in cyclonic conditions. If the registration section was not satisfied that these matters had been adequately addressed by others, it could hardly be satisfied that the ship was fit for her intended area of operation.

[39] The registration section of MSQ in 2005 was content to rest on reports about the ship's strength from Lloyd's Register, a Certificate of Compliance for Safety Equipment (Class 2B) and a Certificate of Compliance for Loadline, leaving how the ship might safely operate in cyclonic conditions to others to devise and another section of MSQ to enforce.

[40] It might be said that this is how the system in Queensland is intended to operate, with accredited persons certifying the ship's load line and the like and the registration authority being required to act on those certificates. If this is how the system is intended to operate, it should be improved. For instance, the registration system is not concerned with the powering of a ship. If the ship has the required certificates in respect of her design, construction, load line and emergency equipment, she may be registered. The fact that she has manifestly inadequate power to avoid being blown ashore in extreme conditions seemingly is not a matter for the registration section of MSQ.[18] It assumes that no owner would commission a ship with such inadequate power.

[41] A better system would be to inject greater controls over the safe operation of a ship at the registration stage. The receipt of certificates from accredited persons or classification societies, coupled with obligations on operators to operate ships safely, may be sufficient in many cases to entitle a ship to registration. The general divide between MSQ's administration of the system of ship registration and other parts of

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18 Mr Bundschuh; T.744-755.

its administration that are concerned with the safe operation of ships is not in itself a problem. It is a sensible division of responsibilities. But at least in the case of a ship with novel design features, or applications for registration or upgrades in the registration of a ship that prompt concerns of the kind articulated by Captain Boath and Captain Diack, a more comprehensive approach to assessment of the safe operation of the ship is required at the registration stage.

[42] In the case of the *Wunma* this required a comprehensive analysis of the ship's seakeeping properties in cyclonic conditions, particularly of her water management system, prior to the grant of any registration upgrade. Such an assessment, based on the ship's actual performance, would have posed, and possibly answered, the kinds of questions raised in the Thompson Clarke Operational Review. It will be recalled that these questions included the following:

> "What height of waves might be experienced in and around Karumba?
> Partial or total destruction of the canopy by wind, sea or unsecured objects?
> What objects might become unsecured? Boats? Loading boom? Safety rails? Other internal damage of canopy covering by wind through openings at stern or on top of canopy?
> Ingress water into well deck over the stern?
> Ingress of rain into well deck?
> Ability, or otherwise, to rid well deck of water?
> Free surface effect of water in well deck and effect on stability?
> Is tank capacity for excessive rain water adequate? Overflow arrangements?
> Ability or otherwise to control the vessel in high seas given likelihood of reduced power available to avoid engine racing (ie propellers coming out of the water)?
> Have some of the crew ability and knowledge and experience to hand cyclones at sea."[19]

[43] A comprehensive analysis of the ship's seakeeping properties in cyclonic conditions would have raised the issue of whether the ship could safely go into cyclonic seas fully loaded, and, if she could not, what operating procedures or condition of registration could ensure that she not be in a loaded condition should she go to sea.

[44] It also would have raised the issue of whether the safe operation of the ship depended upon the installation of a new cyclone mooring in the Norman River in lieu of the one on Sweers Island that Zinifex proposed be decommissioned.

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[19] Thompson Clarke Operational Review, Exhibit 49, CB137, Attachment C, p.4.

[45] Ultimately, no one certified prior to the registration upgrade in September 2005 that the ship could operate safely in open seas in cyclonic conditions, especially when fully loaded.

9.6 RESPONSIBILITY FOR SAFE OPERATIONS

[46] The kinds of issues raised by the Thompson Clarke Operational Review were not only the proper concern of MSQ as regulator in granting the ship a Class 2B registration and reviewing her operating procedures. They were matters that needed to be addressed by the operators of the ship, including her owner, as part of their general safety obligations even if MSQ granted the requested registration upgrade.

[47] Practices and design features that were tolerated by them in the ordinary operation of the ship, such as blocked deck valves and the practice of not directing collected rainwater to sea, were inappropriate for a long voyage in open seas when the ship could not return to port. Contrary to the representation of the consultant to the owners and operators in December 2003, the operational experience gained in the ship's ordinary daily operations did not make a cyclone mooring unnecessary or qualify the ship or her crew to venture into open waters. In fact, operational experience showed that the water management system did not operate according to the design intent of a "first flush" system.

[48] The option of going into open waters during cyclonic conditions required a qualitatively different approach to preparing for the voyage than applied in preparing for the usual voyage in fair conditions to the export vessel at the Karumba Roadstead. Blocked drains would need to be unblocked. Valves in the side deck drains that were designed to direct water to sea would need to be operational. This is easier said than done in the light of the evidence of the time taken to service and replace them.

[49] Whatever justification existed for not installing freeing ports in the aft well deck during normal operations in the ship's normal area of operation did not apply if analysis showed that the aft well deck was likely to collect large volumes of water. In the absence of freeing ports, additional pumping facilities would be required to discharge water overboard.

[50] In 1999 ISM had described the ship as "far from a typical seagoing example" and operational experience had confirmed this fact. The owner's consultant in 1999 and

MSQ had given sworn evidence that going to sea was not a viable option and that a cyclone mooring buoy was needed for the safety of the vessel and her crew. The doubts that had been cast in the intervening years on the utility and safety of the cyclone mooring at Sweers Island by Dr Cowell and others did not detract from the force of this evidence, or make credible the claim that operational experience removed the need for a cyclone mooring. Instead, it served to highlight the need for a *new* cyclone mooring.

[51] The review of the ship's operation by Thompson Clarke Shipping which highlighted some of the shortcomings in the ship's cyclone procedures came too late for a long term solution, such as a new cyclone mooring in the Norman River to be implemented prior to the incident. But the issues identified by Thompson Clarke Shipping in late 2006 could and should have been identified by a proper analysis of the risks associated with the option of allowing the ship to go to sea in cyclonic conditions when that option was being canvassed years earlier. No proper risk analysis was undertaken by the owners and operators of the ship, or by the regulator, MSQ.

9.7 SYSTEMIC ARRANGEMENTS AT THE TIME OF THE INCIDENT

[52] In the result, as at February 2007, systemic arrangements jeopardised the safe operation of the ship in cyclonic conditions:

- A ship that was designed and initially intended to operate by having access to a cyclone mooring had no operational cyclone mooring to protect the ship, her crew and the marine environment.
- The ship's operating procedures did not reflect the sound practice of not loading when a low pressure system was in the Gulf in "cyclone season".
- The ship's SQS Cyclone Procedure and the Port of Karumba Cyclone Contingency Plan did not provide the option of the ship remaining alongside the Zinifex wharf with extra mooring lines, or the more contentious option of heading upstream in ballast and anchoring there.
- They required the ship to head to sea, but only after a certain alert status was declared when wind and tide conditions may have rendered it unsafe for the ship to navigate the channel, and in any case, when there may be insufficient time and searoom to engage in cyclone avoidance procedures against a cyclone heading in the direction of the South East part of the Gulf.

- The ship's water management system did not operate as it was designed to operate: her deck drains and valves were prone to being blocked with concentrate and, once blocked, the valves to sea could not be made operational without a major and time-consuming effort.
- The ship's design and equipment did not allow her to quickly rid herself of water that accumulated in the aft well deck.
- The ship was at risk of becoming, in effect, a receptacle for the large volume of rainwater that her water management system would collect during a long voyage in cyclonic conditions, and any seawater that she might take on board in heavy seas.
- If the ship was caught in a loaded condition when the cyclone threat eventuated, the risk to the safe operation of the ship was acute. As Mr Bundschuh explained in his evidence:

> "In a full load condition if you have a water management system that relies on keeping water on board, you are then in serious danger of actually overloading the vessel. That is the context in which the water management system has to come into play to make sure that when operating in full load you are not going to keep on water that immerses the load line."[20]

[53] A ship that had been designed to operate in coastal waters in fair weather was authorised to go into open waters in foul weather. Without an overhaul of her water management system and loading conditions, any such voyage carried the risk of the ship having its load line immersed in cyclonic seas.

20 Mr Bundschuh; T.767, T.770.

CHAPTER 10 TROPICAL CYCLONE NELSON AND THE *WUNMA*

[1] Tropical Cyclone Nelson originally formed as a tropical low near Gove on 31 January 2007. The low pressure area deepened to a tropical depression and tracked along the North Coast of the Northern Territory and into the Gulf by 1 February 2007. It continued to move through the Gulf to be near Vanderlin Island on 4 February 2007. Strong upper winds over the system made conditions unfavourable for development into a tropical cyclone.

[2] Details of the influence of the low during these days appears in the statements of Mr Ian Shepherd, a Senior Meteorologist with the Bureau of Meteorology based in Darwin,[1] Mr Jeffrey Callaghan, who heads the Severe Weather Section of the BOM in Brisbane,[2] and Mr Robert Cowle, who works for a private organization WeatherDirect.[3] The statements of Mr Shepherd and Mr Callaghan describe and attach a large number of forecasts, coastal waters warnings and tropical cyclone advices and warnings issued by the BOM in Darwin and in Brisbane during February 2007.

[3] Sea level Northwest to West winds became very strong across the Gulf on 4 February while the low that was to become Tropical Cyclone Nelson was located near the Southern Coast of the Gulf. The low commenced moving towards the East on 5 February and began to rapidly deepen as it moved into the South-Eastern Gulf.

[4] Early on 6 February the low crossed to the East of Longitude 138 degrees East, and the BOM in Brisbane assumed responsibility for the issuing of warnings and naming the cyclone. It passed to the North of Mornington Island. At 0500 hours on 6 February the low was intensifying, and conditions became favourable for development of the system into a tropical cyclone. It was officially named Tropical Cyclone Nelson shortly before 0800 hours on 6 February.

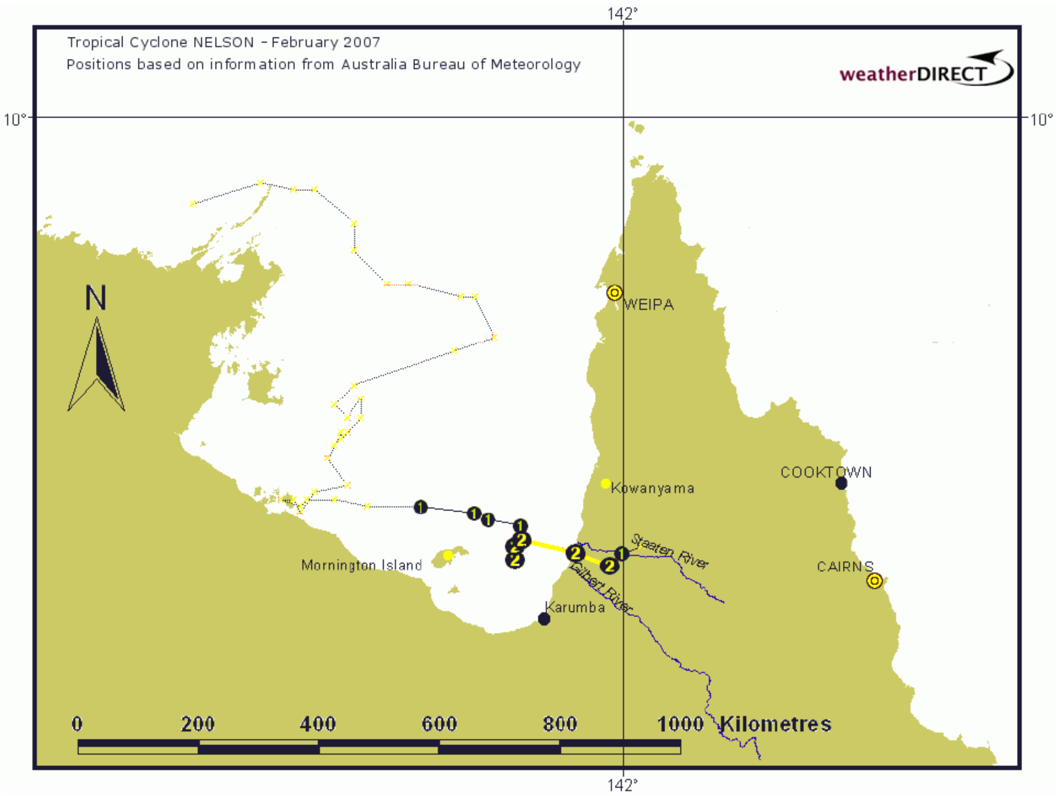
[5] Tropical Cyclone Nelson intensified to a Category 2 Tropical Cyclone on 6 February 2007 and continued in a generally East / East Southeast direction. and crossed the

1 Exhibit 78.
2 Exhibit 77.
3 Exhibit 108.

Coast between Karumba and Kowanyama just south of the Gilbert River mouth on 7 February 2007. It then moved inland in an East South Easterly direction while gradually weakening before it entered the Coral Sea near Cairns and moved steadily away from the Queensland coastline in a South Easterly direction.

[6] Information provided by the Bureau of Meteorology indicates that Tropical Cyclone Nelson was at its most intense between 1900 hours on 6 February 2007 and 0700 hours on 7 February 2007

[7] The track of Tropical Cyclone Nelson is shown in the graphic below:



[8] The track of Tropical Cyclone Nelson confirms Mr Shepherd's evidence that "cyclones in the Gulf can move very erratically".[4]

[9] The *track* of Tropical Cyclone Nelson is, of course, different from its expected *path* from time to time. Accordingly, the imposition of the track of the voyage of the *Wunma* onto a figure of the track of the cyclone needs to be viewed with that

4 Exhibit 78, para 29.

qualification. But such an exercise is helpful in depicting the relative positions of the cyclone and the ship from time to time.

[10] Prior to the hearings, the Board produced graphic representations of Tropical Cyclone Nelson and the *Wunma* for this purpose, and they became Exhibit 7. Parts of Exhibit 7 seek to isolate the position of the tropical low/ tropical cyclone and the ship at critical times. The pages that formed Exhibit 7 are reproduced in the following Gallery.

Figure 1 - Tropical Cyclone Nelson and the *Wunma* – 3 to 6 February 2007 - Overview

Figure 2 - Tropical Cyclone Nelson and the *Wunma* - 0700 Hours - 3 February 2007

Figure 3 - Tropical Cyclone Nelson and the *Wunma* – 1900 Hours - 5 February 2007

Figure 4 - Tropical Cyclone Nelson and the *Wunma* – 0700 Hours - 6 February 2007

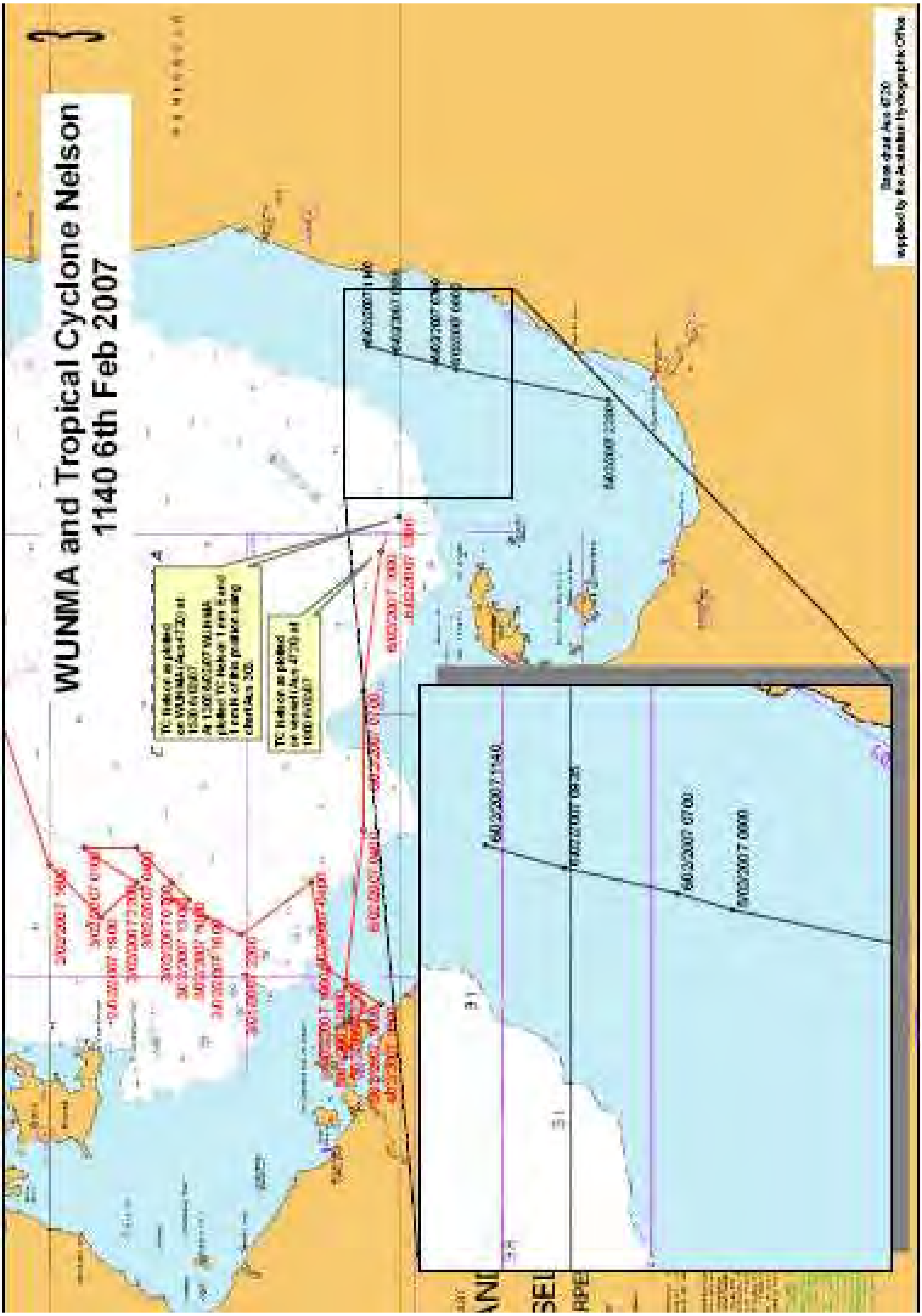


Figure 5 - Tropical Cyclone Nelson and the *Wunma* - 1140 Hours - 6 February 2007

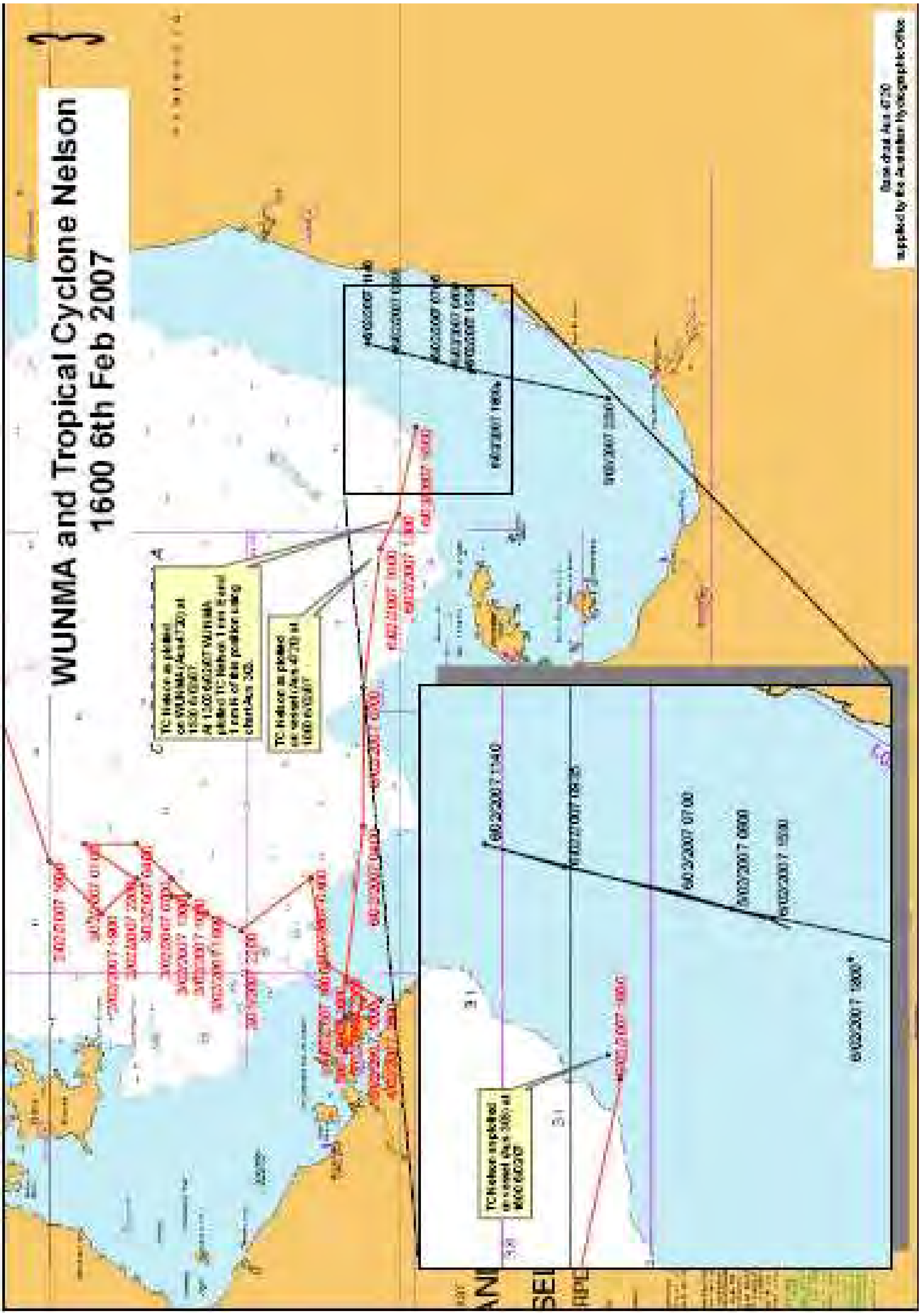


Figure 6 - Tropical Cyclone Nelson and the *Wunma* - 1600 Hours - 6 February 2007

WUNMA BOARD OF INQUIRY

CHAPTER 11 THE COURSE OF EVENTS

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CHAPTER 11 THE COURSE OF EVENTS

11.1 INTRODUCTION

[1] This Chapter examines the course of events from Monday, 29 January to Wednesday, 7 February.

11.2 MONDAY, 29 JANUARY 2007

[2] At 2120 hours on 29 January, loading of the first parcel of cargo into the hold of the *Wunma* commenced.[1]

11.3 TUESDAY, 30 JANUARY 2007

[3] The export vessel *Ernst Oldendorff* is reported to have arrived at the Roadstead at 0854 hours on 30 January.[2] At 1140 hours, loading of the first parcel of cargo (5,004 tonnes) on the *Wunma* was completed and at 1515 hours, the *Wunma* departed the Wharf for the export vessel[3] and, at 1755 hours, the *Wunma* was secure alongside.

[4] A hold survey was conducted and this was completed by 1810 hours. Thereafter, transfer of the cargo to the export vessel commenced and was completed at 2230 hours.

[5] The *Wunma* departed for Karumba at 2245 hours.[4]

11.4 WEDNESDAY, 31 JANUARY 2007

[6] The *Wunma* arrived at the Wharf at 0100 on 31 January.[5] Thirty minutes later, the loading of the second parcel of cargo (5,002 tonnes) commenced.[6] This was completed at 1130 hours and the *Wunma* departed the Wharf at 1649 hours.[7]

[7] At 1930 hours, the *Wunma* arrived alongside the *Ernest Oldendorff* and the transfer of cargo began at 2310 hours.[8]

1 Inco Shipping Summary; Exhibit 26.
2 Exhibit 26.
3 Exhibit 26.
4 Exhibit 26.
5 Exhibit 26.
6 Exhibit 26.
7 *Ibid*.
8 Exhibits 26 and 86.

11.5 THURSDAY, 1 FEBRUARY 2007

[8] Transfer of the cargo from the *Wunma* to the *Ernest Oldendorff* was completed at 0450 hours on 1 February. Five minutes later, the *Wunma* departed for Karumba.[9]

[9] The *Wunma* arrived back at the Wharf at 0645 hours and commenced loading the third parcel of cargo (5,005 tonnes) at 0719 hours. Loading was completed by 1620 hours.[10]

[10] The *Wunma* departed the Wharf at 1830 hours and was secure alongside the export vessel by 2230 hours. Transfer of the third parcel of cargo began at 2235 hours.[11]

11.6 FRIDAY, 2 FEBRUARY 2007

[11] By 0310 hours on 2 February, transfer of the third parcel of cargo to the export vessel was completed.[12]

[12] At 0330 hours, the *Wunma* departed for Karumba.[13] However, at 0420 hours the *Wunma* dropped the starboard anchor at a position some nine nautical miles from the Fairway Beacon.[14] Nothing is recorded in the deck log about why the ship anchored. Captain Seal stated that a decision was taken not to load, due to a tropical low in the South West corner of the Gulf, until "the track of the cyclone went over land".[15]

[13] There are a number of notations in the deck logbook about the weather. Between 0330 hours and midnight on 2 February, the logbook records that the barometer was steady and that the vessel had a long low swell on the beam. Wind directions varied from South East to South South East, up until 1600 hours, and between Beaufort Force 2-3 (4-10 knots). From 2000 hours until 2200 hours, the wind direction was noted to veer, from South South East to the South, and the wind strength was noted to have increased to Beaufort Force 4-6 (11-27 knots). By midnight the wind had backed to the East, Beaufort Force 5-6 (17-27 knots) with passing squalls and heavy rain.[16]

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9 Exhibits 26 and 86.
10 Exhibits 26 and 86.
11 Exhibits 26 and 86.
12 Exhibits 26 and 86.
13 Exhibits 26 and 86.
14 Deck Log – Exhibit 86.
15 Statement of Captain Seal - 26 February 2007; Exhibit 18.
16 Exhibit 86.

[14] The record of the Operational Review Meeting that occurred on the morning of Friday, 2 February[17] records as the Key Issue: "Cyclone in Gulf effecting (sic) shipping". The document noted that the *Wunma* did not comply with the program and recorded:

> "Wunma completed 3rd load but due to strong winds She can not enter channel safely. The Captain has anchored in the Gulf and will re-assess the situation as the weather becomes clearer."

The respective statements of Mr Mewett[18] and of Mr Gurr[19] state that the *Wunma* returned to Port on 2 February. But the ship's deck logbook records that the ship remained at sea throughout 2 February.

11.7 SATURDAY, 3 FEBRUARY 2007

[15] Very little information was recorded in the deck logbook for 3 February. At 0420 hours the *Wunma* commenced heaving up the anchor and, at 0515 hours, the anchor was aweigh. By 0805 hours, the ship had returned to the Wharf.[20]

[16] In accordance with the usual, daily routine, an Operational Review Meeting would have commenced at 0745 hours.[21] The "Port Daily Coms Meeting" record for that meeting indicates that the Zinifex Duty Manager was Mr Gurr (in Mr Mewett's absence) and that Mr Tonkin attended the meeting. The document records in respect of Safety/Environmental matters: "Ensured lockdown of wharf for cyclone prep". Amongst the matters planned for 3 February were "Cyclone preps". In stark contrast, in respect of the ship the following was planned for 3 February:

> "Load & export 4 of 5 MV Ernst Oldendorff."

[17] In their respective statements, Mr Mewett[22] and Mr Gurr[23] stated, in identical terms based upon the relevant minutes of the Operational Review Meetings that:

> "Prior to the incident, it (the Wunma) was last in an unloaded state on 3 February, but the decision to load on 3 February was made on 2 February."

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17 Statement of Mr Mewett, Exhibit 47, Annexure 7. The date on the document is 1/02/2007 and this reflects the fact that the purpose of the meeting on the morning of Friday, 2 February 2007 was to review the operations that had occurred the previous day and to plan operations for 2 February.
18 Exhibit 47; para 75(b).
19 Exhibit 55; para 9(b).
20 Exhibit 26.
21 Mr Mewett; T.399.
22 Exhibit 47; para 75(c).
23 Exhibit 55; para 9(c).

The minutes do not indicate when the decision to load on 3 February was made. At the time of the Operational Review Meeting on the morning of 2 February the ship was at sea and weather conditions uncertain. If a decision was made on 2 February to load on 3 February then the evidence is unclear about who made the decision and when it was made. The record of the Operational Review Meeting that occurred on the morning of 3 February indicates that there was a plan to load the ship that day. The record for that day also records that there was to be a "Weather watch"

[18] The track of the tropical low that was to become Tropical Cyclone Nelson from 1600 hours on 2 February to 0700 hours on 3 February is represented in a graphic[24] appearing at the end of the previous Chapter .

[19] At 0920 hours the loading of a fourth parcel of cargo (5,005 tonnes of concentrate)[25] commenced, and was completed at 1800 hours.

[20] During the loading procedure at 1339 hours, Captain Seal received a group email from Mr Gurr of Zinifex which provided weather information from the BOM.[26] Attached to that email was a "threat map" which provided a visual representation of the position of the Tropical Low at 1000 hours that day and its predicted course. As Captain Seal recalled, it indicated that there was a low out to sea headed in a generally South West by West direction.[27] Captain Seal agreed that "much more precise information" than threat maps is available from the BOM.[28] He said in his evidence that when alongside he "would have" viewed all aspects of the information[29] but was unable to be precise about the weather information that he viewed on 2 and 3 February and when he viewed it.

[21] Loading was completed at 1800 hours and the *Wunma* departed the Wharf at 1830 hours.[30] On arriving at the export vessel, conditions were deemed unsuitable for cargo transfer and the ship anchored to wait for conditions to abate. The starboard anchor was let go at 2330 hours.[31] No weather conditions were reported in the deck logbook for this day.[32]

24 Exhibit 7.
25 Exhibits 26 and 86.
26 Exhibit 22, Captain Seal; T.121.
27 Captain Seal; T.121.
28 *Ibid*.
29 *Ibid*.
30 Exhibits 26 and 86.
31 Exhibit 86.
32 Exhibit 86.

[22] Mr Tonkin spoke to Captain Seal by telephone as Mr Tonkin had been checking weather predictions over the internet. They "discussed what options were available to ensure the safety of the *Wunma* and her crew and also the environmental situation".[33]

11.8 SUNDAY, 4 FEBRUARY 2007

[23] The *Wunma* remained at anchor throughout the morning of 4 February.

[24] The deck logbook records that at 0200 hours the wind was from the East, Beaufort Force 4-5 (11-21 knots), with moderate seas. Similar wind and sea condition observations are recorded at 0400 hours and 0800 hours.

[25] At 1206 hours, the dirty water tanks were recorded in the deck logbook as being full and the ship commenced to heave up the anchor at 1224 hours. In the "Remarks" section of the deck log, the following was recorded:

> "V/L returned to port due to bad weather - strong winds & rough seas (3.5m swell)."[34]

[26] By 2110 hours, the *Wunma* was all fast at the wharf. The dirty water tanks were later discharged to shore.

[27] At 2312 hours Captain Seal sent an email to various persons at Zinifex and to others, including Mr Tonkin. It advised that the *Wunma* would "most probably sail tomorrow night in order to be at sea in case of a cyclone, but is unlikely to be able to discharge her cargo".[35]

11.9 MONDAY, 5 FEBRUARY 2007

[28] Nothing is recorded in the deck logbook for the first 18 hours of 5 February.

[29] Captain Seal in his statement to MSQ said that the cyclone had "crossed back into the Gulf in the morning" and that the "forecast was for the low to pass directly over Karumba".[36] He was mistaken about the first matter as the centre of the low did not cross over land.

[30] Mr Tonkin recalls:

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33 Supplementary Statement of Mr Tonkin - 22 August 2007; Exhibit 57; para 9.

34 Statement of Captain Seal - 26 February 2007; Exhibit 18. Supplementary Statement of Mr Tonkin - 22 August 2007; Exhibit 57; para 10.

35 Exhibit 25.

36 Statement of Captain Seal - 26 February 2007; Exhibit 18.

> "When the *Wunma* came in, I had several discussions with Dean after he had got some sleep. We discussed what we were going to do and looked at the cyclone procedures. Dean would have taken into account the tidal restrictions for entering and leaving the Norman River as this is necessary to ensure there is adequate water for the *Wunma* to traverse the Karumba Channel. Weather forecasts and the *Wunma*'s cyclone procedure, which is stipulated for the *Wunma* to leave Karumba, was also discussed. We both felt that there was no option but to sail and Dean subsequently took the *Wunma* out of Port on the Monday evening about 7pm and I understand his intention was to hug the coastline heading North to Weipa. His intention was not to actually arrive in Weipa but to sail in that direction."[37]

[31] Captain Seal decided to head to sea with it in mind to assess the sea conditions at the Fairway Beacon to determine whether they were suitable for discharging the cargo into the *Ernst Oldendorff* and, if they were not, to then proceed to Weipa.[38]

[32] The position of the tropical low that was to become known as Tropical Cyclone Nelson as at 1600 hours on 5 February 2007 is represented in the graphic[39] appearing at the end of the previous Chapter .

[33] At 1830 hours, the bridge gear was tested and, at 1900 hours, the *Wunma* left the wharf. At approximately 2030 hours, she passed the Fairway Beacon.[40] Captain Seal formed the opinion that the weather conditions were unsuitable for discharging the cargo. According to his statement[41] he determined to proceed to Weipa.

[34] The *Wunma* proceeded in a Northerly direction but, remarkably given that the purpose of the voyage was to avoid the cyclone, Captain Seal chose not to engage the main engine. Rather, only the outboard engines were engaged. This was probably for the reason that the *Wunma* did not have full bunkers.[42]

[35] Entries in the deck logbook for 5 February 2007[43] record only one weather observations. That was recorded at midnight and was that the wind was from the East, Beaufort Force 6 (22-27 knots) and that the ship was rolling and pitching easily in rough sea and low swell. The barometric pressure was recorded as 1,004 mb.

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37 Supplementary Statement of Mr Tonkin - 22 August 2007; Exhibit 57; paras 11 and 13.

38 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.

39 Exhibit 7.

40 As to the position of the Fairway Beacon, Thompson; T.38 and Exhibit 13.

41 Exhibit 18.

42 Statement of Mr Fisher – 2 August 2007; Exhibit 41, paras 30-34; Statement of Mr Leeson; Exhibit 45, para 6.

43 Exhibit 86.

11.10 TUESDAY, 6 FEBRUARY 2007

[36] The *Wunma* maintained her Northerly course during the morning of 6 February.

[37] Ms Osmand was the Deck Officer on watch from midnight to 0400 hours.[44]

[38] By the end of her watch the winds had built up to approximately 40 knots and were coming from an easterly direction and the seas were rough.[45] Ms Osmand recalls that the barometer was "falling steadily", but not greater than normal daily patterns. She said that more observations were needed in this regard and that she mentioned this to the Chief Mate, Mr Davis, when she handed over the watch.[46]

[39] After handing over her watch, Ms Osmand retired to her quarters and slept until 1100 hours on 6 February.[47]

[40] Mr Davis was on watch between 0400 and 0800 hours. Due to problems that he encountered with the ship's communications systems, during his watch Mr Davis did not receive any weather information.[48]

[41] Captain Seal came back onto the bridge between 0630 hours and 0700 hours and remained in charge of the ship's navigation throughout that day.

[42] The position of Tropical Cyclone Nelson and the *Wunma* at 0700 hours on 6 February 2007 is represented by a graphic[49] appearing at the end of the previous Chapter.

[43] At 0739 hours on 6 February, the low pressure system which had been present in the Gulf was named Tropical Cyclone Nelson by the BOM.[50] Cyclone Warnings and Coastal Waters Warnings and other information about weather and sea conditions were issued by the BOM that morning.[51] Remarkably, the *Wunma* did not seek to access them from the BOM or the Designated Person Ashore after telephone calls to Mr Tonkin went unanswered.

[44] Up until 0800 hours, the wind direction was Easterly and the deck logbook records wind speeds of 20-35 knots with moderate to rough seas and a moderate beam swell

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44 Ms Osmand; T.217-271.
45 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 43.
46 *Ibid*, para 41.
47 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 44.
48 Mr Davis; T.681
49 Exhibit 7.
50 Statement of Mr Callaghan; Exhibit 77; Attachment 1; p.3 of 14.
51 Statement of Mr Callaghan; Exhibit 77.

with heavy rain throughout. The barometric pressure during the morning was steady at around 1001 mb.

[45] Throughout the morning, runoff water was accumulating in the well deck. After observing accumulated water on the well deck, Mr Caletti went straight to Captain Seal to advise him.[52]

[46] According to the statement provided by Captain Seal to MSQ,[53] at around 1100 hours, he and the Second Mate opened the deck drains to sea to allow the run-off water to flow directly overboard. But the Second Mate says she did not come onto the bridge until around noon and after the ship had turned south. In his oral evidence Captain Seal confirmed that the deck drains were opened to sea.[54]

[47] At 1127 hours, Captain Seal received an email from his wife. It had attached to it a threat map depicting the position and direction of the cyclone at 0700 hours. By this time, the *Wunma* was approximately 75 nautical miles to the north of Karumba[55] and, according to Captain Seal, proceeding at about 4.5 knots. After receiving the email from his wife, Captain Seal believed that the cyclone had "picked up speed" and changed direction further to the North.

[48] Captain Seal recalled that before turning South, the wind had come around to the port bow. At 1140 hours, Captain Seal decided to take a reverse course, increase speed and make good a course for where he understood the South West quadrant of Tropical Cyclone Nelson to be.[56] The main engine, which had not been engaged, was brought online for this manoeuvre and a decision was made by Captain Seal to leave it engaged in order to steam under full power.

[49] The deck logbook records that, by 1200 hours, the wind had backed to North by West, however, no wind speeds were recorded for this time and the barometric pressure had fallen to 997 mb.

[50] By 1200 hours, water had accumulated in the well deck to a depth of approximately 50 mm and, soon after, permission was sought and granted by Captain Seal to pump the dirty water tanks overboard. Attempts were also made to open the well deck

[52] Exhibit 61, Statement of Mr Caletti.
[53] Statement of Captain Seal - 26 February 2007; Exhibit 18.
[54] Captain Seal; T.173 – the reference in the transcript should be 11am, not 11pm.
[55] Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
[56] *Ibid*.

sump drain, but it was blocked**.**[57] The First Engineer, Mr Leeson, tried to clear it with a steel cable without success.[58] Two pumps were set up in the well deck but one failed and the other lacked suction. In the meantime, the water level in the well deck continued to rise and was estimated to be about half a metre by 1300 hours.

[51] At about 1300 hours, Mr Leeson was in the mess room located below the wheelhouse when Captain Seal asked him to come up to the cargo control room. The cargo control room is located at the aft end of the wheelhouse on the starboard side.

[52] On viewing the closed circuit TV monitors of the cargo hold, Mr Leeson saw that the water level in the well deck had risen considerably and it also appeared that the pump was not moving any of the water. Mr Leeson and Mr Caletti went aft and found that the pipes in the sump drain were blocked with concentrate. The two men worked to clear the pipe and Mr Leeson decided to change over to the other pump on the system, but found that it would not work. He opened up the pump and saw that there was a problem with the diaphragm which he was able to remedy in order to make the pump operational. Mr Leeson and Mr Caletti made another attempt to clear the sump drain pipe and, whilst it cleared, would still not drain any water. By this time, the well deck had been flooded to a depth of about 0.5 m and, for this reason, he and Mr Caletti moved the bobcat into the cargo hold. The Second Mate, Ms Osmand together with the Leading Hand, Mr White, assisted Mr Leeson and Mr Caletti.

[53] Accumulated water had reached the level where it had encroached past the "barn doors' and into the cargo hold to a level of approximately 60 cm or 70 cm. Captain Seal recalls that this occurred at 1400 hours.[59] This meant that there was in effect a "wedge of water" at the stern of the vessel.[60]

[54] By 1415 hours, the high level water alarm on the 5 tonne dirty water tank sounded and was "staying on for long periods of time". By this time, the Chief Engineer, Mr Fisher recalls that the well deck was flooded to a level of about one metre and that the water level was lapping the bottom of the watertight doors to both the emergency generator room (located aft on the starboard side) and the hot workshop (located aft

57 Statements of Mr Leeson - 15 February 2007 and 2 August 2007; Exhibit 45.
58 Statements of Mr Leeson - 15 February 2007 and 2 August 2007; Exhibit 45.
59 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18, p.16.
60 Captain Seal; T.243-244. Exhibit 35.

on the portside opposite the emergency generator room). Mr Fisher also noted that seas were shipping over the stern door. Ms Osmand witnessed this and reported it to the Master.

[55] The *Wunma* made a course change at 1530 hours to the South South West and then a substantial course change to the West at 1800 hours, the motivation for these changes being concerns about the ship being pooped.[61]

[56] The relative positions of the *Wunma* and Tropical Cyclone Nelson as at 1600 hours is represented by a graphic[62] appearing at the end of the previous Chapter.

[57] Between 1200 hours and 1600 hours, the wind was recorded to be from the South East at 25 knots.[63] The barometer fell, from 997 mb at 1200 hours to 993 mb at 1800 hours. By 1800 hours the ship was reported to be pitching and rolling in very heavy confused sea and swell.

[58] At 1800 hours, a notation was made in the deck logbook to the effect that the ship's courses were various and to the Master's orders (CVTMO).[64] By about this time, the water in the well deck was about one third of the way up the watertight door to the emergency generator room.[65]

[59] At 1804 hours, Captain Seal forwarded an email to Mr Tonkin (copied to Mr Peter Iuliano and Captain Ives) which was in the following terms:

> "Just letting you know we are traveling OK. Have a fair bit of freshwater runoff down the tail end approx 1m deep. Ship in loaded condition."[66]

[60] This was the only communication Inco received from the ship prior to Captain Seal telephoning Captain Ives later that evening to advise that the vessel was in distress.[67]

[61] At around 1900 hours, a sea was taken over the stern and sea water was seen to enter the cargo hold on the port side through holes in canopy.[68] By this time, the water level in the well deck had risen to approximately 1.8 metres.[69]

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61 Captain Seal; T.186.
62 Exhibit 7.
63 Exhibit 86.
64 Exhibit 86.
65 Statement of Mr Fisher – 2 August 2007, Exhibit 41, para 42.
66 Attachment AD6 to the Statement of Captain Dally - 19 August 2007; Exhibit 53.
67 Supplementary Statement of Captain Dally - 19 August 2007; Exhibit 53; para 11.
68 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
69 Statement of Captain Seal - 2 August 2007; Exhibit 18, p.16.

[62] Shortly thereafter, Captain Seal decided to alert the Rescue Coordination Centre in Canberra ("RCC") to inform it of the position of the *Wunma* and the ship's general condition.[70] Inco was then contacted by Captain Seal, and an Emergency Response Team was formed in the office of Inco in Sydney which comprised, amongst others, Captain Dally, Captain Ives and Mr McDonald.[71] Mr McDonald kept a diary of those events.[72]

[63] According to Captain Seal:

> "The main communication was with AMSA SER Centre, Canberra and Inco Head Office, Sydney. Initial situation was communicated to SER Centre at 1930 on Feb the 6th. I don't recall the exact time I initiated communications with Inco, but it was around the same time.
>
> The information communicated to SERS included the number of POB, L pos'n and course and nature of distress. I spoke with the Sydney Office in more detail regarding the level of water in the vessel, water in the engine room and conditions.
>
> …
>
> The advice given by the SER Centre was the position of the rescue helicopters and that they would not be able to conduct operations at night in those conditions.
>
> The advice given by the Office, in consultation with Lloyd's and with the data supplied, was that the vessel was still in a stable condition at which point the SER Centre contacted me and I agreed to downgrade it to a Pan Pan."[73]

[64] Attempts were made to heave-to, but water was still coming in over the stern and, in Captain Seal's opinion, the ship was still "wallowing".[74]

[65] At approximately 2004 hours, the engine room high bilge alarm under the centre main engine sounded. Shortly afterwards the ship lost all essential circuits, an event that was recorded in the deck logbook as a "blackout"[75] occurring at 2010 hours. There was a loss of propulsion on the centre and starboard engines and, in consequence, the port engine was running on idle only. The ship also lost all navigation aids, including compass, radar, steering and engine control as well as any

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70 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.

71 Statement of Mr McDonald 30 July 2007; Exhibit 50; paras 4 and 5. And see: Statement of Captain Dally - 1 August 2007; Exhibit 53; paras 37-38. And see: Statement of Captain Dally - 1 August 2007; Exhibit 53; paras 38-40. Captain Dally; T.544-545.

72 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50. Statement of Captain Ives - 6 August 2007; Exhibit 51; para 12. Captain Ives; T.482-484.

73 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18, pp.16 and 17.

74 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.

75 Exhibit 86.

communication systems that were not backed up by battery. This was caused by the ingress of water into the emergency generator room and the arrangement and location of switchboards.

[66] At the time of the blackout, Mr Fisher and Mr Leeson were both on the aft deck. Mr Leeson recalls that there was at least two metres of water over the well deck and that the water level was approximately one third of the way up the watertight doors for both the emergency generator room and the hot workshop. He recalls that the watertight door to the emergency generator room appeared to be loose, but that he and Mr Fisher were unable to "get down to tighten the door due to the depth of water and cylinders and timber crashing from side to side in the water".

[67] Mr Fisher and Mr Leeson worked to isolate the emergency switchboard from the main switchboard. As a result, some power was restored but steering control to the main engine was lost. Thereafter, until approximately 2200 hours, steering was carried out from the emergency steering flat with the main engine clutched in.[76]

[68] Throughout this period, Mr Fisher moved between the wheelhouse and the engine room. By 2030 hours, water was flooding into the engine room from the starboard steering flat. Captain Seal granted permission to commence pumping water from the engine room bilges overboard.[77] By this time, Captain Seal had announced an evacuation call over the ship's public address system.

[69] At 2100 hours, a Mayday message was sent after Captain Seal noticed that seawater was still coming in over the stern. This message was later downgraded to a Pan Pan broadcast.[78] By this time, the water that had collected in the well deck had risen to a level of approximately 2.2 metres and was noted to be at the "edge of the ramp".[79] It remained at that level until approximately 1130 hours on 7 February 2007 when it "dropped possibly 10 cm" due to the activity of the pumps that had been supplied from the Air Sea Rescue Aircraft.[80]

[70] At 2200 hours, Captain Seal decided to drop the starboard anchor after discussing the ship's predicament with Captain Ives. At that time, Captain Seal reported that:

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76 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
77 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
78 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
79 Statement of Captain Seal - 2 August 2007; Exhibit 18, p.16.
80 Statement of Captain Seal - 2 August 2007; Exhibit 18, p.16.

> "Seawater was flowing backwards and forwards over the stern ramp progressively making the cargo heavier and increasing the stern trim."[81]

[71] At that time the *Wunma* was only about eight nautical miles from the theoretical centre of the cyclone, that is well within 30 nautical mile radius of the theoretical centre of the cyclone.

[72] At about 2215 hours, the Chief Engineer had a telephone conversation with Captain Ives over the satellite telephone system.

[73] At about 2230 hours, Lloyd's Register SERS in London were contacted by Inco and computer modelling of the *Wunma* was commenced to determine what, if any, consequences, there would be for the ship in her reported condition and, in particular, given the reported ingress of water into the well deck and cargo hold.[82]

[74] By 2300 hours, the engine room was flooded to a depth of about one metre at the aft end on the tank top and the starboard engine flywheel was picking up water and spraying it around the engine room. Mr Fisher, Mr Leeson and Mr Caletti then worked to reduce the water level in the engine room by pumping the bilges overboard.

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[75] Mr Fisher, Mr Leeson and Mr Caletti remained in the engine room, pumping down the bilges. At about 0200 hours, the ship blacked out again. As a result, and given that the battery backup for the satellite telephone was by around this time exhausted,[83] the main communication systems on the vessel failed. Captain Seal and Ms Osmand were in the process of attempting to transmit a message when the radio equipment in use made a "loud bang/hissing" noise and then "went dead".

[76] Once the main communication systems had failed, the *Wunma* was restricted to VHF radio communication and, by reason of the fact that such communications are restricted to "line of sight", the *Wunma* was restricted to communications with nearby shipping and, on their arrival, rescue aircraft.

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81 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
82 Supplementary statement of Captain Dally - 19 August 2007; Exhibit 53; para 40.
83 Captain Seal; T.173.

[77] The *Ernst Oldendorff* had decided to depart the anchorage in view of the cyclone and proceed on voyage. Some time earlier it was out of contact.[84] The *Eastern Star*, an export vessel that had been at the anchorage waiting to load once the loading of the *Ernst Oldendorff* had been completed, was requested to assist. As a result, the *Eastern Star* left the anchorage and, at about 0300 hours, she was in sight of the *Wunma*,[85] standing off at a distance of between 5 and 8 nautical miles.

[78] In the meantime, Mr Fisher attempted once again to restore power. In this, he was partially successful after running a cable from a spare circuit breaker in the main switchboard to the control console and, at approximately 0300 hours, he managed to restore some power back to the monitoring and engine control system.

[79] Given the loss of direct communications with the *Wunma*, messages from Inco were conveyed to the *Wunma* through RCC and then via the *Eastern Star*. One message that was conveyed to the *Wunma* was that helicopter assistance would be "arriving during daylight hours".[86] The Master of the *Eastern Star* was a Chinese National and it appears that some difficulty was experienced by Captain Seal and other deck officers of the *Wunma* in understanding what information was being conveyed.

[80] By about 0430 hours, the water level in the engine room had been stabilized through the action of the bilge pumps.

[81] At 0424 hours, Captain Ives spoke to the operator at RCC Canberra and told the operator that if there was no power to the vessel and she continued to flood the ship should be abandoned. Further, Captain Ives told the operator that the computer modelling indicated that if the cargo liquidates, the vessel will "sink by the stern".[87]

[82] According to Captain Seal he received a communication via the *Eastern Star* to the effect that if the water level had reached halfway up the stern ramp, the vessel would eventually sink and the ship should be abandoned.[88] The water in the cargo hold at this time was more than halfway up the stern ramp. A notation in the deck logbook reads:

> "0615 Preparing to abandon ship."[89]

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84 Statement of Captain White - 5 September 2007; Exhibit 114; para 4.9.9.
85 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
86 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
87 Exhibit 23 and Captain Ives; T.485.
88 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18, pp.20 and 21.
89 Exhibit 86.

[83] By 0700 hours, the crew had been informed that they were to abandon ship via helicopter rescue.

[84] Prior to 0815 hours, an air sea rescue plane arrived at the scene and unsuccessfully made an attempt to drop pumps to the ship.[90]

[85] Between 0930 hours and 1100 hours, a second attempt was made, the air sea rescue plane dropping four pumps, of which two were recovered and pressed into service by Mr Fisher who set the pumps up in the well deck.[91] The pumps had some effect, the water level in the well deck being observed by Captain Seal to have dropped approximately 10 cms to a level of 2.1 metres,[92] but the pumps had limited fuel supplies.

[86] The Master and crew were evacuated in two successive helicopter lifts that occurred at 1130 hours and 1300 hours respectively.[93] The first helicopter took Ms Osmand, Mr Shepherd, Mr White, Mr Rohrsheim and Mr Roll. The second helicopter took Mr Fisher, Mr Davis, Mr Leeson, Mr Caletti and Captain Seal.

[87] At 1227 hours, Inco's Emergency Response Team recorded advice that the ship still had no power, that Captain Seal was not sure how much water there was in the engine room, that the starboard anchor was down and that the engines were clutched in ahead and "holding nicely to anchor".[94]

[88] Before abandoning ship, Mr Fisher left the auxiliary generator running to allow the engine room bilge pumps to continue operating. [95]

90 Exhibit 86. Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
91 Exhibit 86. Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
92 Statement of Captain Seal - 2 August 2007; Exhibit 18, p.16.
93 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
94 Appendix I to Exhibit 114; Inco Ships Emergency Response Team hand Writeen NotesStatement of Captain White
95 Statement of Mr Fisher, Exhibit 40, para 68

11.12 GALLERY

Figure 1 - MF/HF Radio, 2 x SatComm C Units and 3 x Printers

Figure 2 - The GMDSS VHF Radio

Figure 3 - The Wunma - Waterline at the Base of the Stern Door

Figure 4 - Water in the Aft Well Deck

Figure 5 - The Hot Workshop Depicting Slurry Marks

Figure 6 - Inside the Emergency Generator Room

Figure 7 - Inside the Hot Workshop

Figure 8 - The Cargo Hold

Figure 9 - Bobcat Overturned in the Cargo Hold

Figure 10 - Debris in the Cargo Hold

Figure 11 - Port Side Gear Box

Figure 12 - Damage to the Canopy on the Port Side

Figure 13 - Port Tiller Flat

Figure 14 - Louvered Vent from the Emergency Generator Room

Figure 15 – Damage and Down Pipes and to the Port Side Deck

Figure 16 - Slurry on the Access Walkway to the Hot Workshop

Figure 17 - Slurry on the Access Walkway in the Engine Room

Figure 18 - Blocked Deck Drain - Starboard Deck

Figure 19 - Blocked Deck Drain - Port Side Deck

Figure 20 - Freeing Ports - Starboard Aft Quarter Deck

Figure 21 - Blocked Deck Drain - Port Side Deck

Figure 22 - Wooden Bung in Stern Discharge Outlet

Figure 23 – Oxy-Acetylene Bottles – Aft Well Deck

WUNMA BOARD OF INQUIRY

CHAPTER 12 CRITICAL OPERATIONAL DECISIONS PRIOR TO THE VOYAGE

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CHAPTER 12 CRITICAL OPERATIONAL DECISIONS PRIOR TO THE VOYAGE

12.1 THE DECISION TO LOAD

[1] The decision to commit the *Wunma* to a fourth load of zinc concentrate was made on 2 February or early 3 February. Based upon the minutes of Operational Review Meetings, Mr Mewett and Mr Gurr gave written statements that the decision to load on 3 February was made on 2 February. The minutes for the meeting that occurred at around 0745 hours on 2 February 2007 do not record such a decision. It is possible that a decision to take a fourth load was made later on 2 February 2007 since the Operational Review Meeting that occurred at around 0745 hours on 3 February 2007 records that a fourth load was planned for 3 February.[1] Captain Seal, in his evidence to the Inquiry, stated that the decision to load would have been made at least one to two hours and "most probably quite a bit before" loading commenced at 0920 hours on 3 February 2007.[2] As previously noted, it is difficult to pinpoint who makes the decision to load: it is possible to say that it occurs at the Operational Review meeting but the Master can decide to not load.

[2] Captain Seal's evidence is that typically the decision to load involved the Zinifex Duty Manager, Mr Tonkin and himself. Captain Seal said that he would not have been surprised if the decision to load the ship was made the previous day, but did not recall being involved in the decision, only that he "agreed to it".[3] Any decision to load the *Wunma* required the Master and the Operations Superintendent to gather adequate information about the location of the tropical low in the Gulf.

[3] It is necessary to analyse the evidence about the decision to load and the information on which it was based.

[4] The matter is complicated by the fact that very late in the Inquiry, and after some submissions had been received in relation to these matters, Captain Seal submitted a Second Further Supplementary Witness Statement dated 1 November 2007. This

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1 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 75(c). Statement of Mr Gurr; Exhibit 55 and the Annexures to that statement. Annexure to that 7, being a copy of the relevant Minutes of the Operational Review Meetings. Mr Mewett; T.383. Mr Gurr; T.586-589. Mr Mewett; T.397-403. Mr Mewett; T.437-438.

2 Captain Seal; T.191.

3 Captain Seal; T.191.

statement seeks to correct previous evidence given by Captain Seal in his witness statement dated 2 August 2007 and in his oral evidence about the state of his information and belief when he agreed to load the *Wunma* on 3 February 2007. The Board is conscious of the fact that this statement was not the subject of cross examination, and was given in response to submissions from Counsel Assisting that were critical of his earlier evidence. This makes it necessary to review Captain Seal's evidence and other evidence is some detail in order to determine if the evidence given in his most recent statement should be accepted.

[5] In the Supplementary Statement dated 2 August 2007 Captain Seal stated that he "agreed" to load the *Wunma* on 3 February because he was informed by email from the Port that the low had crossed over land near Bing Bong and that the Cyclone Warning had been cancelled.[4] Captain Seal stated that he:

> "informed the Port Manager on duty at the time that we wouldn't be loading again till the cyclone passed. The cyclone crossed over land near Bing Bong and the warning was cancelled. The Port informed via email that the cyclone had crossed over land, and I agreed to load the vessel."[5]

[6] No email containing such advice was produced to the Inquiry. The possibility that Mr Gurr or someone else in the Port sent Captain Seal an email before loading commenced on 3 February to the effect that the cyclone was *expected* to cross over land cannot be excluded. About six hours after loading commenced on 3 February Mr Gurr sent a general email that attached a "threat map". The email was sent at 1339 hours and stated "it would appear that the progress of the Low has slowed down". The attached "threat map" anticipated that the low would cross the coast at around 0400 hours on 4 February. But it also made clear that the low was still well out to sea.

[7] In support of his account of events, Captain Seal's main witness statement of 2 August 2007 included an email sent by Mr Gurr which contained information issued by the BOM in Darwin. There were however at least three difficulties with reliance on that email as a basis for his decision, or agreement, to load the *Wunma*:

- First, the low did not cross over land.

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4 Exhibit 18.

5 Annexure B to the statement of Captain Seal - 2 August 2007; Exhibit 18.

- Secondly, the email was sent by Mr Gurr at 1919 hours on 3 February – 10 hours after the ship had commenced loading, after the ship had departed the Port on its voyage; and
- Thirdly, whilst the email communicated the cancellation of the Cyclone Warning, it advised that a Cyclone Watch was in effect and gave the position of the low. It mentioned the possibility of a tropical cyclone developing and that small gales could develop if the low remained over the water.

To the extent that the email is supportive of Captain Seal's decision to load, it relates to where the low was expected to travel, not where it was. There is no evidence that the email was received on board the ship on the night of 3 February.

[8] In Captain Seal's Second Further Supplementary Witness Statement dated 1 November 2007 he seeks to correct the evidence given in his witness statement dated 2 August 2007 and in his oral evidence to the effect that:

- His agreement to load on 3 February 2007 was based on a belief that he held that the low had crossed land;
- His belief was based on the email from Mr Gurr sent at 1919 hours on 3 February 2007;
- He may have misread or misinterpreted weather information prior to agreeing to load.

He says that following discussions with Mr Tonkin on 2 and 3 February 2007 he agreed that the ship would commence loading on the morning of 3 February 2007 because the low pressure system was predicted to cross land near Bing Bong, and therefore was unlikely to pose a threat to the ship's operations. Captain Seal says that at no time did he believe that the low pressure system had, in fact, crossed land. He says that his understanding that the low pressure system was predicted to cross land was based on BOM weather information that he obtained on 2 and 3 February and that this information was not limited to documents saved on the hard drive of the ship's computer but also comprised documents he printed directly from the BOM website and placed next to the ship's computer. The BOM weather information was said to include "threat maps" showing that the low pressure system was predicted to cross land on 4 February and move inland.

[9] The critical issue is what weather information Captain Seal as Master and Mr Tonkin as Operations Superintendent had when the decision to load was made,

and at the time loading commenced at 0920 hours on 3 February. Any information at those times would have placed the low at sea in the southern part of the Gulf. This appears from the graphic at the end of Chapter 10 showing the position at 0700 hours on 3 February 2007.

[10] Captain Seal knew that the behaviour of cyclones is erratic and that this was "all the more reason to take special care before deciding to load the vessel",[6] and he agreed that, had he not misread the information, he would not have loaded the vessel.[7] Whilst he could not recall precisely what information he had regarding the low on 2 February or the morning of 3 February,[8] he could neither point to nor produce any other weather information to support his decision to load.

[11] In his oral evidence at the Inquiry, Captain Seal conceded that, because loading had commenced at 0920 hours on 3 February, it was possible that the decision to load was made on the previous day, that is, 2 February.[9] He said that the decision was made by him in consultation with Mr Tonkin and Mr Gurr or, at least, they would typically be involved in such a decision.[10] If the decision to load was made on 2 February, it was most likely made at the Operational Review Meeting at approximately 0730 hours on that day.[11] However, Captain Seal could not recall having been consulted about that issue on 2 February, although he conceded that was possible.[12]

[12] In the end, Captain Seal said in his oral evidence that:

> "We sort of got to the point that it was decided ashore and then they sought clarification that it was okay to load with me. There was some discussion about that. I really can't recall the exact goings-on with the load, the decision to load."[13]

[13] Captain Seal's oral evidence to the Inquiry was to the effect that he "would have" read weather information before agreeing to load.[14] It provided no detail about what

6 Captain Seal; T.162.
7 Captain Seal; T.237.
8 Captain Seal; T.237, T.240.
9 Captain Seal; T.191.
10 Captain Seal; T.191, T.203.
11 Captain Seal; T.191-192.
12 Captain Seal; T.192.
13 Captain Seal; T.237.
14 Captain Seal; T.121.

this information was or when he read it. Captain Seal agreed that it was he who "finally determined that it was in order to load the *Wunma*".[15]

[14] Mr Tonkin gave evidence that at the time he discussed whether or not the ship should be loaded, he and Captain Seal both knew that there was a "low in the Gulf".[16] Although he knew that weather conditions "can change quite quickly in the Gulf" and that storm systems can "track erratically", he did not feel that there was "any impediment to load".[17] Captain Seal would obtain the weather information for the basis of these discussions and interpret it or, as Mr Tonkin put it, "decipher" that information.[18] If Mr Tonkin had been asked by Captain Seal to provide weather information to the vessel, he would have been able to do so.[19]

[15] There is a lack of precision in the evidence of Captain Seal and Mr Tonkin about the weather information that they had when they discussed whether the ship should be loaded and when that discussion occurred. But there cannot have been any information from the BOM that indicated that the system had "crossed over land" and for that reason was no longer a threat to operations. Nor is there any reliable evidence to suggest that Captain Seal or Mr Tonkin took reasonable steps to obtain and analyse current weather information.

[16] Captain Seal's initial reconstruction of events in his main witness statement was that he was told that the low had passed over land. But there is no evidence that supports this, and Mr Gurr's email of 1339 hours on 3 February or access to BOM data during the loading process would have disabused him of any such belief.

[17] Captain Seal agreed in his oral evidence that he may have been affected by fatigue when he saw a threat map that predicted that the weather system would go over land and may have misread it as to whether it had or had not crossed the land.[20] Whether he did so is a matter of speculation. It is equally possible that he saw a threat map prior to or during the course of loading on 3 February 2007, correctly read it and expected that the low pressure system would behave, as predicted, and go over land.

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15 Captain Seal; T.237.
16 Mr Tonkin; T.600.
17 Mr Tonkin; T.600.
18 Mr Tonkin; T.604.
19 Mr Tonkin; T.605.
20 Captain Seal; T.238.

In any event, he could not recall when giving oral evidence precisely what information he had regard to on 2 February 2007 or the morning of 3 February.[21]

[18] The imprecision in Captain Seal's evidence left him open to the suggestion that he misread a threat map and interpreted it as indicating that the low had already passed over land. The suggestion that Captain Seal misread an email prior to loading and believed that the low was over land may be thought by some to place him in a better light than the suggestion that he loaded the ship when he knew the low was still over the sea. Captain Seal allowed the former suggestion to be left open in his oral evidence. But it is probable that, as Mr Tonkin said, they knew there was a low in the Gulf, and Captain Seal made a prediction, in accordance with BOM forecasts, that the low would move towards the Northern Territory coast and cross it.

[19] The unsatisfactory nature of Captain Seal's evidence, and the inconsistency between parts of his earlier evidence and the evidence given in his Second Further Supplementary Witness Statement dated 1 November 2007, warrants a careful review of his evidence, and the rejection of parts of his earlier evidence which cannot be reconciled with contemporaneous documents. It also requires the Board to have regard to other evidence, such as Mr Tonkin's evidence, that he and Captain Seal knew that there was a low in the Gulf.

[20] Captain Seal's initial witness statements and his oral evidence about what he knew and where he understood the low pressure system to be at the time of loading are generally unreliable. Parts of his evidence in this regard are contradicted by contemporaneous documents. He has now resiled from that evidence. The evidence to the effect that a decision was made not to load until the cyclone had passed over land and the suggestion that he may have misread a threat map should not be accepted. At best, this evidence was a flawed reconstruction of events. At worst, it was evidence given without any reliable recollection so as to give the impression that he was a party to a decision that conformed with what is obviously a sound practice, namely not to load when a low pressure system is still over water.

[21] The rejection of Captain Seal's earlier evidence does not necessarily mean that his Second Further Supplementary Witness Statement should be accepted. To the extent that it corrects previous evidence that has been shown to be unreliable, then his

21 Captain Seal; T.237, T.240.

Second Further Supplementary Witness Statement should be accepted. However, other parts of it, which have been untested by cross examination, assert that he had regard to weather information on 2 and 3 February 2007 from a number of sources. This evidence is hard to reconcile with his oral evidence which was vague about the weather information that he had regard to when allowing the ship to be loaded. It probably amounts to evidence of what Captain Seal thinks that he would have read and done, rather than being a genuine recollection.

[22] Nevertheless, it is probable that on late on 2 February or early on 3 February, Captain Seal had regard to some weather information about the low pressure system, and any weather information to which he had regard at the time would have shown the low to be out to sea. If he read a track map or consulted weather information from the BOM then that information may well have predicted that the low was moving in the direction of the Northern Territory coast.

[23] Having reviewed the evidence, the Board finds that the decision to load the ship on the morning of 3 February was made, and agreed to by Captain Seal, when Captain Seal and Mr Tonkin knew that the low was still over the Gulf, but predicted that it would cross over land. Such a prediction took inadequate account of the known erratic behaviour of cyclones in the Gulf.

[24] The decision to load is important. As Mr Mewett explained:

> "Once the *Wunma* is loaded, she can only discharge into a bulk carrier. Because of the design of the Wharf, the onshore loading mechanism and the *Wunma* discharge mechanism, there is no way she can discharge at Karumba. The onshore loading mechanism cannot be reversed. In any event, it is not designed to collect material being discharged. The Wharf is in L shape and not wholly connected to the land. If the *Wunma* was to attempt to discharge onto the Wharf, much of the concentrate would end up in the river, either directly or by being blown in."[22]

[25] Once the decision to load was made and confirmed by the decision to commence loading at 0920 hours on 3 February, the ship was not able to unload its cargo short of a successful discharge to the export vessel at the Roadstead. As such, the decision to load was a significant contributing cause of the incident.

[22] Statement of Mr Mewett - 9 August 2007; Exhibit 47; paras 78. Mr Mewett; T.394-395.

[26] Given the state of the evidence, it is impossible to reach any reliable finding about whether Captain Seal had regard to a "threat map" prior to agreeing to load the ship on the morning of 3 February or had reference to BOM coastal waters warnings and other information. At 0345 hours on Saturday, 3 February the BOM issued a Coastal Waters Wind Warning for eastern Gulf waters. The synoptic situation was as follows:

> "A Tropical Low in the SW Gulf of Carpentaria moving SW towards the Northern Territory coast may develop into a tropical cyclone during the morning. Fresh to strong NW monsoonal flow to the north of this low.
>
> Gale Warning
> Gulf waters west of Mornington Island
> N/NE winds 25/33 knots, possibly increasing to 30/40 knots during the morning.
> Seas rising to 3.5 metres. A 2.0 metre NW swell.
>
> Strong Wind Warning
> Elsewhere over Eastern Gulf waters
> N/NW winds 25/33 knots. Seas rising to 2.5 metres on a 1.5 to 2.0 metre NW swell."[23]

[27] Captain Thomson gave evidence to the Inquiry to the effect that he would not have loaded the ship given the existence of the forecast because he knew the area.[24] Indeed, he said that such a forecast represented "alarm bells" provided one understood "the area".[25]

[28] Subsequently, when Captain Ives learned that the ship had been loaded in the presence of a low in the Gulf, he was "surprised."[26] He agreed that it was a sensible practice not to load in those circumstances, although that procedure was not recorded anywhere. He agreed that was a deficiency in the written procedures for the vessel.[27]

[29] In summary, the decision commit to loading was made and agreed to by Captain Seal when a tropical low with a potential to develop into a tropical cyclone was over the waters of the Gulf. To the extent that it was made or confirmed at the Operational Review Meeting that occurred at around 0745 hours on 3 February, it

23 Statement of Mr Callaghan - 23 August 2007; Exhibit 77; Annexure B; p.7/27.
24 Captain Thomson; T.73-74, T.88.
25 *Ibid*.
26 Captain Ives; T.478.
27 Captain Ives; T.478, 480.

was made at a time when the wharf and port facility planned cyclone preparations for that day. Captain Seal was not at that meeting. Mr Tonkin was. The Zinifex Duty Manager later that day at 1339 hours issued a cyclone tracking map that showed that the low was still well out to sea and reported that its progress had slowed down. This suggests that earlier emails or discussions had monitored its progress and predicted that the low would cross over land. It is difficult to conclude what weather information either in the form of Zinifex group emails or information from the BOM information or other sources that Captain Seal and Mr Tonkin had in their possession and relied upon when, as it were, the "final decision" was made shortly before 0920 hours on 3 February that loading should commence.

[30] The provisional and final decisions to load were made on the basis of a *prediction* about where the low was expected to go, and not on the basis of an analysis of where it was: still over water. But such weather systems are, by their nature, unpredictable and Captain Seal knew that they can track erratically. The decision to commence loading at 0920 on 3 February, and to continue loading that day, was a result of inadequate attention to weather information that was available to Captain Seal as Master and Mr Tonkin as Operations Superintendent.

[31] Inco's submissions to the Inquiry seek to deflect criticism of the absence of any prohibition in the ship's operating procedures against loading when a low pressure system is over Gulf waters in "cyclone season". Inco points to what it describes as the "minimum requirement" contained in its SQS cyclone procedure to cease loading in the case of a Blue Alert and says that "otherwise the matter is left to the judgment of the Master".[28] Inco submits that a prohibition in the SQS against loading when there was a low in the Gulf would have made no difference to Captain Seal's decision because his decision to load was based on his belief, albeit mistaken, that the low had crossed the coast.[29] It submits that Captain Seal was adhering to a practice consistent with what critics of the Inco SQS contend should have been expressly stated in it, but that he erred in thinking that the low had crossed onto land. Its submissions seek to disclaim responsibility for the failure to obtain and monitor current weather information and contend there is no reason to criticise Mr Tonkin

28 Inco's submissions; para 3.1.3.
29 Inco's submissions; para 3.2.2.

for “any failure by the Master to keep himself up to date with the weather conditions or forecast”.[30]

[32] It is true that the Master has a major responsibility to monitor weather information. But under the SQS cyclone procedure the Operations Superintendent had a responsibility for the operation of the ship in Karumba. Under the SQS cyclone procedure and more generally both the Operations Superintendent and the Master had a responsibility to monitor weather information. Incidentally, the Operations Superintendent was obliged to communicate with Head Office on a regular basis to keep them advised of cyclone activity in the region.

[33] The criticisms that can be made of Captain Seal’s analysis (or lack of analysis) of available weather information do not justify Inco’s cyclone procedures at the time of the incident. The fact that Captain Seal did not follow the practice of other Masters in not loading when a low was over the waters of the Gulf is, in part, because this practice was not reflected in Inco’s operating procedures. Inco’s submissions, and Captain Dally’s evidence, was that the matter was “left to the judgment of the Master”. To the extent that Captain Seal made an error of judgment in loading the ship when he predicted that the low would head over land, it was an error that Inco’s written operating procedures permitted him to make. Appropriate loading procedures in the SQS would not have permitted Captain Seal and Mr Tonkin to allow the ship to be loaded. The appropriate procedure was reflected in the practice of Masters such as Captain Thomson and Captain Dunnett and was reflected in Captain Daniel’s email of 22 September 2005. If it had been in Inco’s operating procedures, and applied by Captain Seal and Mr Tonkin on 3 February, the ship would not have been loaded.

[34] Inco’s “minimum requirement” to cease loading in the case of a Blue Alert simply was not good enough. Its prohibition on loading came far too late.

[35] Captain Seal’s reconstruction of events led him initially to assert that he was informed by email that the low had crossed the coast. No email has been provided which said that. As earlier noted, it is possible that Captain Seal misread a threat map and mistakenly believed that the low had crossed the coast. His oral evidence

30 Inco’s submissions; para 3.3.3.

left this open as a possibility.[31] But it is more probable that Captain Seal based his decision to load on information about where he and others predicted the low would go, not where it was. Those predictions took inadequate account of the known erratic behaviour of tropical weather systems. Captain Seal made an error of judgment in permitting the ship to be loaded on 3 February on the basis of a prediction about where the low would go. The inadequate "minimum requirement" contained in Inco's SQS permitted him to make that error of judgment.

[36] Captain Seal was not the only person who made a decision to load based on a prediction of where the low was heading. He was the last. The plan to load was made and confirmed at meetings onshore and Inco's Karumba Operations Superintendent was involved in that plan. Captain Seal had the opportunity to not agree with the plan that had been discussed and recorded at the Operational Review Meeting on the morning of 3 February. In circumstances in which Mr Tonkin was not guided by a written operating procedure that prohibited loading when a low was situated in the Gulf, when he was not informed of the practice that had been adopted by his predecessor and in circumstances in which he deferred to decisions by the Master of the ship, his failure to adequately monitor the presence of the low in the Gulf and prevent the ship from being loaded cannot be heavily criticised.

[37] A better written procedure by Inco would have removed the potential for error by compelling compliance with the sound practice of not loading when such a weather system was over the sea. Even if it be assumed that Captain Seal misread weather information and wrongly assumed that the low had crossed land, an improved procedure would have been applied by both the Operations Superintendent, who had responsibility for the operation of the ship in Karumba including decisions to load it, and the Master. An improved procedure, reflecting the sound practice of previous Masters and the practice described by the previous Operations Superintendent, would have led to a decision by the Operations Superintendent to not load. The occasion for Captain Seal to make his "final decision" to load on the morning of 3 February would not have arisen. The operation of a sound cyclone procedure would not have led Captain Seal to make the error of judgment that he did. The ship would not have been loaded on 3 February.

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31 Captain Seal; T.160, 237-238.

[38] The absence of a written operating procedure that would have prevented the ship from being loaded when a low pressure system, with the potential to develop into a cyclone, was in the Gulf, contributed to the loading of the ship, and therefore to the incident

12.2 THE DECISION TO RETURN TO PORT

[39] The attempt to discharge at the Roadstead on the evening of 3 February was unsuccessful. The *Wunma* was then anchored for over 12 hours in the prevailing weather conditions until noon the next day when her dirty water tanks had filled around midday. A decision was made to return to Port.

[40] The alternative to embark upon the northerly voyage he was to commence a little over 18 hours later instead of returning to Port was not pursued. Captain Seal had experienced the worsening sea conditions (over two voyages – on the nights of 2 and 3 February). Captain Seal does not contend that this "bad weather" - strong winds and rough seas with a 3.5m swell – was the reason the ship returned to Port. It was so that the dirty water tanks could be discharged.[32] The decision to return to Port courted the risk that the low would develop into a cyclone, and quickly. Returning to Port to discharge the dirty water tanks would relieve the ship of a relatively small amount of weight, but delay the ship's departure from Port until the "tidal window" on the evening of 5 February.

[41] Captain Seal later explained his decision to return to Port was based on regulations not to "dump dirty water" at sea. He wrote to Captain Dally a few months after the incident:

> "It would have … been prudent to leave earlier. However due to the regulations imposed on me not to dump dirty water at sea and the fact that when the Wunma re-entered the port it was still a tropical low and had not developed into a cyclone I did not consider the act of dumping the water to be justified. I was then significantly delayed by tide due to the vessel being (in) a loaded condition."[33]

[42] The operation of the water management system and adherence to a "no spills" policy placed Captain Seal in an awkward situation. The water management system did not operate as a "first flush" system permitting Captain Seal to direct rainwater to sea.

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32 Statement of Captain Seal - 26 February 2007; Exhibit 18. And see: Supplementary Statement of Mr Tonkin - 22 August 2007; Exhibit 57; para 10.

33 Exhibit 19.

Captain Seal must have appreciated that further rainfall would lead to the accumulation of water in the well deck of an already loaded ship. But on 4 February the ship was not in distress and the course of emptying the dirty water tanks at sea would have been a bold step to take in terms of MARPOL prohibitions on the discharge of cargo and adherence to what the crew described as the "no spills" policy.

[43] That said, returning to Port to empty the dirty water tanks might provide only a short-term postponement of the difficulty in which any Master of the ship was placed by systemic deficiencies on the ship's safe operation in cyclonic conditions. Returning to Port and emptying the dirty water tanks would increase the capacity of the ship to store rainwater once it went to sea again. But depending upon the intensity and duration of the rain that it would collect during that voyage and the operation and capacity of deck drains to direct rainwater overboard, the dirty water tanks might fill again in a relatively short time.

[44] In retrospect, the decision to return to Port to discharge dirty water tanks provided limited benefits in terms of weight reduction and the additional capacity created in the emptied tanks. In retrospect, those benefits were greatly outweighed by the delay in heading North. But the decision was made partly as the result of design and operational deficiencies for which Captain Seal had no responsibility and could do little to alter.

[45] Had Captain Seal decided to steam North instead of returning to Port, the *Wunma* would have been well clear and to the North of the track of the cyclone by 6 February.

[46] It might be suggested that it was necessary to return to Port to ensure that the ship was fully bunkered or otherwise prepared to avoid a cyclone at sea. But these preparations should have been undertaken before the *Wunma* loaded on the morning of 3 February and sailed on the evening of 3 February.

[47] These matters concerning the decision to return to Port on 4 February and the significant delay it caused in the ship being able to sail North to avoid the threatened cyclone serve to reinforce the significance of the decision to load on 3 February. That earlier decision placed the ship in the situation of being unable to discharge into

the export ship due to deteriorating sea and weather conditions. Once the dirty water tanks were full a difficult decision had to be made to:

- Return to Port and pump them out in accordance with the usual practice; or
- Stay at sea either at the Roadstead or by voyaging North.

The first option may have been the natural and logical choice in normal conditions. But in the face a weather system that had the potential to develop into a cyclone, the decision to return to Port significantly delayed the attempt to avoid the threatened cyclone.

[48] This does not mean that Captain Seal should be criticised for deciding to return to Port. His decision carried potential adverse consequences, which came to be realised. But his decision to return to Port was largely the product of systemic problems in the design and operation of the ship's water management system. Whatever practice earlier Masters such as Captain Thomson may have engaged in once the dirty water tanks were full, the SQS gave no guidance about appropriate operating procedures in such a situation. The practice approved by the ship's manager and owners was to return to Port once the dirty water tanks were full. In the circumstances that prevailed on 4 February, Captain Seal cannot be said to have acted inappropriately in following that practice.

12.3 THE DECISION TO DEPART AGAIN

[49] No entries appear in the deck logbook for the morning of 5 February 2007. They do not record the state of the weather or preparations for a voyage to avoid a threatened cyclone. The first entry in the deck logbook for 5 February 2007 is at 1830 hours, shortly before departure when the bridge gear was tested.

[50] The ship had returned to Port through the available "tidal window" on the night of 4 February and by 2110 hours was secure at the Wharf. At 2312 hours Captain Seal appreciated that conditions were not expected to improve and that the low was predicted to intensify into a cyclone. He sent an email to various persons at Zinifex and to others, including Mr Tonkin, on the subject of "load 4 of 5 for the *Ernst Oldendorff*." The email stated:

> "Although Wunma sailed on the 4th conditions where (sic) unsuitable for her to discharge. The swell in the Roadstead was up to 3.5 metres at times and both vessels rolling in excess of what is considered safe to

> discharge. The Wunma returned to port on Sunday night as Her dirty water tank was full to capacity.
>
> Conditions are not expected to improve with the tropical low moving out to sea and predicted to intensity into a cyclone. This low is now moving eastwards. Wunma will most probably sail tomorrow night in order to be at sea in case of a cyclone, but is unlikely to be able to discharge her cargo."

[51] If a provisional decision was made by Captain Seal on the night of 4 February to go to sea the next night to avoid an expected cyclone, and if that decision was confirmed on 5 February, then it required a number of steps to implement it:

(a) informing the crew of the intended course of action;

(b) making preparations for sea in accordance with the SQS and requirements for the safe operation of the ship on a voyage in cyclonic conditions including:

   (i) bunkering sufficient fuel for a potentially lengthy voyage at sea;

   (ii) attention to the operation of the ship's water management system so that, as far as possible, rainwater and any seawater that would be collected by the ship during that voyage could be discharged to the sea;

   (iii) obtaining current weather information before leaving port and during the expected voyage.

These matters will be addressed. It however is first necessary to review the decision to head to sea.

[52] In his statement to MSQ, Captain Seal advanced as the reason for deciding to leave the Port on the evening of 5 February that the "cyclone had crossed back into the Gulf in the morning" and that the "forecast was for the low to pass directly over Karumba".[34] He then recorded, as his reasons for sailing the following:

- High tidal levels;
- Predicted tidal surges;
- High river levels.[35]

[53] In his written evidence to the Inquiry, Captain Seal added to those reasons:

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[34] Statement of Captain Seal - 26 February 2007; Exhibit 18.

[35] *Ibid*.

"1. Tidal surge (The low pressure system in the atmosphere creates less force on the ocean, allowing it to rise more than usual).

2. River flooding (The heavy rainwater in the region floods low-lying areas, raising the level of the river. This, combined with high flows, significantly increase the risk to the vessel. High water levels may cause the vessel to ride up on the Wharf doing significant damage. There is also the possibility that if the vessel breaks free, it may end up on the mangroves; when the water recedes, the chances of getting the ship off are remote. This has already happened to a smaller ship in a cyclone in about 1974 – that ship is still on the mangroves about 2 miles upstream of where the Wunma normally moors).

3. Wind force (The force of the wind may be beam-on at stages during a cyclone, increasing the damage done to the *Wunma*'s canopy; as opposed to being head to wind or close-to, where the metal accommodation takes a significant amount of the wind force).

4. Pollution (If the canopy were to blow off whilst alongside and a full load was onboard, the dust contamination may be significant in the local town)."[36]

[54] Captain Seal then consulted the Port of Karumba Cyclone Contingency Plan[37] which requires the removal of large vessels to sea. The *Wunma* left the Port of Karumba before any of the Alerts under any of those plans were triggered.[38] But the terms of the Port of Karumba CCP, in requiring large ships to go to sea, was a factor in the decision to go to sea.

[55] Captain Seal intended to assess the sea conditions once the ship reached the Fairway Beacon in order to determine whether it would be possible to discharge the cargo into the *Ernst Oldendorff*. Once at sea he assessed the conditions as not being suitable for unloading[39] and he proceeded on a course to Weipa.[40] According to Captain Seal:

> "The plan was to proceed in the general direction towards Weipa, get to the North of the cyclone track, wait for it to cross over land and dissipate, then return to Karumba."[41]

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36 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.8.
37 Exhibit 8.
38 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.10.
39 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.10.
40 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
41 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.10.

[56] As to this, based on a threat map received on 5 February prior to departure,[42] Captain Seal was of the opinion that there was "enough time and sea room to proceed in the general direction towards Weipa". He stated that he did not make a "final decision" until "departure from the Channel".[43] He said:

> "At 10 knots the *Wunma* should have been able to travel a distance of 444 km in 24 hours. If the cyclone had not sped up and changed direction further to the North, it would have been well clear, giving a distance from the centre of the eye of around 300 km."[44]

[57] Two observations may be made about that statement:

- On departing the Wharf and on the northerly part of the voyage, Captain Seal decided against engaging the main engine for, it appears, fuel preservation reasons. As such, the vessel never sailed at 10 knots;
- The cyclone did increase in speed as it made its easterly track across the face of the Gulf but it did not change direction "further to the North".

[58] Captain Seal said that the only person he spoke to with respect to the decision to head to sea was Mr Tonkin and that this occurred on the morning of 5 February. Mr Tonkin said that he spoke to Captain Seal on the morning of 5 February and said to him: "We will discuss what you need to do after you have had a decent sleep", and that he told Captain Seal to "Go put your head down and we will discuss it at 3 o'clock".[45] Mr Tonkin also recalls speaking to Captain Seal in the presence of Mr Fisher, Ms Osmand and Mr Davis on the afternoon of 5 February to clarify "that there were no doubts about this intended action" and that the vessel was "sufficiently prepared and capable of the voyage".[46]

[59] Mr Tonkin had a discussion with Captain Seal "and his officers" about the "predicted low pressure system coming across the Gulf".[47] According to Mr Tonkin, Captain Seal discussed whether to remain at the Wharf or head to sea with him. Captain Seal expressed concerns about "setting up on the wharf with a storm surge if he remained alongside.[48]

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42 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.10.
43 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.11.
44 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.10.
45 Mr Tonkin; T. 601-602
46 Supplementary statement of Mr Tonkin - 22 August 2007; Exhibit 57; para 13.
47 Supplementary statement of Mr Tonkin - 22 August 2007; Exhibit 57; para 9.
48 Statement of Mr Tonkin - 8 March 2007; Exhibit 57.

[60] Ms Osmand stated in her written evidence that she was "not directly involved in the decision to sail".[49] At the time of the incident Ms Osmand lived in Karumba and, therefore, tended to be out of touch with on-board activities during the time that she was at home. On 5 February she was due to go on leave from the ship, but was recalled because the ship required an additional watch keeper. Ms Osmand returned to the ship about an hour before she sailed. She stated:

> "I came back onboard knowing that it was going to sail. But from general discussions that occurred between the ship's officers about what we were going to do, I gained a general understanding of the Master's reasons for sailing."[50]

[61] Her understanding of the "passage plan" was to "go out of the Channel and assess whether it would be possible to discharge into the *Ernst Oldendorff*" and then to "head north and try to heave-to at Kowanyama to see if we had communications" with the "ultimate destination", being Weipa. The plan, at least as Ms Osmand understood it, was to "head North with the hope that (they) would not need to go further North than Edward River or Pompuraaw".[51]

[62] According to Mr Mewett:

> "In terms of when the *Wunma* is to leave Port, the Master has absolute authority. If a decision is made not to sail, I will usually discuss that decision with the Master or other Inco personnel. However, I never tell the Master he has to sail. I've always understood that the Master has absolute authority in relation to when the *Wunma* will sail and that authority is something which I unconditionally respect."[52]

[63] Captain Seal cannot be fairly criticised for deciding to go to sea and to voyage North in order to avoid the threatened cyclone. The cyclone mooring at Sweers Island was not operational. Even if it had been, difficulties may have been encountered in connecting to it in high winds and, most importantly, to voyage to that cyclone mooring would have required the ship to head in the general direction of the low pressure system that was predicted to head East. It simply was not an option.

[64] Remaining alongside presented a number of difficulties, including those identified by Captain Seal in his evidence. Captain Seal was entitled not to adopt the practice

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49 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 16.
50 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 16.
51 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 27.
52 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 53. Mr Mewett; T.385.

favoured by Captain Thomson and others to stay alongside and then hope for the tide, winds or current to supply an excuse if questioned by the Regional Harbour Master. His reasons for not doing so were reasonable. In addition, the option of remaining alongside was not included as an option in the SQS cyclone procedure and was contrary to the objectives of the Port of Karumba CCP. If the ship remained alongside and the cyclone hit Karumba, with or without a storm surge, there was a risk of damage to the ship and the wharf, with severe consequences for Captain Seal and his employer.

[65] The suggested option of going "up the creek" was not a realistic option in the circumstances. The Port of Karumba Cyclone Contingency Plan did not recommend it because of the risk of the ship being stranded in a storm surge.

[66] In the circumstances, the decision to depart Port and go to sea was a reasonable course of action in the difficult situation in which Captain Seal found himself on 5 February. He cannot be fairly criticised for deciding to depart Port that evening. However, the *Wunma* was forced to undertake a cyclone avoidance voyage in a loaded state and with less time to outrun a developing cyclone than if she had stayed at sea and headed North sooner.

12.4 PREPARATIONS FOR SEA

12.4.1 PREPARATIONS IN GENERAL

[67] According to Captain Seal, preparations for departure commenced at 0800 hours on 5 February.[53]

[68] Captain Seal asked the Bosun, Mr Shepherd, to secure the vessel for sea. As already noted, the Second Mate, Ms Osmand, did not board the vessel until about an hour before she sailed. Her recollection is that when she came on board the last of the dirty water from the dirty water tanks was being pumped ashore. Ms Osmand recalls that the preparations for departure were in accordance with the SQS. In addition to the normal, daily preparations which are undertaken in accordance with a checklist, she recalls that preparations for sea were undertaken by her, Mr Shepherd and deckhands and that in addition to the normal pre-departure preparations, they had to batten down the ship using "heavy weather checklists".[54]

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53 Statement of Captain Seal - 2 August 2007; Exhibit 18.
54 Statement of Kelly Osmand; Exhibit 38; para 28.

[69] The Chief Mate, Mr Davis, rejoined the ship shortly prior to its departure, having commenced travel at 0430 hours that morning to make his swing. The ship had a relatively small crew. The absence of a Chief Mate and a Second Mate until an hour or two prior to the ship's departure on 5 February limited the scope for preparation. Neither Mr Davis nor Ms Osmand was on board throughout 5 February to prepare, and direct deckhands to prepare, for a cyclone avoidance voyage.

[70] In his inspection report,[55] Captain Thomson stated:

> "I suspect the *Wunma* was somewhat unprepared to face the perils of going to sea in these conditions. It is evident in photos that gear that was not properly secured was removed from its stowed position by the force of the water.
>
> If the deck drains were clear in going to sea there would have been a fair percentage less water in the cargo hold before the vessel reportedly began getting pooped.
>
> The pooping led to the well deck and cargo hold aft of the stockpile filling up and water entering the emergency generator room which led to the complete loss of power to all essential services and loss of all emergency backup systems."

[71] In making those remarks, Captain Thomson was aware that he was reporting conduct that was in breach of Section 41 of the *Transport Operations (Marine Safety) Act.*[56] Indeed, he "picked up the language of Section 41" in the terms of his report[57] and the conclusion – "I suspect the *Wunma* was somewhat unprepared to face the perils of going to sea".

[72] In his evidence at the Inquiry, Captain Thomson was asked to comment on his contention that the *Wunma* was "somewhat unprepared to face the perils of going to see". He stated:

> "That was based on, let's say, my professional judgment. When you look in the cargo hold and you see oxyacetylene bottles that were washed around and thrown up into the cargo hold, it just means they were not locked down, there were clamps there, there were brackets to hold them, it just meant a fair amount of gear had not been secured for that sort of condition."[58]

55 Exhibit 12.
56 Captain Thomson; T.100.
57 *Ibid*. And see: Exhibit 12.
58 Captain Thomson; T.30, 50, T.104.

[73] It is possible that certain items had not been secured. However, there is evidence that some items became free as a result of the cargo hold becoming awash. Drums that were lashed down became free through the force of waves.[59] Normally, oxyacetylene bottles that were "clamped" would not become free from a normal rolling and pitching of the ship. But depending upon their buoyancy and the impact of waves and timber that were floating in the cargo hold at the height of the incident they may have become free. The evidence does not permit the Board to conclude that these items were not properly secured prior to the voyage.

12.4.2 FUEL RESERVES

[74] A remarkable feature of the preparation for the voyage is the fact that the Chief Engineer, Mr Fisher, was only notified that the ship was leaving Port and sailing North a half hour before she left.[60] This period of notice did not allow him to take more fuel onboard.[61] Mr Fisher stated:

> "If I had been notified that we would be sailing that evening, if I had been notified in the morning we were sailing North to avoid the cyclone, I could have took on more bunkers."[62]

[75] The First Engineer, Mr Leeson, only learned that the voyage was other than a routine trip to and from the Roadstead as the ship was "heading out of the Channel".[63] Had he known that a longer voyage was in contemplation, he too would have topped up the bunkers.[64] According to Mr Mewett, bunkers are available 24 hours a day at Karumba. Provided the proper notifications are made, fuel for the *Wunma* is readily available.[65] Normally 24 hours notice is required, but if circumstances of urgency that existed, as they did on 5 February, the evidence indicates that fuel could have been obtained that day.[66]

[76] The failure of Captain Seal to inform the engineering department on the morning of 5 February that a potentially long voyage north was in contemplation had significant consequences. A concern about fuel conservation prompted him to direct the *Wunma* to sail without the main engine being engaged.

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59 Mr Leeson; T.365.
60 Mr Fisher; T.321.
61 Statement of Mr Fisher - 2 August 2007; Exhibit 41; para 34.
62 Mr Fisher; T.317.
63 Mr Leeson; T.370
64 Mr Leeson; T.370
65 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 19.
66 *Ibid.*

[77] Although the ship had enough fuel to get to Weipa, it did not have enough to return from Weipa, and there was a concern that emerged at some stage during the voyage about being able to purchase fuel in Weipa.[67] On 5 February Captain Seal's preference was to sail North of the cyclone's path and return to Karumba once the cyclone had passed.

[78] Given the purpose of the voyage, namely to attempt to outrun a developing cyclone, and, if necessary, to remain at sea for some days, proper preparation for the voyage required steps to be taken to take on additional fuel before departing the Port.

[79] It is difficult to understand why additional fuel was not taken on board. The *Wunma* sailed with only 75 tonnes of fuel onboard when her maximum capacity was 120 tonnes.[68] For Captain Seal it was suggested that the ship could not have bunkered more fuel because she was already loaded to her "marks" and indeed, that was the evidence that Captain Seal gave in this regard.[69] However that cannot be correct because:

- the ship was last bunkered on 27 January;[70]
- from then until her departure on the morning of 5 February, the ship undertook four return voyages to the Roadstead;[71]
- at least 20 tonnes of fuel would have been consumed during those voyages;[72]
- there is no evidence to suggest that the ship, when bunkered on 27 January, was overloaded, that is, that her load line was submerged.

It follows that it must have been possible to take on at least another 20 tonnes of fuel prior to departing on 5 February. This would have been more than enough fuel to have supported a full day's steaming on all three engines[73] and, ought to have allayed any concerns about engaging the centre main engine on the northerly part of the voyage.

[80] Further, the ship had discharged 25 tonnes of "dirty water" from her tanks prior to the voyage and that alone ought to have permitted her taking on of additional fuel reserves.

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67 Mr Leeson T.363; Mr Fisher; T.298-299.
68 Captain Seal; T.164.
69 Captain Seal; T.165.
70 Exhibit 49; CB182, p.2.
71 Exhibit 26.
72 Statements of Mr Fisher; Exhibit 40; para 42; Exhibit 41; para 31.
73 *Ibid.*

[81] Even if the ship was loaded to her marks after the discharge of 25 tonnes of water from her dirty water tanks, then steps could and should have been taken to remove as much cargo as possible once the ship returned to Port on the night of Sunday 4 February. Earthmoving equipment could have been deployed to remove as much cargo as possible before the ship departed on the night of 5 February. If, for instance, 45 tonnes could have been removed during this period of about 22 hours, an additional 45 tonnes of fuel could have been taken on board. This was a simple, practical way to ensure that fuel reserves would not be a problem. Such steps could have been supplemented, if required, by a review of the amount of fresh water that was required for the expected voyage. Removing as much cargo as possible in the time available on the night of 4 February and during 5 February prior to departure would have enabled additional fuel to be taken on board.

[82] Proper consideration of these issues and consultation with the Chief Engineer early on 5 February probably would have led to a decision to request additional bunkers and to additional fuel being provided prior to departure. There was no proper explanation why Mr Fisher and Mr Leeson were not informed of the proposed lengthy voyage to the North much earlier in the day.[74]

[83] Even without additional fuel, a decision to only engage the outer engines is puzzling given that the sole purpose for the voyage was to outrun the cyclone. In this regard, when Captain Seal was asked why he decided not to top off the bunkers, he said that he believed that there was sufficient fuel to sail in accordance with the requirement contained in the SQS - sufficient for a minimum of four days' steaming[75] - and one would think that he would be anxious to ensure that the ship was sailing under full power. But having not taken on additional fuel, the amount of fuel became a matter of concern to Captain Seal late on 5 February and led to the decision to engage only the outer engines.

[84] Captain Seal and Mr Fisher agreed that, once the vessel cleared the Channel, they would "shut down the centre main engine"[76] and just run on the two outer engines – something that would reduce the fuel consumption by one third.[77] On the other

[74] Statement of Mr Fisher - 2 August 2007; Exhibit 41; para 34.
[75] Captain Seal; T.165.
[76] Mr Fisher; T.299.
[77] Mr Fisher; T.298.

hand, engaging the centre main engine would have increased the speed of the ship by 1.5 to 2 knots.[78]

[85] As it was, the centre main engine was not engaged again until the decision was made to turn South at 1140 hours on 6 February,[79] a decision influenced in large part by an assessment on Captain Seal's part that the ship was not far enough to the North of the track of the cyclone.

[86] Captain White put the matter this way:

> "Had the fuel remaining on board not been of concern, and had the centre engine been engaged, the *Wunma* should have been capable of making an additional two knots speed. This would have had the effect of putting the Wunma some 30 nautical miles further to the north at 1140 hours on 6 February when the decision was taken to alter course on to a reciprocal course."[80]

12.4.3 CLEARING AND CHECKING DECK DRAINS

[87] Shortcomings in the design and operation of the ship's water management system have been addressed in Chapter 6. Cleaning, clearing and maintenance of side deck drains and valves that could direct water to sea were a constant problem.

[88] First decks had to be cleared of concentrate. To clear the concentrate from the deck below the conveyor belt involved "a lot of shovelling",[81] and if done twice daily would take a total of four hours. If the ship was empty of cargo then clearing the decks of concentrate might be undertaken with hoses, with the holes under the covered on the port deck being opened to wash concentrate through them into the cargo hold. Either because of wash down activities, or despite it, deck drains could be blocked with concentrate that tended to cake when it dried out. Air hoses were used on occasions to try to clear drains. For the reasons canvassed in Chapter 6, the valves that might be operated to direct water in them to sea were prone to being blocked with concentrate, and blocked valves could not be quickly and easily serviced.

[89] Because the *Wunma* was fully loaded on 3 February, there were two days before she sailed on the relevant voyage within which to attempt to clear any blockages in the

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78 Mr Fisher; T.298.
79 Mr Fisher; T.298.
80 Statement of Captain White - 5 September 2007; Exhibit 114; para 6.1.3.
81 Captain Thomson; T.106.

deck drains.[82] Captain Seal's evidence was that the deck drains were normally cleaned when the walkway was cleaned, and that was only occasionally when a contracted "suction truck" came from Cairns to extract the zinc concentrate off the walkway.[83] It was nearly "an impossible job" for the crew to do.[84] Captain Seal could not specifically recall if the decks were cleaned by having the crew shovel around the conveyor belt after 3 February when the ship was loaded, but he thought that this was probable.

[90] It was Ms Osmand's practice, as she walked around the ship, to check the drains.[85] For this purpose, air lines were used but if they were not successful in clearing the drains, the "Engineering Department" would be alerted that the "valves might need to be cleared".[86]

[91] In preparing for a potentially long voyage through tropical downpours it was critical to ensure that water did not accumulate in the aft well deck, given the limited capacity of the dirty water tanks, the limited capacity of the small drain from the sump that led overboard and the potential for drains leading from the sump to the dirty water tank and overboard to become blocked with concentrate. Attention was required to the operation of side deck drains**.** The evidence indicates that on 5 February Captain Seal thought about checking the side deck drains and realized that the best way to test whether the drains and valves were working would be to direct the side deck drain valves to sea and run water through the drains. But this risked sending water mixed with concentrate residue in the drains into the Norman River. Captain Seal's inability to come up with a solution about checking the deck drains whilst in port seems to have been largely due to a concern that dirty water might enter the marine environment whilst the deck drains were being tested and thereby violate the "no spills" policy.[87]

[92] Captain Seal cannot be criticised for the fact that he was unfortunate enough to confront the systemic problems that existed in relation to the operation of the ship's water management system during a voyage in cyclonic conditions. One of those problems was that blocked deck drain valves could not be serviced and made

82 Captain Seal; T.235.
83 *Ibid*.
84 *Ibid*.
85 Ms Osmand; T.287.
86 *Ibid*.
87 Captain Seal; T.170.

operational in the space of a few hours. In addition, on 5 February Captain Seal did not have the assistance of a Chief Mate or a Second Mate on board the ship until late in the afternoon and shortly prior to the ship's departure. They were not available to consult about what should be done in connection with the ship's drains. They were not there to attend to these matters or direct other crew to do whatever was possible, in the circumstances, to clear deck drains so that they might be directed to sea during the forthcoming voyage.

[93] If Captain Seal could not think of a way to check that the side deck drains would be able to send water overboard, then he had no reason to conclude that they would be operational on the voyage that was to commence that evening. Consideration of the likelihood that a large volume of water would accumulate in the aft well deck during a prolonged voyage through tropical downpours should have prompted precautions such as the provision of additional portable pumps.

[94] According to Captain Seal, at 0800 hours he asked the First Engineer, Mr Leeson to check that the dump valve from the well deck was "clear and ready for operation".[88] Mr Leeson could not recall being asked by Captain Seal to do so,[89] although he recalled cleaning out the galley drain in the company of Mr Pitts.[90] According to Captain Seal, he had that morning been asked by Mr Leeson to provide a man to "help clear the dump valve". Mr Pitts was assigned and Captain Seal believed that the task in relation to sump drain was being carried out. Later that day, Captain Seal "heard on the UHF radio that the valve had been cleared". However, what Captain Seal heard was a report that a drain had been cleared. He understood that it was the dump valve in the aft sump drain, when it was in fact the drain in the galley.[91]

[95] Captain Seal did not learn until 6 February that Mr Leeson had discovered that, although the dump valve was functioning, the drain was blocked and could not be operated. After the incident, he learned, as did many others associated with this Inquiry, that the drain had been permanently blocked with a timber bung inserted from the shell plate of the vessel.[92]

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88 Statement of Captain Seal - 2 August 2007; Exhibit 18.
89 Mr Leeson*;* T.361-362.
90 Mr Leeson*;* T.361.
91 Statement of Captain Seal - 2 August 2007; Exhibit 18, p.23.
92 *Ibid*.

[96] On 10 February, at the request of Captain Boath, Captain Thomson boarded the *Wunma* and conducted an inspection. He was asked to assess any damage to the vessel, ascertain the cause of that damage and the probable causes of the water inundation of the vessel.[93] When Captain Thomson inspected the *Wunma* after the cyclone, he could only find "four or five scuppers" that had been draining. The others were "all full of concentrate". He could see the blockages.[94] The deck drains around the bridge were open and working. Only one deck drain on the port side deck and only one deck drain on the starboard deck were working.[95]

[97] In Captain Thomson's report[96] of his inspection,[97] the following relevant observations were made about the operation of the deck drains:

- In the engine control room, he observed from the mimic screen[98] that the deck drain valves had been "closed to the sea and open to the tanks".[99]
- In the case where valves were open but were not working properly, the mimic screen[100] would "flash yellow". When otherwise functioning properly, the mimic screen[101] would be illuminated in red or green. On his inspection, Captain Thomson saw that there was "a couple of them ... were flashing Yellow".[102] He thought that this indicated that the valves "haven't opened or they haven't closed, there could be a problem there".[103]
- On the starboard quarter deck, he noticed that all freeing ports were open but that the deck drains in this area were blocked. On the starboard side deck, he observed that all deck drains were blocked with concentrate.
- On the forward main deck, he reported that all drains were clean and that they "seem to have been working".
- In the cargo hold, he noticed damage to the cladding on the portside but there were "no visible signs of water going over the side of the cargo hold portside wall". However, he reported that "all drainpipes to the cargo hold from the port deck under the conveyor were open with no bungs evident".

93 Captain Thomson; T.20.
94 Statement of Captain Thomson, Exhibit 9; para 47.
95 Captain Thomson; T.27.
96 The report was prepared on about 12 February 2007. Captain Thomson; T.20.
97 Exhibit 12.
98 Mr Fisher; T.307-308.
99 Captain Thomson; T.20.
100 Mr Fisher; T.307-308.
101 Mr Fisher; T.307-308.
102 Captain Thomson; T.67.
103 *Ibid*.

- In addition, "all but one deck drain along the starboard side was blocked".[104]

[98] The possibility that the side deck drains only became blocked with concentrate during the voyage when concentrate was washed down them was put to Captain Thomson during his evidence. He acknowledged that it was possible that the "portside scuppers around the conveyor" might have become blocked in this way, but could not see how any concentrate that became a slurry could have entered and blocked the "starboard side scuppers".[105]

[99] In the absence of specific evidence concerning the cleaning of decks after 3 February, the Board is unable to conclude with certainty that they were cleaned prior to the voyage. But it is a reasonable assumption that the normal shovelling of split concentrate below the conveyor belt occurred. The "bungs" under the conveyor belt were removed at some stage prior to the incident. The evidence does not reveal when or by whom this was done. If the side decks were reasonably clean of concentrate at the start of the voyage on 5 February (and there is no specific evidence that they were) as a result of shovelling and other cleaning activities, then this does not mean that the deck drains were free of concentrate or unblocked. They could have been blocked for a substantial period of days or even weeks, or they could have been blocked in the few days prior to the voyage by concentrate that was washed down them during cleaning activities and which dried out.

[100] In the absence of records or reliable oral evidence of when the side deck drains and valves were last checked prior to the voyage on 5 February, many of them may have been blocked with concentrate for a substantial period of time. The failure of Inco to produce maintenance records or any acceptable evidence about when the side deck drains and valves were last checked and serviced makes it more probable than not that side deck drains and valves had not been checked for probably several days, if not longer, prior to the voyage on 5 February.

[101] Indeed, the same reluctance to test the operation of side deck drains and valves to check that water could be directed overboard that Captain Seal had on 5 February probably applied as a matter of general practice prior to 5 February.

104 Captain Thomson; T.29.
105 Captain Thomson; T.87.

[102] If side deck drains and valves had been found on 5 February to be blocked, there was however little that could be done in the limited time that was available that day to make the valves operational. In the end result, additional preparations prior to departure on 5 February in respect of the ship's drains and water management system may not have made much of a difference to the accumulation of water in the well deck during the voyage.

[103] The detection and removal of the bung in the outlet of the small drain from the sump may also not have made much of a difference. This drain has a limited capacity to discharge large quantities of water and is not supplemented by a pump. If before the voyage it was tested and made operational it was unlikely to remove more than a small proportion of the water that accumulated on the aft well deck during the voyage once the ship's dirty water tanks were full. It probably would have become blocked with concentrate. In Mr McDonald's view, even had the drain from the well deck been operating, it would not have been likely have made a great deal of difference.[106] The position might have been otherwise however, if the deck drains were open to the sea and operational.[107]

[104] Captain Seal's direction to Mr Leeson to check that the dump valve from the well deck was "clear and ready for operation" was an appropriate direction. But further preparations in relation to the ship's water management system were required, particularly in relation to side deck drains. The need to check that they were operational should have been apparent in circumstances in which during the previous 48 hours Captain Seal had experienced the dirty water tanks being filled with rainwater runoff. Although, the failure to check side deck drains was not fully explained by Captain Seal in his evidence to the Inquiry, the only way to test them was to direct the side deck drain valves overboard and run water through the drains, and he was probably reluctant to do so in case test violated the "no spills" policy.

[105] On 5 February, a potentially prolonged voyage in tropical downpours was in anticipation. Additional checking and maintenance of side deck drains should have been undertaken. But blocked valves could not be quickly serviced and replaced. Even with additional attention, the ship faced the risk of accumulating a large

106 McDonald; T.457.

107 McDonald; T.457. McDonald; T.456-467.

volume of rainwater on its decks that the side deck drains and the aft sump drain could not discharge to sea.

12.4.4 CHECKING CYCLONE AVOIDANCE PROCEDURES

[106] The voyage to be undertaken commencing on the night of 5 February was to be the first voyage by Captain Seal and his crew into open waters North of the Roadstead. Their training and experience on the *Wunma* did not include a lengthy voyage in open waters undertaken to avoid cyclones at sea. Because Captain Seal and his crew had not trained to undertake such a voyage it would have been appropriate for him and his navigation officers to familiarise themselves on 5 February with the SQS procedure for avoiding cyclones at sea. The navigation officers would have been able to acquaint themselves with the requirements of the SQS including the importance of obtaining weather information and plotting it, and the importance of frequent and accurate wind observations in order to determine the ship's position in relation to the cyclone.

12.4.5 CONCLUSION: PREPARATIONS FOR SEA

[107] General preparations on 5 February were undertaken without the presence on board of a Chief Mate or a Second Mate. They came on board an hour or two prior to the ship's departure on 5 February. Their presence earlier in the day may have assisted in general preparations for the voyage into cyclonic conditions, and prompted questions about whether preparations contained in the SQS Cyclone Procedure, including its fuel requirements, had been met.

[108] Captain Seal failed to inform the Chief Engineer in sufficient time of the planned voyage North to enable additional fuel to be bunkered. Early consideration of the need to increase fuel reserves by Captain Seal or other members of the crew would have allowed additional fuel to be bundered.

[109] Additional steps could and should have been taken to check whether the side deck drains were operational. Whether they were blocked or not could not be ascertained simply by looking at the mimic panel. To check them required the valves to be directed overboard and water run through the drains. Captain Seal was understandably reluctant to do this, due to the risk of sending concentrate into the marine environment. But even if this check had been done, and the valves were

found to be blocked with concentrate, it is unlikely that could be serviced in time due to the time-consuming and difficult process of gaining access to them.

[110] The *Wunma* went to sea on 5 February with a number of side deck drains blocked, but this was principally due to shortcomings in the design and operation of its water management system. Systemic problems with the design of, and operating procedures for, the water management system prevented the ship being able to direct overboard the large the rainwater that it would encounter on the voyage.

CHAPTER 13 THE VOYAGE

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13.1 THE VOYAGE

13.1.1 Operational Matters on the Voyage

[1] The voyage that commenced at 1900 on 5 February was to avoid a cyclone. The cyclone avoidance procedures in the SQS reflected well-known principles. They stressed the importance of monitoring the weather and charting the cyclone's path. The *Wunma* was equipped with a range of communication systems to monitor weather information from the BOM and, if required, to seek assistance from experienced persons ashore about what to do.

[2] This Chapter initially analyses the operation of the ship prior to the critical decision at around 1140 on 6 February to turn South. Four points will emerge from this analysis:

- The failure to obtain weather information during this period of around sixteen hours.
- The consequential lack of plotting of the cyclone's position and path, and the ship's position in relation to the cyclone.
- Only infrequent observations of wind direction and barometric pressure were made and recorded, and these inadequate observations did not facilitate the application of the cyclone avoidance rules in the SQS.
- There was a failure to engage onshore assistance.

13.1.2 Weather Information

[3] Mr Davis reported for duty at approximately 1630 hours on 5 February, after having travelled all of that day.[1] He learned of the existence of the cyclone and of the Captain Seal's intentions to "not stay alongside".[2] Captain Seal was "going to sail the vessel with intentions to unload the ship if he could and, if he could not, to head towards Weipa". Mr Davis was told these things on the bridge prior to sailing.[3] This was his first voyage after his four week induction.[4] Mr Davis was asked by Captain Seal to do "a quick plot giving us a speed of 10 knots to see how we would

1 Mr Davis; T.635.
2 Mr Davis; T.635.
3 Mr Davis; T.635.
4 Mr Davis; T.637.

clear the cyclone".[5] Mr Davis did so with reference to a threat map that had been obtained prior to the commencement of the voyage.[6]

[4] The *Wunma* was at the Fairway Beacon at 2028 hours. At about this time Captain Seal assessed the conditions as unsuitable for discharge to the export vessel, so he laid "off a passage plan to the North from the chart".[7] The ship headed North.

[5] Some weather information was obtained via VHF radio from Karumba before the ship was out of VHF range. Captain Seal realized at some point that there was a problem with the HF Radio receiving broadcasts after the ship sailed,[8] and that the SatComm C was not automatically generating reports. There was a discussion with Mr Davis and Ms Osmand. From the start of the voyage until the afternoon of 6 February, the ship did not receive information via the HF Radio. Captain Seal says that they thought that they would be able to solve the communications problems in the coming hours.[9]

[6] Mr Davis retired to his quarters at approximately 2330 hours.[10] Ms Osmand came onto the bridge to start her watch, and Captain Seal retired around 2330 hours.[11]

[7] Ms Osmand was the Deck Officer on watch from midnight to 0400 hours. She recalls that, during that time, the weather worsened and that she "put the first cyclone plot on the chart with its track and speed".[12] However, there is no satisfactory evidence of this plotting, and the source of weather information that enabled her to put the "first cyclone plot" is not established by the evidence.

[8] By the end of her watch the winds had built up to approximately 40 knots and were coming from an easterly direction and the seas were rough.[13] Ms Osmand recalls that the barometer was "falling steadily", but not greater than normal daily patterns. She says that more observations were needed in this regard and that she mentioned

5 Mr Davis; T.637.
6 Mr Davis; T.639.
7 Captain Seal; T.127.
8 Captain Seal; T. 125.
9 Captain Seal; T.137 -138.
10 Mr Davis; T.642.
11 Captain Seal; T.139.
12 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 41.
13 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 43.

this to Mr Davis, when she handed over the watch.[14] After handing over her watch, Ms Osmand retired to her quarters and slept until 1100 hours on 6 February.[15]

[9] At 0400 hours a notation was made in the deck logbook of moderate seas with wind gusting. Mr Davis was on watch between 0400 hours and 0800 hours. His evidence was to the effect that he had a very limited knowledge of the communication systems onboard the *Wunma*.[16] Without being critical of Mr Davis, who impressed the Board as a conscientious seaman, his evidence underscored deficiencies in his training by Inco to operate the communications systems on the voyage North.

[10] During his four week period of induction between mid-December 2006 and 15 January 2007 the ship was not outside the range of VHF communications, and he did not gain experience in the operation of all aspects of the ship's communication equipment. The SatComm C was virtually never used and the HF system was never used, and so Mr Davis had never seen anyone using the HF or the SatComm C other than to test it by using the test button.[17] He was the holder of a GMDSS General Radio Operator qualification, and experienced in the use of communications systems. But he was not familiar with the specific operating procedures of each of the communications systems on board the ship. During his period of induction he concentrated on matters of more immediate importance in becoming acquainted with the ship's normal, daily operations. Unfortunately, this lack of familiarity with the ship's communication systems proved to be a problem on the morning of 6 February when he was on watch.

[11] Mr Davis' lack of familiarity with the communications systems should have been addressed before he was required to undertake a voyage in open seas. Captain White observed in his report:

> "The obligation to ensure that watchkeeping officers are familiar with the ship's communication system is also a matter of good seamanship and now well documented in the Seafarer's Training, Certification and Watchkeeping Code and Convention. I believe it is also set out in Marine Waters Part 28 and more importantly, section B SQS 04C. It is also unsatisfactory to have persons unfamiliar with equipment

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14 *Ibid*.
15 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 44.
16 Mr Davis; T.678-683; T.686.
17 Mr Davis; T.682.

> attempting to operate it as settings could be changed that may lead to the equipment being rendered inoperable."[18]

The general point being made about the need for navigation officers to be familiar with the specific equipment on the ship they are navigating is well made. Mr Davis should have been given instruction on the use of all aspects of the ship's communications systems during his period of training or, failing that, instruction during the first part of the voyage and before he took over the watch.

[12] Mr Davis vaguely recalls something being said to him by Ms Osmand about the radio equipment at the handover.[19] He had problems with the communications systems from the time he took over. He could not say whether the problem was that the system was not operating properly or he was not using it properly. Mr Davis did what he could to rectify the problem with the radio, but his attention was on other matters. He had restricted visibility, the crew member who was supposed to be on duty with him was seasick, and he had to ask the Bosun to stay on the bridge to keep lookout. It seems unlikely that Mr Davis' attempts to use the HF radio rendered it inoperable. The evidence supports the conclusion that it was problematic before he took over on the watch. His lack of familiarity with it meant that he could not fix any pre-existing problem and could not use it.

[13] In the result, during his watch Mr Davis did not receive any weather information.[20] This is to be contrasted with his usual experience on other ships where, unless there is a problem with the equipment, you receive "reams of information" that can be routed to a printer or a disc.[21] The absence of any weather update for the four hours that he was on watch alarmed Mr Davis, but he did not raise the problem with Captain Seal or Ms Osmand during those hours.

[14] Captain Seal came back onto the bridge at around 0630 or 0700 hours and remained in charge of the ship's navigation throughout that day. He could recall problems with the communications system that day. If the SatComm C system had been functioning properly then weather information would be automatically received, stored and printed. Had this been done, a person such as Mr Davis who was unfamiliar with the particular GMDSS equipment on board the *Wunma*, would have

18 Report of Captain White - 5 September 2007; Exhibit 114; para 5.1.13.
19 Mr Davis; T.680.
20 Mr Davis; T.681.
21 *Ibid*.

received the forecasts issued by the BOM as and when they were issued, as would Captain Seal and Ms Osmand.

[15] If the memory (a 3½” floppy drive) on the SatComm C was full, or the printers had run out of paper, the automatic generation of reports would cease.[22]

[16] Early in his evidence Captain Seal had a recollection of the HF radio providing positions on the cyclone, and thought that he delegated the task to the First Mate and the Second Mate who wrote the positions on various pieces of paper. But this does not seem to have occurred on the morning of 6 February, and his later evidence was that there were problems with the HF radio that morning.[23]

[17] Ms Osmand stated in her written evidence that the “HF radio was passworded out and (they) could not change the transmit frequency on it”.[24] There was no evidence of Ms Osmand having plotted any weather information received during her midnight to 0400 watch on 6 February.[25] The evidence indicates that the HF radio was not able to receive weather information during her watch.

[18] Captain Seal said that there “seemed to be some sort of password protection which couldn’t enable us to get the standard HF broadcast”, although later on 6 February that was rectified “by using higher frequencies”.[26] Captain Seal could not be sure that the HF radio was working from the commencement of the voyage.[27] Before departure he did not receive a report about the HF radio, just that “everything was ready”.[28] He inferred that the normal testing of it was done by DSC (Digital Selective Calling) because there is not normally any verbal checking of HF radios due to the closure of voice communications stations around the coast.[29] DSC is a facility by which a text message is transmitted to establish contact by VHF or HF radio. Unless voice communication is required, the text will result in an acknowledging text.

22 Captain Dunnett*;* T.327.
23 Captain Seal; T.125.
24 Statement of Ms Osmand - 16 August 2007; Exhibit 38, para 39.
25 Ms Osmand; T.273.
26 Captain Seal; T.125.
27 Captain Seal; T.126-126.
28 Captain Seal; T.125.
29 Captain Seal; T.126.

[19] Given that the purpose of the voyage was to outrun a cyclone, proper steps should have been but were not taken to ensure that the HF radio was functioning before the voyage commenced. The HF radio on the *Wunma* was not a "standard set".[30] The evidence justifies the conclusion that from the start of the voyage until the afternoon of 6 February 2007, the system was not able to receive information from the BOM via HF radio. The possibility exists that problems with the HF radio only arose during the course of the voyage and were not rectified at the time they became evident. In any case, the ship was not in receipt of weather information during the first part of the voyage.

[20] However, the continuing problems that Captain Seal had reported to him when he came on the bridge on the morning of 6 February concerning the HF radio and/or the SatComm C did not prevent him from obtaining current weather information.

[21] The ship's satellite telephone was working until late on the evening of 6 February and the AMOS system was able to send and receive emails.[31] It is remarkable that Captain Seal did not avail himself of one of these modes of communication soon after coming on the bridge on the morning of 6 February.

[22] When Captain Seal was asked during his evidence whether he tried to communicate with someone onshore to get detailed information on the track of the cyclone, he said that he attempted to speak to Mr Tonkin via the satellite phone "a couple of times on the morning" of 6 February.[32] According to Captain Seal he attempted to telephone Mr Tonkin on his mobile number and landline number.[33] He said this occurred at probably around 0830 hours and again, at 1100 hours on 6 February and that he made "maybe two or three attempts".[34]

[23] Although Captain Seal may have attempted to speak to Mr Tonkin by telephone, he did not choose to leave a message on his answering machine.[35] There was nothing to stop him telephoning Captain Ives or Mr Iuliano at Inco in Sydney, but he chose

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30 Captain Seal; T.126.
31 Captain Seal; T.136.
32 Captain Seal; T.122.
33 Captain Seal; T.123-124.
34 Captain Seal; T.124.
35 Captain Seal; T.250.

not to do so.[36] In addition, when problems were encountered with the password for the HF radio, he did not think to contact Inco to seek its assistance.[37]

[24] Captain Seal agreed that when he came back on the bridge at around 0630 or 0700 hours he was alarmed that the ship had been sailing for about 12 hours without any new information, and that the deck officers had been unsuccessful in sorting out the problem with the communications systems. He spent about half an hour looking at the equipment, then unsuccessfully tried to contact Mr Tonkin.[38] When asked why he didn't "contact the Bureau of Meteorology or the office of Inco Ships" for up-to-date meteorological information, Captain Seal replied:

> "As I said before, it was a Cat 1 cyclone and I wasn't particularly concerned about it, and I didn't want to bother the office basically to supply maps and so forth when I felt I should be able to do that myself on the ship."[39]

[25] It is worth noting that for all Captain Seal knew at this time, the cyclone could have been intensifying, increasing speed and changing direction. If he was as unconcerned as his evidence suggests, it shows a failure to appreciate the importance of obtaining current weather information, so as to assess it and to plot relevant information on the chart. His initial attempt to obtain information from Mr Tonkin, rather than from Inco's head office or the BOM, is understandable. But when he was unable to speak to Mr Tonkin, he should have promptly sought information from these sources. Instead, he made further calls to Mr Tonkin and when he could not get through began "chasing" his wife to "basically send me a map".[40] A current threat map was going to be better than nothing. But more detailed weather information sourced from the BOM on the cyclone's location, its speed and its direction, along with a description of sea and weather conditions was available, and was needed to inform decisions about whether to continue North, to do so with the middle engine engaged or to turn South.

[26] This information was not obtained during a period of hours starting at 0700 hours when Captain Seal came on the bridge.

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36 Captain Seal; T.250.
37 Captain Seal; T.250.
38 Captain Seal; T.140.
39 Captain Seal; T.140. Captain Seal; T.227.
40 Captain Seal; T. 140.

[27] By around 1100 hours, Captain Seal was "starting to come to the view that he might have to turn around" and that was his reason for attempting to telephone Mr Tonkin.[41] When he contacted his wife, he asked her to send him "any information" she could find.[42] When asked whether the only thing that he required to be sent was a threat map, Captain Seal answered "She was probably busy at work and decided that was sufficient".[43] But the decision to turn South required more than a threat map. It required whatever information he could obtain from the BOM and other sources on the cyclone's position and path, and ideally, input from an experienced navigator like Captain Ives, to discuss the options.

[28] Given the significance of a decision to reverse course during a cyclone avoidance voyage, and his inability to speak to and obtain current weather information from Mr Tonkin, Captain Seal should have sought both information and advice from the Designated Person Ashore or Captain Ives, who had recently vacated that position. Captain Ives was still Operations Manager and the person to whom Captain Seal eventually turned to for assistance on the night of 6 February. On the morning of 6 February Captain Seal did think to call him but chose not to because he "didn't believe that (he) was in danger at that time and (he) didn't particularly want to trouble him".[44]

[29] What Captain Seal did with the threat map that was emailed by his wife at 1127 hours will be discussed later. The present issue is what he did not do during the morning of 6 February prior to 1140. He did not obtain current weather information.

[30] Captain Seal was not aware of the information about the cyclone's position and path that was issued at 0700 hours that morning.[45] He had been "sailing for about twelve hours without any fresh information as to the position of the cyclone".[46] All he could say was that he had "a feeling that the cyclone was pretty much to the West" of him.[47]

41 Captain Seal; T.124.
42 Captain Seal; T.268.
43 Captain Seal; T.269.
44 Captain Seal; T.132.
45 Captain Seal; T.133.
46 Captain Seal; T.133.
47 Captain Seal; T.133.

[31] It was put to him during his oral evidence that, apart from the two threat maps, he was “sailing blind”, to which he replied “we did have communication problems, I agree with that”.[48] But those communications problems on the morning of 6 February did not prevent him from obtaining information by telephone or receiving written weather information by email via the AMOS system. No new weather information was received by him about the cyclone.[49] Although he said that he was “quite stressed”[50] about this lack of information about the precise position of the cyclone, Captain Seal did very little to allay those concerns.

[32] When pressed about why he didn’t obtain “regular updates of the weather” as he proceeded on the voyage, Captain Seal replied:

> “You will have to understand, of course, that at that time the cyclone wasn’t that bad. I was looking at other things as well and it wasn’t (the) only thing that I was chasing. I did make a fair attempt in my mind to obtain the latest weather.”[51]

[33] Captain Seal’s failed to comply with his obligations under the SQS to closely monitor the weather in circumstances where he was, for the first time as a Master, attempting to avoid a cyclone. His attempts to obtain the latest weather information prior to 1140 hours on the morning of 6 February were inadequate. By not obtaining current weather information during this period, the opportunity was missed to make an earlier, more informed and more considered assessment of the appropriate course of action required under cyclone avoidance rules.

[34] Mr Davis and Ms Osmand are in a different position to Captain Seal in this regard, if for no other reason than they were under the command of the Master after 0700 hours on 6 February. That said, either could have, on their watch in the early hours of 6 February, sought information by satellite telephone or email on the progress of the cyclone when they realised that the HF radio and SatComm C were not functioning. But when their failure to obtain weather information from those sources became apparent to Captain Seal at 0700 hours, he should have obtained current weather information in the hours that followed by phone and email. He did not.

48 Captain Seal; T.133.
49 Captain Seal; T.134.
50 Captain Seal; T.133.
51 Captain Seal; T.153.

[35] As Captain Seal made plain in his evidence, the only weather information on which he based his decision to turn South at 1140 hours on 6 February were two threat maps – one obtained by him prior to departure on 5 February which reflected the general position at 1600 hours on 5 February and one emailed to him by his wife at 1127 hours on 6 February which reflected the position at 0700 hours that day.

[36] Reliance on such a paucity of information is conduct that falls well short of the standards of good seamanship. It was not current information. The threat map, by its nature, gave a generalised depiction of the storm system. It was inadequate information on which to base such a critical decision.

13.1.3 Recording of Information

[37] Given the paucity of information about the cyclone's position prior to the decision to turn South, it is not surprising that the cyclone's path was not plotted as required by the SQS and well-established cyclone avoidance procedures.

[38] When Captain Seal's attention was directed to the requirement contained in the cyclone procedure of the SQS to "maintain a good track of the eye of the cyclone" and to "maintain a plot so as to determine if the vessel has sufficient speed to outrun the cyclone" he agreed that he did not maintain a good track of the eye of the cyclone or plot the cyclone on the chart with reference to the *Wunma* as required by that procedure.[52] He agreed that "up until 1140 hours on 6 February" there had been no plotting of the cyclone in accordance with the procedure in the SQS and that this was because he did not have the information to do it.[53]

[39] During his watch Mr Davis made weather observations in the deck logbook. On the question of charting, Mr Davis looked at the charts from the voyage,[54] and observed that a number of notations had been erased.[55] He was very critical of this. The positions at 0300 and 0330 hours on 6 February had been erased.[56] Captain Seal's explanation was that they were erased when the voyage South occurred along the same course. A relative motion plot that Mr Davis recalls having placed on the charts on the evening of 5 February 2007 does not appear.[57]

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52 Captain Seal; T.167.
53 Captain Seal; T.167.
54 Exhibit 30.
55 Mr Davis; T.663.
56 Mr Davis; T.663-664.
57 Mr Davis; T.665.

[40] When asked "what steps were taken to chart the voyage and how regularly entries were made on the chart" Captain Seal responded:

> "The vessel's position was regularly plotted on the chart. I cannot recall the exact entries that I placed on the chart."[58]

[41] The evidence does not enable the Board to conclude that the ship's position how regularly the ship's position was plotted on any chart because entries that were made were erased.

[42] The ship's logbook[59] does not record frequent observations of the weather and wind conditions or barometer readings. The cyclone avoidance rules in the SQS and elsewhere emphasise the importance of monitoring wind direction in order to determine whether the wind is backing or veering, and thereby to assess if the ship is in the "dangerous semi-circle" or the "navigable semi-cycle". Because of the importance of pressure readings, cyclone avoidance manuals such as *The Mariners Handbook* advise that frequent barometer readings should be made. *The Mariners Handbook* states that it is wise to take hourly barometer readings.

[43] For the evening of 5 February, the logbook only has the wind and barometric pressure recorded at midnight. Between midnight and 0400 hours on 6 February 2007, there were three entries. Between 0400 hours and 0800 hours there is only one entry, namely at 0600 hours which recorded the wind direction as East North East. There is an entry at 0800 hours with the wind direction recorded as East and the barometer 1000.

[44] Critically, after 0800 hours and prior to 1200 hours there is no wind or pressure recording. During the first three and half hours of this critical period, the ship did not receive any weather information from the BOM or other onshore sources. Even if it had received such information, onboard weather observations were essential in order to ascertain the location of the cyclone's centre and to apply cyclone avoidance rules.

[45] The failure to frequently record wind direction and pressure readings during this critical period fell well below the standards required for a cyclone avoidance voyage.

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58 Statement of Captain Seal – 2 August 2007; Exhibit 18(c); p.15.
59 Exhibit 86.

[46] There is an entry at 1200 hours. The failure to frequently record wind direction and pressure readings continued on the afternoon and evening of 6 February. Between 1200 hours and 1600 hours there are entries at 1530 hours and 1600 hours. There are entries at 1800 hours and 2000 hours.

13.1.4 Onshore Assistance

[47] The failure to seek information from Captain Ives during the morning of 6 February, and the reasons for it have been noted. Captain Ives was a busy individual, and it is understandable that, in the first instance, Captain Seal would seek weather information from Mr Tonkin. But as already noted, by 1100 hours a significant cyclone avoidance decision was required, and Captain Ives' counsel would have been valuable.

[48] Later in the day, as things got progressively worse, assistance was not sought from Captain Ives or the Designated Person Ashore, Mr Iuliano. Instead, at around 1800 hours when another important decision was made, this time to turn to the West, Captain Seal forwarded an email to Mr Tonkin (copied to Mr Iuliano and Captain Ives) which was in the following terms:

> "Just letting you know we are traveling OK. Have a fair bit of freshwater runoff down the tail end approx 1m deep. Ship in loaded condition."[60]

[49] This was the only communication Inco received from the ship prior to Captain Seal telephoning Captain Ives later that evening to advise that the ship was in distress.[61]

[50] Although Zinifex has up to date weather information available, it did not assume any responsibility for providing that information to the ship at sea, since Inco's Operations Superintendent had that responsibility.[62]

[51] Mr Tonkin gave evidence to the effect that there was a "routine" to be in telephone contact with the ship at 2100 hours, 2400 hours, 0300 hours and 0900 hours.[63] That routine presumably developed to monitor the ship's daily operations to and from the export vessel. There is no satisfactory evidence that communications were made at those times as the ship voyaged North. Mr Davis could not recall Mr Tonkin

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60 Attachment AD6 to the Statement of Captain Dally - 19 August 2007; Exhibit 53.
61 Supplementary statement of Captain Dally - 19 August 2007; Exhibit 53; para 11.
62 Mr Mewett; T.408-409.
63 Mr Tonkin; T.606.

telephoning the vessel.[64] Captain Seal did not give evidence of receiving telephone calls from Mr Tonkin. Mr Tonkin did not recall receiving a telephone call from Captain Seal on the morning of 6 February.[65] He was out of the office attending to cyclone preparations. He had his mobile phone with him, but for reasons he explained, it did not record missed calls. Mr Tonkin said he could not remember getting any calls between 0700 hours and midday.[66] He gave evidence that he spoke to "Dean late on Tuesday",[67] that is, at "7pm after dusk".[68]

[52] During the afternoon of 6 February as the ship voyaged South it was "taking a lot of water" and its condition was deteriorating. Captain Seal knew that Captain Ives was an experienced mariner and he respected his opinions.[69] The fact that Captain Seal was preoccupied with the situation on board may explain why he did not contact Captain Ives during these hours.

[53] In addition, Captain Seal thought that he could extricate himself from the situation without outside assistance:

> "Captain, did you think you could extricate yourself from this situation without outside assistance? ---At that point I did.
>
> Did you think it would reflect poorly on you if you called for outside assistance? ---I have no comment.
>
> You must answer? ----That would have crossed my mind, that it would have reflected poorly on me.
>
> That was a consideration for you? ---That's correct."[70]

[54] His email at 1804 hours that was copied to Captain Ives did not seek assistance. But within an hour or two, assistance was being sought from Captain Ives and the RCC in Canberra. In short, Captain Seal did not seek assistance from persons onshore until very late in the day.

[55] Earlier in the day, when he was deciding whether to turn South the situation was not nearly as serious. Captain Seal's evidence was that he was not particularly worried

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64 Mr Davis; T.667.
65 Mr Tonkin; T.607.
66 Mr Tonkin; T.608.
67 Mr Tonkin; T.608.
68 Mr Tonkin; T.608. Compare: Mr Tonkin; T.614.
69 Captain Seal T.198.
70 Captain Seal; T.198.

about the cyclone because it was a Category 1 cyclone and he had seen a lot windier conditions.[71] He says that he was not particularly concerned about the situation.[72] If Captain Seal was not particularly concerned about the situation late on the morning of 6 February, as some passages of his evidence suggest, if he did not want to bother Inco's head office with a request for weather information and if he was conscious that Captain Ives was busy managing the operations of the Inco fleet, then this may explain why he did not seek information and advice from Captain Ives before deciding to turn South. But some passages of Captain Seal's evidence indicate a concern by 1100 hours about his lack of weather information, and consideration of the option of turning South.

[56] In retrospect, the decision to turn South proved to be a critical decision. But even at the time and in circumstances in which Captain Seal says he was not "particularly concerned"[73] about the Category 1 cyclone that he was seeking to avoid, it was a significant decision. Captain Seal had prior experience as a junior officer in two cyclones off the North West Coast of Australia.[74] This was his first cyclone avoidance voyage as a Master. Captain Seal was confident in his own abilities. He had seen far worse conditions at sea, and he was understandably reluctant to seek assistance from Captain Ives about an operational decision that was ultimately a decision for Captain Seal, and not Captain Ives, to make.

[57] If Captain Seal at around 1100 hours was not particularly concerned about the situation and, as a consequence, did not feel the need to seek onshore advice and assistance, then his perception of the situation was, in part, due to his failure to obtain current information about the position, speed and path of the cyclone. Advice from Captain Ives or another experienced mariner about current weather information and the appropriate cyclone avoidance action in the circumstances would have informed the decision that Captain Seal had in contemplation of turning South.

13.1.5 Plotting

[58] The SQS required the Master to maintain a good track of the eye of the cyclone and to maintain a plot on the chart. This was essential in order to determine if the ship was able to "outrun the cyclone". Remarkably, no plotting of the cyclone in

71 Captain Seal; T. 270.
72 Captain Seal; T. 140.
73 Captain Seal; T.140.
74 Captain Seal; T.136-137.

accordance with the SQS or prudent seamanship was undertaken before the decision to turn South. There was inadequate plotting throughout the voyage.

[59] In order to estimate the nearest approach of another vessel or storm it is essential to keep a continuous record of its track. Combining this track with the track of one's ship is the essence of "plotting".

[60] The purpose of the plot is to discover if the storm presents a threat, potential or actual, to the safety of the ship. Knowledge of a threat is supplemented by information regarding its degree and urgency. This information will assist in deciding on a course of action. The most effective indication of a threat lies in the predicted distance of the CPA (Closest Point of Approach).

[61] There are two forms of plots, true motion plots and relative motion plots.

[62] True or geographic plotting gives a natural and easily understood picture. It can be done directly on the chart if the scale is large enough to give a clear picture. If the two courses are extended, the anticipated positions of both storm and ship can be marked on them since the speeds of each are known. A study of the expected positions at the intersection of the projected tracks will enable an approximation to be made of when the storm and the ship will be closest together.

[63] The true motion plot does not provide the observer directly with the distance of the nearest approach, hence the relative motion plot is more often used. In relative motion plotting, one's ship is considered a fixed point. To determine this relative motion a vector triangle of velocities is constructed.

[64] Neither form of plotting was undertaken during the voyage North and prior to the decision to turn South.

13.1.6 Conclusion

[65] Prior to the critical decision at around 1140 hours on 6 February to turn South:

- there was an inexcusable failure to regularly obtain, record and analyse weather information;
- there was a consequential failure to plot the cyclone's position and path, and the ship's position in relation to the cyclone in order to assess appropriate cyclone avoidance measures;

- infrequent observations of wind direction and other weather observations were made and recorded, and inadequate wind observations did not facilitate the application of cyclone avoidance rules in the SQS;
- there was a failure to engage onshore assistance.

13.2 THE DECISION TO TURN SOUTH

[66] Any decision to alter course during a voyage needs to take account of observations of prevailing weather and sea conditions, current weather information and weather forecasts. This is especially so if the purpose of the voyage is cyclone avoidance. A decision that is based on completely inadequate information may be the "correct" decision based on the information at hand, but unjustifiable in terms of the information that could reasonably have been obtained and analysed.

[67] A decision as important as a decision to reverse course in cyclonic conditions requires careful consideration. Although the decision is the final responsibility of the Master, consultation with other navigation officers, and the plotting of positions and paths will inform the Master's choice of action, and reduce the risk of a hasty and wrong decision being made. The relative positions of the ship and the cyclone should be calculated under different options.

[68] This Section analyses the decision to turn South that occurred at around 1140 hours on 6 February. This analysis indicates that:

- the decision was made in haste, without prior consultation with other navigation officers and without adequate information;
- inadequate analysis of even the limited information that was on hand at 1140 hours about the path of the cyclone led Captain Seal to make an inadequate assessment of how far North of the cyclone's path the ship was;
- inadequate consideration was given to the consequences of turning South, since in addition to having to cross back over the cyclone's path at some stage, it put the ship in the position of having a following sea and carried the of risk being pooped;
- the option of engaging the main engine to make better headway North was not pursued;
- if relevant and current weather information had been obtained, plotted and analysed with the assistance of other navigation officers, then along with

consideration of changing wind directions and guidance from the cyclone avoidance procedures of the SQS, a Master in Captain Seal's position exercising reasonable skill and care would not have decided to turn the *Wunma* to the South at 1140 hours on 6 February 2007.

13.2.1 The Decision to Turn South and the Master's Reasons for Making It

[69] The decision to turn South and voyage in an opposite direction was based upon generalized information that was 4½ hours old.[75] The only weather information in Captain Seal's possession at the time the decision was made was two "threat maps".[76] The first threat map was obtained by him prior to departure on 5 February and indicated the cyclone's position as at 1600 hours. The second threat map was emailed by his wife to him via AMOS Connect at 1127 hours on 6 February and indicated the cyclone's position as at 0700 hours.[77] It follows, as Captain Seal agreed, that he decided to reverse course in the space of thirteen minutes.[78]

[70] Captain Seal's evidence is that in these thirteen minutes he:

- considered the threat map that had been emailed to him by his wife;
- compared it with the other threat map in his possession from the previous day;[79]
- discussed the alteration of course with Ms Osmand and Mr Davis;[80]
- asked Ms Osmand to "pull out the appropriate documentation to ensure that we had it, in fact, right", which documentation consisted of the *Mariner's Handbook* and the extract from the SQS containing the cyclone procedures;[81]
- spoke to the Chief Engineer from the "fuel perspective".[82]

[71] In his statement to MSQ taken on 9 February, and signed on 26 February, Captain Seal said that the decision to sail on a "reciprocal course" was to increase speed and make good a course for the South West quadrant of Cyclone Nelson. Captain Seal's statement to MSQ, and also his main witness statement to the Inquiry dated 2

75 Captain Seal; T.148.
76 Captain Seal; T.129.
77 Captain Seal; T.130.
78 Captain Seal; T.130.
79 Captain Seal; T.132.
80 Captain Seal; T.150.
81 Captain Seal; T.151. Exhibits 10 and 16.
82 Captain Seal; T.151.

August 2007 asserted that the cyclone "had changed its track to a position South of Edward River".[83] This is not reflected in the threat map. The threat map, as emailed by Captain Seal's wife at 1127 hours on 6 February 2007 is an Appendix to the Report.

[72] The threat map does not show Edward River or Pompuraaw, and showed the cyclone passing well to the South of Kowanyama.[84] Edward River, Pompuraaw and Kowanyama are all North of the balloon shape depicted on the threat map. Captain Seal may have been mistaken when he referred to Edward River in his witness statements. He said he was acting under time constraints and stressed when he prepared them, and could have shown more care.[85] But if he thought on 6 February that the threat map depicted the cyclone would cross the coast at a position South of, and in the vicinity of, Edward River, he was mistaken, and must have viewed the threat map in great haste and misinterpreted it.

[73] Some support for the conclusion that Captain Seal read the threat map in haste, and misinterpreted it as indicating that the cyclone would cross the coast near Edward River and that the ship was then South of the cyclone's track appears in the evidence of Mr Fisher who gave evidence that he was on the bridge at the time the decision to turn South was made. Mr Fisher's evidence was:

> "… Dean assured me he had new information on the cyclone, that we were south of the track and it was well to the west of us."[86]

[74] If Captain Seal interpreted the threat map as indicating that the cyclone's path was in the general direction of Edward River and that the ship was south of its track then this would amount to an inexcusable failure to give even cursory attention to the cyclone's path, as depicted on the threat map. Despite the distinct possibility that Captain Seal's decision to turn South was based upon a belief that the cyclone had changed its track to a position South of Edward River, the Board is prepared to assume, in his favour, that the reference to Edward River in his statement to MSQ,

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83 Statements of Captain Seal - 26 February 2007; 2 August 2007 p.13; Exhibit 18; Captain Seal; T.214. Exhibit 13 for the location of Edward River.

84 Captain Seal; T.215-216.

85 Captain Seal; T. 216.

86 Fisher; T.300.

and incorporated into his statement of 2 August 2007, was, as he claimed, "a geographical mistake" on his part in preparing his statement.[87]

[75] After providing his account of events to MSQ on 9 February, Captain Seal had a further opportunity to explain his decision to reverse course as a result of an email from Captain Dally on 21 March. Captain Dally, appreciating that investigations were being conducted by MSQ, thought that it was "worth having an answer that is clear and concise now" as to why Captain Seal altered course at 1140 hours and also whether there was any weather information that caused Captain Seal to make that decision.[88] In his written response to Captain Dally, Captain Seal included a copy of the two threat maps.[89] His evidence to the Inquiry confirmed that they were the weather information on which he based his decision.[90]

[76] His response to Captain Dally states:

> "This is the Threat Map I basically made the decision to alter course on. It was received by me on AMOS Connect at 11:27 am on the 6th Feb. <u>The wind being on my port bow</u> had reduced the speed of the vessel down to 4 knots. I saw no reason to proceed on the current course due to my lack of speed, increased remoteness and the fact that although I was in the dangerous semicircle it is better to be in the southern quadrant than the northern quadrant.
>
> When I altered course my speed increased to 10 knots and I kept the wind on the port quarter as much as practicable as described in the Mariner's Handbook. …
>
> On sailing, my only escape route was to the North as this is mentioned in the Cyclone Procedures on the vessel. However, on receiving the updated report at 11:27 I realized that the cyclone had significantly changed track and considering the current speed of the vessel, it was inevitable that I would be in the track of the cyclone. …
>
> The fact that remains however, that a vessel should always avoid being in the left front quadrant as not only is the eye moving towards you, but the winds are blowing the vessel towards the area of maximum wind."[91] [Emphasis added]

[77] The threat map that Captain Seal received from his wife gave a visual representation of the position of the centre of the cyclone as at 0700 hours on 6 February. Captain

87 Captain Seal; T.216.
88 Captain Seal; T.117.
89 Exhibit 19. They are the two threat maps that are annexed to his written statement to the Inquiry; Exhibit 18.
90 Captain Seal; T.118.
91 Captain Seal; T.118.

Seal relied on nothing else.[92] Thus, Captain Seal believed that a radical course change was required based solely on an assessment of the non-current and generalised information contained on the threat map, compared to one that had been issued the previous afternoon.

[78] The email sent by his wife at 1127 hours contained additional information about the cyclone, but Captain Seal did not say in his evidence that he had regard to that information, which included the position of the cyclone at 0700 hours and its estimated positions over the next 48 hours. He did not plot the cyclone's reported position at 0700 hours or its path on a chart. He did not rely on this information to calculate the closest point of approach of the cyclone to the ship if he continued North compared to turning South. He did not apparently note that the Tropical Cyclone Advice (which had been issued at 0748 hours) advised that the next forecast track map would be issued at 1100 hours. Less haste at around 1130 hours would have resulted in Captain Seal seeking the details that in fact had been issued by the BOM at 1114 hours, including the position of the cyclone at 1000 hours and its path.

[79] In his written evidence to the Inquiry, Captain Seal gave essentially the same explanation for his decision as he had to Captain Dally:

> "Ultimately all decisions made in regards to the deck department were my own. However, I always consulted with members of the bridge team regarding important matters.…
>
> The decision to sail South was made shortly before 1140 on 6 February. It was primarily based on a Threat Map received via email on the ship's computer.[93] The cyclone had altered direction further to the North and increased speed. The wind <u>was now on my port bow</u> and the ship's speed down to 4 knots. I saw no reason to continue on the current course because of these changes and the predictions issued by the BOM. Also it is better to be in the southern quadrant of the cyclone rather than the northern and I believed that I could greatly increase my speed and get further away from the eye of the cyclone."[94] [Emphasis added]

92 The two Threat Maps he relied upon (dated 5 and 6 February) were retained on the shipboard computer and Captain Seal retrieved them on the commencement of his first "swing" on the Wunma after the incident. No other information was retrieved from the computer (Captain Dally; T. 872 – 876 and Exhibit 120). Emails his wife sent him after the "blackout" at 2010 on the night of 6 February and the morning of 7 February were not received on board the vessel until 11 February. Exhibit 120; Further Supplementary Statement of Captain Seal – 23 October 2007, Exhibit 131 para 8.

93 Captain Seal then referred to the Threat Map received by him on 6 February 2007 being part of Annexure C to his statement - 2 August 2007; Exhibit 18.

94 Statement of Captain Seal - 2 August 2007; Exhibit 18; pp.14 and 15.

[80] In essence, the decision was based on the belief that the cyclone's track had moved further to the North, and that because the ship was making slow headway, she was at risk of being caught in the dangerous northern quadrant of the cyclone.

[81] In fact, the cyclone had not altered direction further to the North. A quick comparison between the two threat maps may have given this impression. But the cyclone avoidance rules in the SQS did not authorise comparison between "threat maps". They required the position of the cyclone to be plotted, and stated "it is imperative that the Master maintain a good track on the eye of the cyclone".[95] At 1140 hours Captain Seal had the means to obtain the BOM's publicly issued information on the position of the cyclone as at 1000 hours. He may have been able to obtain even more current information. If he had plotted his ship's position, and the cyclone's track on a chart, then the result would have appeared something like the page from Exhibit 7 at 1140 hours on 6 February appearing at the end of Chapter 10.

[82] The impression that the cyclone had altered direction further to the North was not one based on reliable and current information, and would not have been gained if the cyclone's centre had been plotted during the course of the voyage. Instead, the cyclone's path would have been in an easterly direction, and the ship would have been North of its path. Access to the details issued at 1114 hours by the BOM in Tropical Cyclone Advice Number 33 would have included the advice that the cyclone was moving east at 20 km/h and was "expected to move east-south east while intensifying".[96] It predicted that the cyclone would cross the coast between Kowanyama and Karumba on Wednesday morning.

[83] In any event, wherever Captain Seal thought at the time the cyclone might cross the coast, his oral evidence to the Inquiry was that he did not think that he would make it far enough to the North of the cyclone's path because "it had sped up and it changed course".[97] Captain Seal accepted that the ship was already North of the cyclone's path. He rejected the suggestion that to turn South meant that he was trying to "outrun it to the South" and was putting himself on a collision course with it. He

95 SQS Cyclone Procedure; Exhibit 6; p.D9
96 Statement of Mr Callaghan, Exhibit 77; Attachment A page 3 of 14.
97 T. 217.

said that he believed that the ship was only a small distance to the North of the cyclone's path.[98]

[84] In short, Captain Seal's belief that the cyclone's track had moved further to the North was based on a quick comparison between one outdated threat map, and another more recent one, and not on an analysis of the actual track of the cyclone. The cyclone's path having not been plotted on the basis of current and precise weather information, his views about how far North the ship was of the cyclone's path were not based on a reliable analysis.

[85] The second essential reason given to turn South was that the ship was making slow headway going North. On Captain Seal's calculations, at a speed of 4 knots, in five hours' time, the ship would be 20 nautical miles to the North of the track of the cyclone whereas, if the ship voyaged South at 10 knots, in five hours running, she would be 50 nautical miles to the South of the track of the cyclone.[99]

[86] This analysis overlooks the feature that the ship, although only making headway of between 4 and 4.5 knots at the time, did not have her main engine engaged. It also ignores the feature that, to turn to the South, would almost certainly put the ship in the position of having a following sea and risk being pooped. It also involved the prospect of intersecting with the predicted path of the cyclone, at least at some point.

[87] In circumstances in which Captain Seal and his crew had not plotted the path of the cyclone, and the weather information available to him was so limited, he made an inadequate assessment of how far North of its path he was when he decided to turn South. His inadequate assessment of his ship's position relative to the cyclone's path did not enable him to make an informed decision on the merits of maintaining a course to the North compared to turning South.

[88] Even without a current BOM forecast, Captain Seal failed to give proper consideration to the wind conditions. As Captain White has stated:

> "If he believed that he was still below the track of the cyclone he would have correctly applied the advice in the Handbook. However, given that he was aware that before he turned the vessel the wind had backed to the NxW he ought to have realised that he was North of the

98 T. 217-218.
99 Captain Seal; T.154.

> track of the cyclone and in the dangerous hemisphere. If he was aware that this was so he did not apply the advice in the Handbook in turning to the South and putting the wind on the port quarter. It appears that the Master had failed to continue to observe and consider the wind position so as to ascertain his position in relation to the cyclone."[100]

[89] Under cross examination by Counsel for Captain Seal, Captain Thomson accepted the proposition that, when in the vicinity of a cyclone, if outrunning a cyclone cannot be achieved, the best course is always to navigate the ship in order to move it into the navigable zone.[101] He was then referred to extracts from the *Admiralty Weather Manual*.[102] It was suggested then to him that the ship ought to have, in these circumstances, "run with the wind" keeping the wind on the portside.[103]

[90] Although Captain Thomson appeared to agree with those propositions, a few matters should be noted. First, the wind was backing and was in fact on the port bow of the *Wunma* at the time the decision was made to turn South indicating that it was in the "dangerous quadrant". Secondly, the assumption contained in the proposition put to him was that the ship could not outrun the cyclone. Whether it could or not depended on how far North of the path of the cyclone it was, including whether engaging the main engine would have enabled it to clear the dangerous quadrant by keeping the wind on its port bow, or whether it was preferable to alter course and try to "run with the wind". Captain Thomson confirmed what "the rules" were, but was not prepared to say whether continuing North or turning South and "running with the wind" was the best option. This was because he was not on board at the time to know the conditions.

[91] Publications such as the *Admiralty Weather Manual*, *Small Ships Training Operation Manual*; *The Australian Seafarer's Handbook* and *The Mariner's Handbook* provide essential guidance, based on accumulated experience. Their cyclone avoidance rules are based on the use of observations of wind direction and the plotting of the cyclone's path. But as Captain Thomson said, "things don't happen like … you see in the good book."[104] There is no substitute for experience as well as training in navigating in the area of intended operation of the ship, including the tendency of cyclones to recurve in the Gulf. The application of the avoidance

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100 Statement of Captain White - 5 September 2007; Exhibit 114; para 6.1.6.
101 Captain Thomson; T.95.
102 Exhibit 16.
103 Captain Thomson; T.96.
104 Captain Thomson; T.95.

techniques in "the books", or a decision to depart from those techniques, requires accurate information about and plotting of the cyclone's path and the relative position of the ship and the cyclone under various scenarios. These scenarios at around 1130 hours on 6 February should have included the ship making better headway North by engaging the main engine and improving her speed as she moved away from the storm's centre.

[92] Cyclone avoidance rules require careful attention to changes in wind direction. As Captain Seal's statements indicate, before he decided to turn South, the wind had changed direction onto the port bow, in other words, it was backing.[105] He stated:

> "Even though, as you quite correctly state, the book does say to keep the wind on the port bow, but that would be – the majority of mariners would say if you are close to the track of the cyclone you put it on the port quarter."[106]

[93] In short, the ship was North of the path of the cyclone, but by failing to plot the cyclone's path, Captain Seal was not well informed about how far North of it he was. Without a careful analysis of the relative positions of the ship and the cyclone under various scenarios, Captain Seal could not make an informed decision about the merits of continuing North or returning South.

[94] Captain Seal should have made detailed observations of wind direction and the tendency of the barometric pressure when assessing his position in relation to the cyclone.[107] In this context, Captain White expressed the following opinion:

> "At 1140 hours on the morning of 6 February, the Wunma was in all probability to the north of the track in the dangerous semi-circle. It is noted that it seems as if the wind had "backed"; come around from the east to the north by west. In these circumstances, the Master in my opinion, should have followed the procedure in the *Mariner's Handbook* and put the wind on the port bow and continued in a northerly direction, and put as much distance as he could between his vessel and the storm. Had this path been taken the Wunma would have travelled to the north and away from the oncoming cyclone."

[95] Mr Robert Cowle agreed:[108]

105 Captain Seal; T.151-152. Exhibit 86.
106 Captain Seal; T.152.
107 Report of Captain White - 5 September 2007; Exhibit 114; para 5.5.2.
108 Exhibit 108.

“The decision on what course of action to take for the safety of the WUNMA was based on limited and not full (being up to the minute) information on the track of TC NELSON.

After turning to the South and the vessel was experiencing severe weather conditions the master, without full information on the cyclone and associated weather, was put in to a position where he would have been unable to be certain that any decision he made was the correct one to avoid the worst effects of the cyclone.

…

The decision to change from a northerly heading to a southerly heading contributed to the incident and was further compounded by the subsequent change in heading to the west. Both these actions brought the vessel closer to the cyclones centre even though they also took the vessel into what is known as the “safer” quadrant. However, had the vessel continued north rather than turn to the South, far less severe weather would have been experienced. By the actions of the Master the WUNMA was heading towards the “safer semi-circle” but only by definition. In fact, even though the Master positioned the vessel in the “navigable semi-circle” it was more dangerous than being north of the storm (in what is termed “the dangerous semi-circle”) because of the relative distance to the centre of the cyclone. If the vessel were 100nm to the north of the cyclone it would be in a far safer position than being 10nm to the south. In this respect, the concept of “safe” and “dangerous” semi-circles must also be defined in terms of distance to the centre of the cyclone.

The Mariners’ Handbook advises masters to keep winds on the port bow when encountering the weather associated with storms and cyclones. It appears the master did not follow this advice. Prior to the change in course at 1140 hours the vessel would have had winds off the starboard side, contrary to the instructions in the Mariners’ handbook. As the master waited so long to make the course change to bring the winds on to the port side of the vessel he had crossed the forecast track of the cyclone. It appears that at about 11:40 hours the wind had backed to the North by West and the winds were coming on the port bow. At that time progressing on a course which kept the wind on the port bow would have been in accordance with the mariners’ Handbook. Given that at the time of the change in course the vessel was in the “dangerous semi-circle” the application of the directions in the Mariners’ Handbook would have taken the vessel away and to the north of the approaching cyclone. The change in course at 1140 hours, however, then put the vessel on a course to cross the forecast track again.

Overall, the vessel effectively reached the north of the track of the cyclone and then turned south ahead of it. Had the master continued on the northerly track he would have moved in to less severe weather. By turning south at the time he did and putting the winds on the port side of the vessel the vessel was in fact being steered back to the more

> severe weather. The vessel having already endured the worst of the weather by heading north ahead of the storm in fact turned back to encounter it again."[109]

[96] In his defence, Captain Seal emphasized that on the basis of the information that he considered, the option of continuing North was considered and dismissed as being "the inferior option".[110] Captain Seal's evidence was:

> "In hindsight, I was unlucky that the cyclone happened to track to the South like it did. It was taking a 90-degrees change to its course, and in hindsight it was the wrong decision to make, if you look at the track of the cyclone, but I had to operate on the information that I had available to me at the time."[111]

[97] One major difficulty with this is that the information on which Captain Seal based his decision to turn South was completely inadequate. In addition, his analysis of that information was rushed. Further, for the reasons to be discussed in the next section, his analysis was inadequate

13.2.2 Inadequate Analysis of Information then in his Possession

[98] Long before receiving the email at 1127 hours, Captain Seal should have been plotting the position of the cyclone, its expected path and the relative positions of the cyclone and the ship. But even with the inadequate information in his possession at around 1130 hours on 6 February in the form of a threat map that had been issued about four hours earlier, Captain Seal did not properly analyse the information on hand. The information that was emailed to him at 1127 hours should have permitted appropriate plotting to be undertaken including a relative motion plot. But even the most rudimentary analysis of the threat map would have permitted him to estimate how far North of the cyclone's path he then was.

[99] The following could have been done with information provided in the 1127 hours email:

(a) Even using the threat map which provided a very general indication of the cyclone's path, Captain Seal could have marked on the threat map the position of the ship at 1140 hours;

(b) Preferably, and quite easily, he could have marked on a readily-available chart:

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109 Exhibit 108.
110 Captain Seal; T.154.
111 Captain Seal; T.154.

(i) The predicted path of the cyclone and even duplicated on it the "threat balloon" depicted on the threat map;

(ii) The position of the ship;

(iii) The location of the cyclone at 0700 hours;

(iv) The presumed location of the cyclone at 1140 hours (assuming the path and speed provided by the BOM);

(v) The radius of the cyclone.

[100] Even with the rudimentary exercise referred to in (a) or the more precise exercise in (b)(i) and (ii) it would have been apparent that the ship was a substantial distance North of the path of the cyclone. A simple plotting exercise would have indicated that the ship was then approximately 22 nautical miles North of the cyclone's path. An illustration of the plotting exercise appears at the end of this Chapter (**Figure 1**). By marking on the chart the forecast latitudes and longitudes at their corresponding times, and then by drawing a line between these positions, the most likely future track of Tropical Cyclone Nelson is shown. The distance from the *Wunma's* plotted latitude and longitude position taken from the GPS (Global Positioning System) relative to the most likely future track can then be "read off" by measuring with a simple navigational tool known as dividers.

[101] Reference to the threat map and the shading of areas of current and expected gales indicated that less severe winds were forecast to the North.

13.2.3 Inadequate Consideration of Consequences

[102] On the basis of the information in his possession, the course that Captain Seal decided to take would have two consequences;

- Having to cross back over the cyclone's path at some stage: at what stage depended on, amongst other things, how far North of the cyclone's path the ship already was, and whether the cyclone recurved in a south easterly direction.
- It would put the ship in the position of having a following sea and carried the risk of being pooped.

[103] As to the first point, Captain Seal knew that the common recurve of cyclones in the Southern Hemisphere meant that cyclone was more likely than not to travel in a south easterly direction, and that was the premise on which he originally sailed the

ship.[112] The tendency of cyclones tracking from the West of the Gulf to the East to recurve to the South should have been taken into consideration. If the cyclone recurved to the South it would take the ship longer to cross its path and enter the navigable hemisphere. Worse still, the ship might be caught in the dangerous quadrant and head into the eye of the cyclone, or be only a small distance South of the cyclone's path.

[104] As to the second point, up until the time when the *Wunma* turned to the South, it would appear from the evidence of the various witnesses, including Captain Seal, that the ingress of water onto the *Wunma* had not reached unmanageable proportions. However, the decision to turn to the South meant that the stern would be exposed to a following sea or, as Captain White has described it, the "Achilles-heel of the vessel".[113] The SQS, Section I 330, warns that when going with the weather, the speed of the vessel should be adjusted so that "surfing/broaching is avoided, and that the sea breaks behind the stern".

[105] It was not until the stern was presented to the following sea that the sea started breaking over the stern ramp and this, as those onboard quickly discovered, exacerbated the accumulation of water in the well deck.

13.2.4 No Prior Consultation with Navigation Officers

[106] Although the decision to turn South was the ultimate responsibility of the Master, consultation with other navigation officers, including the plotting of positions and paths and calculating the closest point of approach of the cyclone to the ship under various options, was likely to assist consideration of the available courses of action and reduce the chance of a wrong decision being made.

[107] Differences in the recollections of witnesses make it necessary to refer to their evidence about the involvement of other navigation officers in the decision to turn South.

[108] According to Captain Seal, during the thirteen minutes between the receipt of the threat map by e-mail at 1127 hours and the decision to turn to the South, "all members of the bridge team were … at the chart table".[114] The bridge team

112 T.213-214.
113 Statement of Captain White - 5 September 2007; Exhibit 114; para 6.1.7.
114 Captain Seal; T.156.

comprised Captain Seal, Mr Davis and Ms Osmand. Captain Seal recalled a discussion between the three officers about whether the *Wunma* should adopt a "reciprocal course" or continue in a northerly direction.[115] However, a relative motion plot was not produced.[116]

[109] Ms Osmand was due to commence her next watch at 1200 hours and she went to the bridge at about that time. According to her written evidence:

> "I found out that we had turned around on a reciprocal course South at about 9:00am. There was also water in the cargo hold. The deck water discharge was not working."[117]

[110] Her oral evidence was that she slept until 1100 hours and then proceeded to the bridge and discovered that the ship had turned around.[118] Captain Seal did not agree with her recollection in this regard, contending that she was on the bridge at the time the decision was made.[119] He says that, even though her watch started at midday, the normal practice was for someone is her position to come up on the bridge earlier, and she was on the bridge and involved in the decision.

[111] Ms Osmand says that, when she came onto the bridge, she saw from the camera vision of the cargo hold that there was "obviously water in the stern".[120] She was informed by Captain Seal of the reason why he had altered course to head in a southerly direction, namely, that the ship had "ceased to make headway".[121] Her evidence is that she did not assist Captain Seal in making his decision by checking any reference works in the library such as the *Mariner's Handbook* until later on in the afternoon on 6 February after the ship had changed "onto a westerly course".[122] She believed the reference work she consulted was the *Small Ship's Manual*.[123]

[112] Mr Davis performed the 0400 to 0800 hours deck watch on 6 February 2007.[124] His evidence was that the first he knew about the change of course was after he awoke at about midday on 6 February. By that time, the *Wunma* had already turned around.

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115 *Ibid*.
116 Captain Seal; T.146-147.
117 Statement of Ms Osmand - 16 August 2007; Exhibit 38;para 45.
118 Ms Osmand; T.272.
119 Captain Seal; T.195.
120 Ms Osmand; T.274.
121 Ms Osmand; T.274 and T.282.
122 Ms Osmand; T.275 and T.282.
123 Ms Osmand; T.275.
124 Mr Davis; T.642.

He said that he went to the mess and was told by a crew member "Oh don't you know? We are now heading South".[125]

[113] That Mr Davis was not consulted on the decision to turn South was specifically put to Captain Seal during the course of his oral evidence but he had a different recollection, whilst conceding that his recollection could be wrong.[126]

[114] Mr Davis' evidence was that after he went to the bridge he "noticed that the vessel was on a southerly course in comfortable conditions".[127] Mr Davis was asked at the Inquiry whether he discussed with the Master the option of turning the ship around and going back North, to which he responded, "Definitely not".[128] Mr Davis explained that he was not the Master and did not make the final decisions, even though he had an opinion on the matter. His opinion was that if the ship had continued North it would have passed to the North of the cyclone. He said:

> "Keeping in mind cyclones are unpredictable, but they don't head north in the Southern hemisphere. The worst that could be was that it could head East, it might track North a little bit but it's not going to chase you North."[129]

[115] But Mr Davis kept any opinion about the earlier decision to head South to himself. He deferred to the authority and knowledge of the Master who:

> "**…** seemed very confident in what he was doing. He had the information in front of him and he also had information I didn't know and that could have been the fuel."[130]

[116] Whereas Mr Davis did not express an opinion about the earlier decision to turn South, and whether the Master should turn the ship around again and head North, later in the afternoon he expressed his concerns about the proposal to head West. By then seas were coming over the stern and, according to Mr Davis, the ingress of water was "the important thing". At this time, Ms Osmond was reading from the *Mariner's Handbook* and a "little debate" started. According to Mr Davis, he said:

> "The *Mariner's Handbook* doesn't say what to do when you are filling with water, either. It is telling you what to do when you are avoiding a

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125 Mr Davis; T.647.
126 Captain Seal; T.193.
127 Statement of Mr Davis - 8 February 2008; Exhibit 85.
128 Mr Davis; T.654.
129 Mr Davis; T.654.
130 Mr Davis; T.654.

> cyclone. We are filling up full of water. Your problem is not the cyclone, it's the ingress of water."[131]

[117] The discussion with Ms Osmand occurred prior to the alteration of course to the West.[132]

[118] Mr Fisher said that he was not part of any of any discussions about whether to turn around, and did not hear any discussion because "there wasn't anyone else in the wheelhouse except for Dean and myself" when the ship turned around.[133] He made the point that the only discussions he had with Captain Seal was in regards to the fuel remaining onboard.[134] However, he stated:

> "As part of the discussion he had prior to turning around, Captain Seal stated that we were still <u>South of the track</u> with the cyclone well West of us still." [Emphasis added][135]

[119] Relevantly, Mr Leeson recalls being on the bridge before the ship changed course and overhearing a discussion between Captain Seal, Mr Davis and Ms Osmand along with Mr Fisher.[136] He recalls this conversation because, in consequence of it, he was directed to "start up the centre main engine for extra population".[137] Up until that point the ship had been "cruising just on two main engines, to conserve fuel".[138] However, Mr Leeson then expressed some confusion about when he overheard this conversation but recalled a "disagreement between the First Mate and the Second Mate" on that topic.[139] He acknowledged that it was possible that the discussion he referred to occurred after the ship had changed course to the South.[140]

[120] Unsurprisingly, because of the traumatic events during the voyage and the natural tendency of individuals to have different recollections of events at the best of times, there is a conflict in the evidence about the involvement of other navigation officers in the decision to turn South. The Board finds that the most probable course of events is:

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131 Mr Davis; T.658.
132 Mr Davis; T.685.
133 Mr Fisher; T.312.
134 Mr Fisher; T.312.
135 Mr Fisher; T.312.
136 Mr Leeson; T.362.
137 Mr Leeson; T.363.
138 Mr Leeson; T.363.
139 Mr Leeson; T.363.
140 Mr Leeson; T.364.

(a) Chief Mate Davis and Second Mate Osmand were not on the bridge at 1140 hours when the decision was made to turn South, and only learned of this change of course after it was made;

(b) Chief Engineer Fisher and First Engineer Leeson were not directly consulted about the decision to turn South, but were consulted about fuel consumption and the need to engage the main engine prior to turning South;

(c) Second Mate Osmand came onto the bridge not long after the ship turned South;

(d) Chief Mate Davis learned of the decision to turn South in the messroom, and not long afterwards came onto the bridge;

(e) Neither Mr Davis nor Ms Osmand expressed disagreement with the decision to turn South.

13.2.5 The Fuel Situation

[121] Some evidence raised the possibility that a concern about fuel reserves may have influenced the decision to turn South. However, the evidence is not sufficient to support such a conclusion.

[122] Mr Leeson, the First Engineer, gave evidence that with their knowledge of the fuel consumption there was sufficient fuel to get to Weipa but not sufficient fuel to return from Weipa and there were concerns about being able to purchase fuel in Weipa. However, he gave no evidence that the concern about fuel featured in the decision to turn South.[141]

[123] Mr Davis, when he learned of the decision to turn South thought that it may have something to do with fuel but, on the basis of his discussions with Captain Seal at the time, realised that the change of course had to do with the cyclone's position. He recalls Captain Seal saying words to the effect that he was not having much luck, that the cyclone had altered course and was heading for them, or chasing them.[142]

[124] Mr Fisher, who was probably the only other person on the bridge when the decision to turn South was made, put the issue of fuel as a factor in the decision to turn South as no higher than a possibility. His evidence indicates that his conversation with Captain Seal at the time indicated that the position and track of the cyclone justified

141 Mr Leeson; T.363.
142 Mr Davis; T.649.

the decision to head South.[143] Mr Fisher's evidence indicates that it was "new information on the cyclone" that led to the decision to head South. There is insufficient evidence, and only speculation, that concern about fuel reserves was the reason to turn South.

13.2.6 The Appropriate Decision in the Circumstances

[125] Had Captain Seal obtained current weather information, plotted the path of the cyclone as well as the position of the *Wunma* and then followed cyclone avoidance rules in the SQS in order to determine whether the ship was in the "navigable hemisphere" or the "dangerous hemisphere", he would have concluded that the ship was North of the cyclone's path. The wind was coming from the North by West unlike the prior readings recorded in the deck logbook.[144] The wind had backed so that it was on the ship's port bow as it proceeded North. In those circumstances Table 2 of the *SQS Cyclone Avoidance Procedure* advised him to continue on the course he was, only ever changing course to keep the wind on the port bow.[145]

[126] Better weather information would have allowed the path of the cyclone to be plotted, and the relative positions of the cyclone and the ship to be calculated under various scenarios. Incidentally, had Captain Seal been in possession of current weather information he would have appreciated that the forecast at 1000 hours on 6 February was that high winds were predicted for the North East of the Gulf and gale force winds were predicted for the South East of the Gulf. He was not aware of that difference at the time he made the decision to alter course.[146] He "just went as per the threat map".[147]

[127] The failure to obtain current and appropriate weather information placed Captain Seal in an invidious position. It certainly compromised his capacity to make an informed decision about the track and likely path of the cyclone.

[128] If relevant and current weather information had been obtained, plotted and analysed with the assistance other navigation officers, then along with consideration of changing wind directions and guidance from the cyclone avoidance procedures of the SQS, a Master in Captain Seal's position exercising reasonable skill and care

143 Mr Fisher; T.300.
144 Exhibit 86.
145 Captain Thomson; T.83-84.
146 Captain Seal; T.123.
147 Captain Seal; T.123.

would not have decided to turn the *Wunma* to the South at 1140 hours on 6 February.

[129] The Board reaches this conclusion despite the fact that when he was asked during his evidence whether he would have made the same decision to turn South had he been armed with up to date information about the position and tracking of the cyclone, Captain Seal said that he would.[148]

[130] His evidence may be on account of a lack of consideration of that information, and insufficient time to reflect on its implications. His evidence was given prior to Captain White's Report becoming available, and Captain Seal may not have carefully studied the BOM data and plotted it before giving evidence. But the essential point was well-illustrated by Exhibit 7, which was circulated by the Counsel Assisting shortly before the hearing. It graphically illustrates that at 1140 hours on 6 February, the *Wunma* was North of the path of the cyclone, and, if the cyclone continued on its Easterly path , the *Wunma* would be even further North of its path later on 6 February. This Exhibit appears at the end of Chapter 10.

[131] The failure to make an appropriate concession in response to a "what if" question may be explained by the pressure of giving oral evidence. Captain Seal made concessions during his oral evidence about his failure to obtain weather information from sources that were accessible during the morning of 6 February prior to the decision to turn South. No one likes to admit making a mistake. Admitting error in public proceedings is very difficult indeed. Captain Seals' written submissions did not persist in asserting that he would have made the same decision to turn South had he been armed with up to date information about the position and tracking of the cyclone.

[132] A figure[149] produced by Captain White, which is reproduced at the end of this Chapter (**Figure 2**), depicts the position of the cyclone according to the forecast issued by the BOM at 1122 hours, which gave the cyclone's position at 1000 hours. The position of the *Wunma* for 1000 hours is based on its logbook. The circle around the cyclone represents a radius of 30 nautical miles. The predicted track and the predicted positions of the cyclone at 2200 hours on 6 February and 1000 hours

148 Captain Seal; T.211.
149 Exhibit 30; Report of Captain White; Exhibit 114; para 6.2.6, Figure 10.

on 7 February are also shown. It depicts the ship North of the cyclone's path at 1000 hours on 6 February.

[133] Mr Cowle calculates that at 1000 hours on 6 February, the cyclone was 66 nautical miles, almost due West of the ship.

[134] The next figure,[150] which is also reproduced at the end of this Chapter (**Figure 3**), depicts the estimated position of the cyclone at 1140 hours based on the forecast track and speed given in the forecast issued by he BOM at 1122 hours, which gave the cyclone's position at 1000 hours. The position of the *Wunma* for 1140 hours is based on its logbook. The figure also shows the estimated position of the ship at 1240 hours, based on an estimated speed of 8 knots.[151] This figure confirms the impression conveyed by the Board's Graphic of the track of the cyclone and the position of the *Wunma* at 1140 hours (Exhibit 7), namely that at 1140 hours the ship was a substantial distance North of the cyclone's predicted path.

[135] Mr Cowle calculates that at 1140 hours, when the *Wunma* reached the most Northerly point on her track, she was 68 nautical miles to the North East of the cyclone's centre.

[136] The next figure reproduced at the end of this Chapter (**Figure 4**)[152] depicts the estimated position of the cyclone and the ship at 1240 hours. Relevantly, it shows that after steaming South for an hour the ship was approaching the 30 nautical mile circle from the cyclone's presumed centre, and was still a significant distance to the North of its path.

[137] The last two figures (**Figures 3 and 4**) are at odds with the view expressed by Captain Seal in his evidence that he was close to the path of the cyclone and would quickly cross back over its path if he turned South and put the wind on the port quarter.

[138] It will be recalled that Captain Seal's evidence was that in hindsight, he was unlucky that the cyclone happened to track to the South like it did, taking a 90 degrees

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150 Exhibit 30; Report of Captain White; Exhibit 114; para 6.2.7; Figure 11.

151 The ship's logbook for its voyage South between 1140 and 1800 hours produces an average speed of 7.9 knots.

152 Exhibit 30; Report of Captain White, Exhibit 114; para 6.2.8; Figure 12.

change to its course.[153] It would be unfair to assess Captain Seal's decision at 1140 hours to turn South by reference to the cyclone's sharp turn to the South after 1600 hours, as graphically depicted in Exhibit 7 and other exhibits. His decision must be assessed by reference to the position of the ship, the position of the cyclone, its expected path and the application of cyclone avoidance rules based upon weather information that was available at the time. One returns to the importance of determining how far North of the cyclone's path the ship was at 1140 hours, and assessing where she would be in relation to the cyclone in a number of hours depending upon whether she continued North or turned South.

13.2.7 What if the Ship Had Continued North?

[139] Captain Seal gave evidence to the effect that, by 1140 hours, the speed of the ship had been reduced to about 4 knots. But if the ship kept heading north, the sea conditions would have improved the further she moved away from the centre of the storm, allowing her to make more speed.[154] This was the assumption made by Captain White who plotted the position that the *Wunma* would most likely have reached had she maintained a northerly heading. For this purpose, he adopted a speed of 5 knots which was an average calculated over the known positions recorded in the logbook.[155] Notably, it does not take account of any additional speed and distance the ship might have achieved had it engaged the main engine.

[140] A figure[156] produced by Captain White, and which is reproduced at the end of this Chapter (**Figure 5**), depicts the cyclone position at 1600 hours on 6 February, based upon the forecast issued by the Bureau of Meteorology at 1709 hours. It shows the actual position of the *Wunma* taken from the ship's logbook at 1530 hours. It shows the position that the *Wunma* , assuming she had maintained a Northerly course at a speed of 5 knots.

[141] It depicts the ship outside the 30 nautical mile circle from the cyclone's presumed centre at 1600 hours.

[142] It does not gainsay Captain Seal's contention that he was "unlucky" that the cyclone took a sharp turn to the South late on the afternoon as he was voyaging South.

153 Captain Seal; T.154.
154 Statement of Captain White - 5 September 2007; Exhibit 114; para 6.2.10.
155 Exhibit 86.
156 Statement of Captain White - 5 September 2007; Exhibit 114; Figure 13, p. 126; Exhibit 30.

Instead, it calls into question the decision to turn South in the first place. That decision was based on a superficially attractive comparison to the effect that more *distance* would be covered by heading South at 10 knots over a five hours period (50 nautical miles) than by heading North at 4 knots over the same period (20 nautical miles). That comparison assumes the correctness of the estimate of 10 knots heading South, which proved to be an overestimate, and that not more than 4 knots could be achieved heading North, which was probably conservative.

[143] But any 50 nautical miles versus 20 nautical miles *distance* comparison depended on the starting point from which the distance was to be measured. Plotting of the ship's position in relation to the cyclone's path at 1140 hours based on information available at the time, would have shown it to be was a substantial distance North of the cyclone's predicted path. It appears that at 1140 hours the ship was approximately 22 nautical miles North of the cyclone's predicted path, based upon the weather information that Captain Seal obtained by email at 1127 hours. Applying his 50 nautical miles versus 20 nautical miles distance comparison, continuing North would have placed the ship 42 nautical miles North of the cyclone's path in five hours, whereas turning South, retracing 22 nautical miles back to the cyclone's path and then continuing the Southerly course for a total distance of 50 nautical miles would have placed the ship 28 nautical miles South of the path. In short, on these assumptions about distance and speed, continuing North would place the ship 42 nautical miles north of the cyclone's path, whereas turning South would place it only 28 nautical miles South of the cyclone's path.

[144] The final figure,[157] reproduced at the end of this Chapter (**Figure 6**), shows the same information as in the previous figure save that the orange circle depicts the area affected by the cyclone as 60 nautical miles

[145] It can be seen that, at a speed of 5 knots, the Wunma would have been close to the extremity of the 60 nautical mile zone that had been predicted by the Bureau of Meteorology to be affected by the cyclone. As Captain White says, "had the Master used three engines throughout the night, it is quite possible that he would have been beyond this predicted area".[158]

157 Statement of Captain White - 5 September 2007; Exhibit 114; Figure 14; p. 127; Exhibit 30.
158 *Ibid*; para 6.2.11.

[146] It was "unlucky" that the cyclone turned South late on the afternoon of 6 February, but only because Captain Seal had made a rushed decision at 1140 hours that day to turn South.

[147] The appropriate decision in the circumstances was to continue North.

[148] If the ship had continued North, by 1600 hours she probably would have been well outside a 30 nautical mile radius from where the cyclone's centre was expected to be at that time, and close to the extremity of the area predicted to be affected by the cyclone.

[149] In the result, the decision at about 1140 hours to turn South was a significant cause of the incident.

13.2.8 Conclusion

[150] The decision to turn South was a crucial decision that was made without obtaining adequate weather information, without plotting the path of the cyclone based on that information, without prior consultation with the Chief Mate or the Second Mate and without adequate consideration of its consequences. It was a decision that was made under pressure. But much of that pressure was self-imposed by Captain Seal's failure to obtain at an earlier stage on the morning of 6 February weather information from readily-available sources, or to seek advice or assistance from the Designated Person Ashore.

[151] Captain Seal sailed with no new cyclone information other than a generalised representation of the cyclone at 1600 hours the day before – almost 20 hours before he obtained an update - and, when that arrived, it depicted the position of the cyclone four and a half hours earlier. The arrival of his wife's e-mail at 1127 hours on 6 February prompted Captain Seal to make a hasty decision to turn South.

[152] No one can suggest that the decision he had to make at 1140 was a simple one. The "books" could offer guidance, but an exercise of judgment was called for. It is unfair to assess Captain Seal's decision by reference to where, with the benefit of hindsight, one sees the cyclone tracked later on 6 February. But it is not unfair to have expected him, over the previous hours, to have plotted the cyclone's track and expected path, and to have taken account of the possibility that it would re-curve to the South. The BOM forecast issued at 1114 hours said it was "expected to move

east-south east". Nor is it unfair to have expected Captain Seal to have a better idea of how far North of the cyclone's path he was at 1140 hours on 6 February, and, on that basis, assessed the relative positions of the ship and the cyclone under various scenarios.

[153] Captain Seal found himself at 1140 hours on 6 February in the position of making a difficult decision about competing choices because of a failure to plot the cyclone over the duration of the voyage and to consider the best course for cyclone avoidance, including engaging the main engine. Instead, at around 1130 hours on 6 February the arrival of a second "threat map" and a quick comparison between it and the one he had obtained before leaving port led to a hasty assessment of his position relative to what he understood to be the cyclone's path to be, and a quick decision to turn South.

[154] The decision taken by Captain Seal to turn to the South was not an informed one:

- He was not in possession of current weather information and did not attempt to obtain such information at 1130 hours via the AMOS email system or the satellite telephone which were operational at that time. This is despite the fact that the email received at 1127 hours indicated that the Tropical Cyclone Advice had been issued nearly four hours ago and that further information was to be issued by the BOM at 1100. In fact Tropical Cyclone Advice Number 33 was issued at 1114 hours and a further threat map was issued at 1117 hours. Consideration of the need to obtain current weather information should have led Captain Seal to obtain the most current weather information that was available at 1130 hours.
- He failed to make appropriate observations about the prevailing wind direction and to analyse what he should do in the light of changes in wind direction in accordance with well-established cyclone avoidance rules, as reflected in the SQS.
- He did not know or calculate at 1140 hours how far North of the path of the cyclone he was, and therefore did not assess the relative positions of the ship and the cyclone under various scenarios.

[155] A decision was required about the merits of heading North as against turning South, re-crossing the cyclone's path at some stage and hopefully making enough distance

to be sufficiently South of the cyclone's path to be able to avoid its impact. The choice of heading South risked being pooped by following seas and the ingress of seawater into the well deck.

[156] Even with the inadequate information in his possession at 1140 hours Captain Seal should have analysed the available information and the consequences of turning South. He was able to ascertain on the basis of the information in his possession that he was a substantial distance North of the cyclone's expected path. Gale force winds were expected in the southern Gulf. Turning South risked being pooped by following seas and the ingress of seawater into the well deck. The cyclone was predicted to move East-South East while intensifying and it might recurve even further to the South, as it in fact did later on 6 February. Turning South involved turning back into what has been described as a "marine cul de sac". Last, but not least, turning South did not apply the cyclone avoidance procedures contained in the SQS or other publications.

[157] The decision to turn South came to be made at around 1140 hours because the need to make a decision about continuing North or turning South had not been confronted by Captain Seal much earlier. If it had been, then a careful consideration of the options, based on current weather information, would have favoured continuing North but with the main engine engaged to make better headway. But even if, for the reasons given by Captain Seal, the decision to turn South at 1140 hours was the correct decision based upon the information that was available to him at that time about the cyclone's likely path, then that decision should have been made much earlier.

[158] A decision to either continue North or to turn South with the main engines engaged having not been made much earlier on 6 February 2007, Captain Seal made a hasty decision at 1140 hours without adequate information, without adequate assessment of competing choices, without consultation with the other navigation officers and without adequate consideration of the consequences of the ship having a following sea.

[159] The decision at about 1140 hours on 6 February to turn South was a significant cause of the incident.

13.3 DECISIONS TO AGAIN ALTER COURSE

[160] As appears from the earlier account of events, during the afternoon of 6 February as the ship voyaged South, the crew tried to deal with the accumulation of water in its well deck from rainwater and following seas.

[161] The various versions of events given by individual crew members makes it hard to reconcile precisely when steps were taken. Witness statements were based upon individual recollections of when things occurred, and, understandably, recollections differed. The crew were too busy dealing with emerging problems to be looking at their watches all the time. But the steps taken by them during that day can be summarised as follows:

- Opening deck drains in an attempt to direct rainwater overboard.
- Attempting to clear and operate the sump drain to direct water in the well deck overboard.
- Pumping dirty water tanks overboard.
- Setting up pumps in the well deck.

[162] Captain Seal ordered the deck drain valves be opened to sea after the dirty water tanks were full. At that stage he did not consider that the ship in any particular distress".[159] His recollection was that this occurred at 1100 hours when he and Ms Osmand tried to open the deck drains. Ms Osmand says she was not on duty at 1100 hours and so this may have occurred later. Captain Seal had a definite recollection of going into the control room with Ms Osmand to open the deck drains, and that "maybe two or three on either side of the vessel" had problems, and the mimic panel had flashed yellow.[160]

[163] During the afternoon of 6 February, Mr Davis alerted Captain Seal to the extent of the water collecting on the ship and entering the cargo hold and suggested that Captain Seal open the valves to sea. Captain Seal told Mr Davis that some of the valves could not be opened.[161] Mr Davis' confirms the exchange with Captain Seal abut the ingress of rainwater was to the effect that the deck drains could not be opened, not that Captain Seal was not willing to open them. Captain Thomson's finding of the state of the valves is not inconsistent with this evidence. When

159 Captain Seal; T.194.
160 Captain Seal; T.194.
161 Captain Seal; T.193.

Captain Thomson inspected the ship after the incident the valves were closed to sea and open to tanks and a couple of them were flashing yellow on the control panel, meaning that they either had not opened or had not closed and that a problem existed.[162] It is possible that after the salvage was in progress and before Captain Thomson' inspection, the valves were re-directed to the tanks, rather than have "dirty water" directed overboard.

[164] Photographs of the ship taken after the incident indicate that at least some of the deck drains were functioning.[163] But the opening of deck drains late on the morning or early on the afternoon of 6 February did not prevent the accumulation of water in the aft well deck.

[165] Despite various attempts by Mr Leeson and Mr Caletti to clear the sump drain pipe, it would not drain any water. As was discovered after the incident, this was because of the presence of a timber bung that had been inserted in the outlet to the drain.

[166] Pumping dirty water tanks overboard did not prevent the accumulation of water in the aft well deck. In any event, blockages in the drains leading into the dirty water tanks limited the volume of water that could enter them, and in Port the pumps took several hours to empty the tanks. Therefore these pumps did little to rid the ship of water.

[167] Difficulties were encountered in using pumps in the well deck to pump water overboard. In the afternoon of 6 February, Ms Osmand returned to the well deck with Mr Leeson and Mr Caletti to endeavour to pump water from the well deck over the side. However, the pumps available for use were "too small and … not effective enough to lower the water level".[164]

[168] During the course of the afternoon of 6 February, as the ship continued on its Southerly course it took seas over the stern. Mr Fisher estimated that it was an hour or an hour and a half after turning around that the seas started coming in.[165]

[169] At some stage, precisely when cannot be stated, wave impact caused substantial damage to the portside canopy permitting water to enter the cargo hold. Ms Osmand

162 Captain Seal; T.67.
163 Exhibit 35.
164 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 48.
165 Mr Fisher; T.312.

recalls that the stern was taking on water over the stern ramp and various attempts were made to tie down welding equipment that had become loose in the well deck. During this time the water level in the well deck rose from shin to thigh deep. Waves were pooping the ship. Ms Osmand informed Captain Seal of this by radio and this led to an alteration in course which, according to Ms Osmand, stopped the ingress of water over the stern.[166]

[170] After her time at the stern, Ms Osmond returned to the bridge along the port walkway and was hit by a wave that came through a hole in the cladding. She noticed that one wave would lift the cladding while another would then break in.[167]

[171] Despite the best attempts by various witnesses to recall the events of the afternoon of 6 February, it is impossible for the Board to make any definite finding about how much of the water that accumulated in the well deck was run off rainwater that, for one reason or another, could not be directed overboard through deck drains, and how much of it was sea water that was taken over the stern and also through the hole in the portside canopy. Heavy rain was recorded in the deck logbook on the afternoon of 6 February.

[172] With the crew's focus on managing the ingress of water and navigating, it appears that not a lot of time was spent on analysing weather information. But the deck logbook records that the barometer continued to fall. In the morning it had been 1,000 mb. At noon it was 997 mb. By mid afternoon it was 996. By 1800 hours it had dropped to 993 mb.

[173] It is likely that during the early afternoon the ship received some further emails from Captain Seal's wife. Their contents and what was done in response to them was not explored in detail at the hearing because it was only after the conclusion of the evidence that copies of the emails were produced to the Inquiry in a further supplementary witness statement dated 23 October. Prior to the hearing copies of them had not been provided by Inco or anyone else by retrieving them from the AMOS system. Because Captain Seal only produced copies of the emails from his wife's computer at that late stage, he was not examined at the hearing on their contents. As he acknowledged, because of the loss of the ship's essential circuits

166 Statement of Kellie Osmond Exhibit 38; para 46.
167 *Ibid*; para 47.

following the blackout that occurred at about 2010 hours on 6 February he would not have been able to receive a number of the emails that were sent by his wife on the night of 6 February and the morning of 7 February. Relevantly for present purposes, Captain Seal produced copies of emails that were sent by his wife:

- At 1220 hours on 6 February which sent Tropical Cyclone Advice No 33 which had been issued by the BOM at 1114 hours.
- At 1349 hours on 6 February which attached a "threat map" that had been issued in conjunction with tropical cyclone advice No 33 at 1117 hours.
- At 1613 hours on 6 February which attached a "threat map" issued at 1408 hours as part of Tropical Cyclone Advice No 34.
- At 1902 hours on 6 February which attached a "threat map" issued at 1719 hours as part of Tropical Cyclone Advice No 35.

[174] It is unfortunate that the contents of these emails were not made available to the Inquiry prior to its hearing. If the emails were received on board shortly after the time they were sent then they permitted Captain Seal and the navigation officers to review the information that had been issued by the BOM at 1114 hours and reconsider the decision to turn South. Captain Seal did not give evidence at the hearing that he did this. Mr Davis gave evidence of seeing documents, including threat maps on the bridge that afternoon. He was critical of the failure to make proper use of them and to mark when they had been received on board. The threat maps came with the inherent limitations that such a generalised visual representation has concerning the precise location of the cyclone. Apart from threat maps the only email received on the afternoon of 6 February that provided a position for the cyclone was the Tropical Cyclone Advice No 33 which gave its position at 1000 hours. It is possible that these details were used by Ms Osmand to plot the cyclone's position at 1000 hours. At some stage on the afternoon HF radio communications were restored and it is possible that this was the source of information used to plot the cyclone's position at 1300 and 1600 hours.

[175] In summary, any emails received by Captain Seal from his wife during the afternoon of 6 February were not said by him to have been analysed so as to plot the cyclone's path and to reconsider the earlier decision to turn South. Because he did not give evidence of having used this information, particularly any information that may have been received as a result of the email sent at 1220 hours, it is unnecessary to dwell

on whether his decision to continue voyaging South was the correct one, based upon the contents of that email or the "threat maps" that were sent later that afternoon. The decision to continue voyaging South appears to have been based upon the same objective as the decision to turn South, namely to cross the path of the cyclone and navigate to its safe "southern quadrant".

[176] At 1200 hours the logbook recorded that the ship was rolling and pitching in a "moderately to heavy swell". At 1530 hours the logbook recorded that she was rolling in a heavy sea.

[177] The course change made at 1530 hours was taken because of concerns about the ship being pooped and as a result of Ms Osmand's advice about the ingress of water over the stern. It involved a course change to the South South West.

[178] A further substantial course change to west was made at 1800. The deck logbook records that at 1800 hours the ship was pitching and rolling in a very heavy confused sea and swell. A notation was made in the deck log to the effect that the ship's courses were various and to the Master's orders.[168] A reconstruction of the vessel's movements on the evening and night of 6 February depicts a Westerly voyage.

[179] Despite the difficulties which the ship was in late on the afternoon of 6 February, as previously noted, at 1804 hours Captain Seal forwarded an email to Mr Tonkin, which was copied to Mr Iuliano and Captain Ives at Inco which advised:

> "Just letting you know we are travelling OK. Have a fair bit of freshwater runoff down the tail end approx 1m deep. Ship in loaded condition."[169] [Emphasis added]

[180] The failure to seek assistance or advice from the Designated Person Ashore during the afternoon of 6 February is remarkable.

[181] Throughout the afternoon of 6 February Captain Seal continued to hope that he could extricate himself without outside assistance from the difficult situation in which he found himself.

[182] By the time course changes were made at 1530 and at 1800 hours on 6 February the ship was close to the cyclone's centre. As Mr Cowle explained:

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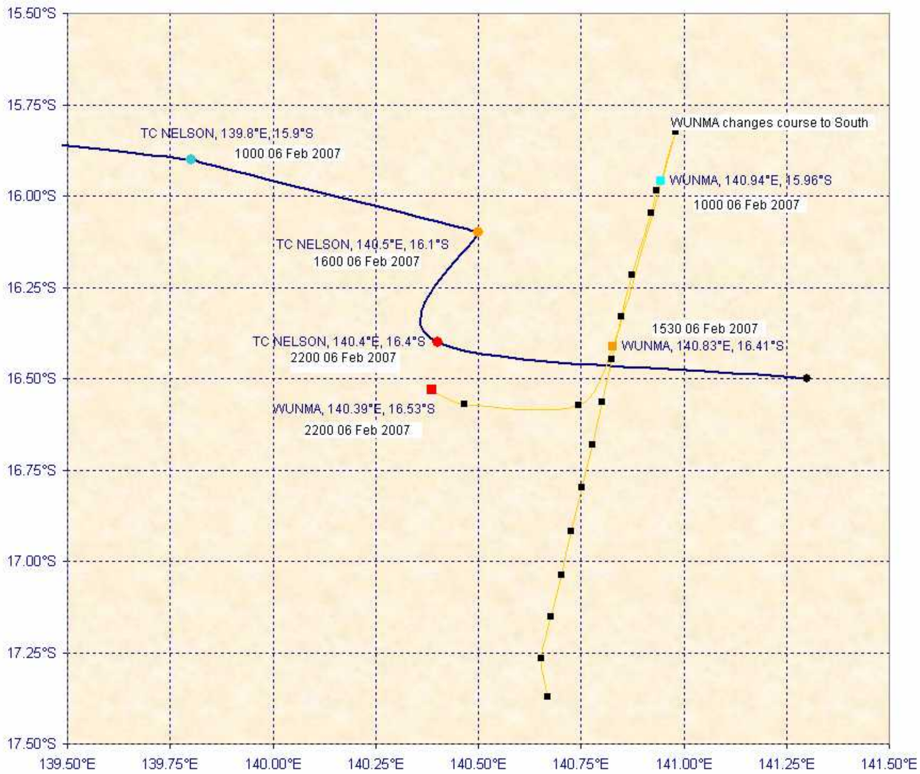
168 Exhibit 86.
169 Attachment AD6 to the Statement of Captain Dally - 19 August 2007; Exhibit 53.

"After the vessel had turned to the south and moved closer to the cyclone the general rules concerning the avoidance of cyclones (such as are found in the Mariners' Handbook) would be less applicable due the small distance between the WUNMA and the cyclone's centre. The nearer the centre of a cyclone the more the winds tend to blow across the isobars towards the centre. Over water the cross-isobaric is between 6 and 10 degrees this can become as much as 45 degrees very close to a cyclone's centre.

The decision to change from a northerly heading to a southerly heading contributed to the incident and was further compounded by the subsequent change in heading to the west. Both these actions brought the vessel closer to the cyclones centre even though they also took the vessel into what is known as the "safer" quadrant."[170]

[183] As the Board's Graphic of "*Wunma* and Tropical Cyclone Nelson"[171] shows, and unbeknownst to Captain Seal and his crew at the time, the later course changes took the *Wunma* closer to the cyclone's centre. This Graphic (Exhibit 7) appears at the end of Chapter 10.

[184] The figure below, prepared by Mr Cowle, shows the relationship between the track of the vessel and that of Tropical Cyclone Nelson.



[185] According to Mr Cowle:

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170 Exhibit 108.

171 Exhibit 7.

> "The Wunma continued South until reaching the "orange" position, 1530 hours on 6 February 2007, 27 nautical miles from the centre of Tropical Cyclone Nelson. By that time, the winds would have increased to 45 to 50 knots from the East or East South East. The significant wave height would have been in the range of 4.5 to 5.5 metres. The winds would have shifted on to the port beam suggesting the vessel should continue on the current track and would have kept the vessel heading towards the less severe quadrant of Tropical Cyclone Nelson.
>
> At around 1800 hours however, the vessel adjusted course to the West which would have put the winds and waves almost fully on the stern of the vessel. The vessel continued to head West until it reached the "red" position, 2200 hours 6 February 2007 where it dropped anchor. At around the time the vessel turned West, Tropical Cyclone Nelson made a sudden change of direction and headed south, the distance between the vessel and Tropical Cyclone Nelson decreased rapidly and at 2200 hours when the vessel dropped anchor, the cyclone was only 8 nautical miles to the north. At this point, the winds would have been almost southerly and up to 65 knots, having probably backed to this direction from a short time blowing from the South West. Very confused seas would have been present, over 6 metres. Tropical Cyclone Nelson then changed course again and headed East, away from the Wunma.
>
> At the point where the distance between the vessel and the storm centre were at a minimum, 8 nautical miles, Tropical Cyclone Nelson was at its most intense. Tropical Cyclone Nelson was a Category 2 Tropical Cyclone with maximum winds of 60 to 65 knots."

[186] The decisions to turn to the South South West and then to the West compounded the problems that had been produced by earlier decisions.

13.4 THE DECISION TO ABANDON SHIP

[187] Consideration of the Master's decision to abandon ship must begin with the following observation by Captain White in his evidence to the Inquiry:

> "The decision to abandon ship must be one of the most difficult calls a Master will ever have to make. No Master should be overly criticised for taking the decision to abandon his ship if the information available to him at the time gave him cause for concern for the safety of his crew."[172]

[188] When asked the reasons why he decided to abandon ship, Captain Seal responded:

> "Having lost communications, I did not know the position of the cyclone. I asked the SER plane on probably five occasions "did they know the position of the cyclone?" to which they answered they would get back to me on that but never did.

[172] Statement of Captain White - 5 September 2007; Exhibit 114; para 5.9.2.

> I received a message from the Eastern Star that read from memory "If the water level is higher than halfway up the stern ramp, the eventual loss of the vessel is probable and you should make preparations to leave the vessel." This message had been given by the Eastern Star who had purely Chinese Nationals onboard whose English left much to be desired, however I was not prepared to risk people's lives on the assumption that they had got the message wrong from Lloyd's who had in their possession all of the vessel's data.
>
> The vessel had developed a list, we were out of contact with all people except the Eastern Star and there was a lot of free surface effect and the cargo itself was becoming slurry changing its effect on GM from a positive to a negative.
>
> I was not happy with the positioning of the Eastern Star. I had asked on repeated occasions for the vessel to move closer to the Wunma so that they could observe the vessel, however they were at some stages over 12 miles away.
>
> My training on the effectiveness of life rafts in high winds.
>
> The fact that the pumps would soon run out of petrol. There was little else that could have been done to further secure the vessel and there was only risk left for personnel."[173]

[189] Captain Seal can hardly be criticised for his decision, given the reasons set out above. No party or witness has suggested that he should be. This included the information conveyed to him by the *Eastern Star* which, if accurate, meant the ship and her crew were in serious danger. His decision to abandon ship on the basis of the information known to him, his evaluation of the situation and his concern for the safety and lives of his crew accorded with the SQS's guidance on the decision to abandon ship. It was a reasonable decision based on the information known to him at the time the ship was abandoned.

[190] As to that information, Ms Osmand received a message from the *Eastern Star* which she wrote down on a piece of paper which has since been misplaced. To the best of her recollection, the message from the *Eastern Star* stated that, amongst other things, that "once the water in the hull was more than halfway up the stern ramp, progressive down flooding would occur" and "the Master was advised to abandon ship if he thought it was necessary".[174]

173 Statement of Captain Seal - 2 August 2007; Exhibit 18; pp.17 and 18. Captain Seal; T.175-176.
174 Statement of Ms Osmand - 16 August 2007; Exhibit 38; para 53. Ms Osmand; T.280-281.

[191] At that time, the well deck was completely full of water and certainly considerably above "halfway up the stern ramp". On the other hand, the sea level outside the hull, as a mean, would have been approximately 2 metres lower outside the stern ramp.[175]

[192] Captain Seal knew from his satellite telephone conversations with Captain Ives at approximately 2230 hours on 6 February that Lloyd's SERS had performed a number of calculations based on computer modelling of the ship and had concluded that she "still had plenty of stability".[176] After 0130 hours the next morning, the *Wunma* was not in direct communication with Inco. Captain Seal was reliant upon communications from Inco to through RCC that would then be relayed to the *Eastern Star* and via VHF radio to the *Wunma*.[177] Captain Seal's evidence was:

> "A message was received via the Eastern Star and I have to say that the level of English on the Eastern Star was minimal, it was a Chinese ship and we got a message at approximately 6:30 in the morning and what we deciphered at the time it said that if the water at least halfway up the ramp the vessel was in danger of progressively sinking and you should make arrangements to abandon ship. ... At that time, the water was fully up to the edge of a ramp."[178]

[193] Captain Seal also explained:

> "I was concerned with the fact the amount of water in the back of the cargo hold was creating a free surface effect along with the fact that the zinc was beyond its transportable moisture limit, it was actually turning into a slurry. I was also concerned that the engine room at that stage was taking on water and the free surface effect of that. The other thing I was concerned about was that I knew if we got off the ship in life rafts our probability of survival would be very little."[179]

[194] According to Captain Ives, between 0400 and 0430 hours on 7 February:

> "Lloyd's contacted me to advise that the indications were that they could assume that the cargo had shifted, but the ship would be okay as long as the engine room didn't flood. <u>If the flooding in the engine room got greater than 50%, the ship would sink by the stern</u>. By this, I understood that this could happen because the water level in the cargo hold was <u>halfway up the stern ramp</u>, with the ship having this huge trim. If the engine room, which is below the cargo hold, then continues to flood with the flooding increased to 50%, the extra weight at the back of the ship from the cargo shifting and the weight

175 Captain Seal; T.177.
176 Captain Seal; T.175.
177 Supplementary Statement of Captain Dally - 19 August 2007; Exhibit 53; para 43.
178 Captain Seal; T.176.
179 Captain Seal; T.175.

from the flooding, would make the ship sink by the stern."[180] [Emphasis added]

[195] On receiving this information, Captain Ives spoke with RCC Canberra at 0424 hours and requested that they relay a message to Captain Seal via the *Eastern Star*. Captain Ives recalls saying words to the effect that:

> "You will need to tell Dean that if the engine room fills more than 50% with water, the ship will sink by the stern."[181] [Emphasis added]

[196] RCC Canberra agreed to convey Captain Ives' message to Captain Seal via the *Eastern Star*.[182] A copy of the RCC Operator's notes of the conversation with Captain Ives at about 0424 hours[183] records the following points were written:

> "If:
> - No power
> - And to continue flood
> - He should abandon ship
> - Model indicate cargo liquafies (sic)
> - Sink by stern"

[197] RCC sent a message in writing via Immarsat-C to the Master of the *Eastern Star* which relevantly requested the following information be passed to the Master of the *Wunma*:

> "1. Inco has conducted modelling and advise that you should abandon ship if you have no power, and are taking water.
>
> 2. If possible you should check the trim aft. Modelling indicates that if trim is above halfway of (sic) the rear door progressive flooding will occur into the engine room."[184] [Emphasis added]

[198] As Captain Seal noted in his evidence, the written message is ambiguous as to whether the water level referred to – "above halfway of the rear door" – was intended to be a reference to the water level inside the ship or the sea level aft.[185] Of course, Captain Seal did not have the message in writing at the time. He understood

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180 Statement of Captain Ives - 6 August 2007; Exhibit 51; para 22.
181 Statement of Captain Ives - 6 August 2007; Exhibit 51; para 23.
182 Statement of Captain Ives - 6 August 2007; Exhibit 51; para 23.
183 Exhibit 23, p.30.
184 Exhibit 23, p.27.
185 Captain Seal; T.177.

the message conveyed to him from the *Eastern Star* related to the water level being half way up the internal side of the ramp.[186] At this time the well deck was completely full and water was "flowing out the sides".[187]

[199] In his oral evidence at the Inquiry, Captain Ives was asked about the accuracy of the RCC message to the *Eastern Star*. He said:

> "The message that went to him should have gone as basically, if the cargo hold is full and the water is – and the trim is such that the water is halfway up the stern door where the top of the seal is and the cargo hold is full of water and the trim is excessive, we were under the impression that the trim – the vessel was trimmed by the stern such that the aft draft was halfway up the stern door.
>
> …
>
> But the crunch where this message is incorrect, it says that it is okay as long as the engine room stays in tact and is not flooded. If the engine room floods by more than 50%, then the vessel could sink by the stern."[188]

[200] Later in his evidence Captain Ives was asked to look at the handwritten notes taken by the RCC Operator of the conversation with him at 0424 hours, which have been set out above. Captain Ives stated:

> "What he's neglected to write down and I think he has tried to summarise what I was saying, that, sure, modelling indicates cargo liquidates and sink by the stern, that's fine. In his note, he has it half correct. He has said modelling indicates that if trim is above halfway over the rear door progressive flooding won't necessarily occur into the engine room, right, because the engine room could still have stayed intact but we knew we had leaks into the engine room because that was established very early on in the case. So progressive flooding would not necessarily have occurred into the engine room at that stage. He has referenced then to no power. I indicated to him when I last spoke to the vessel that they had pumps running, right, and I said if no power – if they have lost the pumps and they have no power at all and the engine room continues to flood, then if it reaches 50% and the modelling is correct it would sink by the stern."[189]

[201] Captain Ives was asked to look at the typewritten message that had been sent by RCC to the *Eastern Star*. At to the two relevant paragraphs which have been quoted above, he stated:

186 Captain Seal; T.177.
187 Captain Seal; T.177.
188 Captain Ives; T.485.
189 Captain Ives; T.486.

> "If you have a look at it, even going through paragraph by paragraph, paragraph 1, Inco has conducted modelling and advised that you should abandon ship if you have no power and are taking water, well that is nonsensical. If you have no power and the ship was at anchor anyhow, we knew the cargo hold was full of water anyhow and we knew they were taking on water, but if the pumps are running there is not a problem. The problem was if we were having progressive flooding in the engine room and the trim by stern was correct you would need to abandon ship."[190]

[202] Requests were made to AMSA by the Board to locate and provide a copy of the voice recording of the conversation between Captain Ives and the RCC Operator, but AMSA for the reasons explained in Exhibit 52, said that they could not be provided.[191] In short, although voice recordings were made on a new voice recording system that RCC introduced in late 2006, an AMSA employee and an outside technician had not been able to locate archived calls for the relevant period. It would have assisted the Inquiry if the recordings of these conversations had been available to it.

[203] AMSA's legal representative at the Inquiry cross examined Captain Ives,[192] but it was not suggested to him that his recollection of what he conveyed by telephone to the RCC Operator was inaccurate in any respect.[193] Rather, it was put to Captain Ives that he ought to have passed these messages on in a hard form, such as by facsimile or email and Captain Ives, utilizing hindsight, agreed that would have been a better course,[194] It should be added that Captain Ives was not asked to do so at the time, and had been told at the time of his initial contact with the RCC that his calls were being recorded.[195]

[204] Following Captain Ives' evidence, the Chairperson observed:

> "It seems that there is a distinct possibility that the Board will make a finding that there was some miscommunication. But whether it makes that finding depends to some extent upon the evidence as to what was said by Captain Ives to the RCC. All I wanted to say is that if, for instance, AMSA wishes to submit at the end of the evidence that certain aspects of Captain Ives' evidence should not be accepted, then the Board will need to take account of the fact that so far AMSA

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190 Captain Ives; T.487.
191 T.503-504.
192 Captain Ives; T.492-496.
193 Captain Ives; T.492-496.
194 Captain Ives; T.495.
195 Statement of Captain Ives, Exhibit 51; para 26.

has not produced a witness statement from the person who was at the other end of the telephone call from Captain Ives. In the absence of someone who contradicted Captain Ives' account of events, the Board might be more inclined to accept his evidence than if it was contradicted. I'm not saying that someone from AMSA will contradict what he said, but I'm simply making what I think is probably an unnecessary observation about the way in which any Board reaches its conclusions of fact, about whether it accepts evidence and its greater preparedness to accept evidence where it is not contradicted."[196]

[205] Despite that statement, no witness statement was provided by AMSA to contradict qualify or supplement the evidence of Captain Ives. The Board has no good reason to reject Captain Ives' evidence about what he said to the RCC Operator in Canberra at around 0424 hours on 7 February. By the same token, the Board has no good reason to not place appropriate reliance upon the contents of the RCC Operator's contemporaneous, handwritten note. That said, the note does not purport to be a verbatim record of what was said by Captain Ives and the person who made the note has not contradicted or qualified Captain Ives' account of their conversation.

[206] Ultimately, for reasons to be briefly stated below, there may not be the degree of conflict between Captain Ives' evidence about what he said to the RCC Operator and the RCC Operator's file note as some of the submissions received by the Board tend to suggest. Before addressing that issue it is appropriate to return to the principal issues in connection with the decision to abandon ship and to place that decision in some context.

[207] The decision to abandon ship did not suddenly arise at about the time that Captain Seal and Ms Osmand received the message in question from the *Eastern Star*. It is unnecessary to detail the course of events. But it is necessary to refer to some of the evidence. According to Captain Ives, Captain Seal had given consideration to abandoning ship on the night of 6 February because of the amount of water in the cargo hold, the sheeting that had already been lost from the canopy and the fact that water was going into the engine room.[197] The ship suffered a total blackout at around 2010 hours on 6 February. Some power was restored. The ship was faced into the wind and anchored. The situation was stabilised to some extent. Information was passed directly from the ship to Inco's Sydney headquarters. But power was lost

196 Captain Ives; T.503-505.
197 Statement of Captain Ives; Exhibit 51; para 13.

again and for reasons previously canvassed, direct communications between the ship and Inco's head office did not continue. Given the state of flooding on the ship, including observations made by certain crew members of flexing in the hull, the crew was in a state of readiness to abandon ship throughout the night. Before communications between the ship and Inco were interrupted, there had been some assurances given about the advice from Lloyd's SERS about the ship's stability. But that was at about 2230 hours on 6 February.

[208] In considering the decision to abandon ship and the information upon which it was based, it is important to distinguish between:

(a) The information available to individuals in Inco's Emergency Response Team in Sydney and their views about whether the ship would sink, and how long it would take to do so; and

(b) The information available to Captain Seal on the morning of 7 February.

[209] As to the former, various individuals who were in Inco's Sydney office that night gave their views about whether the ship was in danger of sinking.[198] But their views may have been coloured, to some extent, by information that they received after the event which led them to conclude that the ship was in no danger of sinking. The belief of Mr McDonald that if there was excessive flooding the ship would go down by the stern and the cargo would slip out with the result that the ship would rise again[199] could hardly have provided much comfort to Captain Seal and his crew, even if his view had been conveyed to them at the time. Incidentally, there is a conflict in the evidence between the Inco witnesses about the advice that was received from Lloyd's SERS about the level of flooding in the engine room that would need to occur before the ship sunk by the stern. Captain Dally thought it was 70%.[200] Mr Iuliano thought that the critical figure was 80%.[201] Mr McDonald thought that so long as the engine room was "not flooded" the ship was not going to sink.[202] But it is well to recall that Mr McDonald's evidence was that he overheard words from the Lloyd's SERS in London that "if the engine room floods the results would be catastrophic".[203] In short, although in the early hours of the morning of 7

198 See for example, Captain Ives; T.496; Captain Dally; T.555 and Mr McDonald; T.455.
199 Mr McDonald; T.455.
200 Statement of Captain Dally; Exhibit 53; para 42.
201 Statement of Mr Iuliano; Exhibit 65; para 8.
202 Statement of Mr McDonald - 30 July 2007; Exhibit 50; para 8.
203 Supplementary Statement of Mr McDonald - 9 August 2007; Exhibit 50; para 28; T.455.

February, some Inco managers in Sydney, on the basis of earlier advice, may not have expected the ship to sink, the advice to Inco from Lloyd's at the time was that if the engine room flooded the results would be catastrophic.

[210] It was this advice that informed Mr Ives' conversation with RCC. His view at the time, rather than after the event when he saw photographs, was that the ship may sink via the stern. His evidence was;

> "If the conditions were what we expected, that we passed on to Lloyds, the information was if the thing was about eight metres aft ad-raught (sic) and it was continuing to flood in the engine room, it may sink via the stern"[204]

[211] The more important issue is the information that was available to Captain Seal on the morning of 7 February. His evidence has been quoted above and is corroborated by the evidence of Ms Osmand. It should be noted that prior to the hearing Captain Seal and others appeared to be under the misapprehension that the Master of the *Eastern Star* had been unable, through language difficulties or difficulties in the VHF communications, to accurately convey the information that had been sent to him by RCC in Canberra. In fact, as has been shown, the substance of that advice was in fact conveyed to Captain Seal and Ms Osmand. In essence, it was that if the water was at least halfway up the ramp the ship would eventually sink and they should abandon ship.[205]

[212] A subsidiary issue, although one of obvious importance to Inco, AMSA and other parties, is what was said between Captain Ives and the RCC Operator. The Board has had regard to the extensive written submissions of the parties, including submissions in reply, the evidence of Captain Ives and other witnesses, and contemporaneous documents, particularly the relevant pages from Exhibit 23. It finds that it is probable that Captain Ives conveyed the following advice and information with a request that it be forwarded to the Master of the *Wunma*.

(a) Inco was aware that water was leaking into the engine room;

(b) If the ship had no power and lost the pumps that had been running and the engine room continued to flood, then Lloyd's modelling indicated that the ship would sink by the stern, and Captain Seal should abandon ship;

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204 Captain Ives; T. 496

205 Statement of Captain Seal – 2 August 2007; Exhibit 18; pp.14 and 17.

(c) Lloyd's modelling indicated that the ship would sink by the stern if the flooding in the engine room got greater than 50%;

(d) Lloyd's modelling had indicated that if the trim was such that the water was halfway up the stern ramp (where the top of the seal is) so that the cargo hold was full of water, then the cargo would liquidate, and the ship would sink by the stern.

[213] It is possible to be critical, in hindsight, that the message sent by RCC Canberra to the *Eastern Star* was not more complete in details about the extent of flooding in the engine room that, according to Lloyd's modelling, would be required before the ship sunk by the stern. But it is also possible to be critical, in hindsight, of the manner in which details were conveyed by Inco to the RCC Operator. Leaving aside these hindsight criticisms, the written message sent by RCC Canberra to the *Eastern Star* conveyed important information. In the difficult circumstances prevailing in terms of communications between the *Eastern Star* and the *Wunma* the view might have been taken by the RCC Operator that sufficient information was conveyed to the *Eastern Star* in the circumstances. Unfortunately, the RCC Operator has not given evidence to the Inquiry about what he was told by Captain Ives and his reasons for formulating his written message to the *Eastern Star* in the terms that he did.

[214] The submissions of the parties elevated the extent of possible inconsistency between Captain Ives' evidence and the message conveyed to the *Eastern Star* by the RCC Operator and, to some extent, framed the issue as whether Captain Ives said to the RCC Operator something about water being halfway up the engine room, or halfway up the stern ramp. But this is a false issue. On his own evidence[206] Captain Ives was concerned with two separate, but related, "halfway" measurements. The first was whether flooding in the engine room would be greater than 50%. The other was his understanding that progressive flooding into the engine room and sinking by the stern this would happen if the water level in the cargo hold was halfway up the stern ramp. In the end result, the 50% figure in respect of flooding of the engine room was not conveyed to the *Eastern Star* and, therefore, was not conveyed to the *Wunma*. But the substance of the rest of Captain Ives' advice was.

206 Statement of Captain Ives – 6 August 2007; Exhibit 51; para 22.

[215] Captain Seal probably received the relevant advice and information sometime shortly after 0600 hours on 7 February. His initial witness statement suggested a time of 0630 hours but limited reliance can be placed upon that precise time since Captain Seal's witness statement was prepared without reference to the ship's logbook or other contemporaneous records. The ship's logbook records the decision to abandon ship at 0615 hours.

[216] Captain Seal continued to monitor the situation and, although the weather abated to some extent and there was some progress in removing water from the well deck by the use of pumps that were dropped to the ship, Captain Seal did not countermand his decision to abandon ship. Relevantly, the advice that he had received about progressive flooding into the engine room and the probable loss of the vessel was not contradicted, qualified or supplemented by further communications from the RCC or any other source. In addition, he was concerned that the pumps that had been set up would soon run out of petrol. In his words, "There was little else that could have been done to secure the vessel and there was only risk left for personnel".

[217] In summary:

- Captain Seal's decision to abandon ship on the basis of the information known to him, his evaluation of the situation and his concern for the safety and lives of his crew was a reasonable decision in the circumstances; and
- the information that was conveyed to him from the *Eastern Star* made a significant contribution to his decision to abandon ship.

[218] The submissions of some parties raise the issue of whether Captain Seal would have abandoned the ship if he had been informed that Captain Ives had advised that if flooding in the engine room "got greater than 50%" the ship would sink by the stern. It is unnecessary for the Board to decide that issue and, in any case, the state of the evidence does not permit the Board to reach any confident conclusion in relation to it.

[219] It is appropriate to briefly explain why this is so. One reason is that Captain Seal was not asked the question. This is a minor consideration because limited reliance can be place upon a response to such a "what if" question. The written submissions of Zinifex places particular reliance upon the views of various individuals in Inco, the fact that by 0430 hours on 7 February water levels in the engine room had been

stabilised and that although the water was between one metre and a metre and a half deep in the starboard corner of the vessel and about one-fifth of the way up the walls of the engine room, it was “nowhere near to being 50% inundated”.[207] It submits that if RCC had relayed the information received from Inco it is most unlikely that Captain Seal would have ordered the evacuation of the ship. There would have been no need to do so because the ship was not in danger: the cyclone had passed and the conditions were improving. But this submission does not take sufficient account of the concerns that Captain Seal had for the safety of his crew even with the engine room not being flooded to a substantial level. Lloyd’s modelling was one thing, but it might be wrong and the power and fuel that was being used to pump water might not last. The engine room might quickly fill. Although some persons ashore probably estimated that it would take many hours for the engine room to fill to a 50% level if power was lost, they were not in Captain Seal’s position. A precautionary approach was appropriate. The Zinifex submissions do not persuade the Board to make the finding that it seeks.

[220] AMSA in its submissions point to other features that operated on Captain Seal’s decision to abandon ship. The evidence in this regard has already been quoted. In addition, AMSA points to evidence of reports by other crew members of the flexing of the ship. AMSA submits that the advice received from Lloyd’s SERS, via the *Eastern Star,* was “one factor but was not a significant factor in the decision-making of the Master in deciding to abandon ship”.[208] For the reasons previously given, the Board is unable to agree with this submission. The advice received from the *Eastern Star* was a significant factor in the decision to abandon ship. Although the abandonment of the ship had been in contemplation and in a degree of advanced preparation throughout the night of 6 February and the morning of 7 February, the receipt of the advice from the *Eastern Star* made a significant difference. It featured in Captain Seal’s explanation for his decision and in point of time immediately preceding the recording of the decision to abandon ship in the logbook.

[221] The issue of whether Captain Seal would have abandoned ship if additional information had been conveyed to him by the *Eastern Star* is an issue about which the evidence permits different inferences to be drawn. It is unnecessary for the

207 Zinifex written submissions; para [285] citing Mr Fisher; T.316.
208 AMSA written submissions; para 72.

Board to make a finding on this issue and it declines to do so. It is sufficient for the Board to identify the matters that materially contributed to the decision to abandon ship. The receipt of information from the *Eastern Star* was a material and significant factor in that regard. Accordingly, it was *a* cause of the incident.

[222] For completeness, it is necessary to refer to AMSA's submission that the Board cannot make findings in relation to the alleged miscommunication by the RCC Operator of information to the Master of the *Eastern Star* or the role that this alleged miscommunication had on the decision to abandon ship. AMSA's submissions focus upon what is said to be a lack of jurisdiction to investigate actions under AMSA's search and rescue function. But, with respect, this misses the point. The "jurisdiction" of the Board is to inquire into the marine incident. The relevant "marine incident" in terms of s.123 of the *TOMS Act* is an event "causing or involving" the abandonment of a ship.[209] AMSA submits that an administrative board of inquiry established under a State Act does not have the power to investigate the activities of a Commonwealth authority. No authority is cited in support of this proposition. The Board is not persuaded that it is correct. Surprising results would flow in respect of the conduct of commissions of inquiry under State Acts if the proposition was correct.

[223] AMSA applied for and was granted leave to appear as a party. Under the Board's Practice Direction, and as indicated at the initial directions hearing, it was anticipated that parties would prepare witness statements. This practice was adopted by other parties. AMSA chose not to. After Captain Ives' evidence the point was made, which has already been quoted, that AMSA had not produced a witness statement from the operator who received the telephone call from Captain Ives and of the possible consequences of a witness statement not being produced. AMSA chose not to provide one. In its final written submissions, AMSA stated:

> "AMSA has consistently put that the subject matter of paragraph 8 of the terms of reference was not within the competence of the BOI. Accordingly, AMSA would have been in error to have called a witness, who would then have been subject to cross-examination, to give evidence in relation to the search and rescue. For the same reason, AMSA was not prepared to provide the evidence sought by counsel assisting in relation to the recording processes."

209 *TOMS Act*, s.123(1)(c).

[224] Whatever view AMSA takes concerning paragraph 8 of the Board's terms of reference, evidence concerning communications between it and the *Eastern Star* are relevant to the "marine incident" that is the subject matter of this Inquiry. Despite appearing as a party and cross-examining Captain Ives, AMSA made a forensic or tactical choice not to provide a witness statement from the relevant RCC Operator. Having made the choice not to provide a witness statement on a matter relevant to the abandonment of the ship, AMSA must accept the forensic consequences of doing so, including, as foreshadowed by the Board on 21 August 2007,[210] the greater preparedness to accept the evidence of Captain Ives where it is not contradicted by a witness statement from the other participant in the relevant conversation.

210 T.505.

13.5 GALLERY

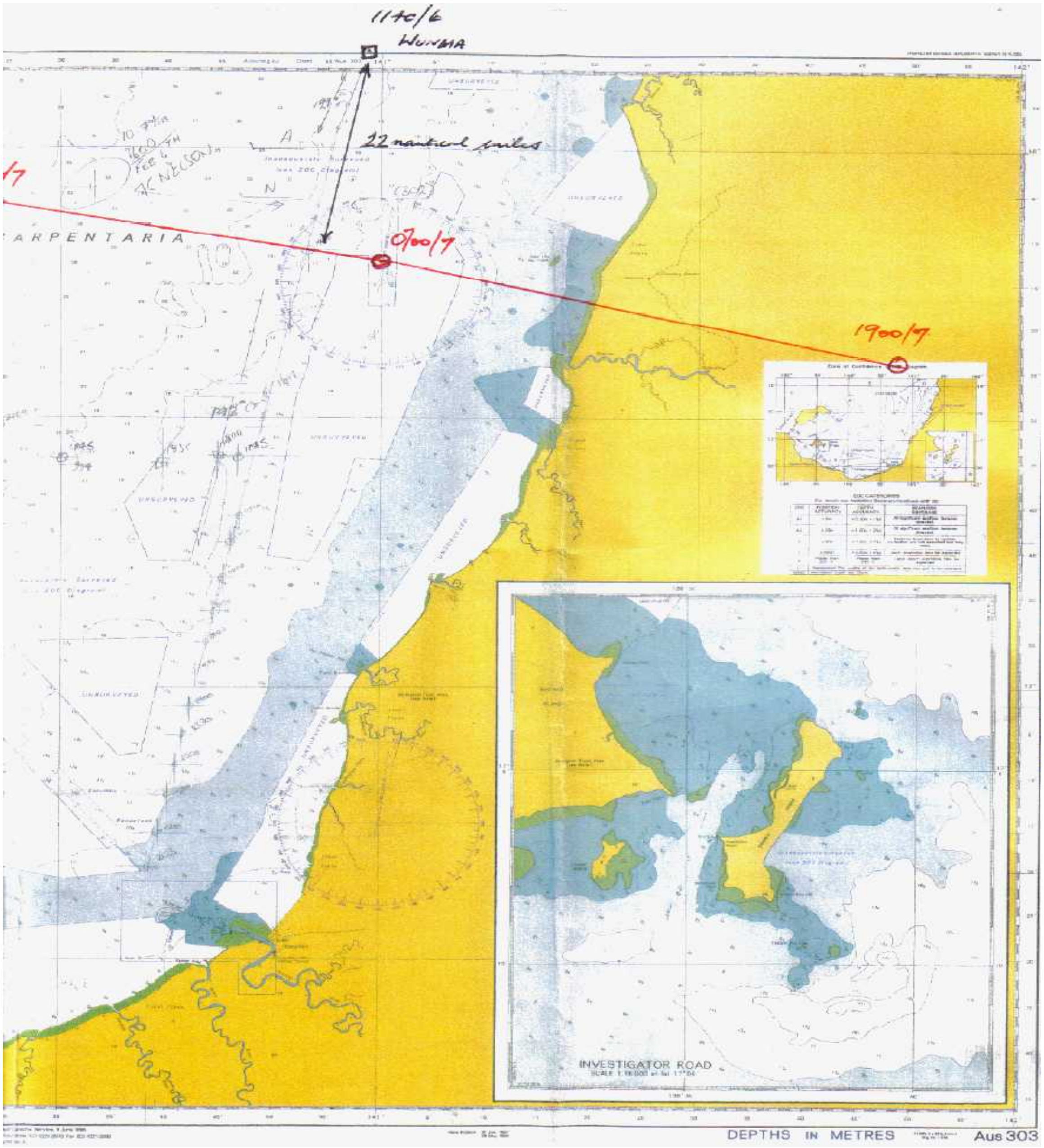

Figure 1 - Simple Plot of the Position of the *Wunma* Relative to the Predicted Path of Tropical Cyclone Nelson

Figure 2 - Showing the Actual Position of the *Wunma* and Tropical Cyclone Nelson at 1000 Hours on 6 February 2007

Figure 3 - Showing the Predicted Positions of the *Wunma* and Tropical Cyclone Nelson at 1140 Hours on 6 February 2007

Figure 4 - Showing the Predicted Positions of the *Wunma* and Tropical Cyclone Nelson at 1240 Hours on 6 February 2007

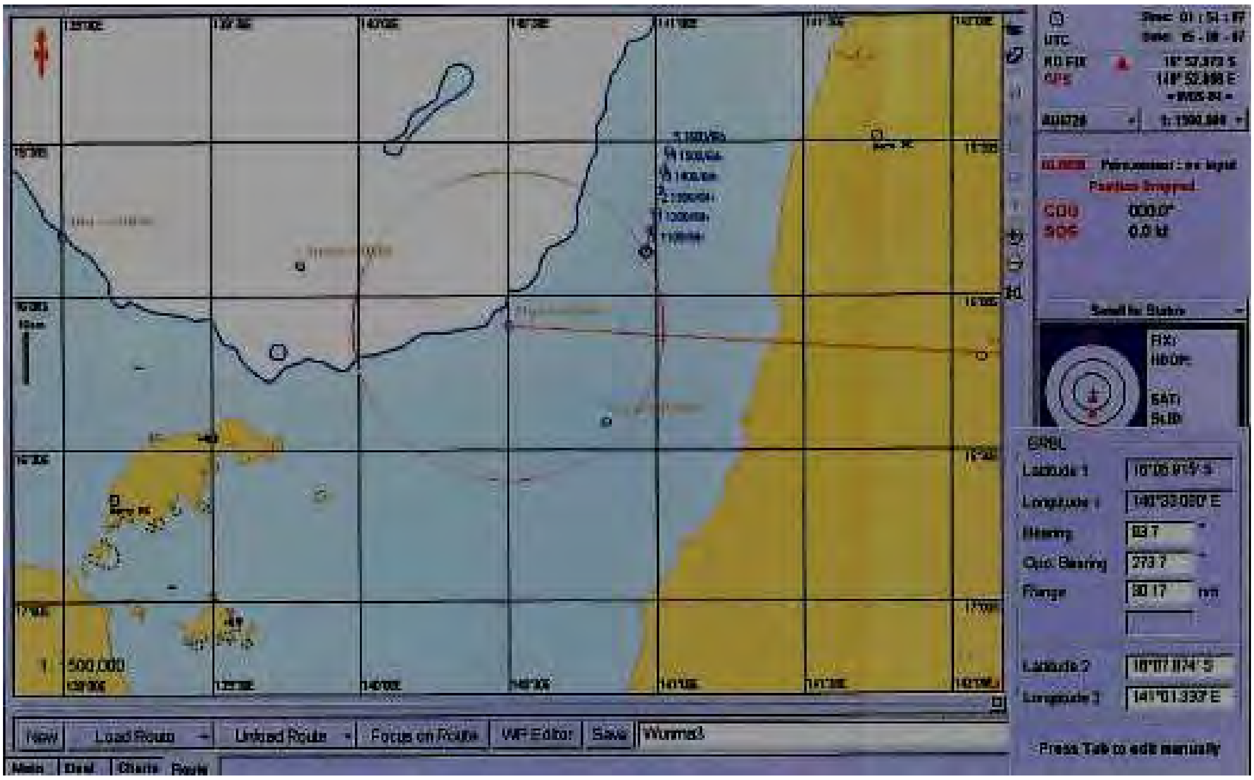

Figure 5 – Showing the *Wunma* and the Relative Track of the *Wunma* at 1530 Hours on 6 February 2007 had the Master Maintained a Northerly Heading

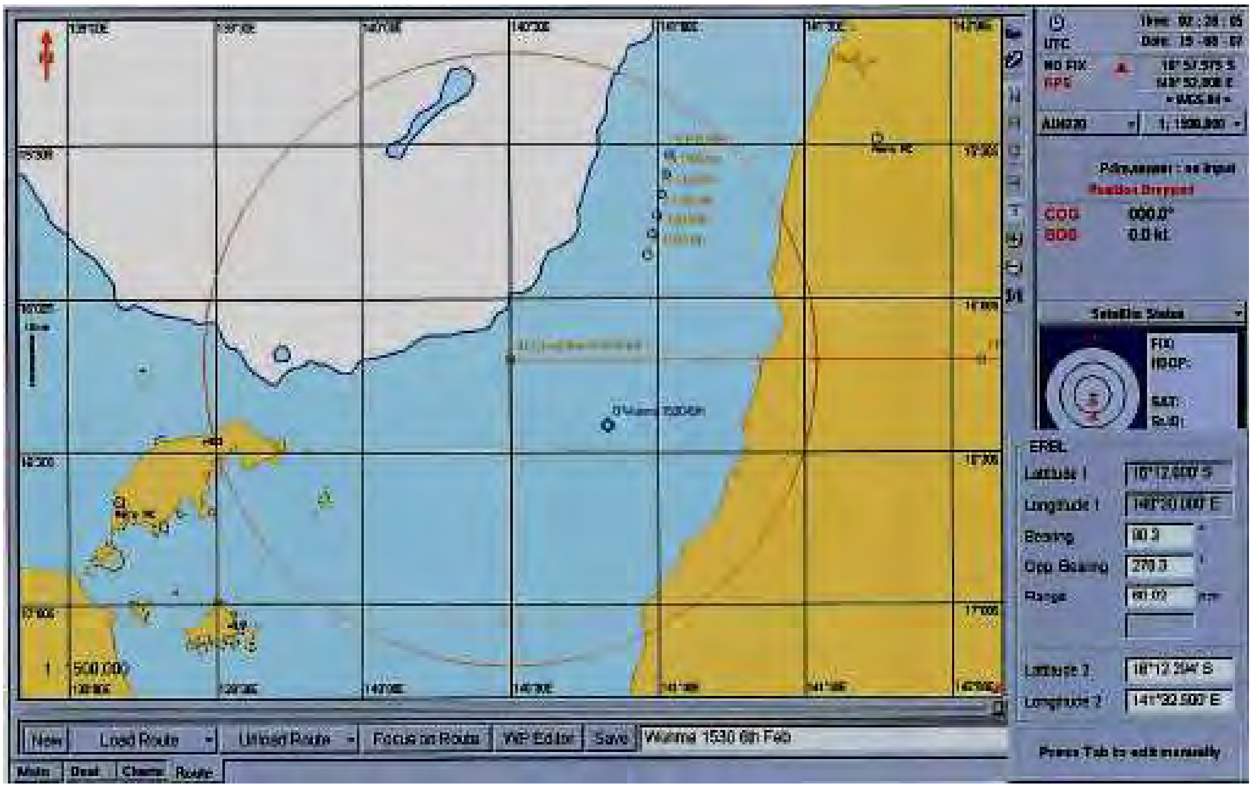

Figure 6 - Area Forecast to be affected by Tropical Cyclone Nelson at 1600 Hours on 6 February 2007 (Within a 60 Nautical Mile Radius of the Centre)

WUNMA BOARD OF INQUIRY

CHAPTER 14: THE IMMEDIATE RESPONSE TO THE INCIDENT

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CHAPTER 14: THE IMMEDIATE RESPONSE TO THE INCIDENT

14.1 OVERVIEW

[1] One of the Terms of Reference is as follows:

> "The adequacy and effectiveness of the response to the Incident including search and rescue procedures, salvage arrangements and the determination and provision of a port of safe haven."[1]

14.2 SEARCH AND RESCUE

[2] The Master and crew of the *Wunma* were evacuated by helicopter in two successive trips at 1130 hours and 1300 hours on 7 February.[2] According to Captain Seal, when the ship was abandoned, she was:

> "securely anchored and a considerable distance from a lee shore. Communication was via VHF only. There was some power to the ship but only to the non-essential circuits."[3]

[3] Reference has been made to the fact that certain information was not conveyed to the Master of the *Eastern Star* to enable it to be relayed to the *Wunma*. That aside, there is no basis to criticise the search and rescue procedures implemented during or immediately after the incident, whether on grounds of their effectiveness or adequacy or otherwise. To the contrary, the actions taken to establish communications via the *Eastern Star*,[4] to conduct aerial reconnaissance of the ship, to drop pumps to assist the discharge of water and to rescue the Master and crew from the ship[5] were all undertaken quickly and efficiently.

[4] There is nothing more that could have been done to assist the Master and crew, or the ship, in the circumstances that then prevailed.

14.3 SALVAGE

[5] Following the evacuation of the Master and crew, an Emergency Rescue Team was formed by Zinifex and proceeded with pumps and other equipment to the *Wunma*

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1 Para 8 of the Terms of Reference; Exhibit 1.
2 Statements of Captain Seal - 26 February 2007 and 2 August 2007; Exhibit 18.
3 Statement of Captain Seal - 2 August 2007; Exhibit 18; p.18.
4 Statement of Mr Bull - 2 August 2007; Exhibit 60.
5 Statement of Mr Dorr - 12 June 2007; Exhibit 62; Statement of Mr Huggett - 30 July 2007; Exhibit 64; Statement of Sgt Sweeney - 10 July 2007; Exhibit 72.

during the afternoon of 7 February.[6] The pumps were placed aft and put into operation to transfer water and concentrate slurry from the cargo hold to the ballast tanks.[7]

[6] Zinifex can hardly be criticised for acting promptly to render assistance in all of the circumstances. However, the intervention of Zinifex in this regard and the subsequent assembly of an Electrical Team that went to the ship on the fishing vessel *Vixen II*, should have been the subject of better communication between Zinifex and the relevant authorities.

[7] As matters transpired, the use of a fishing vessel to transport Zinifex personnel to the ship led to the issuing of a Marine Infringement Notice to the Master of the *Vixen II*, with Queensland Transport authorities adopting the view that the Master should have applied for a Restricted Use Flag for the purpose of taking personnel to the *Wunma*.[8] This aroused ill-feeling in the community. A local resident wrote to the Board:

> "Karumba has always been a community that is a natural self starter in the event of any problem, using any resource available, the community is greatly disturbed that some of the "helpers" in the "Wunma" event were penalized for technical lawbreaking actions. The general feeling is that Authorities who cannot control foreign Poachers can nevertheless penalize a local who cannot run away and was trying to help. If ever we need these people in the future, I know what the answer will be. Actions like this cannot be undone."

[8] It is unfortunate that there was not better communication about the proposed use of fishing vessels so that the Queensland authorities could have promptly approved their use so as to avoid the Master of the *Vixen II* being penalized for operating a fishing ship in contravention of registered conditions.

[9] That said, the intervention of the Zinifex Emergency Rescue Team and its Electrical Team to stabilise the situation and restore power was appropriate. Better communication about their proposed intervention, and co-ordination and authorization of that intervention by the authorities could have avoided the Master of the *Vixen II* finding himself in breach of the law.

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6 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 20(a). Mr Mewett; T.419-420.

7 Statement of Mr McDonald - 30 July 2007; Exhibit 50; para 16. The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.

8 Statement of Mr Jarman - 6 June 2007; Exhibit 66.

[10] On 7 February, Mr Shannon - a Salvage Master employed by United Salvage Pty Ltd ("United") – was contacted by Inco for assistance. A Lloyd's standard form of Salvage Agreement was entered into for that purpose.[9]

[11] In company with Mr Skola – a Senior Salvage Engineer who was also employed by United – Mr Shannon proceeded to Karumba to join up with other personnel before boarding the *Wunma* on the evening of 7 February.[10] There they were greeted by the Zinifex personnel who were on board and, after a short meeting, those personnel departed the ship, leaving the salvage team to continue the work of transferring the water and slurry from the cargo hold to the ballast tanks. The salvage team was requested by Zinifex not to discharge any water or slurry into the sea and, accordingly, all liquids from the holds and the aft well deck were pumped to the ballast tanks.[11]

[12] At approximately 2300 hours on 7 February, an Electrical Team assembled by Zinifex arrived at the *Wunma* to assess the damage to the electrical circuitry and communications systems.[12] Mr McDonald, along with the Chief Engineer and the First Engineer accompanied this Team.[13] At that time, the ship was at anchor, the generators were still running and the pumps had removed some water from the cargo hold. Mr McDonald noticed that the water in the well deck was about halfway up the stern door, and about halfway up the space in the emergency generator room and the same distance on the port side.

[13] The Electrical Team found that there was no power to the GMDSS equipment because the batteries were run down. The battery charger was then rewired to the main power circuit and supply was restored to the GMDSS equipment. Once that occurred, communications via VHF, Sat Comm C and satellite telephone became operational.[14]

[14] Once the water levels in the cargo hold had been reduced to an acceptable level and reports on the condition of the *Wunma* were made to AMSA and to Captain Boath,[15]

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9 Statement of Mr Shannon; Exhibit 70. Statement of Captain Watkinson; Exhibit 119; paras 12-14.

10 *Ibid*. Statement of Mr Skola - 15 February 2007; Exhibit 71.

11 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.

12 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 20(b). Mr Mewett; T.420; Statement of Mr Jarman - 6 June 2007; Exhibit 66.

13 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50; paras 12-14.

14 Report of Captain White - 5 September 2007; Exhibit 114; para 5.3.15.

15 Statement of Mr Shannon; Exhibit 70; para 13.

attention turned to arrangements for the ship to be towed to a secure location out of the weather so that the cargo could be discharged and repairs effected.[16] There were obviously only two real alternatives in this regard – the Ports of Karumba and Weipa. However, given the narrow entrance to the Karumba Channel, it was determined that the Port of Weipa offered the "simplest solution for ease of access and provision of shelter whilst effecting repairs".[17]

[15] A decision was accordingly made in consultation with MSQ and MERCOM[18] to tow the ship to Weipa. Mr Huggett completed a risk assessment in conjunction with Captain Boath based on reports about the condition of the ship provided by the salvors.[19]

[16] This was in turn provided to Ports Corporation Queensland and Comalco. Each had reservations based on "safety, environmental and port infrastructure issues" but, in the end, permission was granted for the *Wunma* to enter the Port of Weipa[20] on condition that Zinifex provide appropriate indemnities.[21]

[17] An ocean going tug – *The Pacific Responder* – was chartered to tow the ship to Weipa[22] and arrived alongside the *Wunma* on 9 February and, by 1442 hours on the following day, the tow was underway.[23]

[18] By 0745 hours on Monday, 12 February, the *Wunma* had reached the Weipa Channel and, at 1018 hours, the vessel was anchored in the Weipa Emergency Anchorage under direction of the Pilot.[24] On Tuesday, 13 February, the Salvage Agreement terminated and the *Wunma* departed the emergency anchorage at 1110 hours and berthed alongside Humbug Point at 1305 hours.[25]

[19] After arrival in Weipa, Zinifex oversaw remedial work until the *Wunma* was re-commissioned. Zinifex also allocated maintenance, resources and personnel to

16 Statement of Mr Huggett - 30 July 2007; Exhibit 64; para 20.
17 *Ibid*; para 22.
18 Marine Emergency Response Commander (AMSA).
19 Statement of Captain Boath - 3 August 2007; Exhibit 90; para 60. Statement of Mr Huggett - 30 July 2007; Exhibit 64. Statement of Captain Watkinson - 30 July 2007; Exhibit 119; paras 12-14.
20 *Ibid*; paras 24 and 25.
21 Mr Mewett; T.434. The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.
22 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 20(c). Mr Mewett; T.421. The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.
23 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.
24 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50.
25 The Annexure to Mr McDonald's Statement - 9 August 2007; Exhibit 50. Statement of Mr Shannon - 15 February 2007; Exhibit 70; paras 15-19.

support Inco to complete any remaining maintenance issues observed either during the incident or after it. [26]

[20] The salvage arrangements for the *Wunma* were both effective and adequate in all of the circumstances.

14.4 A PORT OF SAFE HAVEN

[21] The management of the incident became the responsibility of AMSA Pollution Response Unit as the lead agency and MSQ became involved through the National Maritime Plan Arrangements as the support agency.[27]

[22] MSQ is the State Government agency responsible for the regulation of the safety of ships and their operation and, relevantly, has responsibility for the prevention of pollution from ships. It works closely with other government agencies, including AMSA. AMSA provided support to MSQ, and vice versa. The Board should report that coordination of matters between them was efficient and effective.

[23] The current legislative framework regarding marine pollution in Queensland waters appears in the *Environmental Protection Act* 1994 ("EP Act") and the *Transport Operations (Marine Pollution) Act* 1995 ("*the MARPOL Act*")[28]. Because of the limits of Queensland's jurisdiction in the territorial sea, the *MARPOL Act* only deals with discharges from ships that happen, or are taken to happen, in the first three nautical miles of the territorial sea and other coastal waters subject to the ebb and flow of the tide.[29]

[24] The *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances* provides a national framework for responses to marine pollution incidents. As part of the intergovernmental agreement reflected by that plan, the EPA has an advice and support role to MSQ on marine pollution issues.

[25] MSQ was involved in a variety of respects in responding to the incident. This included the involvement of the Vessel Traffic Services in Cairns in relaying

26 Statement of Mr Iuliano - 31 July 2007; Exhibit 65.

27 Statement of Captain Boath - 3 August 2007; Exhibit 90; para 60. Statement of Captain Watkinson - 30 July 2007; Exhibit 119; para 10.

28 See in particular section 23 of the EP Act and sections 3, 11, 14 and 23 of the *MARPOL Act.*

29 Section 11.

communications to the *Eastern Star*. The Regional Harbour Master (Cairns) was involved in, and monitored, these developments.

[26] On 7 February the General Manager of MSQ, Captain Watkinson, was in Bundaberg and, in the circumstances, he asked the Director (Maritime Services), Mr Huggett, to act on his behalf in relation to the incident. Mr Huggett liaised with AMSA in order to clarify matters of jurisdiction. MSQ's view was that the search and rescue response in Commonwealth waters was a matter for AMSA. But because the ship was a Queensland registered ship, and there was a real possibility of marine pollution, MSQ formed the view that it should be involved in the response to the incident in consultation and cooperation with AMSA. Mr Huggett had the day-to-day management of MSQ's response. The documents and other evidence reviewed by the Board indicate that MSQ's response was appropriate and efficient.

[27] As previously noted, in the days immediately after the incident issues arose in arranging the ship's entry into the Port of Weipa. The matter was inevitably complicated by concerns by interested parties, including Comalco, about possible disruption to operations in the Port of Weipa. These concerns may have been overstated due to a lack of information about the nature and extent of the risks involved. MSQ correctly took the view that the threat of a pollution incident would be significantly minimised if the vessel could be secured within the relatively calm waters of an appropriate port or area of sheltered water.

[28] As Mr Huggett has stated,[30] the incident did not fall "strictly under the *National Maritime Place of Refuge Guidelines* which provide guidance for dealing with ships in distress at sea" given that:

> "The situation had stabilised, the weather had abated and the ship was under the control of professional salvors."[31]

[29] Captain Watkinson was of the same view, for essentially the same reasons.[32] It is helpful to quote passages from Captain Watkinson's statement to inform parties of the interrelationship between the "place of refuge" guidelines and the powers available to Commonwealth and State authorities in the event that a similar situation arises in the future:

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30 Statement of Mr Huggett - 30 July 2007; Exhibit 64; para 20..

31 *Ibid*; para 21.

32 Statement of Captain Watkinson - 30 July 2007; Exhibit 119; paras 20 -24.

“20. … once the salvors were on board and the cyclonic conditions had passed, although the vessel still had the potential to cause significant pollution, both from its cargo and from oil carried on board, I did not consider that the ‘place of refuge’ guidelines were required to deal with the tow of the ship to Weipa. The place of refuge guidelines have been approved by the National Plan Management Committee and endorsed by the Australian Transport Council (the forum of chief executive officers of Government Transport Council (the forum of chief executive officers of Government Transport Departments in Australia) in 2003, with the intention of appropriately managing ships that become casualties in order to prevent and minimise marine pollution.

21. I formed the view that the place of refuge guidelines did not apply to this incident because:

   a. there were no crew on board, save for the salvors and the chief engineer;

   b. professional salvors were in charge of the ship and the tow;

   c. heavy weather conditions were no longer present;

   d. there was no immediate danger to the ship, its cargo or to life;

   e. the ship was a ‘dead ship’ and so could be towed;

   f. the towing vessel was significantly equipped, powered and crewed to more than adequately respond to any incident.

22. In those circumstances, the concept of place of refuge for the ship simply doesn’t apply. … The PCQ had sufficient authority and experience to approve the entry of the ship to the port of Weipa, but declined to exercise such authority.

23. However, if there had been a continuing danger to property, risk to life or a potentially serious danger to the Queensland Coastline, then I would have had no hesitation in following the guidelines and exercising my powers of intervention under Part 12 Division 7 of the *Transport Operations (Marine Pollution) Act* 1995 and my powers as a harbour master under Part 7 Division 2 of the *Transport Operations (Marine Safety) Act* 1994.

24. In such circumstances however, the Marine Emergency Response Commander (MERCOM) may have intervened under the National Marine Emergency Response arrangements as agreed under an IGA between the Commonwealth and States

> and as prescribed in *Protection of the Sea (Powers of Intervention) Act 1981*."

[30] As matters transpired, the difficulties encountered in arranging the entry of the ship into Weipa were negotiated by the provision of appropriate indemnities and the helpful production of a risk assessment by MSQ based on reports about the condition of the ship provided by the salvors. But in other circumstances, for instance, in which appropriate indemnities and the like could not be resolved and provided, it would have been necessary for either the Commonwealth or State authorities to intervene by exercising powers under relevant anti-pollution and marine safety legislation.

[31] Had the *Wunma* been in a situation of distress that required a port of safe haven, the choices were limited. As Captain Boath explained in his oral evidence, the obvious choice would be the Port of Weipa, but that may not be possible if that Port is affected by the same weather conditions that put the *Wunma* in peril because the Port of Weipa would be closed to large vessels such as the *Wunma*.[33] The availability of Bing Bong as a place of refuge would also be at least potentially affected by the same concern as well as the added feature that it is outside the maritime jurisdiction of MSQ. Captain Watkinson gave evidence that while the Port of Weipa provided the most beneficial location, the sheltered waters within Albatross Bay could have provided favourable sea conditions to allow various activities to take place to stabilise the *Wunma's* condition.[34] That said, the Port of Weipa is the likely choice as a "port of safe haven" for a ship such as the *Wunma* in the event that a place of refuge is required for it in cyclonic conditions.

[32] The physical environment in which the ship operates has not materially altered since 1999. In 1999 the limited opportunities for the ship to find shelter in the Wellesley Islands, the Sir Edward Pellew group of islands (approximately 260 nautical miles North-West of Karumba) and in other locations in the Gulf were canvassed in evidence in the Federal Court proceedings. Those environmental realities remain. Experience since 1999 highlights the difficulty encountered by the ship in navigating the channel at Karumba in high winds and the relatively narrow "tidal window" that is available to it when it is loaded.

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[33] Captain Boath; T.707-723, especially 718.

[34] Exhibit 119; para 13.

[33] The Port of Weipa is a remote "port of safe haven" for a ship with the speed of the *Wunma*.

[34] These considerations reinforce the need for:

- the urgent installation of a suitable cyclone mooring in the Norman River;
- improvements to the ship's design and operating procedures to minimise the risk that it will need to seek refuge in the future in "a port of safe haven".

CHAPTER 15: THE REMEDIAL RESPONSE TO THE INCIDENT

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CHAPTER 15: THE REMEDIAL RESPONSE TO THE INCIDENT

15.1 OVERVIEW

[1] After the incident, a number of steps were taken by MSQ (as regulator), by Zinifex (as owner), by Inco (as operator) and by Lloyd's Register of Shipping (as the classification society).

[2] The purpose of this Chapter is to examine the nature and timing of the remedial steps that have been carried out, to consider what is planned by way of remedial steps in the future and to make some observations about the overall adequacy of the combined efforts of those parties.

15.2 MARITIME SAFETY QUEENSLAND

[3] Following the incident, Captain Aarons travelled to Karumba and took a number of statements from the Master and crew of the ship on 8 and 9 February and also interviewed a number of other people concerning the incident.[1] On 9 February, Mr Kavanagh as Manager of Compliance, MSQ took over the conduct of the investigation.[2]

[4] Amongst other things, by Notice dated 15 February issued pursuant to Section 165 of the *Transport Operations (Marine Safety) Act*, the registration of the ship was suspended so that she could be assessed and surveyed.[3]

[5] On 17 February, a Restricted Use Flag ("RUF") was issued by Captain Boath to facilitate the discharge of the cargo from the ship. The conditions of the RUF included compliance with Lloyd's Conditions of Class and several other conditions designed to ensure a safe voyage to the Roadstead to unload.[4] The discharge was completed on 17 February and, on the following day, a further RUF was issued by Captain Boath to allow the ship to return to Karumba.[5]

[6] On 20 February, Mr Kavanagh forwarded letters to Zinifex and Inco in which he

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1 Statement of Mr Aarons - August 2007; Exhibit 59.
2 Statement of Mr Kavanagh - 1 June 2007; Exhibit 67.
3 Statement of Captain Boath; Exhibit 90; para 67. Statement of Mr Kavanagh - 1 June 2007; Exhibit 67; Statement of Mr Bundschuh - 1 August 2007; Exhibit 94; paras 78-90.
4 Statement of Captain Boath; Exhibit 90; paras 67 and 68.
5 *Ibid*; para 69.

asked a number of questions and sought documentary and other information.[6] Zinifex responded on 16 March and Inco responded on the same day. Mr Kavanagh made several other enquiries and sought and obtained information concerning the incident from a number of other sources before his investigation ceased on the announcement of this Inquiry.[7]

[7] In the following month, Mr Normington was retained by Zinifex to conduct a load line renewal survey with respect to the *Wunma*, and this was completed on 15 March.[8] As a result of this survey, the ship was considered by MSQ to "be in a satisfactory condition in regard to the load line survey and … suitable to have (an RUF) renewed to continue commercial operations".[9]

[8] The ship remains under this RUF pending completion of each of the Lloyd's Condition of Class requirements.[10] Once the Conditions of Class have been met, Mr Bundschuh is to consult with Captain Boath to determine whether the ship's registration ought to be renewed - that is, the suspension lifted - and, if so, on what conditions.[11]

[9] In early March, Captain Watkinson asked Captain Boath to "engage in discussions with the owners of the ship about alternative cyclone contingency arrangements as a matter of urgency".[12] In turn, Captain Boath requested Mr Hayward to draft an Interim Cyclone Contingency Plan for the *Wunma*.[13]

[10] Mr Hayward asked for Captain Thomson's assistance, although he informed Captain Thomson that the request from Captain Boath stated that the plan "could not allow for the Norman River to be used, it must be based on the safest option or options for the operation of the vessel in the Gulf".[14]

[11] In due course, an Interim Cyclone Contingency Plan was published by Captain

6 Statement of Mr Kavanagh - 1 June 2007; Exhibit 67; paras 18 and 19. Exhibits 102, 103.
7 *Ibid*.
8 Statement of Mr Normington - 3 September 2007; Exhibit 111; para 12.
9 Statement of Mr Bundschuh - 1 August 2007; Exhibit 94; para 88.
10 *Ibid*; para 70.
11 *Ibid*; para 85.
12 Statement of Captain Watkinson - 30 July 2007; Exhibit 119; para 18.
13 Captain Thomson; T.55. Statement of Captain Dally - 1 August 2007; Exhibit 53; paras 26-31.
14 Statement of Mr Hayward; Exhibit 74; paras 26-29.

Boath on 15 March.[15] It was specified to commence in operation:

- immediately a Tropical Low develops in the Gulf of Carpentaria Region;
- when a cyclone that has formed in the Coral Sea has a westerly moving aspect and is likely to cross Cape York Peninsula into the Gulf of Carpentaria region; or
- for reasons the Master of the *Wunma* has that storm and hurricane force winds may develop in the Gulf of Carpentaria within 48 hours.[16]

[12] The Gulf of Carpentaria Region was defined to include the whole of the sea space in the Gulf. A Tropical Low was defined as "an area of low pressure surrounded by at least one isobar that has potential to deepen and become a tropical cyclone".[17]

[13] The procedure provided for action to be taken depending upon the issue of a Yellow, Blue or Red Alert which was each triggered in the same way as under the Port of Karumba Cyclone Contingency Plan,[18] that is, on the forecast of destructive winds between 24, 16 and 6 hours, respectively.[19]

[14] On the commencement of the Plan (for instance, when a Tropical Low develops in the Gulf, the focus of the procedure was to ensure that the vessel was not loaded, either by discharging its load to the export vessel at the anchorage or, if at the Wharf, not to commence loading.[20]

[15] Any cyclone contingency procedure based on alerts should carefully select the timing of the activation of each of the Alerts and what is to be done at each stage. But as the incident shows, alerts can come too late to prevent loading. Importantly, the Interim Plan commenced in operation before any of the alerts do. Its objective was to ensure that the ship was not caught in a loaded state in the face of a cyclone. This is to be contrasted with the procedure under the SQS that did not at the time of this incident require loading operations to cease until the Blue Alert.

[16] Part 2 of the Plan required the *Wunma* to make preparations to sail and included several detailed lists of what is required in that regard – including the maximisation

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15 Exhibit 15.
16 Exhibit 15; p.1.
17 *Ibid*; p.2.
18 Exhibit 8.
19 *Ibid*.
20 *Ibid*; p.3.

of all bunker tanks.[21] The procedure then required the *Wunma* to "let go and depart" the Wharf for the cyclone anchorage,[22] a position that is located about three nautical miles to the North West of the Fairway Beacon in 3 metres of water.[23]

[17] At all stages the crew of the Wunma were to continuously monitor the "position, track and intensity of the cyclone as well as the ship's position.[24]

[18] One of the benefits of the Interim Cyclone Contingency Plan was stated to be to ensure that the:

> "The *Wunma* has ample time to prepare at the onset of a severe Tropical Revolving Storm … (and be) in the state of readiness to ride-out Tropical Revolving Storms in close proximity to Karumba."[25]

[19] Following the suspension of the ship's registration the Director (Maritime Safety) of MSQ, Mr Bundschuh, instructed his Senior Naval Architect to liaise with the accredited surveyor, and through him with Lloyd's Register, about their requirements for the ship so as to ensure that relevant conditions are reflected in the registration and load line conditions issued by MSQ. One area of obvious concern is the ship's loading conditions during cyclone seasons. It will be recalled that shortly after the incident, Captain Boath recorded the views taken by him and other MSQ officers which succinctly summarised the problem:

> "1. The ship in a light ship condition is susceptible to dangerous pounding.
>
> 2. The ship in a loaded condition is susceptible to swamping."

The development of appropriate loading conditions must accommodate these stark realities. Mr Bundschuh indicated that if Lloyd's Register amends the loading conditions for operating during cyclone seasons then he would state them explicitly on the registration certificate.

[20] The other obvious matter of concern affecting the conditions of the ship's registration and its safe operation is the management of water on the ship,

21 *Ibid*; pp.3-5.
22 *Ibid*; p.5.
23 *Ibid*; p.2.
24 *Ibid*; p.5.
25 *Ibid*; p.6.

particularly arrangements to drain water off the ship and to store water that is not drained off the ship. In his witness statement of 3 August 2007 Mr Bundschuh advised that he was "monitoring progress" in relation to these matters.

[21] Unfortunately, as explained below, the progress of these arrangements has been much delayed, and there is no evidence that MSQ did much to hasten them, for instance, by indicating to the ship's owners and manager that it would consider exercising powers in relation to the ship's operation and withdrawing the RUF if the matters were not attended to by the start of the cyclone season.

15.3 ZINIFEX

[22] On the day following the incident - 8 February - Dr Lewin, who is the Group Manager Safety and Health at Zinifex, initiated an investigation in order to attempt to determine the cause of the incident.[26] Mr Placanica was directed to conduct the investigation. On 14 February, Mr Clarke of Thompson Clarke Shipping was asked to assist the investigation.[27]

[23] After the preliminary phase of this investigation was completed, on 3 April, a review was conducted in Melbourne at which Captain Dally, Mr McDonald, Mr Mewett, Mr Clarke,[28] Mr Placanica and Mr Ballantyne along with Dr Lewin were present.[29] The workshop highlighted "some immediate safety and operational issues".[30] In the end, the investigation was terminated for a number of reasons, including the convening of this Inquiry.[31] However Mr Clarke has continued to have an ongoing role in advising Zinifex as to how the *Wunma* "could be operated more safely and efficiently".[32]

[24] In July, Zinifex engaged the Australian Maritime College ("AMC") to investigate and prepare a report about cyclone contingency arrangements for the ship.[33] In

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26 Statement of Dr Lewin - 9 August 2007 and Supplementary Statement of Dr Lewin - 22 August 2007; Exhibit 57.

27 Statement of Mr Clarke - 4 September 2007; Exhibit 99.

28 *Ibid*.

29 Statement of Dr Lewin - 9 August 2007; Exhibit 56; para 14. Dr Lewin; T.590-594.

30 Statement of Dr Lewin - 9 August 2007; Exhibit 56; para 18. Dr Lewin; T.590-594.

31 Statement of Dr Lewin - 9 August 2007; Exhibit 56; para 20. Dr Lewin; T.590-594.

32 Statement of Mr Clarke - 4 September 2007; Exhibit 99; para 10.

33 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 94. Supplementary statement of Mr Mewett - 20 August 2007; Exhibit 47; paras 3-10; Statement of Mr Clarke - 4 September 2007; Exhibit 99; para 12.

particular, the AMC was asked to consider the following alternatives:

- Remaining alongside the berth including any suggested modification to the structure of the berth and mooring arrangements.
- A single cyclone mooring in the Norman River close to the berth.
- Mooring the *Wunma* between two cyclone moorings and the Norman River close to the berth.
- Lying moored partially between the berth and a cyclone mooring in the river.
- Locating heavy anchors in strategic locations in the Norman River bed or a snag that could be picked up and made fast to the ship in the event of a cyclone approaching.
- Making for an alternative port of refuge such as Weipa.
- Heading to a protected anchorage off one of the islands in the Gulf.
- A new draft procedure by MSQ to ride out the cyclone at the quarantine anchorage which is located near the fairway buoy.
- A cyclone mooring situated elsewhere in the Gulf, possibly off one of the islands in the Gulf and as such, a review of the location and suitability of the current cyclone mooring buoy near Sweers Island.[34]

[25] In examining the above alternatives, the AMC was required to consider them in the context of the vessel being in ballasted, fully loaded and partially loaded conditions. The AMC was also asked to make recommendations concerning:

- the future operational arrangements for the ship;
- ports of safe haven; and
- the appropriateness of cyclone moorings in the Gulf of Carpentaria.[35]

[26] In September the AMC produced for Zinifex a report on Phase 1 of its study which consisted of advice on various cyclone mooring options ("the AMC Report"). This report was provided to the Inquiry on 11 October on a confidential basis since it wished to announce its planned action, and a process of community consultation had not commenced. On 18 October, a copy of the AMC Report was provided to the parties who had been granted leave to appear, initially on a strictly confidential basis for the purpose of making submissions in relation to the recommendations that the

34 *Ibid*; para 7.9.
35 The Supplementary Statement of Mr Mewett - 20 August 2007; Exhibit 47; para 9.

Board might make. An interim direction was made to this effect, but it was vacated for reasons given by the Chairperson on 1 November to the effect that no valid claim for confidentiality had been established, and that the public interest supported the general release of copies of the AMC Report.[36]

[27] The AMC Report considered various options without undertaking an in-depth technical study. From this assessment it concluded that there is no doubt that if the ship can remain in the Norman River, either alongside the wharf or at a dedicated mooring arrangement, during a cyclone then this is the safest place for it, for the crew and for the environment.

[28] The AMC recommended that these options be pursued further to determine the technical and operational requirements associated with them. Because it is extremely unlikely that any technical modifications to the wharf can be made in time for this cyclone season, the AMC at the time of its initial report felt that the best option for the forthcoming cyclone season was to locate heavy anchors in strategic locations in the Norman River.

[29] Its recommendations were:

> "1. As a matter of urgency, commence the process required to provide an anchorage for the MV WUNMA up the Norman River. This will involve:
>
> a) obtaining appropriate permission for anchors points, (note that this could be MSQ permission if the anchor points were to be below high water level, and it is estimated that this could be obtained in about two months)
>
> b) putting in place a study to determine the requirements for MV WUNMA to utilise fixed anchor points up the Norman River and
>
> c) procurement, installation and commissioning of the appropriate hardware including: anchor points; mooring lines; work boat; and storage/maintenance area.
>
> The aim should be to have this in place for the 2007/2008 cyclone season.

36 Exhibit 127.

2. Commence a study to determine how to strengthen the wharf structure to permit the MV WUNMA to remain alongside the wharf during a tropical cyclone. This will involve:

a) modelling of the likely influence of a tropical cyclone on Karumba and

b) determining the requirements for MV WUNMA to remain alongside the wharf.

It is recommended that this be commenced as soon as practical in order to determine which of the two recommended options can be adopted on a permanent basis."

[30] Further discussions were held between MSQ, Zinifex, P&O Maritime Services, AMC and Thompson Clarke in late October and early November with a view to finalising a cyclone contingency plan for the 2007/2008 cyclone season. On 5 November the lawyers for Zinifex advised the Board that the AMC had been substantially involved in a proposal for a single point mooring in the Norman River and that a Buoy Mooring application for that option was expected to be made the following week, and that applications for a four point mooring had been made the previous week.[37]

[31] Zinifex retained an engineer – Mr Ross Ellen[38] - to review the Storm Water Management System on board the *Wunma*. This occurred, to a greater or lesser extent, in consultation with Inco.[39] This process resulted in proposals for:

- increasing the size of the water collection tank for a first flush system;
- use of a water level transmitter; and
- hard piping roof down pipes to the new system, rather than the current system of water from the roof down pipes being collected on the deck and then being captured by the scuppers.[40]

[32] Subsequently, a "basic markup drawing" obtained from Inco of the revised Storm Water Plan was, at the cost of Zinifex, transformed into an engineering drawing by the Robert Bird Group.[41]

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37 Exhibit 136.
38 Mr Mewett; T.408. Mr Mewett; T.423.
39 Supplementary Statement of Mr Mewett - 20 August 2007; Exhibit 47; paras 13-15.
40 Supplementary Statement of Mr Mewett - 20 August 2007; Exhibit 47; para 15.
41 Supplementary Statement of Mr Mewett - 20 August 2007; Exhibit 47; para 16; Exhibit 48. Mr Mewett; T.387-388, T.390-391. Statement of Mr McDonald - 9 August 2007; paras 15-18.

[33] Zinifex also engaged O'Brien Marine Consultants to undertake an assessment to determine the suitability and effectiveness of Dynamic Under Keel Clearance System ("DUKC").[42] Such a system could measure the depth of water under the keel in real time by drawing on live information from equipment located at various "strategic spots" to convey data concerning wind strength, wave heights at the entrance to the fairway and alike. The benefit of this system is, according to Mr Mewett, that Zinifex will know "whether or not the *Wunma* can enter or leave Port with a lot more certainty".[43]

[34] In addition to the above steps, Zinifex initiated a "pre-feasibility assessment regarding the installation of a wharf unloader" and, otherwise, undertook a strategic review of the *Wunma*'s operational capability.[44] In this regard, Mr Mewett agreed that it is "not a good idea to have a vessel in a loaded state in the face of a cyclone".[45]

[35] In the Supplementary Statement provided by Mr Mewett dated 20 August 2007,[46] he advised that Zinifex was in the process of upgrading the communication system on board the vessel. Until this incident, Zinifex understood that the *Wunma* had "more communications than is required by law and more than is reasonably need".[47] However Zinifex engaged AWA to install a new communication system.[48] This includes changes to its power supply, the installation of a new GMDSS system and the trial of a NextG modem to allow the ship to access the internet whilst offshore.[49]

[36] On 22 June the lawyers for Zinifex instructed Mr John Kernaghan of Noble Denton to investigate the incident and, as part of that investigation, to review the design of the vessel. Mr Kernaghan is a naval architect with over 40 years' experience in the marine industry. His Design Review report dated 4 September 2007 became an exhibit.[50]

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42 Statement of Mr Clarke - 4 September 2007; Exhibit 99; para 12.
43 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 21(c). Mr Mewett; T.387.
44 Statement of Mr Mewett - 9 August 2007; Exhibit 47; paras 21(d) and (e). Mr Mewett; T.389, T.389, T.421.
45 Mr Mewett; T.421.
46 Exhibit 47.
47 Statement of Mr Mewett - 9 August 2007; Exhibit 47; para 2.
48 Statement of Mr Mewett - 9 August 2007; Exhibit 47; paras 2 and 21(b). Mr Mewett; T.386-387. Mr Mewett; T.433; Statement of Mr Thomas, Ex 107.
49 Statement of Mr Thomas, Ex 107; paras 34-37; Statement of Mr Fleming; Exhibit 123; para 28.
50 Exhibit 109.

[37] Mr Kernaghan made recommendations both in relation to operational and design matters, noting that an important part of the safe operation of the ship is that operating procedures should take account of the design. Mr Kernaghan correctly inferred that the ship was not designed to operate in a cyclone and therefore cyclone avoidance procedures are of paramount importance.

[38] A key aspect was to ensure that, in the future, the ship is not put into a similar position in which it found itself on 6 and 7 February. This requires the development of new processes to ensure that the operators of the ship will be better informed about the possibility of adverse weather conditions with the result that it will not be in a loaded condition when seeking to avoid cyclones in the Gulf.

[39] Mr Kernaghan's first recommendation was:

> "A full Risk Assessment of the operations of the "WUNMA" should be conducted. All present Masters and all those involved with "WUNMA" operations should be involved in the assessment procedure and play a full part in the development of mitigation strategies. The Risk Assessment should be undertaken by specialist independent consultants and cover the full operations of the "WUNMA" from loading the cargo through to offloading at export vessel and return to port. This Risk Assessment should be completed as soon as possible and no later than the start of the cyclone season in November 2007."[51]

[40] He advised that the analysis should consider:

- the ability of the vessel to expel water landing on the canopy and other parts of the vessel;
- the ability to expel water from the well deck;
- the ability of the vessel to handle cyclonic seas in the Gulf of Carpentaria; and
- a consideration of the above in loaded, partially loaded and unloaded conditions.[52]

[41] Mr Kernaghan recommended that any new cyclone contingency plan should include input from accredited weather forecasters familiar with the movement of cyclones in and around the Gulf of Carpentaria, with cargo loading and vessel sailing restricted on the receipt of warnings of the approach of potentially cyclonic conditions. He

51 Exhibit 109; para 8.2.1.
52 Exhibit 109; para 7.3.14.

noted that procedures had been developed in the Gulf of Mexico which restrict vessel loading and movements when major storms pass a specific geographic location.

[42] Mr Kernaghan noted that Lloyd's Register had included a number of conditions of class including modification of the emergency generator intake, stern door modifications and the development and submission of a new stormwater management plan. He noted that although these had completion dates varying from May to August 2007, at the time of his report these matters had not been completed and that it would be expected that they would be completed in a timely manner.

[43] In addition, Mr Kernaghan noted the observation of Mr Taylor that there was no watertight closure between the aft well deck and the cargo hold. He stated that consideration should be given to the possibility of fitting some form of watertight closure if their structural constraints permitted this. The *MV Aburri* has such a device. Mr Kernaghan noted, however, that the inclusion of such a device may inhibit the expulsion of water that enters the cargo hold as well as preventing water in the well deck from entering the cargo hold.

[44] Mr Kernaghan recommended that the number and effectiveness of all drains and scuppers be studied, preferably by an independent consultant. This assessment would include the amount of water collected, particularly during heavy rain storms. One would have thought that such an analysis would have been undertaken as part of the stormwater management plan to be submitted to Lloyd's Register as a condition of class. But this is not apparent from the evidence, and recent evidence disclosed that Lloyd's Register would "only assess the plan in the context of class rules more specifically in relation to hull penetrations and modifications to tanks".[53] Mr Kernaghan recommended that some form of independent verification be undertaken of the number and effectiveness of all drains and scuppers and that a similar study be undertaken as to the sizing and drainage of the collection tanks.

[45] Mr Kernaghan also recommended that a study be undertaken, preferably by independent consultants, into the watertight integrity of the stern, and that such a study would assess the probability of the stern being swamped and/or flooded based

53 Statement of Mr Fleming – 24 October 2007; Exhibit 123; para 22.

on historic cyclone events. Mr Kernaghan anticipated that this may result in recommendations about the extent of watertight integrity required.

[46] Mr Kernaghan recommended that his operational recommendations be completed before the onset of the cyclone season in November 2007 and that all other recommendations should be completed as soon as possible.

[47] The Board is unaware whether each of Mr Kernaghan's operational recommendations, particularly his recommendation for a full risk assessment, have been implemented. However, Noble Denton was engaged to undertake a full technical design audit of the original design of the ship with a view to identifying further design enhancements, and to undertake a Hazard Identification process ("HAZID") as recommended by Mr Kernaghan and Captain White in their reports, and these matters were to be attended to in November 2007.

15.4 INCO

[48] Immediately after the incident, Inco conducted a de-briefing of the Master and crew over three days. What are described as "preliminary investigations" were also undertaken, although no reports were generated given the investigations already in train by the insurers, MSQ and Zinifex.[54]

[49] Captain Dally has outlined a number of remedial steps Inco wished to take with respect to the *Wunma*, but the expiration of the VOMA on 1 November 2007 means that his evidence in this regard is now more properly dealt with as recommendations.[55] These are addressed in the Recommendations Chapter of this Report (Chapter 18).

15.5 LLOYD'S REGISTER OF SHIPPING

[50] Following the incident, Lloyd's Register of Shipping imposed thirteen Conditions of Class on the *Wunma*.

[51] Following a visit by the Lloyd's Registered Surveyor on 28 May, eight of those Conditions of Class were deleted and five Conditions of Class were given due dates for completion of between August 2007 and September 2007. Captain White

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54 Further Supplementary Statement of Captain Dally - 17 September 2007; Exhibit 120.
55 *Ibid*; para 7.

naturally enough, recommended that these Conditions of Class be satisfied as soon as practicable.[56] As already noted, Mr Kernaghan urged in his 4 September report that Lloyd's conditions of class including modification of the emergency generator intake, stern door modifications and the development and submission of a new stormwater management plan be completed in a timely manner.

15.6 CONCLUSION

[52] The Board was concerned at the lack of evidence concerning the satisfaction of these important conditions of class, despite requests by Counsel Assisting for advice about the status of remedial action. The Board expressed its concerns to the parties in a letter from Counsel Assisting dated 18 October 2007, and raised the issue of whether failure to satisfy those conditions should prompt MSQ to consider the exercise of its powers in relation to the operation and registration of the ship.

[53] A statement from Zinifex's lawyers[57] disclosed that an extension had been granted in respect of the stormwater management plan to November 2007 and in respect of the emergency generator vent to January 2008.

[54] Zinifex's final submissions dated 5 November 2007[58] state that these matters "are currently being progressed and are expected to be completed by the end of the current year".[59]

[55] The delay in satisfying these important conditions of class is unacceptable. Zinifex initially looked to Inco to progress these matters. There were discussions between them and some basic engineering drawings were prepared in relation to stormwater management. The lengthy delay in gaining Lloyd's approval to a matter as fundamental to the safety of the ship as its water management system cannot be justified.

[56] No proper explanation has been given for the delay in satisfying the condition of class in respect the emergency generator radiator intake.

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56 *Ibid*; para 7.6. Appendix P to Captain White's Report (Exhibit 114), being a copy of the Lloyd's Survey Report No. CNS 70094.

57 Exhibit 123.

58 Para 401.

59 Paras 402, 405.

WUNMA BOARD OF INQUIRY

CHAPTER 16: ENVIRONMENT

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CHAPTER 16: ENVIRONMENT

16.1 OVERVIEW

[1] An essential starting point for any consideration of the possible environmental impact of the incident is to determine how much concentrate or other material was lost overboard. Once that is established, reference may be had to the expert evidence adduced before the Inquiry to ascertain the impact on the environment, if any, such a discharge into the Gulf of Carpentaria has given rise to.

16.2 THE ZINIFEX ENVIRONMENTAL POLICY

[2] Zinifex had, at the time of this incident, an Environmental Policy.[1] It had been promulgated by Mr McMillan, General Manager, on 22 June 2006. It consists of a series of what might be described as "motherhood statements". The preamble to those statements consists of the following:

> "We aim to achieve a high standard of care for the natural environment in all of the activities in which we engage – from mining and processing, through to the transfer, filtration, drying and shipment of lead and zinc concentrate.
>
> We undertake to <u>minimize</u> our impact on the natural environment." [Emphasis added].[2]

[3] Apart from this document, there is no specific procedure dealing with the discharge of water overboard the *Wunma*. Of course, it maybe said that parts of the SQS had that as one of its unspoken objectives but one would think that, ordinarily, there would be a clear procedure outlining what could or could not be done in the operation of the vessel so far as the discharge of water was concerned.

[4] The absence of such a procedure leads to confusion. For example, Captain Seal interpreted the Policy as, in effect, a "no spills" Policy which meant that he was not permitted to discharge water overboard unless it was truly an emergency situation.[3] Others, such as Captain Thomson and Captain Dunnett took a more pragmatic approach.[4]

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1 Exhibit 36.
2 Exhibit 36.
3 Captain Seal; T.245. Mr McDonald; T.464. Captain Dally; T.557.
4 Captain Dunnett; T.341-342.

[5] Mr Fisher shared the same understanding of the policy, that is, that "no zinc contaminated water is to be discharged over the size".[5] However, he was not aware of any "environmental policy" to that effect; rather, it was "just the practice that was there when (he) came in"[6]

[6] According to Captain Dally:

> "It was very clear to us the way we were to conduct it. It was their ship and it was that policy, so I didn't have any reason to question it. That was our goal, to deliver what the client wanted provided it was safe."[7]

[7] Indeed, Captain Dally was surprised to hear of the pragmatic line taken by Captain Thomson and Captain Dunnett in the operation of the vessel.[8]

16.3 LEGISLATION AND PLANS TO COMBAT MARINE POLLUTION

[8] These have been addressed in other parts of the report, principally in the description of legislation in Chapter 5 and the Immediate Response to the Incident (Chapter 14).

16.4 THE ENVIRONMENTAL PROTECTION AGENCY

[9] On 30 November 1999, lawyers acting for the Lardil, Kaiadilt, Yangkaal and Gangalidda Peoples and the Carpentaria Land Council Aboriginal Corporation, wrote to the Environmental Protection Agency ("EPA") to request that an environmental investigation be conducted into the construction and operation of the buoy mooring at Sweers Island.[9]

[10] For the reasons explained in Chapter 4, many years later the EPA was able to avoid reaching any conclusions about any potential for environmental harm for the use of the cyclone mooring.

[11] This was because of advice provided to the EPA by Inco on behalf of Zinifex that the buoy would not be used in connection with the *Wunma*.[10]

5 Mr Fisher; T.313.
6 Mr Fisher; T.314.
7 Captain Dally; T.543.
8 Captain Dally; T.543.
9 Statement of Mr O'Connor - 27 July 2007; Exhibit 44, para 4. Statement of Mr Jones - 21 August 2007; Exhibit 58. Jones; T.626-628.
10 Mr O'Connor; T.353.

16.5 THE AMOUNT OF CARGO LOST OVERBOARD

[12] In his report following his inspection of the *Wunma* on 10 February,[11] in Captain Thomson's opinion, approximately 800 tonnes of cargo had been washed from the loaded pile and "spread across the hold floor in a wedge shape tapering out to the well deck". Of course, this evidence does not address how much concentrate was lost overboard: Captain Thomson was only speaking about the displacement of cargo onboard the ship.

[13] He reported the following about cargo spillage:

> "At one stage the aft end of the hold had water slopping in and out of the aft cut-outs and over the side of the door above the ceiling point. This would point to a loss of zinc contaminated water.
>
> It is evident that contaminated water from the hold was going over the stern from the initial efforts to stabilise the vessel and from the stern cut-outs while the hold aft was still full of water.[12]
>
> From photos published during the height of the incident and those taken on Saturday the 10th February[13] there seems to be sufficiently more staining on the port stern of the *Wunma* which would suggest there may have been more contaminated water pumped overboard before the salvors took over the ship and started pumping into the ballast tanks."[14]

[14] So far as the topic of pollution is concerned, Captain Thomson recorded the following observations:

> "The bobcat approximately 20 litres of engine oil, 40 litres distillate plus 40 litres (of) hydraulic oil. There was evidence of a fair amount of oil still in the cargo hold and on speaking to the salvors they had pumped some oil contaminated water into the ballast whilst stabilising the cargo hold. There would have to (have) been some oil contaminated water go over the side with the slopping through of the aft cut-out.
>
> The engine room bilge showed very little signs of oil contamination but in saying this some oil leaks from machinery were evident which would point to some oil pollution coming from here during the bilge pumping operations at sometime but I would doubt if there were any large quantities. Bilge pumps were started and run from approximately 2300 on the night of the incident and were kept running to combat

11 Exhibit 12.
12 Exhibit 12.
13 Exhibits 12 and 14.
14 *Ibid.*

ingress of zinc contaminated water from the starboard steering flat, hot workshop on the starboard side and soft hatch midships."[15]

[15] In his oral evidence at the Inquiry, Mr Mewett provided an estimate of the amount of zinc concentrate lost overboard during the incident. That estimate was "approximately 200 tonnes".[16] The basis for that estimate is a comparison between the amount of cargo loaded against the amount cargo discharged.[17]

[16] However, later evidence from Mr Johnson of the Australian Fisheries Management Authority called into question the accuracy of Mr Mewett's estimate in this regard.[18] Mr Johnson's concerns were founded on a series of photographs provided to him by Mr O'Brien, a member of the Northern Prawn Fishing Association, and which were taken by Mr Garry McNamara - a Marine Engineer - when on board the *Wunma* on 7 and 8 February 2007. Mr Johnson suggested that the photographs evidence the loss of "significantly more than the 200 tonne estimate" provided by Zinifex and that the amount lost was "more likely to be in the order of 1,000 to 1,500 tonnes".

[17] In response, Zinifex produced evidence from Mr Bolton who is the Port Superintendent, Operations at Karumba.[19] He was tasked earlier this year with providing an accurate calculation of the amount of cargo lost for insurance purposes. Shortly stated, he calculated that 245 tonnes were unaccounted for.

[18] To do so, he referred to the original weight of cargo (4442 dry tonnes) and compared that with draft surveys that were performed to determine the amount of cargo discharged after the incident (1410 wet tonnes and 2094 wet tonnes respectively). Those tonnages were then converted to a dry tonne measurement and, in the result, Mr Bolton concluded that 4197 dry tonnes of zinc concentrate was recovered of 4442 dry tonnes loaded – a difference of 245 dry tonnes. However, he then made the point that the amount lost was likely to be "more like 200 tonnes" because "extra concentrate was recovered from the ballast tanks".

[19] Mr Bolton was not required for cross-examination and his evidence is unchallenged. His evidence is based on loading and discharge data. For obvious commercial and other reasons the amount loaded on the *Wunma* was accurately recorded at the time,

15 Exhibit 12.
16 Mr Mewett; T.439.
17 *Ibid*.
18 Statements of Mr Johnson - 4 September 2007 and 17 October 2007; Exhibit 112.
19 Statement of Mr Bolton - 6 September 2007; Exhibit 113.

just as the amounts subsequently discharged were recorded. It is this data that was primarily referred to by Mr Bolton in making his calculations.

[20] The legitimate concerns of Mr Johnson, based on impressions gained from photographs of the cargo after the ingress of water, need to be balanced against the hard data. The settling effect of the ingress of water into the cargo hold should not be ignored.

[21] It may of course have been mistakenly thought that the cargo had been loaded to the extremities of the cargo hold, that is, up to what are referred to as the "barn doors", but that in fact is not the case. Alternatively, the impression may have been gained from Captain Thomson's report that 800 tonnes of concentrate had been washed overboard, but Captain Thomson was only speaking of the displacement of the cargo onboard the ship.

[22] In the end, and whilst Mr Johnson very properly raised concerns, the evidence of Mr Bolton establishes that the amount of concentrate lost overboard was approximately 200 tonnes but, in any event, no more than 245 tonnes.

16.6 THE EXPERT EVIDENCE

[23] The Inquiry received evidence from two experts who had considered the potential for environmental harm caused by the incident:

- Dr Munro Mortimer, a Senior Principal Scientist employed by the EPA[20]
- Professor David Parry, of the Charles Darwin University.[21]

[24] Dr Mortimer has wide experience and expertise in the detection of aquatic contamination.[22] He explained that the metal concentrates carried by the *Wunma* are mineral ores comprising zinc and lead sulphides that have been separated by mechanical processes from much of the other mineral components with which they were incorporated in a natural state.[23] Any assessment of the risk of potential of environmental harm from spillage must of course take into account the chemical and physical properties of those metals.[24]

20 Statement Dr Mortimer - 3 August 2007; Exhibit 46.
21 Statement Professor Parry - 9 August 2007; Exhibit 76.
22 Statement of Mr O'Connor - 27 July 2007; Exhibit 44, para 4.
23 Statement Dr Mortimer - 3 August 2007; Exhibit 46, para 5.
24 *Ibid*; para 6.

[25] He explained that there are two types of harm associated with the spillage of particulate matter into a waterway; first, physical effects such a smothering of plant and animal life living in, on or near the bottom of the sea floor and, secondly, toxic effects due to the chemical properties of the concentrate.[25]

[26] Dr Mortimer considered the potential impact due to increased turbidity or suspended particulate matter in the water column and impacts from material settling on the seafloor and concluded that:

> "The metal concentrates carried by the *Wunma* during Cyclone Nelson would, if spilled into the ocean, settle very readily, not spread very far, with little or no impact due to increased turbidity or light exclusion."[26]

[27] However, Dr Mortimer stated that if the concentrates accumulated on the sea floor after a spillage, it is likely there would be some loss of sea life due to smothering and changes to sediment particulate structure, and that plants such as seagrass could be affected if present.[27]

[28] To determine whether there was any potential toxic effect from a spillage, it is necessary to first consider the bioavailability of the material. Dr Mortimer stated that, in an aquatic environment, a potentially toxic material must be in a water soluble chemical form or in a chemical form that can become water soluble before it may be considered to be bioavailable. Material that is not bioavailable cannot be absorbed by the gut or respiratory systems such as the gills of marine animals. Thus, material that is not soluble and cannot be absorbed cannot exert a toxic effect or be bioaccumulated. In this regard, Dr Mortimer stated:

> "The metal concentrates carried by the *Wunma* are sulphides and are extremely insoluble in water. Accordingly, although lead, and to a lesser extent, zinc, are potentially very toxic metals in aquatic systems, with very strict limits … under the ANZECC Water Quality Guidelines … the lead and zinc in the concentrates are tightly bound (in a chemical sense) with sulphur (as sulphide) and are not bioavailable to marine life.
>
> It is an established principle of the toxicology of metals such as lead, zinc and cadmium in aquatic sediments that when sulphides are present, the metals are able to exert little toxicity."[28]

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25 *Ibid*; para 8. Dr Mortimer; T.372. Exhibit 14.
26 *Ibid*; para 27. Dr Mortimer; T.373-374.
27 *Ibid*; paras 21 and 22.
28 *Ibid*; paras 23 and 24.

[29] As such, Dr Mortimer concluded that, because the concentrates are metal sulphides, he would expect "no significant bioavailability of the metals, and as a consequence, no significant chemical toxicity or bioaccumulation of metals such as lead, zinc or cadmium."[29]

[30] To underscore this conclusion, Dr Mortimer referred to testing conducted by the CSIRO in 1995 with respect to marine alga and bacterium of waste waters from the dewatering of lead and zinc concentrates at the Century Zinc Mine. These wastewaters have been in intimate mixing contact with the concentrates during pipe transport and dewatering. Consequently, as Dr Mortimer states, toxicity measured in such wastewater (free of any treatment to reduce potential toxicants) gives a worst case scenario for water coming into contact with bulk concentrates spilt on the seafloor.[30] The CSIRO study found that these untreated wastewaters, even without dilution, were of low toxicity to the bacterium and have no toxicity to the alga.[31]

[31] As Dr Mortimer put it, this testing showed that waters that had been thoroughly mixed with both the lead and zinc concentrates for an extended period of time are "only of low or no toxicity, even without dilution". As such, he believed it unlikely, given the opportunities for dilution associated with a spillage in the open sea, that "significant toxic impact to sea life would result from a spill such has occurred from the *Wunma* during Cyclone Nelson".[32]

[32] Dr Mortimer agreed during his oral evidence that his conclusions are closely aligned to those drawn by Professor Parry.[33] Professor Parry was engaged by Zinifex to undertake a survey of the area around where the incident occurred and to prepare a report as to the environmental impact. At the recommendation of the Carpentaria Land Council Aboriginal Corporation, this report was peer reviewed by the CSIRO.[34]

[33] Professor Parry noted in his report that the "spillage of zinc concentrate was approximately 200 tonnes according to Zinifex records". He analysed seawater and sediment samples from the vicinity of the incident – as determined from information

29 *Ibid*; para 29.
30 *Ibid*; para 25. Dr Mortimer; T.374.
31 *Ibid*; para 26. A copy of which study, authored by JL Stauber, appears in evidence as part of Exhibit 46. Dr Mortimer; T.374.
32 Dr Mortimer; T.372.
33 Dr Mortimer; T.375.
34 Statement of Mr Mewett - 9 August 2007; Exhibit 47, para 22. Exhibit 76.

provided by Zinifex, AMSA and interpreted wind data from the US Navy's Monterey Marine Meteorology Division, being approximately two nautical miles in area - for lead, zinc, cadmium and copper.[35]

[34] The sampling results were then interpreted in accordance with the guidelines published by the Australia and New Zealand Environment and Conservation Council ("the ANZECC Guidelines").[36] He noted that:

> "The largest accumulations of spilt concentrate were located in the immediate vicinity of the *Wunma* drift track. Smaller, but widespread, deposits of concentrate were found predominantly to the north of the drift track."[37]

[35] Based on the analyses of the samples that were obtained, Professor Parry concluded that the concentrations of metals in sediment and seawater as a result of this incident did not exceed the ANZECC ISQ-low guideline values and, in accordance with the ANZECC Guidelines:

- There should be no significant ongoing impacts on the marine eco-system.
- There is no need for further action, or investigations.[38]

[36] However, he made the following recommendation:

> "In consideration of the relatively pristine nature of the Gulf of Carpentaria and taking a precautionary approach, it was recommended … that further chemical and biological analysis on existing samples be carried out to provide a more detailed assessment of metal dissolution rates, bio-availability and biological impacts. (F)urther sediment sampling to the north of the Wunma drift track together with further seawater sampling and analysis in the vicinity of the drift track (was also recommended)."[39]

[37] The peer review of Professor Parry's report by the CSIRO reported that:

- the zinc concentration levels were well below the conservative sediment quality guidelines;
- any longer term dissolution of zinc concentrations would be effectively diluted so as to not pose a threat to aquatic biota;

35 Exhibit 76; paras 10 and 11.
36 *Ibid*; paras 16 and 17.
37 *Ibid*; para 23.
38 *Ibid*; para 31.
39 *Ibid*; para 32.

- the analysis of water samples showed barely detectable concentrations of zinc as either dissolved or suspended particulates; and
- all concentrations in the water samples were almost two orders of magnitude below the water quality trigger values for pristine ecosystems.[40]

16.7 CONCLUSION

[38] The expert evidence of Dr Mortimer and Professor Parry, as supported by the CSIRO study and CSIRO Peer Review respectively, is that the incident did not cause any significant environmental impact so far as spillage of zinc concentrate is concerned. That is also the view taken by the EPA with respect to the matter.[41]

[39] Although there appears to have been a minor degree of oil pollution based on the observations made by Captain Thomson, it cannot be said that this had any significant impact on the marine environment.

[40] The conclusion that the spillage of zinc concentrate at around the time of the incident has not been shown to have produced any significant impact on the marine environment does not diminish the concerns of local communities, persons involved in the fishing industry and members of the general public about the spillage, and the need to avoid a repetition of it. The waters of the Gulf are part of a unique ecosystem. Local indigenous communities and native title holders have a special relationship with these waters. The fishing industry and those who rely upon it for their livelihoods depend upon the protection of the marine environment, and, to some extent, upon the Gulf's reputation as a relatively pristine body of water. The wider community has an interest in preserving the Gulf of Carpentaria's ecosystem.

[41] The preservation of the Gulf as a unique and relatively pristine body of water serves a variety of private interests and the public interest. The public interest in preventing the spillage of cargo into the marine environment is reflected in both international conventions and domestic law. Spillage of the cargo of the *Wunma* into the marine environment should be avoided. The importance of that objective is not diminished by the fact that the spillage in February 2007 has not been shown to have produced any significant impact on the marine environment.

40 *Ibid*; para 34.
41 Mr O'Connor; T.359.

WUNMA BOARD OF INQUIRY

CHAPTER 17: CAUSES OF THE MARINE INCIDENT

[1] The Board's essential task is to inquire into and report on the *causes* of the marine incident. As appears from the previous Chapters, the causes were many and varied. Some can be characterized as systemic. Others can be characterized as operational. The Board's function is not to put labels on the causes, and to place labels on them may be unhelpful. To describe a cause, such as an operational decision to change course as an "immediate cause" may be accurate, but it says little of assistance. To describe certain operational matters as the "actual, direct or proximate" causes of the incident, and to consign systemic factors as merely "indirect" contributing factors is to play with words.

[2] The marine incident would not have happened if errors in the management and operation of the ship in early February 2007 had not occurred. The marine incident would not have happened if systemic matters, such as the design and operation of the ship's water management system and the need for the ship to have a safe and effective cyclone mooring, had been addressed years before the incident.

[3] Pointing to operational causes does not lessen the importance of systemic causes. Equally, pointing to systemic matters, which, if addressed, would have meant that the ship would not have gone to sea on 5 February 2007 or been in a much better condition to cope with cyclonic conditions if she did, does not lessen the importance of operational errors that occurred prior to and on the voyage.

[4] The Board's previous discussion of systemic and regulatory matters and the course of events in February 2007 already has identified factors, decisions and omissions that made a major contribution to the incident. The extent of that contribution does not depend on when, in point of time, the act or omission occurred. For example, the communication of information to Captain Seal on the morning of 7 February was *a* cause of the marine incident, namely the abandonment of the ship. It was probably the last cause in point of time. But its proximity in point of time, to the abandonment of the ship does not make it any more a cause of the incident than matters that occurred years earlier. Each was *a* cause. Some had greater causative

potency than others and, in that respect, some have been described in earlier chapters as major contributing factors to the incident.

[5] The Board's function is not to apportion responsibility for the incident, or make findings in terms of culpability. It is required to report on the causes of the marine incident.

[6] The list of causes appearing below is based upon findings made in previous Chapters. It does not attempt to rank causes as major or minor, direct or indirect. The following list does not include contributing factors that played an insignificant part in the course of events.

(1) The absence of a cyclone mooring in the Norman River to replace the decommissioned cyclone mooring at Sweers Island.

(2) The absence of operating procedures to prevent the ship from being loaded when a low pressure system, with the potential to develop into a cyclone, was in the Gulf.

(3) The design and operation of the ship's water management system that enabled a large volume of water to accumulate in the aft well deck and cargo hold during a voyage in cyclonic conditions. In particular:

- the operation of the system so that rainwater that fell on the ship's canopy during heavy or prolonged rain would collect in the aft well deck rather than being directed overboard;
- the blockage of side deck drains with ore concentrate;
- the blockage of valves in side deck drains that might have been operated to direct water overboard after an initial "first flush" of dust from the canopy into "dirty water tanks";
- in general, the design and operation of the system so that it did not operate as a "first flush" system, namely with waste water from rain run off from the canopy being collected in "dirty water tanks", following which rainwater that fell on the ship's canopy would be directed overboard.

(5) The registration of the ship in 1999, and the upgrading of her registration in 2005:

- without adequate consideration of her compliance with Section 7 of the *USL Code*, particularly in respect of the entry of water into the well deck, arrangements to free water from the well deck, the location of the emergency generator room and the entry of water into the emergency generator room via its radiator vent;

- without adequate consideration of the need to store or discharge the volume of water that might accumulate in the hold during tropical downpours, in circumstances in which the ship was treated, for the purposes of assessing her stability, as having an open hold.

(6) The upgrading of the ship's registration in 2005, and the revision of her cyclone procedures to permit her to undertake voyages in the open waters of the Gulf in the event of a cyclone, without a comprehensive risk analysis being undertaken of the ship's seakeeping properties in cyclonic conditions.

(7) The upgrading of the ship's registration in 2005, and the revision of her cyclone procedures to permit her to undertake voyages in the open waters of the Gulf in the event of a cyclone, without the imposition of loading conditions and a review of her water management system.

(8) The loading of the ship on 3 February 2007 when a low pressure system was in the Gulf.

(9) The practice of returning to port once the ship's "dirty water tanks" were full, which led to the ship returning to port on 4 February 2007, thereby delaying her departure until the "tidal window" on the night of 5 February 2007.

(10) The failure to take adequate steps on 5 February 2007, or beforehand, to prepare the ship and her crew for a prolonged voyage in open waters during cyclonic conditions, including:

- bunkering sufficient fuel to enable the ship to remain at sea for an extended period whilst operating all three of her engines;
- unblocking deck drains to permit, so far as possible, rainwater to be directed overboard through deck drains;
- familiarisation by navigation officers of procedures in the ship's Safety & Quality System to avoid cyclones at sea.

(11) The failure during the voyage that commenced on 5 February 2007, and particularly during the period prior to the decision at around 1140 hours on 6 February to turn South, to obtain current weather information by email or satellite phone. The consequential lack of plotting of the cyclone's position

and path, and the ship's position in relation to the cyclone. The making and recording of only infrequent observations of wind direction and barometric pressure.

(12) In general the failure to apply the procedure to avoid cyclones at sea contained in the ship's Safety & Quality System (SQS 06; D 220) or similar procedures to avoid cyclones at sea.

(13) The decision of the Master at approximately 1140 hours on 6 February 2007 to turn South without:

- adequate current information about the cyclone's position and path;
- adequate analysis of the limited information that was on hand at 1140 hours;
- adequate consideration of the consequences of turning South;
- consultation with the Chief Mate, the Second Mate, the Designated Person Ashore or other persons ashore about the proposed course of action.

(14) The operation of the water management system during the ship's voyage that allowed a large volume of water to accumulate in the aft well deck and cargo hold.

(15) The absence on the aft well deck of freeing ports, thereby allowing the accumulation of a large volume of water in the aft well deck during the voyage in cyclonic conditions. Alternatively, the absence of an active pumping system appropriate to an open hold ship to rid the well deck of accumulated water.

(16) To a lesser extent, the blockage of a small drain in the aft well deck that prevented water that had accumulated in the aft well deck being directed overboard.

(17) The absence of adequate pumps to discharge water overboard.

(18) The failure of pumps to operate or to operate effectively due to blockages caused by concentrate.

(19) The entry of seawater over the stern, including through openings on either side of the stern ramp.

(20) The entry of seawater through holes in the portside canopy that had been caused by the impact of waves in cyclonic seas on materials that were incapable of withstanding the impact of waves.

(21) In general, the ingress of water into the ship's well deck whilst she was in a loaded condition at a rate greater than the capacity of pumps to discharge it overboard.

(22) The position of a radiator vent in the emergency generator room that permitted water that had accumulated in the aft well deck to enter the emergency generator room.

(23) The entry of water through a door to the emergency generator room which was not securely dogged.

(24) The shorting of a switchboard following the ingress of water into the emergency generator room.

(25) The total loss of power to the ship following the ingress of water into the emergency generator room.

(26) The consequent loss of power to various primary systems on the ship, including damage to and loss of power to certain communication systems.

(27) Difficulties experienced in the communication of advice and information that was relevant to the Master's decision to abandon ship.

(28) The communication of advice to the Master of the ship at around 0600 hours on 7 February 2007 to the effect that if the water level was higher than halfway up the stern ramp, the eventual loss of the ship was probable and that he should make preparations to abandon ship.

(29) The Master's evaluation of the situation on the morning of 7 February 2007 and how it was expected to develop, and his judgment that the safety and lives of the crew necessitated abandonment of the ship.

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CHAPTER 18: RECOMMENDATIONS

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CHAPTER 18: RECOMMENDATIONS

18.1 OVERVIEW

[1] This Chapter reviews the recommendations made by various witnesses. It then identifies recommendations that are not endorsed, and finally sets out the Board's recommendations. The Board takes the view that any recommendation in response to paragraph 9 of its Terms of Reference concerning possible future proceedings should be the subject of a separate report to avoid possible prejudice to any such proceedings.

[2] The recommendations made by the Board in this Chapter are made at a time when further investigations are being undertaken into cyclone moorings, applications are being made for cyclone moorings and cyclone procedures involving a new ship's manager are being finalised. As was noted during the course of its public hearings, the Board was never going to be in a position to devise complex engineering solutions or detailed operating procedures for the ship's future operation. These include the design and operation of its water management system. Apart from anything else, these matters depend upon the completion of ongoing investigations, design modifications to the ship and the development and refinement of operating procedures in the context of contractual arrangements between the ship's owners and new manager.

[3] That said, the Board hopes that its recommendations will inform decisions to be made by the owners and operators of the ship, regulatory authorities and others with an interest in the safe operation of the *Wunma* and marine safety in general.

18.2 THE RECOMMENDATIONS OF VARIOUS WITNESSES

[4] Reference has been made to the recommendations of Mr Kernaghan, Professor Parry and Captain Dally. Sea Transport Solutions, Captain White, Captain Seal and Mr Davis also advanced a number of remedial suggestions in their evidence.

[5] The recommendations of Mr Kernaghan have been set out in Chapter 15 on Remedial Responses to the Incident. Professor Parry recommended further chemical and biological analysis on existing samples be carried out, and that further sediment

and seawater sampling and analysis be undertaken. His recommendations appear in Chapter 16 on The Environment.

18.2.1 Captain Dally

[6] Captain Dally outlined a number of remedial steps Inco wished to take with respect to the *Wunma*, but the expiration of the VOMA on 1 November 2007. Inco's suggestions were to:

- implement a procedure for opening the stern door in the event that the cargo hold is flooded;
- relocate trunking for the emergency generator room;
- redesign piping for the scuppers and roof cladding;
- remote operation of sea openings of deck scuppers;
- additional wiring for items on the emergency switchboard;
- a watertight division between the well deck and the cargo hold;
- installation of high volume slurry pumps together with fixed piping;
- remote indicators for the under deck passage doors and hot workshop door;
- review and amendment of the cyclone contingency plan; and
- upgrade the infrastructure at Karumba so that the *Wunma* can discharge at the wharf.[1]

18.2.2 Sea Transport Solutions

[7] In a letter to MSQ dated 4 April 2007, Sea Transport Solutions advised that its recommendations for the ship had been, and still were, restricted to the following two options:

> "1- Stay alongside – preferably starboard side to, which is has large Svedala inflatable fenders, and place a bow anchor out at close to maximum cable range, with another mooring attached to the stern. This way the vessel should not impact heavily on the structure or even ride up on it if the tidal surge is excessive
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> 2- Go upstream in a fully ballasted condition until touching the river bed at high tide. Let go both anchors and back off to maximum cable range. She should be sitting on the bottom (ensure no rock) at mid or low tide and leave full crew on board. Stay there til the storm passes. If she is still aground or has been moved to shallower areas, pump out the ballast and pull on both anchor cables."

1 *Ibid*; para 7.

[8] These options were elaborated upon in the witness statement and oral evidence of its Managing Director, Mr Ballantyne. In fairness to him, the option of going upstream in a fully ballasted condition was recognised by Mr Ballantyne to involve risks of being stranded in the event of a large storm surge.

18.2.3 Captain White

[9] Captain White is employed by Noble Denton as the Manager for Marine and Casualty Investigation. He is a Master Mariner and served at sea for some twenty-two years at various ranks to Master, followed by seventeen years as a Marine Consultant. His command experience focused on salvage, wreck removal, ocean towage and he gained experience handling relatively small vessels in a range of adverse weather conditions.

[10] In the last seven years, Captain White has specialised in marine incident investigation. He was retained by the lawyers for Zinifex on 22 June 2007 to investigate the incident. For that purpose, he visited the port facility and the *Wunma* between 4 and 6 July 2007 . He made a number of recommendations.

[11] He noted that given "the imminent arrival of the cyclone season, some measures do have to be put in place to ensure that the risk is managed to an acceptable level".[2] He urged that various specified measures be considered.

[12] Captain White's first recommendation was that an independent dedicated weather forecasting service should be contracted. Such a service would provide "site specific weather forecast"[3] on a twice daily basis but more frequently if necessary. An example of the weather forecast produced by such a service appears in Appendix O to Captain White's report. A perusal of that sample reveals that very specific and detailed information about the path and likely track of the cyclone, as well as the progression of weather systems generally, is provided. In addition, particularised information is provided about wind speed and direction, wave heights, swell and the like.

2 *Ibid*; para 7.1.
3 *Ibid*; para 7.2.

[13] Captain White makes the point that the provision of such a service by an independent body would result in site specific weather forecasts being provided on a twice daily basis, but more frequently if necessary.[4]

[14] He saw the advantages of this service over that offered by the Bureau of Meteorology as follows:

- The forecasters employed are generally experienced marine forecasters.
- Forecasts issued are dedicated to the specific location and operation in hand, whereas Bureau issued forecasts are issued for a general area.
- The forecasting service has experience with sensitive memory and projects which are weather dependent.
- The Master can have direct contact with the duty forecaster if he requires updated advice to assist decision making.
- The forecasting service is not bound to use in a single source for raw data and can access other agencies to assist them.
- Most services can also offer a weather routing advisory service to assist vessels in avoiding weather conditions that are inappropriate for them.[5]

[15] Such a service would serve to notify the Master or Operations Superintendent in Karumba of any imminent adverse weather and the effect it is likely to have on loading and sailing operations in order that any restrictions on loading and/or sailing can be imposed.

[16] Captain White also recommended that a full Hazard Identification ("HAZID") workshop be conducted by a specialist independent consultant. He recommended that the relevant representatives of the owner, operators, deck officers and others who are involved with the loading or sailing of the *Wunma* attend such a workshop. The full cycle of the operation for the *Wunma* should be examined, from planning loads, loading, sailing, discharging to export vessel and returning to the wharf. [6]

[17] As part of the HAZID, a contingency plan could be drawn up for the coming cyclone season after input is received from the dedicated weather forecasting service referred to above.

4 *Ibid*; para 7.2.
5 *Ibid*; para 7.2.
6 *Ibid*; para 7.3.

[18] The HAZID workshop findings were intended to provide the basis for the safe operation of the *Wunma* and for interfacing with Zinifex Port Procedures and with the Operating Procedures under the SQS.[7]

[19] Captain White recommended that a Marine Engineer, preferably with technical management experience, be retained to undertake a full Hull and Machinery Condition Survey of the vessel in order that any defects or deficiencies can be identified and remedied. The purpose of such a survey would be to attempt to address the concerns that have been expressed with regards to the standard of maintenance on the *Wunma*.[8]

[20] Captain White also recommended that the waste water management system on the vessel be modified in accordance with the proposal advanced by the Robert Bird Group.[9] That proposal involves increasing the size of the water collection tank for the first flush system, the use of a water level transmitter, an installation of hard piping of the roof down pipes to the new system, as opposed to the current system of water collection which sees water from the roof down pipes being discharged onto the deck and then captured by the scuppers.

[21] Captain White has expressed the opinion that this recommendation "should be progressed without delay" and proper technical drawings and the procedure produced and presented to Lloyd's Register for approval.

18.2.4 Mr Kernaghan

[22] Mr Kernaghan made recommendations in relation to both operational and design matters which have been outlined in Chapter 15 on the Remedial Response to the Incident. Like Captain White, Mr Kernaghan urged that conditions of class be completed without delay. As noted, these matters have been unacceptably delayed .

18.2.5 Mr Cowle

[23] Mr Cowle of Weather Direct provided a report to the Inquiry after considering the interaction between Tropical Cyclone Nelson and the *Wunma*.[10] In it, he stated:

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7 *Ibid*; para 7.5.
8 *Ibid*; paras 1.4 and 7.7.
9 *Ibid*; para 7.8; and see Appendix Q, being a copy of that proposal.
10 Exhibit 108.

> "The track and development of Tropical Cyclone Nelson was covered by the Australia Bureau of Meteorology bulletins and warnings. These are designed primarily for coastal communities and as such, do not specifically cater for vessels at sea. Moreover, such bulletins do not specifically cater to any particular vessel, or its current circumstances in relation to a cyclone. From my examination of the synoptic situation, Tropical Cyclone Nelson was a particularly difficult cyclone to track and changed course many times and moved at varying speeds. Sudden changes in the speed and direction of movement of the cyclone would not have resulted in additional warnings being issued by the Bureau of Meteorology, as these are issued at fixed times only."

[24] He also stated:

> "Had the vessel been receiving forecasts and warnings from a private weather service, it is very likely the situation would have been somewhat different. Commercial organisations exist which can provide a dedicated forecast and warning service to a vessel and offshore locations that are tailored to the current operations. In this particular case, a custom tropical cyclone chart would have been provided showing the vessel's position in relation to the cyclone and offer a route recommendation away from Tropical Cyclone Nelson and into areas of safe weather. These services are typically offered for less than A$80 a day.
>
> These forecasts are provided via email or facsimile to vessels at sea using SatCommC, VSAT etc. An example of a typical forecast service offered by Fugro GEOS in Singapore is included. Fugro GEOS use only experienced marine weather forecasters and provide these services to over 150 clients in South East Asia and Australia. A large portion of this business is in providing forecasts and warning to vessels towing oil rigs and the large component parts for offshore oil platform construction, ie topsides and jackets."

18.2.6 Captain Seal

[25] In an email[11] to the then Operations Manager, Mr Graham Mackenzie, dated 29 March 2007, Captain Seal suggested a number of steps that ought to be taken to ensure the survival of the *Wunma* "in the future".[12] Captain Seal's recommendations were well-considered, and the Board appreciates receiving them. It is a pity that his employer, Inco, and the ship's owner did not take more active steps to implement them in the last several months.

[26] They included:

11 Exhibit 24.
12 Captain Seal; T.180.

- putting a single point cyclone mooring in the middle of the Norman River;[13]
- ensuring that the vent in the emergency generator room was not capable of being a point of ingress for water;[14]
- isolation of the emergency generator room circuits;[15]
- piping of the roof drainage directly overboard;[16]
- the installation of a watertight hydraulic door between the stern and the cargo hold;[17]
- the provision of diesel driven pumps;[18]
- the clearance of the dump valve from the well deck.[19]

18.2.7 Mr Davis

[27] At the end of his oral evidence at the Inquiry, Mr Davis made a number of suggestions for the improvement of the operation of the ship:

- The installation of a walkway on the port side.
- A boarding ladder on the port side.
- The removal of the life raft and boarding ladder from the starboard side because of the "gap in the fenders" which, in combination with a rolling sea are in Mr Davis' opinion, dangerous.[20]

18.3 RECOMMENDATIONS THAT ARE NOT ENDORSED

18.3.1 Going upstream with full ballast until touching the river bed at high tide

[28] The suggestion that the ship should proceed upriver with full ballast, drop anchor and, once the cyclone has passed, de-ballast and "float off"[21] is not recommended. This proposal, whilst well-intentioned as part an assessment of relative risks, including the risks associated with the ship going into open waters during a cyclone, presents unacceptable risks. Consideration of river confines, tidal surge and hull grounding forces makes this an option with an unacceptable level of risk. Whilst the option of heading "up the creek" is clearly appropriate for smaller ships that can seek shelter in the Norman River, it is not an appropriate option for the *Wunma*.

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13 Captain Seal; TT.230-231; 254.
14 Captain Seal; T.231.
15 Captain Seal; T.231.
16 Captain Seal; T.17, 232.
17 Captain Seal; T.181.
18 Captain Seal; T.181.
19 Captain Seal; T.181.
20 Mr Davis; T.690.
21 Statement of Mr Ballantyne, Exhibit 97; para 39.

[29] It will be recalled that Mr Ballantyne's preference is for the ship to stay alongside with its large fenders on the wharf side to avoid or minimise damage to the wharf and with the port anchor out to hold the ship a small way off the wharf.[22] Mr Ballantyne said that when the ship was designed he made recommendations to Pasminco and Inco regarding cyclone contingency plans. The recommendation was to stay in port or to go up the Norman River with full ballast so that if the ship was aground, it could always pump out the ballast and float off.

[30] Mr Ballantyne acknowledged the risks associated with going up the river, namely that in a bad flood the ship might find itself stranded inland[23] or, as Mr Ballantyne stated, "as a monument or a shopping centre"[24].

[31] Mr Ballantyne explained that the ship should be taken "preferably up the river with full ballast so that, if you found yourself aground, you could always pump out the ballast and float off. That is a standard procedure."[25] He stated:

> "If you have to go up the stream you maximise the ballast and you would go up to the extent of where you have no more water and drop the anchor there because you can't really get into much trouble. When the storm fades you pump out the ballast and come back out."[26]

[32] The Board considers that the risks associated with this proposed strategy are unacceptable:

- In comparison with a small ship such as a trawler, it would be a major task to find an appropriate location in which to locate the ship in the river to implement this strategy.
- The ship's structure is not designed to take the bottom, so grounding the ship may result in local or global structural damage due to bottom contours or obstructions on the river bottom at the grounding location.
- The grounding force provided by ballast may be insufficient to take account of change in river levels such as storm surge.
- The success of the strategy is dependent upon the ship being in line with the riverbed.

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22 *Ibid*; para 41.
23 *Ibid*; para 40.
24 Mr Ballantyne; T.804.
25 Exhibit 97; para 39.
26 Mr Ballantyne; T.804.

- The ship may be subjected to beam winds, which, if there is insufficient grounding force and even if the anchor holds, may result in it swinging across the river and suffering uncontrolled grounding, causing local and/or global structural damage.
- If, to maximise the grounding force, the ship were to be required to take ballast after it has grounded, then the ballast system may need to be re-arranged to facilitate such ballast movements.

18.3.2 Opening the stern door in the event that the cargo hold becomes flooded

[33] The suggestion that a procedure be implemented for opening the stern door in the event that the cargo hold becomes flooded is inappropriate. This suggestion was made to enable water to be released from the hold once it is imminent that the loadline will be submerged. Such a course presents the risk of a large volume of water mixed with concentrate entering the marine environment. More importantly, it carries the risk of not achieving the objective of freeing water from the hold. There is a significant risk that opening the stern door will permit the ingress of seawater.

18.4 THE BOARD'S RECOMMENDATIONS

[34] The Board makes the following recommendations.

18.4.1 Cyclone Mooring in the Norman River

[35] Both long-term and short-term measures are required to avoid a recurrence of the incident. The installation of a cyclone mooring in the Norman River is necessary both in the short-term and long-term. The need for a cyclone mooring in the Norman River has long been recognized. It was recommended by Captain Boath in July 2004 and by the Thompson Clarke Operational Review in December 2006. The AMC was engaged by Zinifex in July 2007 to report on various cyclone mooring options. It concluded in its initial September 2007 report that there is no doubt that if the ship can remain in the Norman River, either alongside the wharf or at a dedicated mooring arrangement, during a cyclone then this is the safest place for it, for the crew and for the environment.

[36] The best solution would be for a single point mooring in the Norman River, and the Board recommends it.

[37] There may be insufficient time to complete the necessary engineering and other investigations, to obtain necessary approvals and to install a long-term, single point mooring in the coming weeks. If a long-term single point mooring cannot be installed as a matter of urgency, then temporary mooring arrangements are required for this cyclone season.

[38] Some evidence before the Board indicated that there was insufficient swing room in the river for a single point cyclone mooring. Counsel Assisting the Board made written submissions that the assumption that there was insufficient swing room for a single cyclone mooring in the river should be tested by further surveys and investigations. This appears to have been done and resulted in an application for a single point mooring.

[39] The development of a single point cyclone mooring in an appropriate location may be enhanced if procedures ensure that the ship is unloaded when required to use the mooring.

[40] The precise location of a single point mooring is a matter to be determined and approved by the authorities in the interests of marine safety in general, and having regard to the interests of persons who may be affected by the proposal.

[41] If for reasons that the Board presently cannot anticipate, it proves impossible to install a single point mooring, then other mooring options in the Norman River should be investigated as a matter of urgency. These would include:

- a "four point mooring" near the Zinifex wharf, with two of the four points on the shore;
- a "four point mooring" further up the river, with two of the four points on the shore;
- a "two point mooring" further up the river in the location described in Captain Diack's evidence.

[42] These less preferred options would require investigations into the location of the proposed moorings, engineering solutions and design loads. Having considered these options without the advantage of such details, the Board considers it appropriate to make some general observations, in case a single point mooring is not installed.

[43] The option of installing a "four point" mooring near the Zinifex wharf is, in some respects, a variation upon the "stay alongside" option favoured by Mr Ballantyne and the option of staying alongside that has been practised by some Masters of the *Wunma* on various occasions over the years. The effectiveness of this option would be greatly enhanced by modifications to the Zinifex wharf, which was not designed to accommodate loads that might be experienced due to wind and current with the ship alongside the wharf during cyclonic conditions.

[44] The essential features of this "four point" option would be the installation of two appropriately engineered mooring points on the riverbank. Two other mooring points would be situated in the river. Once the ship is connected to these four points, it may be possible for the ship to be positioned so that it is held slightly off the Zinifex wharf so as to reduce impacts on the wharf.

[45] The advantages of such an option, apart from the obvious advantage of not subjecting the ship, the crew and the marine environment to the risks of the ship going into open waters during a cyclone, is that its location close to the Zinifex facility permits water to be pumped ashore to the facility with a reduced danger of water mixed with concentrate entering the marine environment.

[46] The risks associated with this option include the well-recognised risk that a high storm/tidal surge may increase loads on the moorings and on the Zinifex wharf and, in a worst case scenario, risk the ship riding up and onto the wharf itself. Another risk associated with any two point or four point mooring is the risk that destructive winds may damage the canopy of the ship and, result in part of the canopy being lost, with risk of injury to persons, property and the environment. These risks must be recognised, but weighed against the risks associated with other options, including the risk to the safety of the crew and the marine environment that would arise upon the ship going into open waters in a cyclone that was more destructive than Tropical Cyclone Nelson.

[47] It is possible that the risks of damage to the ship and to the wharf might be reduced by positioning the ship, as suggested by Mr Ballantyne, with its starboard side to the wharf so as to make use of the ship's fenders. The suggested positioning of the ship in this direction would need to form part of a proper engineering study and risk assessment of this "four point" option.

[48] The extent of the risk of damage to the ship and the wharf associated with a high storm/tidal surge should be the subject of proper investigation and assessment if a suitable single point mooring cannot be installed in the Norman River. If the risks are assessed to be too great, then consideration would be required to the option of locating a "four point mooring" further up the river. A properly engineered mooring is a preferred solution to the use of heavy anchors. Any proposal to locate two mooring points on each shore risks blocking the river. It has the potential to create a danger to shipping and inhibit other craft seeking shelter in the Norman River. To avoid these disadvantages, consideration should be given to a four point mooring with two secure mooring points on the shore and two mooring points in the river.

[49] A "four point mooring" presents advantages over a "two point mooring". But, the option of a "two point mooring" further up the river is preferred to the option of going to sea in a cyclone. Again, the feasibility of engineering mooring points in the location indicated in Captain Diack's evidence or some other location would require investigation. A two point mooring exposes the ship, and especially its canopy, to greater wind loads than would be experienced at a single point mooring. In an extreme event, this may result in substantial parts of the canopy being lost. Appropriate operating procedures to ensure that the ship was not loaded when it went to such a two point mooring would minimize the risk of cargo entering the environment.

[50] The Board wishes to emphasise that its preceding observations about four point and two point moorings in the Norman River is precautionary, in case the preferred option of a single point mooring in the Norman River is not installed.

[51] A cyclone mooring in the Norman River was intended as an essential part of the ship's operation when it was designed. Such a facility should be established without further delay. Temporary mooring arrangements should be established in the Norman River, and all necessary approval processes expedited to facilitate such arrangements in the current cyclone season. A long-term cyclone mooring should be established in the Norman River to reflect the original design intent and the fact that in 1999 the ship was, and remains today, "far from a typical seagoing example".

18.4.2 Cyclone Contingency Plan

[52] It is vital that any cyclone contingency plan for the current cyclone season be finalized without delay. The Board notes that MSQ was not satisfied with a draft plan submitted by P&O to MSQ on Friday 18 October 2007. The Board was advised on 5 November 2007 that MSQ, P&O, Zinifex, AMC and Thompson Clarke were working on finalizing a plan. The Board does not wish to complicate or delay that process. It is appropriate that two general observations be made. Clearly, any plan should address loading procedures with the objective that the ship have no cargo in the event of a cyclone threat. Pending further investigation into, approval of and the installation of a cyclone mooring in the Norman River (either temporary or long-term), any interim cyclone contingency plan might include the option of remaining alongside the Zinifex wharf.

18.4.3 Loading Procedures

[53] The ship's operating procedures should include, and the conditions of its registration should include, loading conditions that generally reflect the terms of the Interim Cyclone Contingency Plan developed by MSQ in March 2007[27], so as ensure, as far as reasonably possible, that the ship is not loaded when:

- a "Tropical Low" (as defined in the Interim Cyclone Contingency Plan or some similar definition that refers to a low pressure system that has the potential to deepen and become a tropical cyclone)) develops in the Gulf of Carpentaria Region (as defined) ;
- a cyclone has formed in the Gulf of Carpentaria;
- a cyclone that has formed in the Coral Sea has a westerly moving aspect and is likely to cross Cape York Peninsula into the Gulf of Carpentaria region; or
- the Master of the Wunma anticipates that storm or hurricane force winds may develop in the Gulf of Carpentaria within 48 hours.

[54] The Board notes that P&O's draft procedure adopts a similar approach.

[55] Such operating procedures and loading conditions may be reviewed in the event a discharge facility is established at the Zinifex wharf.

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27 Exhibit 15.

[56] The Board agrees with the submission of MSQ that that the ship's loading conditions should allow for the dirty waters tanks to be filled plus a substantial safety factor to ensure that the load line will not be immersed.

[57] In general, the Board's recommendations do not descend to detail about operating procedures, and therefore have not addressed sensible submission made by MSQ of the appropriateness that the Master contact the export vessel to determine weather and sea conditions at the Roadstead before loading. These and similar suggestions about operating procedures should be considered by the ship's operators.

18.4.4 Remaining Alongside

[58] An option that presumably have been considered in the light of Mr Kernaghan's recommendation for an urgent risk analysis would be for the ship to remain alongside the Zinifex wharf.

[59] If that risk assessment concludes that the option of remaining alongside carries unacceptable risks to the ship, port infrastructure or the environment, then it would not be appropriate to include it in any Interim Cyclone Contingency Plan. Otherwise an Interim Cyclone Contingency Plan should include as an option available to the Master, the option of remaining alongside the Zinifex wharf with additional moorings and other precautions designed to minimize the risk of damage to the wharf, the ship, other ships and facilities in the Port of Karumba. The option of remaining alongside the wharf rather than proceeding:

- to the anchorage or a similar location as provided for in the previous Interim Cyclone Contingency Plan;
- to the open sea;
- upstream, as recommended by some persons and proposed in P&O's earlier draft plan;

should be available in the event that the Master decides, on reasonable grounds, that the option is in the best interests of the safety of the ship and her crew.

[60] Zinifex should negotiate such contractual and other arrangements with the ship's Master, the ship's manager and others as may be necessary to authorise and facilitate such an option, and review its and the ship's cyclone procedures to facilitate such an option, pending the installation of a dedicated cyclone mooring in the Norman River.

[61] The Port of Karumba Cyclone Contingency Plan should be reviewed to facilitate such an option.

18.4.5 Voyages in Open Waters

[62] In the event that the ship is unable to access a dedicated cyclone mooring, remain alongside the Zinifex wharf, safely anchor off Karumba or safely anchor upstream and is required to voyage into open waters to avoid a cyclone:

- she should do so well in advance of being required to leave Port under the Port of Karumba Cyclone Contingency Plan, and in sufficient time to undertake cyclone avoidance measures;
- the voyage should be planned and undertaken on the basis of accurate and timely weather information, including weather information of the kind recommended by Captain White, Mr Kernaghan and Mr Cowle;
- all appointed Masters and navigation officers should be familiar with Gulf of Carpentaria weather patterns and cyclone avoidance procedures;
- the ship should do so in ballast, rather than in a loaded condition;
- adequate precautions are taken to manage the ingress of water into the ship on such a voyage.

[63] These recommendations should not be misinterpreted. The ship was not designed to voyage into open waters to avoid a cyclone. Her design and the geography of the Gulf make the option of voyaging into open waters in cyclonic conditions a very unattractive option. Cyclone moorings in the Norman River, and the temporary option to remain alongside the Zinifex wharf with additional mooring lines and other precautions if the expected conditions makes this the safest option in the circumstances, are preferred options to going to sea to avoid a cyclone. The development and installation of a long-term cyclone mooring in the Norman River should remove the possibility of the ship being required to voyage into open waters to avoid a cyclone;

[64] However, if for some reason, the ship is required to voyage into open waters to avoid a cyclone, it is important that any such voyage be undertaken in a manner that reduces the risks to the ship, her crew and the marine environment. The foregoing recommendations are advanced on that basis.

[65] If, for some unexpected reason, further investigations into the installation of a cyclone mooring in the Norman River, establish that a suitable cyclone mooring could not be installed, then a major review would be required into whether improved operating procedures and design modifications could make it safe for the ship to undertake a voyage in the Gulf in cyclonic conditions. One possible design modification would be for the sides of the canopy to be reinforced to enable it to better withstand the expected sea loads associated with such a voyage. Another would be to address the entry of seawater in the vicinity of the stern ramps. But these possible design modifications are mentioned for the purpose of completeness. Even with them, the option of undertaking a voyage in the Gulf in cyclonic conditions entails unacceptable risks, especially if the ship is caught in a loaded condition.

18.4.6 Cyclone Procedures

[66] Cyclone procedures applicable to the ship should be based, so far as possible, upon a consistent set of alerts, and the ship's cyclone procedures should be consistent with and integrated into the owner's cyclone procedures for its Port facility.

18.4.7 Weather Information

[67] An independent dedicated weather forecasting service is being implemented as recommended by both Captain White and Mr Cowle. The Board endorses the proposal to equip the *Wunma* with current and detailed weather information tailored to its area of operation. Naturally, compliance with cyclone contingency plans that are formulated in terms of alerts issued by the BOM, and the need to monitor BOM warnings and alerts will require the ship's crew to have regard to BOM weather information.

18.4.8 Risk Analysis

[68] In the event that it has not already been implemented, the recommendation contained in the Kernaghan report for a full risk assessment of the operations of the *Wunma* be implemented. The relevant recommendation states:

> "A full Risk Assessment of the operations of the "WUNMA" should be conducted. All present Masters and all those involved with "WUNMA" operations should be involved in the assessment procedure and play a full part in the development of mitigation strategies. The Risk Assessment should be undertaken by specialist independent consultants and cover the full operations of the "WUNMA" from

loading the cargo through to offloading at export vessel and return to port."

[69] In addition, in accordance with the recommendation contained in the Kernaghan report, a full analysis of the capabilities of the ship in cyclonic conditions should be undertaken. Such an analysis should consider:

- the ability of the vessel to expel water landing on the canopy and other parts of the vessel
- the ability to expel water from the well deck;
- the ability of the vessel to handle cyclonic seas in the Gulf of Carpentaria; and
- a consideration of the above in loaded, partially loaded and unloaded conditions.

18.4.9 Hazard Identification Workshop

[70] A hazard identification workshop should be conducted, as recommended in paragraph 7.3 of Captain White's report, if it has not been completed.

18.4.10 Water Management System

[71] The design and operation of ship's water management system should be reviewed so that it operates as a "first flush" system, with waste water from rain run off from the canopy and deck waste water being collected in "dirty water tanks", following which the rain run off from the canopy would be directed overboard before it comes into contact with the ship's decks.

[72] Pending the completion of that review and its implementation, and the implementation of any stormwater management plan developed to meet a condition of class imposed by Lloyd's Register:

- the ship's water management system including the state of its deck drains and the operation of its side deck drains should be independently reviewed as a matter of priority to ensure that, should the safety of the ship and her crew require it, water collected from the ship's canopy can be discharged overboard through side deck drains;
- the ship should be equipped with additional storage tanks and pumps necessary to either store or discharge water that accumulates in the aft well deck in the event of a monsoonal downpour and allowance be made for the

filling of such tanks during all loaded voyages over the cyclone season so as to avoid over-loading.

[73] Procedures for the operation of the ship's water management system, both pending the implementation of any new stormwater management system and after its implementation, be based upon:

- a study of the duration and/or intensity and/or level of rainfall required to wash the canopy of dust;
- the objective of avoiding entry of water mixed with zinc/lead concentrate into the marine environment.

[74] The study and the procedures should be reviewed by the Environmental Protection Agency to ensure that entry of water mixed with zinc/lead concentrate into the marine environment is avoided so far as is reasonably practicable.

[75] In the ship's present state, so far as the Board is aware, problems of blockages in deck drains have not been resolved, and, the water management system has not been modified to ensure that the ship does not accumulate excessive water on board. The delay in resolving these issues raises an issue concerning the ship's seaworthiness, and the general safety obligation of its owners and operators under the *TOMS Act.*

18.4.11 Conditions of Assignment

[76] The conditions of assignment for load line of the ship be independently reviewed by a suitably qualified naval architect engaged by the owners of the ship, to ensure that they comply with the requirements of Section 7 of the *USL Code* (or such other statutory requirement for load line as may apply at the relevant time), and in particular regard be had to:

- the standard of watertight protection required for the emergency generator room, including its radiator vent.
- arrangements to free water from the well deck.;
- the objective that any freeing ports are designed in a way that avoids, so far as reasonably practicable, entry into the marine environment of water mixed with zinc/lead concentrate, for instance by the insertion of a shutter or other device into the freeing port during wash down activities.

18.4.12 Barrier between the aft well deck and the cargo hold

[77] A weathertight barrier should be fitted to restrict the ingress of water from the well deck into the cargo space. Such a barrier may be of the removable coaming type as fitted on the *MV Aburri* or a "jack-knife" style weather-tight door fitted in place of the "barn doors".

18.4.13 Recommendations by Captain Dally and Captain Seal

[78] Captain Dally and Captain Seal made a number of helpful recommendations in order to improve the operation of the ship's electrical systems, to prevent the ingress of water into the well deck and cargo hold and to improve the management of water. The Board assumes that these suggestions have been reviewed by the ship's owner and operator, their consultants, the classification society and its surveyor and the regulator.

[79] They include the trunking for the emergency generator room, the isolation and arrangement of emergency generator circuits, the operation of openings of deck scuppers and the installation of pumps capable of pumping slurry. If they have not already been reviewed in the course of the risk analysis recommended by Mr Kernaghan, the technical audit of design undertaken by Noble Denton and/or recent surveys of the ship, they should be reviewed by the ship's owners and surveyors and appropriate action should be taken to address those matters.

18.4.14 Recommendations by Mr Davis

[80] If they have not already been investigated, the matters raised by Mr Davis should be urgently reviewed by an inspector of MSQ, and the owners and operators of the ship.

18.4.15 Compliance with Conditions of Class

[81] A matter of concern to the Board is the delay in satisfying conditions of class imposed by Lloyd's Register in relation to critical matters such as the emergency generator room vent and the ship's water management system. These changes to the ship's physical arrangements should have been approved and implemented long ago. Their effectiveness should be independently reviewed, as recommended by Mr Kernaghan. But that should not delay their urgent implementation.

[82] All steps that are necessary to comply with the conditions of class imposed by Lloyd's Register, including modification of the emergency generator vent and the

approval of new storm water management plans, should be attended to without further delay. New stormwater management plans should be implemented as a matter of urgency if they have not already been implemented.

[83] If changes to these arrangements, particularly arrangements in respect of the emergency generator room and the operation of the ship's water management system, have not been implemented, and will not be promptly implemented, then MSQ should consider the continuation of the ship's RUF and whether the operation of the ship in these circumstances involves a breach of the general safety obligation imposed by the *TOMS Act* on the owner and operator.

18.4.16 Thompson Clarke Recommendations

[84] The following recommendation of the Thompson Clarke Operational Review should be implemented by the ship's owners:

- A root cause analysis of product spillage be undertaken by a specialist task force set up to address the causes and effects of product spillage. The task force should include representatives of the ship's manager, operating crews and Zinifex. Following its completion it may be necessary to conduct an ergonometric survey to determine effective cleaning methods around and underneath conveyor belts, and the effectiveness of procedures to ensure the cleanliness of the vessel and the proper operation of drains.
- Scheduled maintenance periods be established to allow a proper program of maintenance, including contractors to come on board, with special attention to the maintenance of drains and valves.

[85] The owners and operators should respond to such other issues as were identified by the Thompson Clarke Operational Review that remain relevant to the operation of the ship in the light of recent changes to her management and the evidence before the Inquiry.

18.4.17 Crewing

[86] The adequacy of crewing, both in terms of numbers and competence, be reviewed by MSQ in consultation with such occupational health and safety consultants as may be appointed by the ship's owners or managers, with special regard to the intensity of the trade undertaken by the ship during its normal operations and crew fatigue issues.

18.4.18 Environment

[87] The recommendations made by Professor Parry that further:

- chemical and biological analysis on existing samples to provide a more detailed assessment of metal dissolution rates, bio-availability and biological impacts;
- sediment sampling to the north of the Wunma drift track; and
- seawater sampling and analysis in the vicinity of the drift track,[28]

should be carried out as soon as possible.

18.4.19 Legislative and administrative changes

[88] Legislative and administrative changes should be made to end what was described in Mr Bundschuh's evidence as the "mix and match" registration system with "partial class approvals".

[89] A more comprehensive approach to assessment of the safe operation of a ship should be undertaken at the registration stage, particularly in respect of a ship with novel design features, or in respect of a ship, the features of which create a higher risk in its intended area of operation than the risk profile of most other ships in that area of operation. For instance, the *Wunma* was not originally designed to voyage in cyclonic conditions and was intended to have access to a cyclone mooring. Its risk profile in open waters in cyclonic conditions was higher than a ship that was designed to voyage in open seas in cyclonic conditions. This risk profile justified insistence on a comprehensive risk assessment of her seakeeping properties and seaworthiness in open waters in cyclonic conditions.

[90] Whilst the receipt of certificates from accredited persons or classification societies, coupled with obligations on operators to operate ships safely, may be sufficient in many cases to entitle a ship to registration, a more comprehensive approach is required in such cases.

[91] This may require a comprehensive risk analysis to be undertaken of the ship's seakeeping properties in its intended area of operation. It may require the registration authority to "look behind" any certificate of compliance issued by an accredited person associated with the ship's design or construction, so that the registration authority is itself satisfied that the ship's design ensures that it will be

[28] *Ibid*; para 32.

able to operate safely in its intended area of operation. It should involve consideration by the registration authority of, and consultation with other sections of MSQ about, operating procedures and arrangements (eg cyclone moorings) so as to ensure the safe operation of the ship.

[92] The Submissions of MSQ to the Inquiry convey an excessively “hands off” approach to regulation. MSQ correctly points to the important role of accredited persons and the reliance that MSQ places upon their certificates. MSQ correctly points to the fact that the obligation to safely operate ships is upon those who operate them, and that the function of MSQ as regulator in not to be a “nautical nanny”. But the MSQ Submissions do not suggest that the incident has prompted it to review its approach to regulation. For instance, its submissions state:

> “MSQ takes the view that the on-board drainage problems with the ship are an ‘internal matter’ for management by INCO and Zinifex. Such an internal matter is very much within the control of the ship owners and operators and beyond the scope of what MSQ should be reasonably required to know, or take action about.”

[93] On the contrary, MSQ might reasonably be required to have known something about the water management system of a ship that was specially designed to keep water on board in the interests of environmental protection, in circumstances in which MSQ was being asked to approve an upgrade in her registration to permit her to sail into cyclonic seas in tropical downpours. Given its lack of a role in plan approval, when the ship was registered in 1999, the Queensland registration authority did not have a comprehensive set of drawings[29] and did not have any understanding that there was some intent that water be kept onboard for environmental reasons.[30] In 2005 prior to granting the registration upgrade, MSQ only understood about the intent that water be kept onboard for environmental reasons “in a very general sense”, and did not become aware of the details until after the incident.[31] MSQ certainly should have known more about the ship’s novel water management design, and its actual operation before upgrading the ship’s registration in 2005.

[94] MSQ in its submissions correctly identifies the fact that the ship went to sea in a loaded condition as a cause of the incident, and supports a recommendation that the

29 Mr Bundschuh; T.772.
30 Mr Bundschuh; T.754.
31 *Ibid*.

ship not load when a tropical low is present in the Gulf. But it rejects the contention that there were shortcomings in regulatory arrangements that enabled the ship's registration to be upgraded in 2005 without loading conditions being addressed. MSQ makes the remarkable submission:

> "In relation to the loading conditions to meet a cyclone, from the perspective that the ship was sufficiently buoyant, had sufficient stability, adequate watertight integrity, appropriate safety equipment and adequate hull strength, <u>it was immaterial whether the ship was in a loaded or unloaded condition</u>." (Emphasis added)

[95] MSQ seeks to shift responsibility to Lloyd's Register for not expressing in 2005 concerns about the proposed operation of the ship outside her classification limits. But Lloyd's Register undertook strength tests, and gave no assurance that the ship could safely operate in cyclonic seas, let alone that it would be seaworthy in cyclonic seas in a loaded condition. Lloyd's Register might have assumed, as did Captain Cole, that MSQ as regulator would want to satisfy itself that the ship would be seaworthy in those conditions before upgrading its registration.

[96] MSQ accepts the Board's view that there is an important distinction between:

(a) the collection and retention of rainwater during the ship's normal daily operations, whereupon the ship is *able to return to port* and empty her dirty water tanks; and

(b) the collection and retention of rainwater (and seawater) during a voyage in open seas in cyclonic conditions in circumstances where the ship is *unable to return to port*.

However MSQ submits that this ought to have been dealt with by way of operating procedures, for which the operator is responsible. Again, MSQ correctly identifies the responsibility of others, but recognizes no role for itself as regulator in addressing these issues. It agrees in its submissions that no risk assessment was undertaken, but "questions whether this is simply something that should have been dealt with by the operator". The answer is that it should have been dealt with by the operator, but that MSQ as regulator should have ensured that the operator had undertaken a comprehensive risk assessment.

[97] Overall, MSQ submits that issues of water management are "class issues to be dealt with as a matter between the owner and the class society… not a matter for MSQ". On the contrary, they are a matter for MSQ. As experience shows, water

management and conditions of assignment impinge directly on the safety of the ship, the safety of its crew and the marine environment.

[98] In circumstances in which MSQ manifests such a “hands off” approach to its role as regulator, the Board’s recommendation that a more comprehensive approach to assessment of the safe operation of a ship should be undertaken at the registration stage may not count for much. In response to that recommendation, MSQ makes the submission that “it should not be a matter for MSQ to look behind a holistic risk assessment that is produced to it by an apparently competent and qualified person”. If that continues to be MSQ’s approach, then there may no point in the recommendation. A risk assessment document will simply join the list of documents to which the MSQ rubber stamp is applied at the registration stage.

[99] Beyond the registration stage, MSQ has a restricted view of its powers as regulator. This is apparent in the view taken by its officers in 2005 that it was powerless to insist that the safe operation of the ship in the cyclone season required the ship to have access to an operational cyclone mooring. This approach is advanced in MSQ’s submissions. If the safe operation of the ship required her to have a cyclone mooring in the Norman River or some other sheltered location (as senior MSQ officers believed at the time), then MSQ as regulator should have pressed the issue with the ship’s owners and operators, and, if nothing came of it, exercised its powers as regulator to enforce what it understood to be the safety obligations of the ship’s operators. If there is any doubt about the power of MSQ to take steps to enforce what its officers consider is necessary in the interests of marine safety, then this doubt should be removed by legislative amendments.

[100] Incidentally, MSQ makes the interesting submission that “MSQ had no evidence to suggest that the operation of the ship in a cyclone was not a reasonable and practicable alternative” and that there was “absolutely no evidence” that the decommissioning of the cyclone mooring off Sweers island was other than a safe and reasonable option. MSQ appears to have overlooked the evidence that was given by it and others in the Federal Court in 1999, and the advice in 2005-2006 of its own officers, Captain Boath and Captain Diack, that operating the ship without a

cyclone mooring was dangerous[32] and presented "a major safety issue in respect of the ship's crew".[33]

[101] Overall, MSQ's Submissions convey a narrow conception of its role as regulator. Whilst correctly emphasizing the responsibilities of "accredited persons" under the *TOMS Act* and MSQ's reliance on their certificates, and pointing out the responsibilities of owners and operators, MSQ's submissions give the impression that once a ship is registered, the obligation to operate it safely rests on those in charge of its operation, there is not much that MSQ can do to alter the situation. In the case of the *Wunma* this led to the ship's registration being upgraded over the documented safety concerns of Captain Boath and Captain Diack.

[102] A system that operates on the basis of certificates from accredited persons has certain advantages. But if accredited persons know that the regulator chooses to not "look behind' their certificates, then there will be a temptation upon some accredited persons to certify matters without having a proper basis to do so.

[103] MSQ's Submissions explain what MSQ does <u>not</u> do as a regulator, namely act as a "nautical nanny" or assume the duties and functions imposed on others under the *TOMS Act*. They do little to explain what MSQ in fact does as regulator.

[104] The Board recommends that MSQ reflect on its role as regulator. If it does not have the resources to adequately assess the seaworthiness of ships like the *Wunma* when processing applications to register, or to properly enforce safety obligations once registrations are granted, then this should be made apparent to the general public. Otherwise, the general public might be misled into thinking that the granting of registration is more of an assurance of seaworthiness than it in fact is.

[105] The extent to which MSQ, through legislative arrangements, lack of resources or inclination, adopts a "hands off" approach to regulation is shown in the words of Mr Ballantyne, who defends what he describes as "the Queensland self regulatory marine safety system".

32 Exhibit 49, CB124.
33 Exhibit 49, CB119.

[106] The Queensland Government should consider whether legislative, administrative and financial arrangements have led to a system of self regulation, and, if so, whether such a system serves the public interest.

WUNMA BOARD OF INQUIRY

CHAPTER 19: CONCLUDING OBSERVATIONS

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CHAPTER 19: CONCLUDING OBSERVATIONS

19.1 STRENGTH, STABILITY AND SAFETY

[1] A recurring theme in the evidence was that the ship had ample stability. Even if her cargo hold was awash with seawater, as occurred during the incident, she was not going to sink.

[2] Although not designed for open waters, Lloyd's Register's strength assessment in late 2004 indicated that the ship probably had the strength to undertake a voyage in cyclonic conditions in the Gulf. Her voyage on 6 and 7 February 2007 suggests that she has the strength to survive a Category 2 cyclone in the Gulf.

[3] The focus was on strength and stability when the ship was designed. It remained the focus when the proposal was approved to permit the ship to ride out a cyclone in open waters.

[4] Strength and stability are vital. But they do not guarantee the safe operation of a ship such as the *Wunma* in cyclonic seas. The focus on strength and stability meant that little or no attention was given to the design and operation of the ship's water management system. Her design and operation turned the ship into a large water receptacle. In a loaded condition every extra tonne of water retained onboard was going to further immerse the load line.

[5] One would have thought that the incident demonstrated that the focus should not be simply on strength and stability. But some witnesses at the Inquiry were inclined to maintain the strength and stability mantra. This was reflected in the rationalisation that the ship would not have been abandoned if there had not been a miscommunication of information to the Master. After all, the ship was practicably unsinkable.

[6] First impressions can be deceptive. A photograph of the stern of the *Wunma*, with her stern ramp fully retracted, shows gaps and windows where seas might enter. In a loaded condition and with a following sea, Captain White described the stern as the "Achilles-heel of the vessel". But to some this Achilles heel was a strength.

[7] In 1999 when an employee of its designer, ADSMAR, was explaining to AMSA

why the ship did not need freeing ports near her stern ramp, he advised that the hold was modelled with spill points at the top of the watertight seal on the stern door "allowing the liquid level to fall to this height" and that stability conditions were satisfied "with wide margins". The same focus on stability permitted the ship's registration and procedures to be amended in late 2005 to permit her to voyage into open waters during cyclones.

[8] But the ship was never designed to voyage in cyclonic seas. Her manager described it in 1999 as "far from a typical seagoing" vessel. Lloyd's Register, which classed her for service not exceeding 21 nautical miles from shore, was careful to pass the task of issuing a load line certificate to someone else. The ship's designer obliged. The Managing Director of the designer gave evidence that he thought that freeing ports had been installed near the stern ramp. But the naval architect employed by his company knew that they had not been, and made a declaration on a Certificate of Compliance for Loadline that the ship was seaworthy for load line in restricted off shore waters.

[9] A belief that the ship was seaworthy during its normal operations between Karumba and the Roadstead is understandable. Freeing ports near the stern were required if you were "working to the letter of the law", but to install them risked water mixed with concentrate entering the marine environment. If the Queensland registration authority had been asked in 1999 to relax the strict application of the load line requirements in the *USL Code* in the circumstances, it probably would have done so. But it was not asked to do so. Its system was built around receiving certificates, and it received all of the certificates that it needed to register the ship. In 1999 the Queensland regulator did not confront the tension between competing objectives of:

- shedding water that may accumulate in the aft well deck via freeing ports in the interest of marine safety; and
- keeping water mixed with concentrate out of the marine environment.

It did not do so at any stage prior to the incident.

[10] Surveyors who inspected the ship over the years probably assumed that her conditions of assignment for load line complied with the applicable rules at the time of her original registration. Otherwise the ship would not have been registered.

[11] People who in later years supported the ship going to sea in cyclonic conditions seem to have assumed that someone else had the responsibility to check that she would not accumulate water in cyclonic conditions. It was someone else's responsibility. In the end, no one assumed the responsibility to check.

[12] Whatever tolerance of the absence of freeing ports or other devices to shed water from the well deck may have been justified for the ship's routine operations, a different approach was required when assessing the safe operation of the ship in open waters during cyclones. But there was no different approach. The focus was on strength and stability. No analysis was undertaken of the ship's ability to shed water from its well deck, despite the ship's manager knowing that her water management system was dysfunctional. A proper risk assessment was never undertaken.

[13] The crew of the *Wunma* battled on the afternoon of 6 February 2007 to stop water accumulating in the well deck. They faced the consequences of a water management system that was incapable of directing large volumes of rainwater overboard through operational deck drains. If someone had asked them at the time whether freeing ports near the stern ramp seemed like a good idea, they probably would have agreed.

[14] Plenty of strength and stability did not make the ship seaworthy in the open waters of the Gulf. It certainly did not stop the water rising in the well deck. Plenty of strength and stability was not enough to ensure the safety of the ship or her crew.

19.2 THE CREW

[15] Those who are not prepared to confront the systemic and regulatory arrangements that permitted the incident to occur may downplay the incident as something of a storm in a teacup. After all, no one was killed or seriously injured. But at times some of the crew probably thought they were going to die, and it is appropriate to make some concluding observations about the crew.

[16] In retrospect, it is easy for some to say that the lives of the crew were never at risk. It is said that, at worst, the ship would have sunk from the stern and righted itself as cargo spilled over the stern ramp and into the waters of the Gulf. As matters transpired, the storm abated and the crew was able to be rescued by helicopter. But such a happy ending was not guaranteed, and may not have occurred if the cyclone had been more intense and the ship ended her voyage in a different location.

[17] If the crew had been forced to take to life rafts, then Captain Seal had real concerns for their chances of survival. As Captain Dunnett said in a characteristic Australian turn of phrase: "It is a long walk to the shore".

[18] The crew deserve recognition. The engineering crew, and Mr Fisher in particular, deserve commendation for restoring power to the ship in extremely difficult circumstances after the blackout that occurred at the height of the cyclone. Criticisms that have been made earlier in the report about certain operational decisions made by Captain Seal. But the evidence indicates that his composure and leadership at the height of the incident enabled the crew to remain calm and attend to their duties. During those hours the water level in the cargo hold was at one with the sea. The Chief Mate, the Second Mate and the Bosun observed flexing in the hull. Having seen this the Chief Mate feared that the ship might quickly sink. Despite the difficult situation in which they found themselves, the crew remained calm, including crew members with little seagoing experience.

[19] This Report has attempted to identify the systemic failures that permitted a ship with a dysfunctional water management system to venture into the open waters of the Gulf in a cyclone. The installation of a dedicated cyclone mooring in the Norman River and other remedial measures should ensure that the *Wunma* is not placed in that situation again. But unless the systemic arrangements that allowed the incident to happen are addressed, the lives of crew on other ships will be placed at unnecessary risk.

WUNMA BOARD OF INQUIRY

LIST OF APPENDICES

D 200 **Cyclone Procedure**

D 210 **Sailing Procedure in the Event of Cyclone**

Objective

To describe the process whereby the crew of the Wunma must react to a Tropical Revolving Storm (TRS) or cyclone event to ensure the safety of the crew and vessel at all times and to ensure that the vessel of cargo does not present as a risk to the environment.

Scope

This procedure is applicable each time the Port of Karumba, and surrounding waters are threatened with a TRS or cyclone event.

Responsibilities

The Managing Director is ultimately responsible for this procedure. The operation of the vessel is the responsibility of the Operations Manager in Karumba, and the operation of the vessel at sea is the responsibility of the Master.

Procedure

General

The cyclone season in Northern Australia extends from December to April, although cyclones in Australia have occurred as early as November and as late as May. Records indicate that cyclones in the Karumba area are more likely to occur in January, and can be expected within a 150 Km radius on average once in every four years.

The Tropical Cyclone Warning Centre (TCWC) responsible for the Karumba area will send out alerts when a cyclone is expected as follows:

- Cyclone watches six hourly.
- Cyclone Earnings three hourly, becoming hourly when the cyclone is in close proximity to a major population centre and is in the range of a weather radar.
- Gale, Storm and Cyclone Warnings for shipping six hourly.

The vessel will receive daily weather information by Satcom 'C', facsimile, VHF or MF/HF radio.

The Operations Superintendent will communicate on a regular basis with the Port Manager and will relay cyclone warnings received by the vessel.

The Operations Superintendent will communicate with Head Office on a regular basis to keep them advised of cyclone activity in the region.

The Operations Superintendent and the Master will monitor the cyclone alerts and will make a preliminary choice of action in the event a cyclone is imminent. Their choice of action will take the form of one of the following:

- Anchor off Karumba in position (Lat. Long). This action to be undertaken if the cyclone is not intended to intensify and is expected to pass over (50 kms??) of the Port. Have both anchors down at maximum scope of cable and engines should be employed to ease the weight on the anchors. The vessel will remain on full alert at the anchorage during the duration of the cyclone.
- Proceed to Weipa. This action to be undertaken if there is sufficient time to make the journey (nautical miles??, / hours). Permission must be obtained from the Port Authority of Weipa who will allocate a berth of an anchorage position.
- Head for the open sea and remain in open waters until the cyclone has passed. This action to be undertaken if either there is no time to steam to Weipa, or permission to enter Weipa has been declined because of the prevailing conditions at the Port at that time.

The Master will have the final responsibility of choice of action taking into account prevailing weather conditions and any changes in forecast conditions that may occur. Choice of action will be relayed to the Port Authority and to the Operations Superintendent.

CYCLONE ALERTS
The Company has adopted the following procedure with respect to Cyclone Alerts.
BLUE ALERT
This is effective when the Bureau of Meteorology has advised the vessel that a 'Watch Alert' is effective i.e. Gale Force Winds > 40 knots are expected within 48 hours, but not less than 24 hours.

Action
- Recall crew and ensure everything is firmly lashed and secure. Specific attention is to be given to any material that may become airborne in extreme wind conditions.
- Ensure vessel has sufficient bunkers to be able to proceed to sea and steam for a minimum of four (4) days. This may require returning to Karumba if the vessel is at the transfer anchorage.
- Cease loading or discharging operations.
- Ensure sufficient ballast water is on board to maintain good stability in the vent vessel proceeds to sea. Ensure that the vessel is not at a draft, which may prevent her from leaving Karumba, taking into account weather and tidal conditions.

YELLOW ALERT
This is effective when the Bureau of Meteorology has advised that a 'Warning Cat 1 Alert' is effective i.e. Gale Force Winds > 40 knots expected.

Action
- If berthed, run extra mooring lines and make appropriate preparations to depart the wharf and proceed to sea if the wind is expected to intensify further.
- Place engine room on stand by and maintain the vessel at an alert status for the passing of the cyclone.
- If alongside overseas ship, let go and remain in vicinity but be prepared to head either to open sea or to the anchorage point closer to Karumba if the wind is expected to intensify further.

RED ALERT
This is effective when the Bureau of Meteorology has advised that a 'Warning Cat 2 Alert' is effective i.e. DesTructive Winds are expected > 70 knots within 24 hours.

Action
- If in Port, depart the wharf and proceed to sea. Make preparations for navigating in heavy weather as per procedure Safety Actions.
- If at sea, either proceed to anchor off Karumba or proceed into deep water keeping in mind procedures to be followed in the event of encountering a Cyclone (see D220).
- If the vessel is unable to proceed to sea for whatever reason, ensure sufficient mooring lines have been run, rig extra fenders if this is possible, and lay out the starboard anchor only if this is possible due to possible weather conditions and time constrains.

D 220 Avoiding Cyclones at Sea

Objective
To describe the procedure for the Wunma to avoid cyclones at sea.

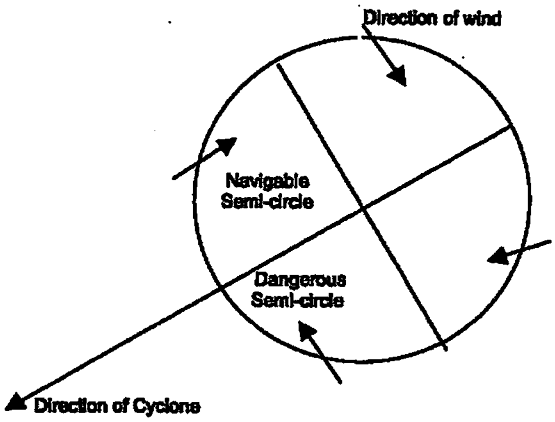
Scope
This procedure is applicable each time the Port of Karumba and surrounding waters are threatened with a TRS or cyclone event, and the MV Wunma heads for open waters.

Responsibilities
The Managing Director is ultimately responsible for this procedure. The operation of the vessel is the responsibility of the Operations Superintendent in Karumba, and the operation of the vessel at sea is the responsibility of the Master.

Procedure
General
After receiving a Red Alert from the Bureau of Meteorology, and the MV Wunma decides to proceed to sea, either to head for Weipa or to remain in open waters, it is imperative that the Master maintains a good track of the eye of the cyclone. The Bureau of Meteorology will give information on a regular basis (see above), however it is the responsibility of the Master to maintain a plot so as to determine if the vessel has sufficient speed to outrun the cyclone or it is more prudent to 'heave to' to allow the cyclone to pass.

<u>Plotting the Cyclone</u>
1. Plot cyclone centre on the chart.
2. Construct a circle to equal the cyclone radius.
3. Construct tangential lines to the cyclone circle at approximately 40° from the forecast path.
4. Construct the quadrant from the cyclone centre to equal 1 day's movement of the cyclone. This is known as the imminent danger area.
5. By projecting the cyclone's movement for an additional 24 hour period, the 'probable danger area' can be charted.

<u>Taking Avoiding Action</u>
1. Determine the semi-circle in which the vessel is situated.
2. If the wind is backing the vessel is in the dangerous semi-circle. The Master should make the best speed keeping the wind on the port bow between 10° to 40°. Alter course to port to keep the wind on the port bow as the wind continues to back.
3. If the wind is observed to veer, the vessel is in the 'navigable semi circle'. The Master should make all possible speed with the wind on the port quarter. Alter course to starboard to keep the wind on the quarter as it continues to veer.
4. If the wind is remaining steady, or nearly steady, the Master should alter course to obtain the wind well on the port quarter and proceed towards the navigable semi-circle. Once within this semi-circle alter course to starboard to maintain the wind on the quarter.



Wind Observation	Ship's Location
Veering	Vessel located in navigable semi circle
Backing	Vessel located in the dangerous semi circle
Steady	If the pressure is falling, the vessel is in the PATH of the cyclone

Table 1: Ship's Location

Location	Action
Dangerous Semi-Circle	Put wind on port bow and alter course to port as wind backs
Navigable Semi-Circle	Put wind on port quarter and alter to starboard as wind veers

Table 2: Ship's action in vicinity or cyclone

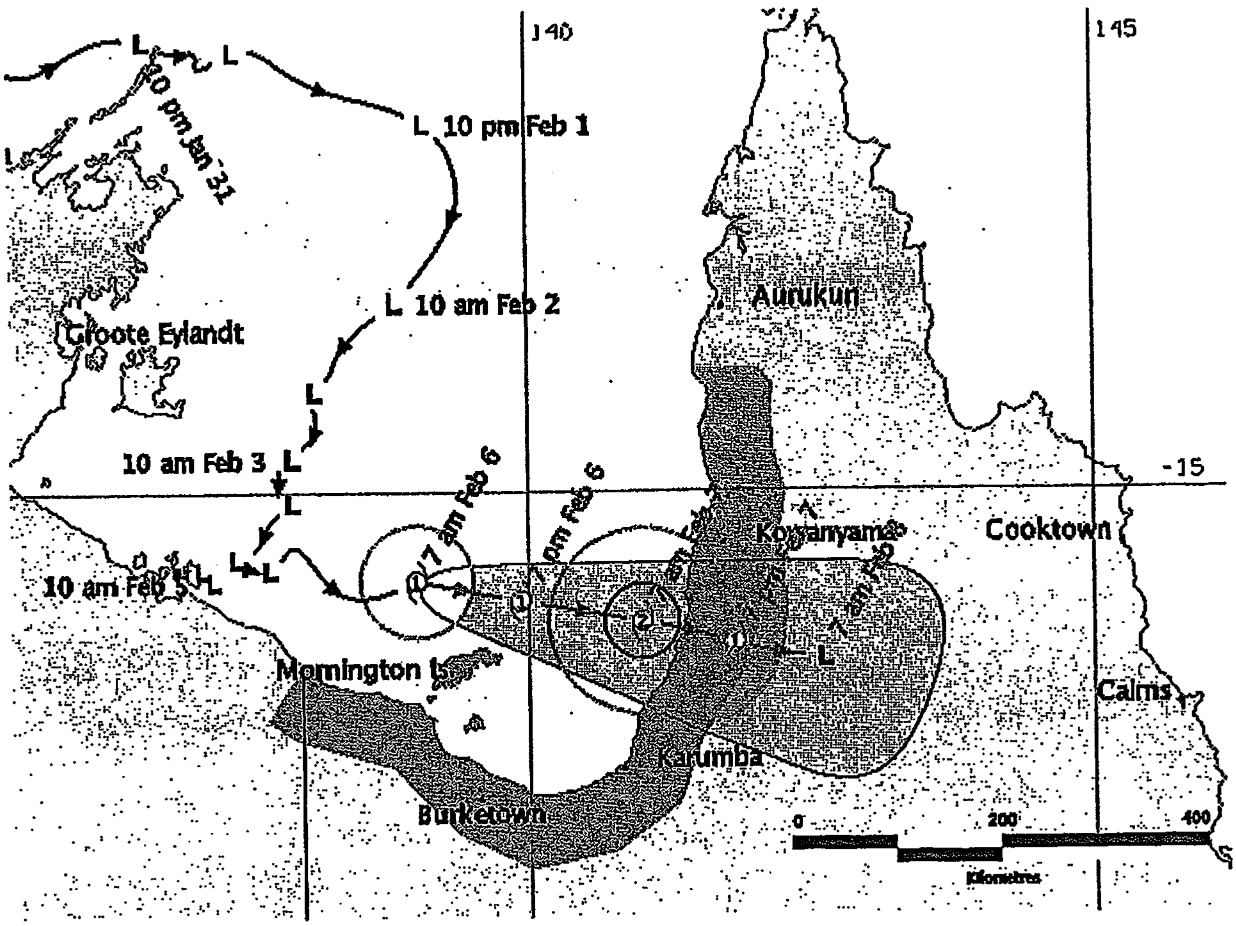
5. It is imperative that the vessel avoids a 'lee shore'. If it is evident that the vessel may be placed in this dangerous situation by altering course, it may be better to turn into the wind and ride out the cyclone in deep water.

From: Amy Seal [mailto:amyc@yahoo-inc.com]
Sent: Tuesday, 6 February 2007 11:27 AM
To: 'master.wunma@intship.amosconnect.com'
Subject: TROPICAL CYCLONE FORECAST TRACK MAP

TROPICAL CYCLONE FORECAST TRACK MAP

Tropical Cyclone Nelson

Tropical Cyclone Advice Number 32 Issued at 7:48 am EST Tuesday 6 February 2007



Community Threat		Past Cyclone Details	
Warning Zone - Gales within 24 hours		Past Location and Intensity Number	③ or L
Watch Zone - Gales from 24 to 48 hours		Past Track and Movement	

23/10/2007

Current Cyclone Details	Forecast Cyclone Details (at 24 and 48 hours from issue)
Current Location and Intensity Number ③ or L	Forecast Location and Intensity Number ③ or L
Very Destructive Winds	Very Destructive Wind Boundary
Destructive Winds	Destructive Wind Boundary
Gale Force Winds	Gale Force Wind Boundary
	Most Likely Future Track
	Range of Possible Tracks

The forecast path shown above is the Bureau's best estimate of the cyclone's future movement and intensity. There is always some uncertainty associated with tropical cyclone forecasting and the grey zones indicates the range of likely tracks.

Due to the uncertainty in the future movement, the indicated winds will almost certainly extend to regions outside the rings on this map. The extent of the warning & watch zones reflects this.

Remarks:

Tropical Cyclone Nelson is expected to continue moving east-southeast while intensifying. It may cross the coast between KOWANYAMA and KARUMBA on Wednesday afternoon.

GALES may develop on the coast between the Northern Territory border and Kowanyama during today or overnight.

The cyclone is expected to cross the coast near low tide, however the associated storm surge is expected to raise these tides close to the highest tide of the year.

People between the Northern Territory Border and Cape Keerweer should take precautions and listen to the next advice at 11am. If you are unsure about precautions to be taken, information is available from your local government or local State Emergency Service.

Name: Tropical Cyclone Nelson

Details:

	Time (EST)	Intensity Category	Latitude (decimal deg.)	Longitude (decimal deg.)	Estimated Position Accuracy (km)
0hr	7 am February 6	1	15.8S	139.0E	55
+6hr	1 pm February 6	1	15.9S	139.5E	85
+12hr	7 pm February 6	1	16.0S	139.9E	110
+18hr	1 am February 7	1	16.1S	140.4E	130
+24hr	7 am February 7	2	16.2S	141.0E	150
+36hr	7 pm February 7	1	16.4S	141.8E	155
+48hr	7 am February 8	tropical low	16.5S	142.6E	175

The next Forecast Track Map will be issued by 11:00 am EST Tuesday.

IDDP0007
Australian Government Bureau of Meteorology
Queensland
Tropical Cyclone Warning Centre

GLOSSARY

AFMA........................Australian Fisheries Management Authority
AMC ....Australian Maritime College
AMSA ....Australian Maritime Safety Authority
AUSAR ....Australian Search and Rescue
COSPAS-SARSAT....International satellite system for search and rescue
DUKC ....Dynamic Under Keel Clearance
EFPL..........................Exemption from Pilotage Licence
EIA............................Environmental Impact Assessment
EMP ....Environmental Management Plan
EPA............................Environmental Protection Agency
EPIRB........................Emergency Position Indicating Radio Beacon
GMDSS......................Global Maritime Distress and Safety System
GPS............................Global Positioning System
HF ....High Frequency Radio
IMO ....International Maritime Organisation
ISM ....International Safety Management
JSA............................Job Safety Analysis
Lloyds.........................Lloyds' Register of Shipping
MARPOL...................Convention for the Prevention of Marine Pollution from Ships
MERCOM ....Marine Emergency Response Commander (AMSA)
MHP..........................Materials Handling Plant
MSO..........................Maritime Safety Officer
MSQ..........................Maritime Safety Queensland
PASS ....Positive Action Safety System
PCQ ....Ports Corporation Queensland
PPM ....Port Procedure Manual

QPS ....Queensland Police Service

QT ....Queensland Transport

RCC ....Rescue Coordination Centre

RHM ....Regional Harbour Master

RUF............................Restricted Use Flag

SAR ....Search and Rescue

SatNAV......................Satellite Navigation System

SERS..........................Ships Emergency Response Service (Lloyds)

SIS..............................Shipping Information Service

SOLAS.......................Safety of Life at Sea (an IMO Convention)

SQS ....Safety and Quality System

SUKC.........................Static Under Keel Clearance

TOMPA ....Transport Operations (Marine Pollution) Act 1995

TOMSA......................Transport Operations (Marine Safety) Act 1994

TRS ....Tropical Revolving Storm

UHF ....Ultra High Frequency Radio

USL ....Uniform Shipping Laws Code

VHF ....Very High Frequency Radio

VMR ....Volunteer Marine Rescue

VTS ....Vessel Traffic Services

VTSO ....Vessel Traffic Service Operator

BOARD OF INQUIRY

INTO THE MARINE INCIDENT INVOLVING THE SHIP "WUNMA"

IN THE WATERS OF THE GULF OF CARPENTARIA

ON OR ABOUT 6 AND 7 FEBRUARY 2007

LIST OF EXHIBITS

NUMBER	**DESCRIPTION**	**DATE TENDERED**	**TRANSCRIPT PAGE**
1.	Extract from Queensland Government Gazette 16.03.07	22.05.07	13 Dir Hearing Trans
2.	Extract from Queensland Government Gazette 20.04.07	22.05.07	13 Dir Hearing Trans
3.	Practice Direction 16.05.07	22.05.07	13 Dir Hearing Trans
4.	Satellite photograph of Port of Karumba and Anchorage	13.08.07	13 Auscript
5.	Cyclone Nelson track map	13.08.07	14
6.	SQS Cyclone Procedure	13.08.07	14
7.	Graphic of Tropical Cyclone Nelson track and the voyage of the *MV Wunma*	13.08.07	14
8.	Advisory Message from the Regional Harbour Master and Port of Karumba Cyclone Contingency Plan	13.08.07	19
9.	Statement of Francis Thomson	13.08.07	19
10.	SQS Cyclone Procedure, taken into possession of Mr Thomson from the ship 10.2.07	13.08.07	20
11.	Zinifex Century Mine Cyclone Procedure – *MV Wunma* ,taken into possession of Mr Thomson from the ship 10.2.07	13.08.07	41

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12.	Inspection report by Mr Thomson February 2007	13.08.07	41
13.	Charts: (a) Approaches to Karumba (b) Nassau River to Wellesley island, showing roadstead (c) Booby Island to Cape Wessel (d) Cairns regional jurisdiction	13.08.07	41
14.	Photographs of the *MV Wunma* displayed during Mr Thompson's evidence	13.08.07	41
15.	Interim Cyclone Contingency Plan – 15 March 2007	13.8.07	56
16.	Cyclone Avoidance Procedures: (a) MSQ "Small Ships" Fifth Edition (pp.190-195) (b) Australian Seafarers Handbook (p.51) (c) Extracts from "The Mariner's Handbook" (subject of examination 16.8.07; T 223-224; tendered as part of Ex 16, T 225 line 45) (d) Admiralty Weather Manual (Chapter 10)	14.08.07	96
17.	Photographs: (a) Lip on the upper deck; (b) Stairs to the well deck; (c) Communications Systems.	14.08.07	112
18.	Statements of Captain Seal: (a) Statement taken 9 February 2007 and signed 26 February 2007; (b) Statement dated 2 August 2007; (c) Supplementary statement dated 2 August 2007.	14.08.07	116
19.	Undated letter from Captain Seal to Mr Andrew Dally	14.08.07	159
20.	Original navigation charts	14.08.07	159
21.	Marine pilot application	14.08.07	159

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22.	Email from Mr Gurr, dated 3 February	14.08.07	161
23.	AMSA SAR file	14.08.07	178
24.	Email Captain Seal to Graeme Mackenzie, dated 29.03.07	14.08.07	184
25.	Email from Captain Seal to various individuals at Zinifex dated 04.02.07, 11.12pm – subject: "Load four or five to the Ernest Oldenforff".	14.08.07	185
26.	Inco shipping summary	14.08.07	189
27.	Photograph of stern drain and associated valves	16.08.07	206
28.	Captain Seal's calculation of capacity of drain	16.08.07	206
29.	Chart of wind direction in cyclone	16.08.07	212
30.	Various charts depicting position of Wunma, position of cyclone and its predicted path	16.08.07	228
31.	Monthly list of certificates	16.08.07	228
32.	ISM Code Audit of SQS – August 2006	16.08.07	229
33.	Certificate of Compliance for Survey- September 2006	16.08.07	230
34.	Schematic of drainage system	16.08.07	235
35.	Photographs of Wunma after incident	16.08.07	245
36.	Zinifex Environmental Policy	16.08.07	246
37.	Inco ship's memoranda 2498 and 2499 concerning designated person and office structure dated 29.01.07	16.08.07	250
38.	Statement of Kelly Osmand	16.08.07	270
39.	List of Compact Discs supplied to the parties, and compact discs	16.08.07	289
40.	Statement of Geoffrey Mark Fisher – February 2007	17.08.07	297
41.	Supplementary statement of Geoffrey Mark Fisher	17.08.07	297
42.	Engine Room Checklists - SQS	17.08.07	320

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43.	Statement of Gordon Dunnett 17 August 2007	17.08.07	322
44.	Statements of Gary O'Connor: (a) 27 July 2007; (b) 6 August 2007	17.08.07	351
45.	Statements of Andrew Leeson: (a) 15 February 2007; (b) 2 August 2007	17.08.07	360
46.	Statements of Dr Munro Mortimer, curriculum vitae and CSIRO Report "Toxicity of Wastewaters from Century Zinc Concentrates" (August 2005)	17.08.07	371
47.	Statements of Malcolm Mewett (a) 9 August 2007 (b) 20 August 2007	20.08.07	379
48.	Drawings and Plans for Storm Water Management – prepared by Zinifex and Inco. Drawn by Robert Bird Group - 2007	20.08.07	389
49.	Core bundle of documents	20.08.07	439
50.	Statements of Richard McDonald (a) 30 July 2007 (b) 9 August 2007	20.08.07	440
51.	Statement of Ian Ives - 6 August 2007	21.08.07	470
52.	Letter, AMSA to Board of Inquiry dated 15.08.07 re voice recordings	21.08.07	504
53.	Statements of Andrew Dally (a) 1 August 2007 (b) 19 August 2007	21.08.07	506
54.	Letter, Intercontinental Ship Management to Captain Watkinson, Marine Division, Queensland Department of Transport dated 30.03.99	21.08.07	522
55.	Statement of Gregory Gurr dated 10 August 2007	22.08.07	587
56.	Statement of Dr Andrew Lewin (a) 9 August 2007	22.08.07	590

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80.	Statement of Arthur Diack	23.08.07	633
81.	Statement of Graham Taylor	23.08.07	633
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83.	Two statements of Troy Shepherd	23.08.07	633
84.	Statement of Matthew Rohrsheim	23.08.07	633
85.	Statement and CV of Paul Davis	23.08.07	634
86.	Wunma Logbook Entries 1 February 2007 to 7 February 2007	23.08.07	662
87.	Statement of Wally Newton	23.08.07	690
88.	Statement of Dale Raynor Cole	23.08.07	691
89.	SQS Revision dated 01.04.04 referred to in evidence of Captain Cole/ Supplementary statement of Caaptain Cole	23.08.07	707
90.	Statement of Captain Alan Boath	23.08.07	707
91.	Letter Campbell Smith of Pasminco Century Mine Ltd to Captain Alan Boath dated 26.06.98	23.08.07	708
92.	Port of Weipa Advisory Cyclone Season 2006-2007 Advisory Message and attached Cyclone Contingency Plan	23.08.07	718
93.	Hydrographic Surveys – Karumba – Norman River K955-076	24.08.07	
94.	Statements of Werner Bundschuh: (a) 3 August 2007 (b) 16 August 2007 Letter Counsel Assisting to Crown Solicitors 9 August 2007; letter Werner Bundschuh to Counsel Assisting 19 August 2007	24.08.07	741
95.	Lloyd’s Register Provisional Interim Certificate 18 August 1999	24.08.07	746
96.	Email, Lloyds Register to Board of Inquiry 3 August 2007	24.08.07	764

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97.	Statement of Stuart Ballantyne dated 9 August 2007	05.09.07	790
98.	Drawing of Dust Control Waste Water System prepaid by ADSMAR Pty Ltd/Sea Transport Solutions dated 24 September 1997	05.09.07	857
99.	Statement of Arnold Richard Clarke dated 4 September 2007	05.09.07	857
100.	Supplementary statement of Andrew Dally	06.09.07	872
101.	Compact disc containing copy of SQS, letter Inco Ships to Mr Kavanagh 13 March 2007	06.09.07	875
102.	Letter Shipping Inspector, John Kavanagh MSQ, to Inco Ships Pty Ltd dated 20 February 2007	06.09.07	882
103.	Letter Inco Ships Pty Ltd to John Kavanagh MSQ circa 13 March 2007	06.09.07	882
104.	Various emails, threat maps and weather information supplied with letter of 13 March 2007	06.09.07	882
105.	Inco Ships to Zinifex, response to Thompson Clarke Operational Review	06.09.07	884
106.	Supplementary statement of Paul Davis dated 31 August 2007	06.09.07	936
107.	Statement of David Thomas dated 31 August 2007	06.09.07	936
108.	Statement of Robert Cowle dated 3 September 2007	06.09.07	936
109.	Statement of John Kernaghan dated 4 September 2007	06.09.07	936
110.	Further supplementary statement of Troy Shepherd dated 4 September 2007	06.09.07	936
111.	Statements of Graeme Normington dated 4 and 5 September 2007	06.09.07	936
112.	Statements of David Johnson dated 4 September 2007 and 17 October 2007	06.09.07	936
113.	Statement of Gregory Bolton dated 6 September 2007	06.09.07	936
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115.	Statements of Paul Campbell dated 6 and 17 September 2007	06.09.07	936
116.	Zinifex Century Mine: Safety and Health Management Plan	06.09.07	936
117.	Zinifex PASS meeting records 29.01.07 – 06.02.07	06.09.07	936
118.	Additional relevant documents from MSQ file	06.09.07	936
119.	Statement of Captain Watkinson dated 30 July 2007	06.09.07	937
120.	Statement of Andrew Dally dated 17 September 2007	-	N/a
121.	Letter Mr Rutherford to Board dated 23 March 2007	-	N/a
122.	Letter from Dr Sammon dated 24 October 2007	-	N/a
123.	Statement of Rees Fleming	-	N/a
124.	Report of the Australian Maritime College Sep 07	-	N/a
125.	Copy Email – Thomson/Kavanagh/Campbell/Sammon	-	N/a
126.	Letter from Blake Dawson Waldron dated 18 October 2007 and attached Quarterly Review Meeting Minutes	-	N/a
127.	Ruling – Chairperson – Report of the Australian Maritime College - 1 November 2007	-	N/a
128.	Catastrophic Risk Assessment - 2004	-	N/a
129.	Catastrophic Risk Assessment - 2005	-	N/a
130.	Letter from Blake Dawson Waldron to Counsel Assisting dated 26 October 2007	-	N/a
131.	First Supplementary Statement of Captain Seal dated 23 October 2007	-	N/a
132.	Second Supplementary Statement of Captain Seal dated 1 November 2007	-	N/a
133.	Ruling – Board - Further Statements of Captain Seal – 5 November 2007	-	N/a

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134.	Supplementary Statement of Captain Boath dated 25 October 2007	-	N/a
135.	Supplementary Statement of Werner Bundschuh dated 18 October 2007	-	N/a
136.	Letter from Blake Dawson Waldron to Counsel Assisting dated 5 November 2007	-	N/a
137.	Letter from Counsel Assisting to Holman Fenwick & Willan dated 15 July 2007	-	N/a
138.	Letter from Counsel Assisting to Dr Sammon dated 12 November 2007	-	N/a
139.	Letter from Dr Sammon to Counsel Assisting dated 16 November 2007	-	N/a
140.	Ruling - Chairperson – Exhibits - 16 November 2007	-	N/a
141.	List of Exhibits	-	N/a

KEY EVENTS

DATE	EVENT
1990	Ore body discovered at Lawn Hill.
1994 – 1995	Impact Assessment Study Reports for Century Mine anticipates use of two transfer vessels.
Aug 1995	PCML decides to use one larger transfer vessel.
1996	Hull design commences.
Dec 1997	PCML appoints AUSCAN to supervise construction.
Dec 1997	PCML and ISM agree to Memorandum of Understanding to operate transfer vessel.
July 1998	Construction of ship commences in China.
16.02.1999	Lloyd's Register advises Queensland Transport that it will not be issuing an International Load Line Certificate and that it assumes that the load line certificate will be issued by Queensland Transport without any involvement from Lloyd's Register.
16.04.1999	Ship launched.
17.08.1999	Certificate of Compliance for Loadline issued by an accredited designer ASDMAR Pty Ltd.
18.08.1999	Provisional Interim Certificate in respect of hull and machinery issued by Lloyd's Register in Shanghai.
22.08.1999	Ship delivered to owners and named *Wunma*.
25.08.1999	Certificate of Registration Class 2C (not more than 50 nautical miles from the coast) issued by Queensland Transport.
Sept 1999	Delivery voyage.
18.09.1999	*Wunma* arrives in Karumba.
Nov 1999	Affidavits filed by PCML and State of Queensland in injunction proceedings in the Federal Court to the effect that a cyclone mooring buoy at Sweers Island was necessary for the safe operation of the ship.
16.12.1999	Restricted buoy mooring authority issued for cyclone mooring at Sweers Island.
19.12.1999	*Wunma* completes first transfer of zinc concentrate.

DATE	EVENT
Late 2002	Proposal to discontinue cyclone mooring buoy at Sweers Island communicated to MSQ by representatives of owners and ship manager.
Dec 2003	New draft cyclone procedures provided to Regional Harbour Master.
14.07.2004	Regional Harbour Master (Cairns) advises representatives of ship’s owner and ship’s manager that there was a problem with the ship having no cyclone moorings and that the best solution was to have a mooring in the Norman River, a discharging system at the wharf to avoid the ship being caught with cargo on board when a cyclone was approaching and procedures to move to the mooring in the river.
06.092004	Representatives of MSQ and EPA and consultant to EPA meet to discuss EPA consultant’s review of relative risks associated with use of mooring buoy at Sweers Island and going to sea.
13.09.2004	Meeting between representatives of MSQ, Zinifex and ISM to discuss proposal to change the vessel’s registration to allow it to proceed into the Gulf outside of its Class 2 classification as part of a new cyclone procedure.
17.09.2004	MSQ communicates its conditional approval to a proposal that the ship no longer be required to utilise the cyclone mooring at Sweers Island.
Late 2004	Lloyd’s Register provides reports in relation to global and local strength of the vessel in cyclonic conditions.
Feb 2005	MSQ provided with Lloyd’s Register reports by Sea Transport Solutions, which seeks advice from MSQ about modifications to the ship’s registration to allow it to “operate outside its normal service conditions, under ballast in special circumstances of a cyclone”.
25.02.2005	Regional Harbour Master (Cairns) advises MSQ’s Director (Maritime Safety) of his strong opposition to any extension of operating limits in a cyclone event.
11.05.2005	MSQ advises ISM of requirements to upgrade the ship’s registration.
Aug 2005	Application to upgrade Class 2B lodged.
08.09.2005	Certificate of Registration for Class 2B “to operate within the Gulf of Carpentaria only and restricted to voyages undertaken to avoid cyclonic conditions”.
16.12.2005	Cyclone mooring buoy authority at Sweers Island expires.
Jan 2006	New cyclone operating procedures inserted into the ship’s Safety and Quality System.

DATE	EVENT
07.02.2006	Captain Diack, Deputy General Manager of MSQ records that expiry of cyclone mooring authority "leaves us with a major safety issue in respect of the ship's crew".
04.12.2006	Thompson Clarke Operational Review report completed, including critique on cyclone preparedness.
01.02.2007	Low pressure system that later becomes Tropical Cyclone Nelson enters Gulf of Carpentaria.
02.02.2007	*Wunma* completes discharge of a third load to the export vessel *Ernst Oldendorff*. *Wunma* then anchors offshore and monitors weather.
03.02.2007	*Wunma* returns to Port, commences loading at 0920 hours. Load is fourth of a planned live loads. Completes loading 1800 hours and departs wharf at 1830 hours. On arrival at export vessel conditions deemed unsuitable for cargo transfer. Ship anchors.
04.02.2007	Ship anchored offshore. Strong Easterly winds and moderate to rough seas. Dirty water tanks full at 1206 hours. Vessel returns to port due to bad weather. Strong winds and rough seas, with 3.5 metre swell. Returns to Port through evening "tidal window". Secured at wharf at 2100 hours.
05.02.2007	Decision made to sail. Sails at 1900. Voyages North because conditions unsuitable to discharge into export vessel.
06.02.2007	Ship continues on Northerly track. 1140 hours Decision made to turn South.
	During the afternoon water collects and rises in aft well deck. Ship in heavy confused seas and swell, and begins to take waves around the stern well ramp onto the well deck. 1530 hours *Wunma* alters course to the South South West 1800 hours *Wunma* alters course to the West 1900 hours seas observed to enters cargo hold through damage on prtside canopy. Water level to about 1.8 metres in well deck.
	2010 hours: Water in emergency generator room causes total blackout of the ship.
	Chief Engineer able to restore some limited power.

DATE	EVENT
	2100 hours Mayday sent, later downgraded.
	Communications with Inco head office and its Operations Manager and Rescue Coordination Centre in Canberra.
	2200 hours Starboard anchor dropped.
	Steps taken to reduce and control the amount of water in the engine room, including pumping directly overboard.
07.02.2007	0200 hours Ship blacks out again. Difficulties in restoring power. Communications difficulties. Communications by VHF radio via an export vessel the *Eastern Star*.
	0430 hours: Water level in the engine room stabilised.
	Circa 0600 – 0615 hours *Wunma* receives advice relayed through the *Eastern Star* that if the water level had reached halfway up the stern ramp the vessel would eventually sink and that the ship should be abandoned. 0615 hours Preparations to abandon ship.
	1130 hours Helicopter takes five crew members.
	1300 hours Second helicopter takes remaining five crew members. Ship left with auxiliary generator still running. Engine room bilge pump and general service pump running.
	Zinifex charters vessel for use by its emergency response team. Salvors appointed and its crew arrive progressively on the evening of Wednesday, 7 February to Thursday 8 February.
10.02.2007	Inspection by Maritime Safety Officer, Frank Thomson.
	Ship taken under tow by *Pacific Responder*.
11.02.2007	MSQ prepares risk assessment for entry to Port of Weipa.
	Negotiations over terms of approval by Ports Corporation of Queensland to enter Port of Weipa.
12.02.2007	*Wunma* secured at Weipa.
15.02.2007	Registration suspended.
17.02.2007	Restricted use flag for a voyage from Weipa to export ship.
	Lloyd’s Register surveyor issues certificate including numerous conditions of class.

DATE	EVENT
18.02.2007	*Wunma* discharges cargo to export vessel.
	Second restricted use flag permits ship to voyage to Karumba.
15.03.2007	Interim Cyclone Contingency Plan.
Sept 2007	Australian Maritime College Reports to Zinifex that there is no doubt that if the ship can remain in the Norman River, either alongside the wharf or at a dedicated mooring arrangement, during a cyclone then this is the safest place for it, for the crew and for the environment.
Oct 2007	Counsel Assisting Board of Inquiry pursues earlier requests for information from parties concerning status of remedial steps, including steps to apply for cyclone mooring in Norman River and cyclone contingency plan
Oct 2007	Zinifex advises that two important conditions of class still not satisfied, and that an extension had been granted by Lloyd's Register in respect of the stormwater management plan to November 2007 and in respect of the emergency generator vent to January 2008. It advises that these matters are "expected to be completed by the end of the current year"
Nov 2007	Zinifex applies for buoy mooring authorities in Norman River