



Accident Report
Taharoa Express
Engine Failure at Taharoa on
22 February 2004



REPORT NO.: 04 3390

VESSEL NAME: *TAHAROA EXPRESS*

Casualty Details:

Date of Casualty: 22 February 2004

Time of Casualty: 1920 hours New Zealand Daylight Time (NZDT)

Casualty Type: Engine Failure

Casualty Location: Taharoa, New Zealand

Weather Forecast Area: Raglan

Investigator: David Coker, MSI, New Plymouth



REPORT NO.: 04 3390

VESSEL NAME: *TAHAROA EXPRESS*

Vessel Details:

Ship Name:	<i>Taharoa Express</i>
Ship Category:	Bulk Carrier
Registered Length (m):	259
Gross Tonnage:	74 364
Official Number:	124698
Port of Registry:	Panama
Flag:	Panama
Owners Name:	Hachiuma Steamship Co Ltd



SUMMARY

On 22 February 2004, *Taharoa Express* lost all main engine power during berthing manoeuvres. The vessel was brought up to both anchors shortly before she would have grounded, but for this action.



1. Key Events

- 1.1 On the 22 February 2004 at 1200 hours New Zealand Daylight Time (NZDT), the Panamanian bulk carrier **Taharoa Express** arrived at Taharoa, New Zealand from Wakayama, Japan.
- 1.2 At 1230 hours the vessel was 3 nautical miles (nm) west of the Taharoa Single Point Mooring buoy (SPM). Notice of Readiness was tendered but mooring operations could not start as the heavy swell and strong wind were outside of the port's operational parameters. The significant swell height was between 3.3 and 3.5 metres with a maximum swell height of between 5.5 and 6 metres and a swell period of around 13 to 14 seconds. The Master was instructed by the Pilot to stand off to the west of the SPM buoy, pending a decision on berthing. The swell was lessening slowly, so the Pilot was hopeful of being able to berth before nightfall.
- 1.3 The service vessel **Margaret J I** had left Kawhia, crossed the Kawhia bar, and was headed for the SPM buoy to check that all was in order with the buoy, mooring rope and the loading hoses. The **Margaret J I** then remained at Taharoa on stand-by.
- 1.4 At 1600 hours when the swell height was approximately 3.2m significant and 5.0m maximum, the Pilot asked **Taharoa Express** to close the SPM buoy. The vessel was drifting in a position approximately 15 nm west off the SPM buoy.
- 1.5 At 1718 hours, the main engine was tested at a position 2.5 nm west of the SPM buoy. At this time the main engine failed to start at the bridge control position. The cause was not ascertained at the time but was believed to be linked to the subsequent failure of the No. 4 main engine distributor valve. The control was changed to engine room control and the engine was started at that position. The Chief Engineer undertook engine control for the operation in the engine control room.
- 1.6 At 1730 hours, the Pilot boarded the vessel by helicopter. During the berthing briefing the Master reported the situation with the engine and it being on engine room control, which the Pilot understood. After the briefing, the Pilot took the con of the vessel and the operation of mooring the vessel to the SPM buoy commenced.
- 1.7 The Pilot's intended approach, due to the swell conditions, was to pass 0.5 miles to the north of the SPM buoy, and then round up between the SPM buoy and the shore, turning through an arc of 180 degrees, to make for the SPM buoy in a "head to swell" attitude.
- 1.8 At 1812 hours, a messenger line from the vessel was connected to the heaving tail of the main mooring rope and the ship slowly steamed ahead. During this time, the tail rope was heaved in at a steady rate.
- 1.9 At 1818 hours, the vessel was between 60 to 70 metres from the SPM buoy. The vessel then started to heave up the main mooring rope. In order to reduce the remaining headway, on approaching the SPM buoy, 'slow astern' was ordered but the engine did not start. The Pilot had 'stop engine' rung and then 'slow astern'. The Master phoned the engine room as the engine had not started. The Master then confirmed to the Pilot that there was a problem with the engine.
- 1.10 At 1820 hours, the vessel's head started to fall off to starboard. The Pilot instructed the Chief Officer on the foscle to immediately pay out all the main mooring rope, the messenger rope and the ship's messenger as quickly as possible and let them go from the ship before excessive weight came on to the mooring. The Chief Officer complied and the rope was released safely.
- 1.11 At 1825 hours, the vessel was drifting in a northeast direction, towards the shore, as a result of the heavy swell.



- 1.12 At 1828 hours, the port anchor was let go with 5 shackles of chain. There was a limiting factor due to the proximity of the shore and the rate of side ways drift. The length of chain was increased to 6 shackles and then 7 before the vessel's head showed any sign of swinging to port.
- 1.13 At 1843 hours, the starboard anchor was let go to 2 shackles in the water. The Pilot requested the Third Officer to keep him advised as to the soundings. The after draft of the vessel was 9.75 metres; the echo sounder at this time was nearly out of paper. While the Third Officer changed the paper roll the *Margaret J I* took up a position on the port quarter and relayed soundings to the bridge until the vessel's echo sounder was back in operation. The two anchors were still dragging at this time.
- 1.14 At 1900 hours, the vessel appeared to stop dragging her anchors and change direction, heading into the swell. The echo sounder was recording a depth of 12 metres. The vessel was pitching to the swell. During this time (between 1820 and 1900 hours) the Chief Engineer and his engineers were attempting to get the main engine started.
- 1.15 At 1918 hours, tug assistance was requested from Westgate Transport Ltd, New Plymouth. The tug *Tuakana* was mobilised, ready for sea.
- 1.16 Between 1820 and 1923 hours, the engineers investigated the failure of the vessel's engine to start and were in contact with Hachiuma Steamship Co Ltd, the management company, for advice.
- 1.17 The Pilot requested the operation centre to contact the Marine Duty Officer of the Maritime Safety Authority of New Zealand (MSANZ) to inform him of the incident.
- 1.18 At 1923 hours, an attempt was being made to start the main engine. The engine turned on air and was able to be started. The engine started in the ahead running position (dead slow ahead). The main engine was kept running. Further engine movements were to bridge orders. Instructions were given by the Pilot to weigh both anchors as the anchor chains became slack with the forward motion of the vessel.
- 1.19 At 1930 hours, the starboard anchor was aweigh. Difficulty was experienced with the port anchor cable, and the vessel eventually overran it. This halted the forward motion of the vessel despite still steaming at 'dead slow ahead'. There were 4 shackles still in the water. It was considered whether or not to jettison the port anchor cable. There was a misunderstanding between the Pilot and the Master as to the arrangement of the end link in the cable locker. Oxygen/acetylene cutting gear was brought up from the forepeak store to the focsle to cut the cable if needed. In the meantime, the port cable continued to be weighed.
- 1.20 At 1955 hours, the port anchor was aweigh. The vessel continued to steam slowly to the west. The Pilot indicated to the Master that he should proceed at least 20 nm off the land until he could safely investigate the main engine failure.
- 1.21 At approximately 2015 hours, the Pilot contacted Westgate and stood down the tug *Tuakana*. He then disembarked by helicopter. The vessel proceeded to the southwest of the SPM buoy.
- 1.22 The Pilot advised that at 0600 hours on the 23 February, the vessel should be standing by for further mooring instructions.
- 1.23 When the Pilot reached the Operations Centre ashore, he contacted the Maritime Safety Inspector at New Plymouth and the Deputy Director of MSANZ. The Deputy Director contacted the Maritime Operations Centre (MOC) to relay instructions to the vessel to stand well off the coast until the owners supplied an explanation for the failure and a guarantee of reliability before a further mooring operation occurred.



- 1.24 On 23 February, at 0015 hours, when the vessel was in position 38°17.09' S 174° 03.20'E, the engine was stopped and a report sent to MOC. The main engine was still giving problems starting. The Hachiuma Kobe office and Nabco service engineering were assisting in finding the cause of the failure by communicating with the ship by satellite phone. The failure was traced to the No. 4 main engine air distributor valve, which was sticking. The valve was overhauled, cleaned and reassembled and other distributor valves checked. The engine was checked at all starting positions and found to be operating normally.
- 1.25 At 0410 hours, the inspection of the main engine was completed and the vessel started to move in the direction of the SPM Buoy. The vessel reported her position to the MOC namely 38°10.84' S 174°11.94'E. Her ETA at the SPM Buoy was at 0600 hours.
- 1.26 At 0530 hours, the Chief Officer of *Taharoa Express* contacted the Operations Centre at Taharoa, to indicate that the vessel would be at the pilot boarding position at 0630 hours. The Master was questioned if he had received advice from the MSANZ to stand off until the Owners had supplied an explanation as to cause of the engine failure. The Owners had advised MSA and the vessel was clear for berthing but had not given any explanation as to the failure of the starting system. In addition, as the weather conditions were such that a berthing could not have been attempted at that time.
- 1.27 The vessel was instructed by the Pilot to return to a position at least 20 nm off the coast until confirmation was received from MSA to berth and conditions were within the berthing parameters. A discussion between the Deputy Director of MSANZ and the Pilot concurred that a tug should be available during berthing. The tug *Tuakana* from New Plymouth was requested by MSANZ to be available to berth considering the potential for subsequent failure of the starting system.
- 1.28 At 1115 hours, the Director of MSANZ issued a Notice of Instruction to Hazardous Ship, *MV Taharoa Express* pursuant to Section 248 of the Maritime Transport Act (MTA) instructing the vessel to maintain a position 50 nm west of the Taharoa Terminal, until engine reliability was assessed and demonstrated to the satisfaction of the class society and MSANZ.
- 1.29 On the 25 February at 0800 hours, representatives of the MSANZ and hours, Nippon Kaiji Kyokai (NKK) boarded the vessel by helicopter to investigate the failure and to witness engine and manoeuvring trials.
- 1.30 The above trials were conducted satisfactorily and no problems were encountered with the vessel's engine and manoeuvring system.
- 1.31 After receiving confirmation of the successful engine trials at 1915 hours, the Director of MSANZ revoked the section 248 Notice and issued a Notice of Conditions under section 55 of the MTA to the vessel.
- 1.32 On 26 February, at 0717 hours, the Pilot boarded the vessel by helicopter. The vessel proceeded to the SPM buoy. The tug *Tuakana* stood by during the berthing.
- 1.33 At 0830 hours, the vessel was safely moored to the SPM buoy.
- 1.34 At 0845 hours, the tug *Tuakana* was stood down and returned to New Plymouth.



2. Key Conditions

2.1 **Taharoa Express** was built in Ulsan, Korea in 1990 and is registered in Panama. She was built as a bulk carrier with nine holds and hatches situated forward of the after accommodation block and engine room. The vessel is owned by Pacific Transport Trading S.A. and time chartered by NYK Line, Tokyo, and K Line, Tokyo, for the carriage of ironsands from Taharoa to Japan. She is managed by Hachiuma Steamship Company but is also "operated" by K Line. The vessel has been on a regular trade between Taharoa and Japan since April 1999. This was following her conversion to a "dedicated slurry carrier" in March 1999. She is classed with NKK, "strengthened for heavy cargos, hold No. 2, 4, 6 and 8 may be empty". The vessel is constructed with five topside wing ballast tanks, port and starboard, and five double bottom water ballast tanks, port and starboard. Double bottom fuel oil tanks, port and starboard, are located beneath No. 8 hold. At the time of the incident the double bottom tanks held 1245.1 tonnes of heavy fuel oil at a temperature of 38° to 41° C giving an specific gravity of 0.958. The total of heavy fuel oil onboard at the time of the incident was 2713.3 tonnes. There is a pipe duct keel running from the forward end of the engine room, which separates the port and starboard double bottom tanks.

2.2 **Taharoa Express** is powered by a Hyundai - B&W 5S70MC (derated) engine developing 11 466 kW at 78 rpm. The main engine is a direct reversing engine coupled via shafting to a fixed 4 bladed propeller with a diameter of 8200mm and a pitch of 6247mm.

2.3 The manoeuvring speeds of the vessel are as follows:

Ahead	RPM	Loaded (Speed Knots)	Ballast (Speed Knots)	Astern	RPM
Navigation Full	74	12.7	13.7	Hard Full	67
Manoeuvring Full	65	12.2	13.1	Full	65
Half	57	10.6	11.5	Half	57
Slow	38	6.8	7.6	Slow	38
Dead Slow	31	5.7	6.2	Dead Slow	31

2.4 All relevant SOLAS certificates, exemptions and other international certificates were found to be on board and valid. A Panama annual safety inspection was carried out on the 30th January 2004 at Kawasaki, Japan. No deficiencies were noted during that inspection.

2.5 The crew complement of **Taharoa Express** was 22, consisting of Master, Chief Officer, Second Officer, Third Officer, Chief Engineer, First Engineer, Second Engineer, Third Engineer, Bosun, 3 AB's, 2 Ordinary Seamen, Deck Cadet, 1 Fitter, 3 Oilers, Wiper, Chief Cook and Second Cook. Apart from the Japanese Master, Chief Officer and Chief Engineer, the crew were of Filipino nationality.

2.6 All Officers and crew held appropriate national Certificates of Competency for their rank and Panamanian Certificates in accordance with STCW 95 regulation 1/10.

2.7 The Pilot and loading Master, holds a Foreign Going Master's Certificate of Competency issued in New Zealand in 1965; a Pilot licence for the Taharoa Terminal Pilotage area and is Deputy Harbour Master for Taharoa. He has been a Pilot at Taharoa since 1984.

2.8 The starting air system for the vessel is as follows: Air is compressed by two compressors charging two air receivers. Air from the receivers then passes to an automatic valve. The automatic valve allows air to pass to the distributor and the air start valves. When a start of the engine is required air pressure forces the distributor valves onto their cams allowing air from the valves to flow to the air start valve pistons, thereby opening the selected valve and allowing air pressure to push down the main engine pistons and turn the engine.



- 2.9 The *Taharoa Express* has a system of planned shipboard maintenance. A sub-section outlines the requirement for the main engine. The Chief Engineer and the vessel's Superintendent review this plan annually. When maintenance has been completed it is entered in the voyage maintenance record and a copy is sent to the management company.
- 2.10 The air distributor is required to be inspected at 12 monthly intervals according to the planned maintenance programme. The Hyundai B & W maintenance manual recommended an inspection of the starting air distributor at 8 000 hours of service. Voyage maintenance records show that maintenance to the air distributor was carried out on the 25th February 2002 and then on the 7th of October 2002. There was no further record of any maintenance to the air distributor found onboard.
- 2.11 The Chief Engineer commented that the maintenance plan showed that the air distributor had been inspected every 12 months. This may only have been a visual inspection of the whole unit in October 2003 as the maintenance plan had been ticked as completed, but there was no entry in the voyage maintenance record that the valves had been removed from the unit and cleaned and inspected.
- 2.12 The engineers onboard were not serving onboard the vessel during October 2003 except for the Third Engineer, who joined on the 17th of October.
- 2.13 The engine room log showed the main engine pressures and temperatures were normal. Both air compressors were also functioning normally.
- 2.14 Hachiuma Steamship Co Ltd has a reporting system for failures of equipment on board their vessels as part of their ISM System. The following is a list of significant failures reported in the last year for the main propulsion equipment.
- | | |
|------------|---|
| 21/2/03 - | No.5 cylinder fuel pump puncture valve failure. |
| 1/3/03 - | No.3 cylinder crankpin bearing shell failure. |
| 23/3/ 03 - | Intermediate shaft cracked. |
| 21/8/03- | Main engine No.2 cylinder exhaust valve shaft rotor blades failure. |
| 11/10/03 - | Main engine No.3 cylinder exhaust valve shaft rotor failure. |
| 3/11/03 - | Main engine No.5 cylinder fuel oil injector valve high pressure pipe leaking. |
| 3/12/03 - | Main engine air cooler failure due to cooling water leakage from tubes. |
| 11/1/04- | Main engine governor power failure. |
| 31/1/04 - | Control room indicator panel had an electrical problem. |
| 6/2/04 - | Main engine No.2 fuel oil injection failure. |
| 22/3/03- | Failure of main engine No.4 air start distributor valve. |
- 2.15 New Zealand Steel Mining Ltd operates the iron sand mining operation at Taharoa. The offshore loading from the mining operation involves pumping concentrate (50% ironsand 50% water) through two parallel pipelines 1.5nm offshore in the Tasman Sea. Flexible pipelines from the seabed then connect to the SPM Buoy, and from the buoy to the vessel when loading. *Taharoa Express* is manoeuvred under her own power and is moored to the buoy by a single 70 metre rope. The Pilot has the use of a service vessel, *Margaret J 1* of 87.76 gross tonnage, to assist with the mooring operations and pipeline connection.
- 2.16 At the date of the accident *Taharoa Express* did not have specific plans for the Taharoa operation and no specific contingency plan if there was a failure while manoeuvring in the pilotage area This has been subsequently addressed by the ship Management Company.
- 2.17 The weather and sea conditions at the time of the accident was a swell of 3.2 metre significant wave height and 5.0 metre maximum. The wind speed was 17.5 knots with gusts to 22 knots. Visibility was good. Low water was at 1830 hours.



3. Contributing Factors

N.B. These are not listed in order of importance.

- 3.1 The air starting system had become contaminated with small particles of oil, rust, and the wear of moving parts that had built up on the main engine No. 4 air distributor valve and cylinder, causing it to stick.
- 3.2 **Taharoa Express** has a five cylinder engine and when the engine was stopped from the ahead movement, only No. 4 cylinder was in the starting position to receive turning air. However, with the No. 4 air start distributor valve being stuck, no air could be admitted to this engine cylinder.
- 3.3 The management company had not established structured procedures in its safety management system to identify equipment machinery which, if the cause of a sudden operational failure at Taharoa, could result in a hazardous situation as occurred in this instance. This is a mandatory requirement of the ISM code.
- 3.4 The planned maintenance system on the vessel was rudimentary and poorly implemented; the planned maintenance system is not sufficiently descriptive enough to give the vessels crew adequate guidance in interpreting the maintenance requirements of the ships equipment.
- 3.5 The complete planned maintenance carried out on the vessel was not well documented. The planned maintenance carried out and documented in the voyage maintenance record was not cross-referenced to the planned maintenance system. The voyage maintenance record also had unplanned maintenance and routine maintenance recorded in the same section of the form.



4. Cause

Human Factor

- | | | |
|---|---|--|
| <input type="checkbox"/> Failure to comply with regulations | <input type="checkbox"/> Drugs & Alcohol | <input type="checkbox"/> Overloading |
| <input type="checkbox"/> Failure to obtain ships position or course | <input type="checkbox"/> Fatigue | <input type="checkbox"/> Physiological |
| <input type="checkbox"/> Improper watchkeeping or lookout | <input type="checkbox"/> Lack of knowledge | <input type="checkbox"/> Ship Handling |
| <input type="checkbox"/> Misconduct/Negligence | <input type="checkbox"/> Error of judgement | <input type="checkbox"/> Other . . . |

Environmental Factor

- | | | | |
|--|---|------------------------------------|--|
| <input type="checkbox"/> Adverse weather | <input type="checkbox"/> Debris | <input type="checkbox"/> Ice | <input type="checkbox"/> Navigation hazard |
| <input type="checkbox"/> Adverse current | <input type="checkbox"/> Submerged object | <input type="checkbox"/> Lightning | <input type="checkbox"/> Other . . . |

Technical Factor

- | | | |
|---|--|---|
| <input type="checkbox"/> Structural failure | <input type="checkbox"/> Wear & tear | <input type="checkbox"/> Steering failure |
| Mechanical failure | <input type="checkbox"/> Improper welding | <input type="checkbox"/> Inadequate firefighting/lifesaving |
| <input type="checkbox"/> Electrical failure | <input checked="" type="checkbox"/> Inadequate maintenance | <input type="checkbox"/> Insufficient fuel |
| <input type="checkbox"/> Corrosion | <input type="checkbox"/> Inadequate stability | <input type="checkbox"/> Other . . . |

- 4.1 The main engine No. 4 air start distributor valve stuck in the closed position stopping starting air being applied to No. 4 cylinder.



5. Opinions & Recommendations

- 5.1 The vessel's ongoing maintenance needs to be effective and proactive to ensure reliability, which was not apparent from the vessel's records and past history. This is particularly important for the **Taharoa Express** as the vessel operates at the extremes of its capability during manoeuvring at the Taharoa offshore terminal and is totally reliant on equipment reliability.
- 5.2 It is recommended that Hachiuma Steamship Co Ltd document and regularly review structured procedures for the safe operation of the vessel at Taharoa in their ISM system. An initial draft of this work has been conducted by the Hachiuma Steamship Company and has been submitted to MSANZ for comment.
- 5.3 It is recommended that Hachiuma Steamship Co Ltd review their planned maintenance system and give detailed instructions to the maintenance of the systems and equipment, which in the case of a sudden operational failure, could result in a hazardous situation, as required by the ISM code. This to be completed within 2 months of the final report and reviewed by an internal audit conducted by the company under their ISM System and verified by MSANZ at a future port visit.
- 5.4 It is recommended that Hachiuma Steamship Co Ltd separate the completed planned maintenance, unscheduled and routine maintenance in their voyage maintenance record (SMS 70) so as to easily identify the type of maintenance carried out. The planned maintenance code number should be used to identify the planned maintenance carried out on equipment in the voyage maintenance record (S MS 70). This is to be completed within months of the final report and reviewed by MSANZ at Taharoa.
- 5.5 It is recommended that the MSANZ conduct a critical review of the operation at Taharoa in its function as Harbourmaster. A risk analysis should be undertaken of the vessel mooring at the buoy when part loaded. This risk assessment was completed on the 18th & 20th of April 2004 and will be used to develop a Safety Management Plan for the vessel.
- 5.6 It is recommended that the New Zealand Steel Mining Company inform MSANZ of any change in permanent personnel involved in the maritime operation prior to the arrival of the vessel
- 5.7 It is recommended that the MSANZ should access any increased risk if there is any change to the established permanent personnel involved in the maritime operation at Taharoa. This to be undertaken by the Harbourmaster and ongoing.
- 5.8 It is recommended that in the event of any future Main Engine failures during manoeuvring at the SPM, the Pilot and Master immediately release the anchors rather than waiting for the ship to drift clear up the Mooring Cables for the SPM, as this drift may result in failure of the anchors to halt the vessel, and this requirement be included in the Safety Management Plan for the Port.
- 5.9 It is recommended that a formalised study be conducted by Hachiuma Steamship Co Ltd to determine the drift of the **Taharoa Express** in varying sea and wind conditions, and a various loaded draught in the event of any future Main Engine failures.
- 5.10 It is recommended that the Pilot and the Master's actions be commended for preventing the **Taharoa Express** from grounding as a result of this engine failure.

