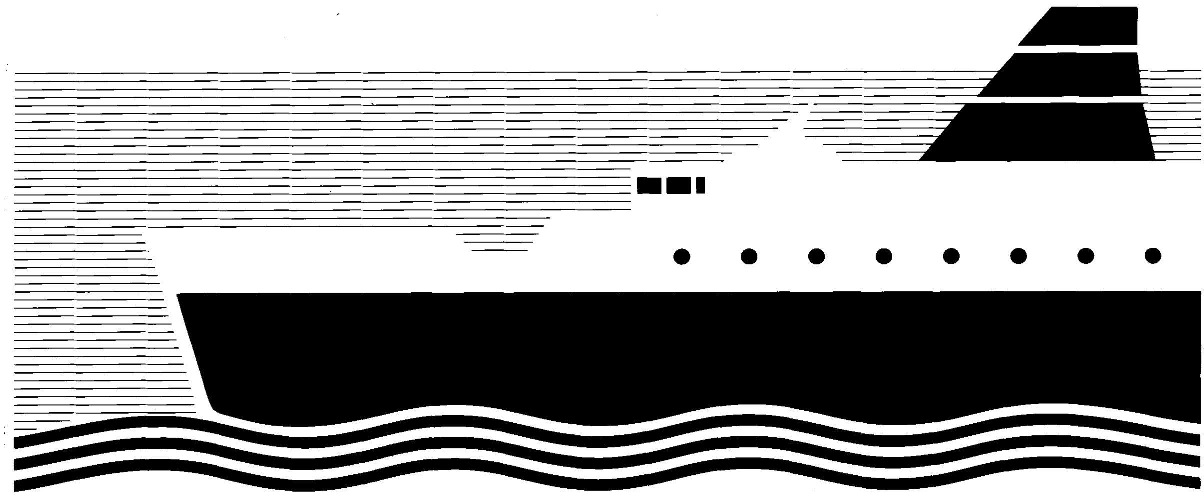
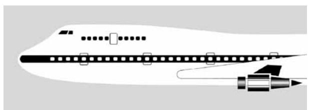
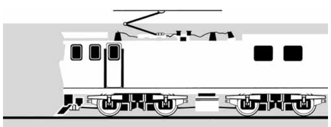
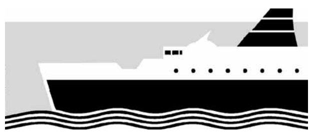


M A R I N E   O C C U R R E N C E   R E P O R T

04-216 **Report 04-216, passenger freight ferry *Aratere*, power failure, Queen Charlotte Sound** **19 October 2004**

TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

Report 04-216

passenger freight ferry
Aratere

power failure

Queen Charlotte Sound

19 October 2004

Abstract

On Tuesday 19 October 2004 at about 1018, the passenger freight ferry *Aratere* was transiting Queen Charlotte Sound after departing Picton when it lost all power. After a few minutes, emergency power was restored and the master navigated safely down the sound until full manoeuvring power was restored. The master then conned the vessel back to Picton to effect repairs to one of the diesel generators.

Safety issues identified included:

- procedures covering the replacement of diesel generator cylinder heads
- procedures covering the return of diesel generators to service after critical maintenance
- risk analysis of when and where diesel generators may be returned to service after critical maintenance
- the common cooling system
- the control system for the emergency generator.

In view of the safety actions taken by Interislander no safety recommendations have been made to address these issues.

The *Aratere* under way in the Marlborough Sounds

Contents

Figures

Abbreviations

AC	alternating current
DC	direct current
kt	knot(s)
kPa	kilopascal(s)
kW	kilowatt(s)
m	metre(s)
psi	pounds per square inch
V	volt(s)

Glossary

athwartships	transversely across a ship
bleed cock	a valve that allows fluid or gas to escape from a closed system
boatswain	crewman in charge of the seamen on board a vessel
bollard pull	a measure of the static pull a vessel can exert
bow thruster	a small athwartships propeller mounted in a tunnel at the forward part of a ship, used to manoeuvre a ship at slow speeds
con (conning)	directing the course and speed of a ship
cool-down mode	the cycle that the diesel generator went through when the load, speed and temperature was automatically reduced to where the diesel generator can safely stop
forecastle	raised structure on the bow of the ship
free end	the end of a diesel generator away from the electrical generating end
gassing-up	air or vapour entering a closed system full of liquid causing vapour locks and inefficient operation
megastar	a power management system that controlled and optimised the power flow between diesel generators and loads connected to the high-voltage switchboard
megawatt	one million watts
Synpol D	an automatic controller that monitored and controlled the electrical output from a generator driven by a diesel engine. Synpol-D units could be connected together to create an integrated power management system.
thermal capacity	the capacity, or ability, of a substance to receive and store heat; equals the specific heat of a substance times its mass

Data Summary

Vessel Particulars:

Name:	*Aratere*
Type:	passenger freight ferry
Class:	✠ 1A1 car and train ferry A, general cargo carrier RO/RO DG-P
Classification:	Det Norske Veritas
Length:	150.00 m
Breadth:	20.25 m
Gross tonnage:	12 596
Built:	1998, Hijos de J. Barreras S.A. in Vigo, Spain
Propulsion:	four 3680 kW diesel generators driving four 2600 kW electric motors coupled in pairs through a reduction gearbox to two 4-bladed fixed-pitch propellers
Service speed:	19.5 kt
Owner:	Toll NZ Consolidated Limited
Operator:	Interislander
Port of registry:	Wellington
Minimum crewing requirement:	12
Date and time:	19 October 2004, at about1018[1]
Location:	Queen Charlotte Sound
Persons on board:	crew: 36 passengers: 200
Injuries:	crew: nil passengers: nil
Damage:	nil
Investigator-in-charge:	Captain I M Hill

[1] Times in this report are New Zealand Daylight Time (UTC + 13 hours) and are expressed in the 24-hour mode.

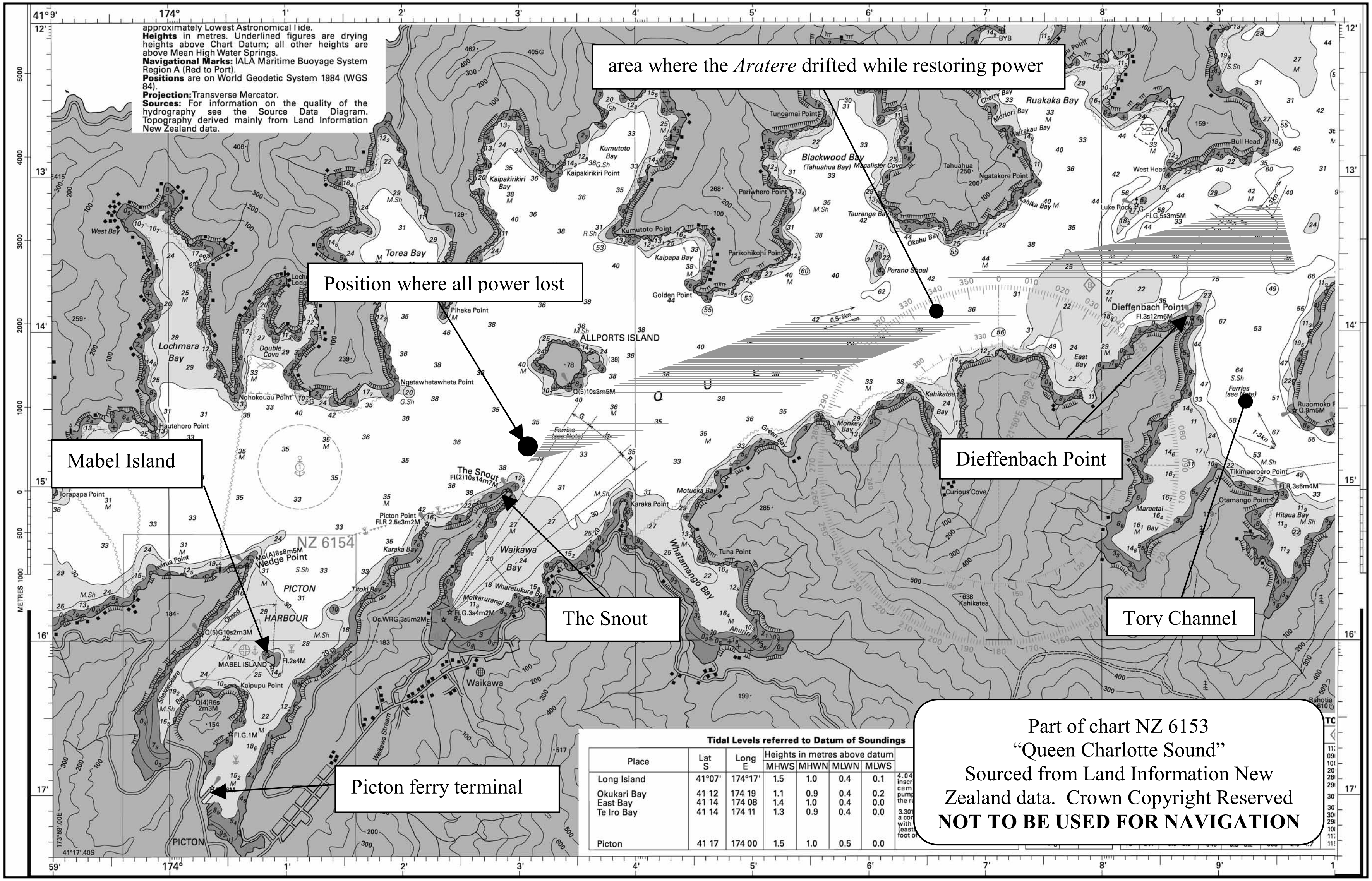


Figure 1
General area of the occurrence

1 Factual Information

1.1 Narrative

1.1.1 On 19 October 2004 at about 1004, the *Aratere* departed Picton ferry terminal with 200 passengers and 36 crew on board. The master had the con and the vessel was being hand steered by the duty helmsman. The vessel was being operated in "enclosed waters mode" and was being powered by 3 of the 4 available diesel generators.

1.1.2 As the vessel passed Mabel Island (see Figure 1) the master estimated that because of the tidal current he would require the fourth generator to maintain schedule. The master contacted the engine control room by telephone and requested the duty engineer to start and engage the fourth generator.

1.1.3 The duty engineer started the fourth, number 4 generator from the engine control room, ran it up to speed and connected it to the system. He then left the engine control room to check that all the generators were operating correctly and to carry out a general check of the engine room spaces. As he approached number 3 generator he saw around the free end[2] a large cloud of steam that also obscured number 4 generator.

1.1.4 The duty engineer returned to the engine control room and began to shut down number 3 generator. As he was shutting it down he telephoned the master and told him number 3 generator was being shut down. He also telephoned the first engineer to advise him of the problem.

1.1.5 From the readouts on the bridge the master had seen the fourth generator come on. However, shortly after he saw that the reading on the megawatt meter was reducing progressively and he concluded that there were problems in the engine room, as confirmed by the duty engineer.

1.1.6 The first engineer took the telephone call from the duty engineer while in the mess for a tea break. Together with the chief engineer, electrician, and other off-duty engineers, he started to make his way to the engine room. The vessel lost all power and blacked out as they were leaving the mess room. The electrician went to the emergency generator room while the others carried on to the engine room.

1.1.7 When the vessel blacked out, the seamen ratings went to their emergency stations and the master was able to contact the boatswain to go to the forecastle head and be ready to anchor the ship should it be required.

1.1.8 On arrival in the engine room the engineers worked to restore electrical power. Meanwhile the master conned the *Aratere* as it drifted down Queen Charlotte Sound. The weather was good with a light northerly wind and good visibility. The master did not anchor the vessel but the option was available to him should the need have arisen.

1.1.9 The emergency diesel generator started automatically but did not connect to the emergency switchboard. However, the electrician managed to connect this generator manually to the emergency switchboard to provide power.

1.1.10 The master kept the harbour authority and Interislander informed of the situation as it developed. At about 1052, full power was restored and the master tested the engines and decided, in conjunction with the harbourmaster and Interislander, to return to Picton to discharge his cargo and disembark passengers and repair the engine fault.

1.1.11 At about 1155 the *Aratere* was secured alongside the terminal. Passengers were disembarked and cargo unloaded to be reallocated to other vessels.

[2] The end of a diesel generator away from the electrical generating end.

1.2 Events in the engine room and ancillary spaces

1.2.1 On arrival in the engine room it was evident to the chief and first engineers that overheating had occurred in the diesel engines. The chief engineer organised the opening of the bleed cocks for the cooling system on each engine to be opened. The air expelled from the cocks confirmed that overheating had been caused by gassing-up of the cooling system.

1.2.2 Because the last work to be done on the diesel engines had been on number 4 machine, the chief engineer considered that it was probably the cause of the gassing-up, so he ordered that it be isolated from the rest of the system and its fuel shut off. The remaining 3 diesel engines were then bled of air, and number 2 generator started manually. The master was advised to revert to "port mode" as this required only one generator and provided power to such systems as navigational, emergency, mooring and lighting. As soon as the water being bled from the system was seen to be free of air, number 2 generator was put on load via the Synpol-D.

1.2.3 When number 2 generator was running smoothly, the chief engineer ordered that the power management system (Megastar) be manually reset. Numbers 1 and 3 generators were then started manually and once the bleed water from them was seen to be free of air the master was advised to go to "standby mode" which required a minimum of 3 generators. Numbers 1 and 3 generators went on load automatically.

1.2.4 However, the water pressure in number 1 generator dropped and the generator shut down automatically on a high temperature alarm. Numbers 1, 2 and 3 generators were then bled again and number 1 generator manually started and put on load. All 3, generators continued to run smoothly.

1.2.5 The electrician made his way to the emergency generator room and discovered that the emergency generator had started automatically but power was not being supplied to the emergency switchboard. The electrician later said that he did not notice if the generator was in cool down mode[3] when he arrived in the emergency generator room. The electrician manually closed the circuit breaker to supply power to the emergency switchboard. He then left the emergency generator room and made his way to the engine control room to help the other engineering staff.

1.2.6 On arrival in the engine control room, the electrician checked the status of the emergency generator on the integrated automation system. This system showed that the emergency generator had low lubricating oil pressure.

1.2.7 Another engineer, who had visited the emergency generator room after the electrician, found the electrician in the engine control room and told him that the emergency generator was in "cool-down time". The electrician, realising that the emergency generator was about to stop, went to the emergency generator room where he noted that the oil pressure on the emergency generator was about 60 psi [413.68 kPa] just before the diesel generator shut down.

1.2.8 The electrician immediately switched the emergency generator to manual mode and restarted it. The generator started and he was then able to switch it to automatic mode, which started supplying power to the emergency switchboard. However, before the electrician left the emergency generator room, the circuit breaker automatically opened, stopping the supply of power to the emergency switchboard.

1.2.9 The ambient lighting remained on, indicating to the electrician that at least one of the main diesel generators was running. The electrician returned to the engine control room to help as required.

[3] The cycle that the diesel generator went through when the load, speed and temperature is automatically reduced to where the diesel generator can safely stop.

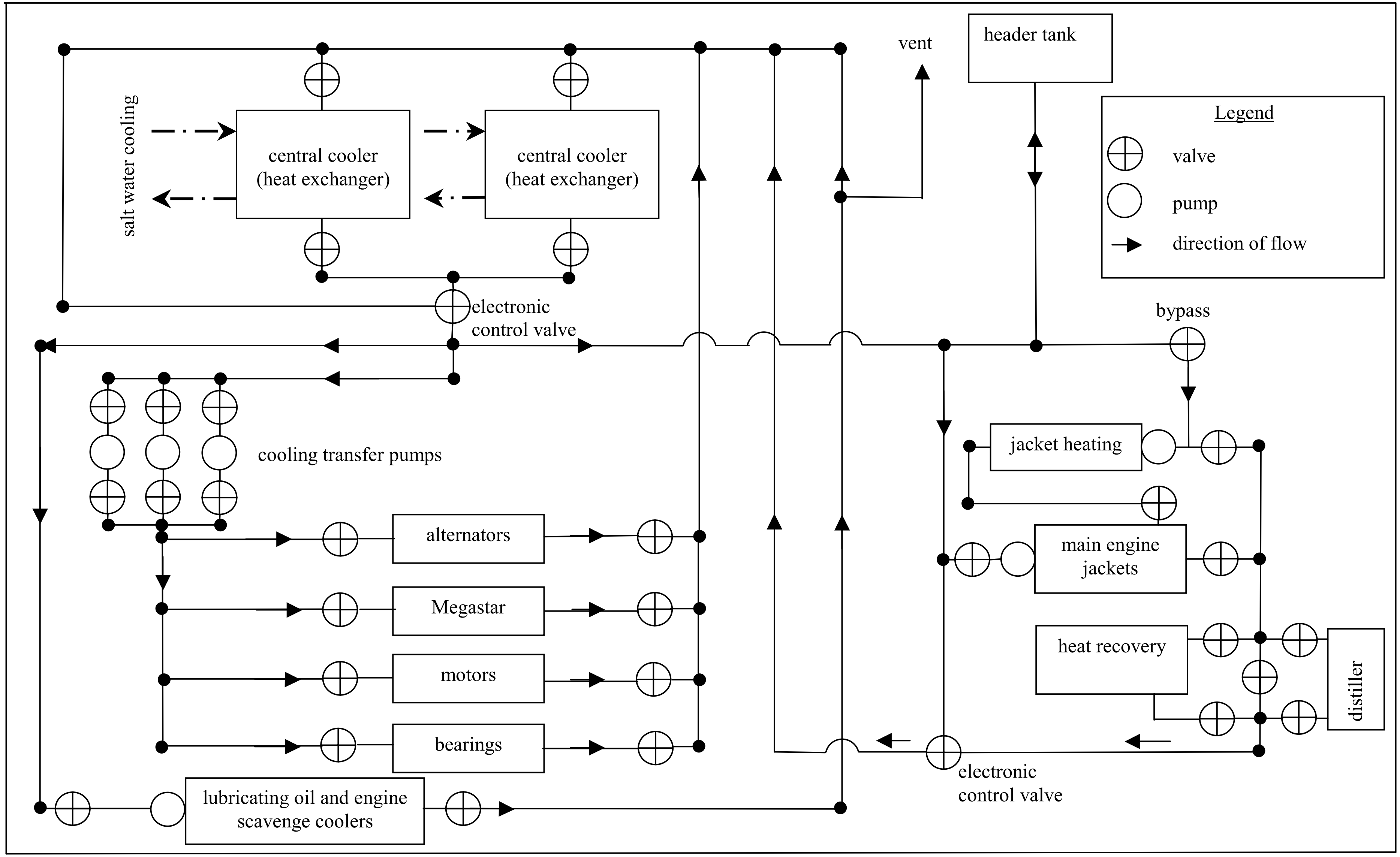


Figure 2
Diagram of the *Aratere*'s engine cooling system

1.3 Events leading up to the total power loss

1.3.1 During the previous day the engineering staff on board the *Aratere* had noticed that number 4 generator was leaking cooling water through the number 8 unit cylinder head joint.

1.3.2 As all 4 diesel generators were usually required for the *Aratere* to maintain its schedule, the chief engineer decided to change the leaking cylinder head. This type of work was usually carried out by extra staff carried for the purpose. However, no extra staff were available at the time so the ship's engineers carried out the work.

1.3.3 Work was commenced during the passage from Wellington to Picton when the vessel entered the enclosed waters of the Marlborough Sounds where only 3 of the 4 diesel generators were required. The first engineer, who had undertaken this task on many previous occasions, led the team doing the work. Because of the configuration of the engine room the work was in a cramped and restricting environment.

1.3.4 The task consisted of replacing the complete cylinder head, joint and "O" ring seal. The defective cylinder head was then sent ashore to a workshop with facilities for refurbishment and testing prior to being returned to the vessel.

1.3.5 When a cylinder head is removed from the engine block, air naturally enters the closed cooling water system through the exposed coolant passages in the block and head. After maintenance the block and cylinder head are refilled with water and the system bled to remove any air trapped in the system.

1.3.6 The task was completed before the scheduled departure of the *Aratere* from Picton. The diesel generator was checked and the engine run without load, after which the master was informed that all 4 generators were available for use.

1.3.7 Because the emergency generator had not stopped on a previous occasion immediately a low oil pressure was detected, a work order had been raised to investigate the cause. This had been raised prior to the electrician returning to the vessel from leave.

1.3.8 When the electrician returned from leave he consulted the maintenance engineers and discovered that, with reference to Caterpillar's original drawings for the emergency generator, the low oil pressure switch had been bypassed. This switch was reconnected as specified in the original drawings and the emergency generator tested and was found to work. However, when low oil pressure was simulated the generator did not stop immediately but entered a 5-minute cool-down period.

1.3.9 After a series of power failure incidents on 29 June 1999 (Marine Occurrence Report 99-202) a new monitoring control system for the emergency generator was designed, manufactured and fitted by Caterpillar. These drawings showed a different low oil pressure control system.

1.4 Vessel information

1.4.1 The *Aratere* was a passenger and freight ferry operated by Interislander, a division of Toll NZ Consolidated Limited (the owner). The ship was certificated to carry a total of 399 persons and was capable of carrying both rail and vehicular cargo. The *Aratere* was in class with Det Norske Veritas and was built in Spain in 1998. The ship traded on a scheduled service between Wellington and Picton with a service speed of 19.5 kt.

1.4.2 Two rudders provided steering, one aft of each propeller. The rudders could be used either synchronised, where both rudders moved in the same direction to the same degree, or independently, where the operator controlled the direction and the degree of each rudder separately. On this occasion the master was using the rudders synchronised. The *Aratere* also had 2 bow thrusters, each with a maximum power rating of 1000 kW, giving a combined 36 tonnes of bollard pull.

1.4.3 The *Aratere* was powered by up to four 3680 kW diesel-driven DC generators that provided electrical power as required, via frequency converters, to four 2600 kW AC electric propulsion motors; coupled in pairs to each shaft. Each pair of electrical motors drove a fixed-pitch propeller through a reduction gearbox. The maximum power rating of the propelling machinery was 10 400 kW.

1.4.4 The cooling system for the machinery and equipment in the engine room, as with many of the world's merchant ships, used fresh water passing through a common system to the machinery. The fresh water then passed through heat exchangers that were cooled by salt water (see Figure 2). All 4 diesel generators, the Megastar, alternators and bearings were cooled by a common fresh water system such that if one part of the cooling system was compromised the whole system was affected.

1.4.5 Water has a large thermal capacity[4] and as such is often used in cooling systems, both open and closed. In contrast air has a small thermal capacity as shown by its rapid rise in temperature when heated, and rapid fall when the heat source is removed. When air enters and mixes with water in a closed cooling system, the thermal capacity of the system is greatly reduced, dependent on the amount of air entering the system, causing a rapid rise in temperature of the coolant and overheating of the system. Air entering a closed system can also cause an "air-lock" in the circulating pumps, preventing the flow of cooling water and similarly overheating the system.

1.4.6 The *Aratere* was fitted with an emergency diesel generator that was rated at 240 kW, which was more than sufficient for its potential fully connected emergency load of 187 kW. The emergency generator engine start system was fitted with a timer that cut out all the safety interlocks for 2 seconds to allow the engine to build up speed and stabilise before the safety interlocks become active. It was also fitted with a lubricating oil heater that kept the lubricating oil warm.

Control systems

1.4.7 A Wartsila electronic control system provided an automatic controller dedicated to each main diesel generator engine to monitor, control and protect it. The controllers were interconnected with the power management system to which signals were sent should alarm conditions require the operating parameters of an engine to be changed.

1.4.8 A ASEA Brown Boveri power management system controlled and optimised the power flow between the diesel generators and the loads connected to the high-voltage switchboard. The system included an independent AC110 controller for each of the 2 frequency converters and a Synpol-D automatic controller for each diesel generator.

1.4.9 The 2 AC110 controllers were modular units for logic and sequential control of speed and power limitation of the propulsion motors according to required or requested load and the available power from the generators. The AC110 controllers optimised the number of diesel generators on load while still providing sufficient power for the operation in hand.

1.4.10 The Synpol-D automatic controllers monitored and controlled the electrical output from each generator driven by a diesel engine. The Synpol-D units were connected together and created an integrated power management system. The controllers had a protection function in that the operating limits of the electrical output were monitored, and the units also received out-of-limit signals from the Wartsila electronic control system at the diesel generators. Out-of-limit parameters might require the Synpol-D controllers to warn engineering staff, reduce the output power of a diesel generator, or stop an engine for more serious events.

1.4.11 The automation system incorporated all the vessel's machinery, process supervision and alarm monitoring. It provided a dynamically responsive single line system display of the vessel

[4] The capacity, or ability, of a substance to receive and store heat; equals the specific heat of a substance times its mass

services to the computer screens at the engineer stations on the bridge and in the engine control room. It also provided alarm printouts.

1.4.12 A control unit was fitted in the emergency generator room to monitor the power supply between the 400 V switchboard and the emergency distribution board. The unit controlled the automatic starting of the emergency generator, and power supply to emergency services when it detected a loss of main power for more than 3 seconds.

1.5 Damage

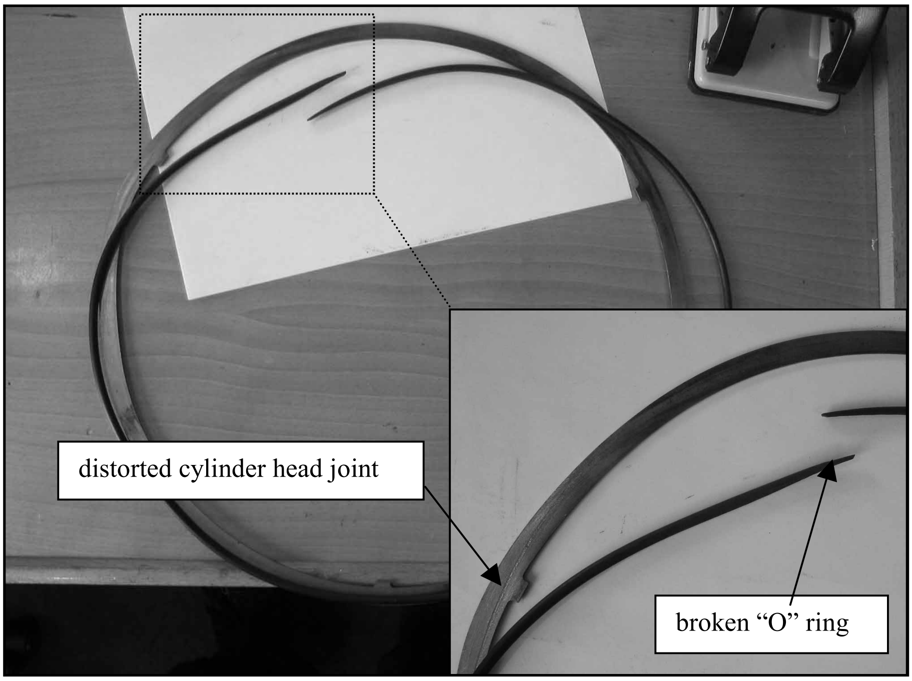


Figure 3
Broken “O” ring and distorted cylinder head joint after removal

1.5.1 When the number 8 cylinder head on number 4 diesel generator was removed after the incident, a broken “O” ring and a distorted cylinder head joint were found (see Figure 3).

1.6 Personnel information

1.6.1 The master went to sea in 1971, gaining his master’s certificate in 1981 after which he joined Interislander. He had been appointed as master in 1994, and had served in that capacity since then on Interislander ferries.

1.6.2 The chief engineer served in overseas vessels until 1967, when he emigrated to New Zealand. He joined the Rail Ferries, the predecessor to Interislander, in 1967. He gained his chief engineer’s certificate in 1976, and had served in that capacity since 1977.

1.6.3 The duty engineer went to sea in 1980 and served on numerous foreign-going vessels until he joined Interislander in 1999. He gained his New Zealand class 1 engineer’s certificate in 2002 and had served on several of the company’s ferries.

1.6.4 The electrician had qualified as an electrical engineer in the United Kingdom before studying to become a marine radio officer. He then worked for a British company in its space and defence division before emigrating to New Zealand. He lectured in industrial electronics, electrical installation and radio communication at a New Zealand polytechnic before joining Interislander as a third electrician in 1994. Since joining Interislander he had served on several of the company’s ferries.

1.6.5 The crew of the *Aratere* comprised live-aboard crew and walk-on crew, who joined the ship for their particular shift and left again at the end of their shift. The live-aboard crew, who worked a one week on one week off rota system, comprised the master, night master, first mate, second mate, chief engineer, second engineer, 3 watchkeeping engineers and the boatswain. The remainder of the crew were walk-on crew. The walk-on crew were on duty for a return trip between Wellington and Picton and crew change occurred during cargo and passenger exchange.

2 Analysis

2.1 Although extra staff were unavailable to carry out the maintenance work on number 4 diesel generator, the shipboard staff were qualified and well versed in changing cylinder heads. This was a routine maintenance task and had been completed on numerous occasions previously by the shipboard staff.

2.2 Although access was limited when changing the head, this did not slow down the operation but did make the job of assessing whether the head was seated correctly more difficult. The ship's engineering staff were used to working in the cramped conditions and had developed processes to overcome them.

2.3 The engineers completed the work in time for the departure from Picton, and took the opportunity to run the diesel generator without load prior to departure. However, it may have been more prudent to run the diesel generator under partial load before making it available to provide power for the propulsion motors. This may have shown up the defective seal on the number 8 cylinder head, although this could have taken more time than was available prior to the departure of the vessel.

2.4 The cooling system on the affected diesel generator may not have been bled fully before it was returned to service. When a diesel generator is run without load, the temperature increases at a slower rate than when run under partial or full load. The increase in operating temperature over the duration of the test run may not have been significant enough to alert the engineers to a problem with the system. Due to the operation of the electronic control system, there would have been little flow of cooling water until the engine reached operating temperature. Therefore any air present would not have been apparent to the engineers.

2.5 The faulty joint between the cylinder head and the engine block may not have been evident when the engine was run without load. The rapid increase in temperature and expansion in the cooling water as the engine came under load may have been sufficient to blow the already damaged seal and allow the cooling water to escape, possibly as steam, from the closed system. If the losses of cooling water were greater than the capacity of the header tank, air may have entered the system through the header tank.

2.6 As air entered the system and mixed with the cooling water, the thermal capacity of the cooling water would have dropped, causing overheating first in the affected engine and then in the other parts of the system. It would also have been possible for the circulating pumps to become air-locked, thus preventing the flow of cooling water round the system and similarly adding to the overheating problems.

2.7 The owner and operator of the vessel were aware of the problems associated with having a common cooling water system for all the diesel generators, that provided power not only to the propulsion motors but also for all other electrical services on board the ship. They had already engaged a consultant to examine the system and suggest modifications, if any, for its improvement. Unfortunately the consultant was not due to commence work until a few days after the incident.

2.8 When asked to provide the fourth diesel generator, the duty engineer followed correct procedures, and after starting the diesel generator from the control room went to see if it was functioning correctly. Seeing the free end of number 3 diesel generator obscured in steam naturally surprised him and indicated to him that it was malfunctioning. Because he could not see number 4 diesel generator due to the steam, he did not consider that it may have been the one malfunctioning despite the fact that he had just started it. Had he considered that work on number 4 diesel generator had only just been completed and number 3 diesel generator had been providing power since departure, and possibly before, he may have looked closer and seen that number 4 was the problem and not number 3.

2.9 When the duty engineer returned to the control room to inform the bridge and summon assistance from the other engineers, he shut down number 3 diesel generator because he thought it was the one malfunctioning. Had he closed down number 4 diesel generator instead, the system may have been able to recover and power may not have been lost.

2.10 The electrician could not remember seeing if the emergency generator was in cool-down mode when he arrived in the emergency generator room. This could have explained to him why the generator had not automatically connected to the emergency distribution board.

2.11 When the electrician manually engaged the emergency distribution board, this probably provided enough power to the engine room to start the first of the diesel generators before the emergency generator tripped out.

2.12 When the electrician manually restarted the emergency generator and switched it to automatic, the generator automatically connected to the emergency distribution board. It is possible that when the generator started initially, the 2-second delay before the safety systems became active was not sufficient for oil pressure to build up in a cold engine and the generator reverted to cool-down mode. This could also explain why the generator continued to run when the electrician restarted it, as the lubricating oil was by then warmer. However, the emergency generator was fitted with heating elements to keep the oil above a certain temperature, making it less viscous and easier to be transmitted around the oil system.

2.13 The lubricating oil pressure that the electrician noted on the emergency generator when he returned to the emergency generator room should have been sufficient to provide the required lubrication to the engine. The electrician therefore had difficulty reconciling the alarm on the integrated automation system with the oil pressure he saw at the emergency generator.

2.14 When a work order was raised to cover investigating the reason that the emergency generator ran on, reference was made to the original drawings. The vessel had had problems with the emergency generator resulting in the original wiring and control system being amended. Reference to the amended drawings would have shown a different system in operation. It was possible that when the low lubricating oil pressure switch wiring was reinstated, one system was working in opposition to the other. This may have caused the emergency generator to go into cool-down mode and fail to connect to the emergency switchboard.

2.15 A thorough risk analysis had not been carried out as to when and where it was safe to return a diesel generator to service after critical maintenance, taking into account navigational and other hazards that affect the safe outcome of the intended passage. Such a risk analysis would have alerted the master and chief engineer to the low-risk areas of the voyage where a generator could be returned to service.

2.16 The master was told before sailing that all 4 diesel generators were available to provide power to the propulsion system without any caveats added. He reasonably based his decision to ask for the fourth diesel generator on that information.

2.17 The master followed the vessel's contingency plans for such a situation and was ready to anchor the vessel should the need have arisen. However, the ship drifted down Queen Charlotte Sound in the good weather clear of any navigational hazards. Once emergency power and the subsequent single diesel generator started he was able to steer the ship, using the steering gear and rudders, through Queen Charlotte Sound. Prudent action in returning to Picton allowed remedial measures to be undertaken on the damaged cylinder head before recommencing the return journey to Wellington.

3 Findings

Findings are listed in order of development, not in order of priority.

3.1 The *Aratere* suffered a complete power loss caused by air in the closed cooling water system.

3.2 Air probably entered the system:

- through a joint between a cylinder head and the engine block on one of the diesel generators, or
- through the header tank system when the coolant level in the header tank was used up through coolant losses at the joint between a cylinder head and engine block, or
- during the changing of a cylinder head on one of the diesel generators.

3.3 Because of the configuration of the cooling water system, this caused all the diesel generators to shut down due to high-temperature alarms.

3.4 The diesel generator cylinder head that leaked had just undergone emergency maintenance for leaking coolant. When the cylinder head had been replaced an "O" ring seal became caught between the cylinder head and cylinder head joint, thus preventing a good seal forming.

3.5 The procedure for the replacement of the diesel generator cylinder head was not robust enough to ensure the correct seating of the head and seals.

3.6 The procedure to test generator diesel engines after maintenance and before being returned to service was not robust enough to discover the fault.

3.7 A thorough risk analysis had not been carried out of when and where diesel generators may be returned to service after critical maintenance.

3.8 The emergency generator did not connect to the emergency switchboard possibly because either:

- the oil was too cold to be pumped to the required pressure before the safety interlocks cut in after 2 seconds, or
- the wiring on the lubricating oil low-pressure switch had been restored to its original configuration despite having been officially altered.

3.9 After the power failure the chief engineer and engineers followed procedures and worked efficiently to identify the problem and restore power to the vessel.

3.10 The master and crew took appropriate actions and followed the authorised contingency plans to maintain the safety of the vessel during the incident.

3.11 The ship was correctly certificated and manned at the time of the incident.

4 Safety Actions

4.1 Since the incident, Toll NZ Consolidated Limited has implemented the following actions:

- a new procedure was instigated for the replacement of cylinder heads
- a new procedure was instigated requiring engines to be commissioned after major maintenance only when the vessel was in certain low-risk locations during a passage. This procedure was designed to identify any problems before the engine was actually required. The engine was to be run on light load in parallel with another engine before progressively higher loadings were applied

- a consultant was engaged to review the cooling water system with a view to modifying it to cope better with air entering the system
- a decision was made to implement whatever recommendations were agreed to for fixing the problem of air entering the system during the vessel's drydock around August 2005
- Caterpillar's New Zealand agents amended the wiring of the emergency diesel generator and added a "latching internal relay shutdown output" to the software controls for low oil pressure, high coolant temperature, overspeed and emergency stop. Updated drawings were also supplied to cover the modifications.

4.2 In view of the safety actions taken by Interislander no safety recommendations have been made to the operator.

Approved on 30 June 2005 for publication

Hon W P Jeffries
Chief Commissioner

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04-214	passenger freight ferry *Aratere*, loss of mode awareness leading to near grounding, Tory Channel, 29 September 2004
04-213	restricted limits passenger ferry *Superflyte*, engine room fire, Motuihe Channel, Hauraki Gulf, 22 August 2004
04-212	Fishing vessel *Iron Maiden*, foundered off Pandora Bank, Northland, 16 August 2004
04-211	coastal cargo vessel *Southern Tiare,* loss of rudder, off Mahia Peninsula, 4 July 2004
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04-205	fishing vessel *Bronny G*, grounding, Banks Peninsula, 26 March 2004
04-204	restricted limit passenger vessel *Freedom III*, grounding, Lake Manapouri, 24 February 2004
04-203	coastal passenger and freight ferry *Arahura*, heavy weather incident, Cook Strait, 15 February 2004
04-202	restricted limit passenger vessel *Queenstown Princess*, grounding, Lake Wakatipu, 13 February 2004
03-211	oil tanker, *Eastern Honor*, grounding, Whangarei Harbour, 27 July 2003
03-210	passenger freight ferry *Aratere*, collision with moored fishing vessel *San Domenico*, Wellington Harbour, 5 July 2003

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