Australian Government
Australian Transport Safety Bureau

Crew member fatality on board the bulk carrier *Nireas*

Gladstone anchorage, Qld | 20 March 2013

Investigation

ATSB Transport Safety Report
Marine Occurrence Investigation
299-MO-2013-005
Final – 4 March 2014

Cover photo: **ATSB**

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Publishing information

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Addendum

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Safety summary

What happened

On 20 March 2013, an engineer on board the bulk carrier *Nireas* was carrying out the routine task of draining water from the ship's main air receiver when the air receiver drainage pot observation window exploded. The engineer was fatally injured by flying debris from the observation window.

What the ATSB found

The ATSB investigation found that the drainage pot observation window glass exploded when it was exposed to the air receiver pressure. This pressure accumulated in the drainage pot because the water being drained restricted the flow into and through the pot outlet line.

The investigation also found that the shipyard which built the ship, and designed and installed the condensate drain system, considered that the drain system was open to atmosphere. When the design of the drainage pot was modified to create a closed system, the shipyard did not ensure that the design was adequately engineered, tested and approved prior to installation, despite having procedures in place which should have ensured such scrutiny.

During the course of the investigation, it was brought to the attention of the ATSB that similar designs of drainage systems had been, and continued to be, fitted in ships by various shipyards around the world.

What's been done as a result

All similar drainage pot observation window glasses were removed on board *Nireas* and its sister ship. The drainage pots were later modified, under the supervision of Lloyd's Register, to include a partly open steel plate in place of the observation glass.

The ship builder advised the ATSB that it had contacted all owners of ships in which it had fitted this design of drain system. They informed them of the accident and requested that all observation glasses be removed and for the pots to remain unobstructed.

In July 2013, the Australian Maritime Safety Authority (AMSA) issued Marine Notice 11/2013, to draw industry attention to this accident and request that appropriate safety action is taken where such systems are encountered on board ships. This Marine Notice is being updated and the latest version is available on the AMSA website: www.amsa.gov.au

The ATSB has also issued a safety advisory notice addressed to all classification societies, advising them of the accident, the safety implications of the installation and use of closed condensate drainage/inspection systems and of the need to draw the attention of the shipping industry to these issues.

Safety message

This accident identifies the need to follow a formal process of risk assessment when considering possible equipment modifications. Such a process should ensure that all associated risks are identified, considered and appropriately treated.

Contents

The occurrence

On 6 December 2012, the 229 m bulk carrier *Nireas* (Figure 1) departed Nanjing, China, on its maiden voyage. The ship sailed to Australia, where it loaded coal for export to Shanghai, China. On 17 February 2013, after discharging that cargo, the ship again sailed to Australia to load a cargo of coal.

Figure 1: *Nireas*

Source: ATSB

On 2 March, *Nireas* anchored off Gladstone, Queensland, to wait for a berth. During the time at anchor, the crew continued with their normal deck and engine room watches and carried out routine maintenance tasks.

During the morning of 20 March, the ship's engineers met for breakfast as normal and the fourth engineer, who had been on duty the previous night, reported to the other engineers that he had had no call outs.[1] The fourth engineer finished his breakfast and a little before 0730[2] went to the engine room to check the machinery prior to handing over duty to the second engineer. At about the same time, the second engineer went to the machinery control room (control room) to complete some routine checks and the third engineer went to the engine room to start work.

The fourth engineer started his engine room checks, which included draining accumulated water (condensate) from the main and auxiliary air receivers.[3] He opened each of the two inline drain valves of the forward main air receiver (Figure 2) about one turn and stood-by, watching the flow of condensate through the observation glass of the drainage pot.

Shortly afterwards, and without warning, the observation glass exploded.

The loud thump of the explosion was heard throughout the ship. In the engine room, the unusual sound drew the attention of both the second and third engineers. On the bridge, the master, chief mate and third mate heard a loud thump, but thought the noise was a wave slamming against the hull in the rough seas.

Shortly afterwards, at 0744, the engine room monitoring system alarm sounded. The monitoring system indicated that a fire detector on the engine room lower platform had activated and that there was a 440 V electrical system earth fault. The second engineer checked the alarms and then left the control room to investigate. On his way, he met the third engineer who was also on

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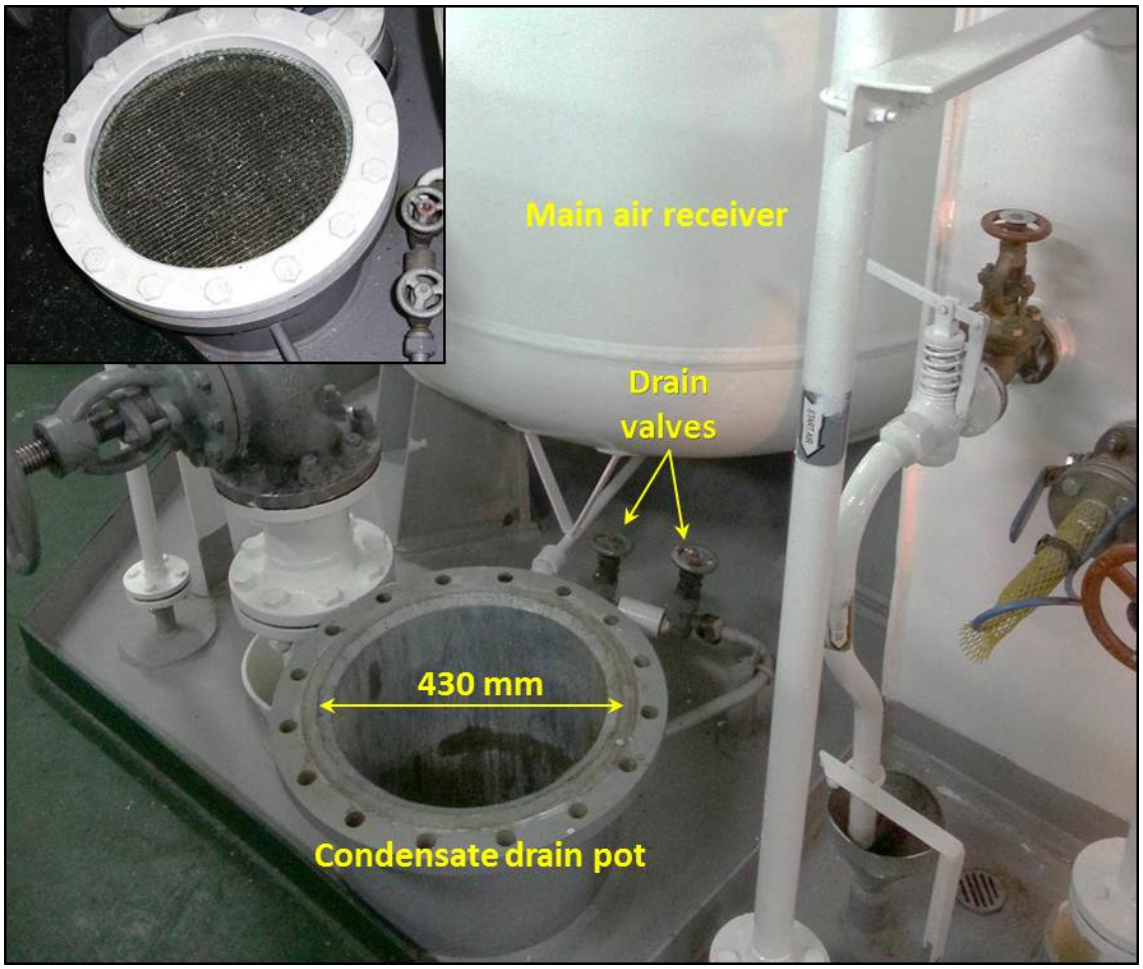
1 On ships with an unmanned machinery space, it is normal practice for the engineers to follow a rotating roster in which each takes a turn at checking and monitoring the ship's machinery and answering alarms and call outs for a 24 hour period.

2 All times referred to in this report are local time, Coordinated Universal Time (UTC) + 10 hours.

3 An air receiver is a large steel cylinder that contains compressed air supplied from a compressor. The main air receivers on board *Nireas* have a volume of 5.5 m^3 and contain 30 bar compressed air which is used to start the main and auxiliary engines.

Figure 2: Forward main air receiver condensate drainage pot arrangement and inset showing a similar drainage pot with the observation glass in place



Source: Brian White and Associates and ATSB

his way to investigate. The two men decided to separate and search either side of the engine room. The third engineer went down the starboard side stairs and the second engineer went down the port side stairs. As the second engineer approached the bottom of the port side stairs, he saw the fourth engineer surrounded by debris and slumped over at the base of the forward main air receiver. The atmosphere was misty, there was the distinct smell of oil and moisture laden air and compressed air could be heard freely escaping. The second engineer urgently called the third engineer.

The fourth engineer was unconscious and seriously injured. The second engineer hurried to the control room to telephone the bridge while the third engineer checked for dangers before moving the fourth engineer clear of the air receiver and laying him on the deck. The third engineer then shut off the two air receiver drain valves, stopping the flow of escaping air.

At about 0752, the second engineer telephoned the bridge and told the master to come quickly to the engine room with the chief engineer. The master and chief mate immediately headed for the engine room. The chief engineer had already heard the noise and the alarms in his cabin and was on his way to the engine room to investigate.

Meanwhile, the third engineer took the first aid kit from the control room to treat the fourth engineer's injuries. The fourth engineer was breathing but unconscious.

When the master, chief mate and chief engineer arrived in the engine room, the second engineer told them that the fourth engineer was badly injured. They went to investigate and as soon as the master saw the injuries, he told the chief mate to attend to them. He then hurried back to the

bridge to get urgent medical advice from ashore. On his way to the bridge, he passed the boatswain (bosun) and an able seaman and directed them to muster the crew and proceed to the engine room to assist.

At 0755, the master notified Gladstone Harbour Control of the accident. He asked for medical assistance and requested that the fourth engineer be evacuated from the ship. The master was advised not to move the injured man or administer any drugs but to continue first aid until shore paramedics arrived. Subsequently, the master informed the ship's managers of the accident.

At about 0815, the chief mate noticed that the fourth engineer had stopped breathing. He immediately commenced cardio pulmonary resuscitation (CPR) with assistance from the other crew members.

By 0845, a helicopter with paramedics on board was en route to *Nireas*. At 0920, the helicopter landed on board the ship and the paramedics were taken directly to the accident site where the crew were still performing CPR. The paramedics assessed the situation, and the condition of the fourth engineer, and shortly thereafter confirmed that he had died.

At 1009, the paramedics departed the ship. Arrangements were then made for the fourth engineer's body to be removed from the ship the following day.

Post occurrence

Australian Transport Safety Bureau (ATSB) investigators and representatives from the ship's protection and indemnity (P&I) association and classification society (Lloyd's Register) attended *Nireas* while the ship was at anchor off Gladstone. On 22 March, the attending Lloyd's Register surveyor issued the master with a condition of class, which in part stated:

> Observation glass of forward main air receiver condensate drainage pot shattered during drainage operation. The observation glasses are fitted to air receivers and air compressors throughout the engine room. The design of the drainage arrangements is to be verified. Meantime, the observation glasses have been removed from all of the pots.

On 25 March, *Nireas* berthed in Gladstone to load its cargo of coal and, on 26 March, the ship departed bound for Singapore.

On 27 March, the ATSB advised Laskaridis Shipping (the ship's managers), Jiangsu Jinling Shipyard (the ship builder), the Liberian Ship Registry (the flag State), Lloyd's Register and the Australian Maritime Safety Authority of the accident. All parties were made aware of what the ATSB investigation had initially found. They were all urged to identify ships fitted with similar drainage pots and to advise operators of those ships to take appropriate safety action to prevent similar accidents from occurring.

In response, Laskaridis Shipping confirmed that the observation glasses had been removed from the remaining drainage pots on board *Nireas*, and that the observation glasses from similar pots fitted on board another of the company's ships had also been removed. The company also stated that a safety circular highlighting the accident would be distributed to their entire fleet.

Jiangsu Jinling Shipyard advised that they had notified owners of ships built with similar air receiver condensate drain systems and requested that they remove the observation glasses from all drainage pots.

In July 2013 the Australian Maritime Safety Authority (AMSA) issued Marine Notice 11/2013 to draw industry attention to this accident and request that appropriate action be taken should such a system be encountered. A copy of this notice is included with this report as Appendix A.

Context

Nireas

At the time of the accident, *Nireas* was registered in Liberia and classed with Lloyd's Register. The ship was owned by Ocean Strength Navigation and managed by Laskaridis Shipping, Greece.

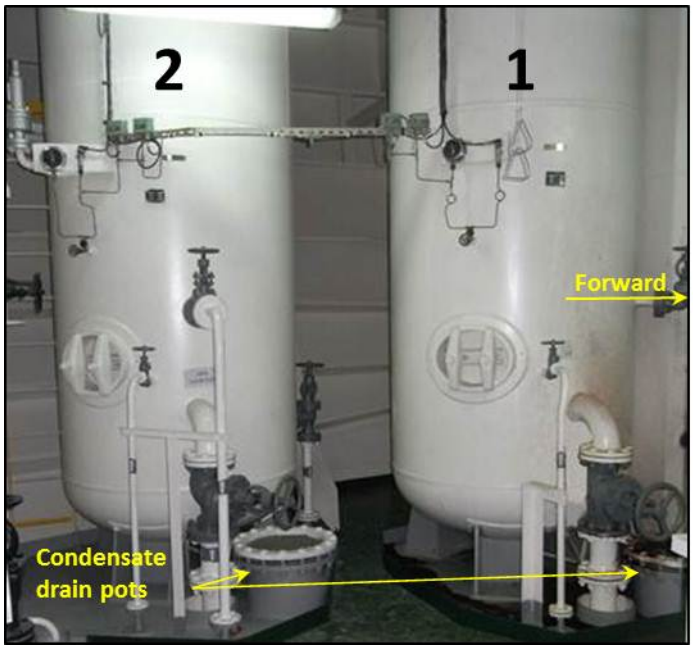
Nireas had a crew of 18 Ukrainian nationals, all of whom were appropriately qualified for the positions they held on board the ship. All of the crew joined the ship on 21 November 2012 in Nanjing, China.

The fourth engineer first went to sea as an oiler in 2007. In 2008, he completed a Ukrainian third class engineer certificate of competency. Since that time, he had sailed as either a third or fourth engineer.

Compressed air system

The compressed air system on board *Nireas* consisted of a high pressure system (controlled to about 30 bar)[4] for main and auxiliary engine starting requirements and low pressure systems for control and machinery air (7 bar) and general service outlets (4 bar). The low pressure systems were supplied from the high pressure system through pressure control valves.

Figure 3: Main air receivers in *Nireas*



Source: ATSB

Two main air compressors and an emergency air compressor supplied 30 bar air, while a working air compressor supplied 7 bar air for deck requirements. The air was stored in two 5.5 m^3 30 bar main air receivers (Figure 3), a 30 bar auxiliary air receiver and two 7 bar control and working air receivers.

The compressed air system was fitted with a drain line arrangement in which individual machinery drains were fed into a closed drain line. This system included condensate and unloader[5] drains for the three air compressors, condensate drains from the five air receivers and manual drains from the main engine starting air system.

The individual drain lines came together into a single drain pipe which exhausted into the after engine room bilge. Each of the compressor and air receiver drain lines fed into a separate drainage pot (7 in total) which then drained into the bilge well via the common line. The line increased in size as more drains emptied into it and extended about 20 m from the forward main air receiver to the bilge well. Flow from the drainage pots to the bilge was clear and no valves were fitted in the lines.

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4 1 bar equals 100 kPa or approximately one atmosphere.

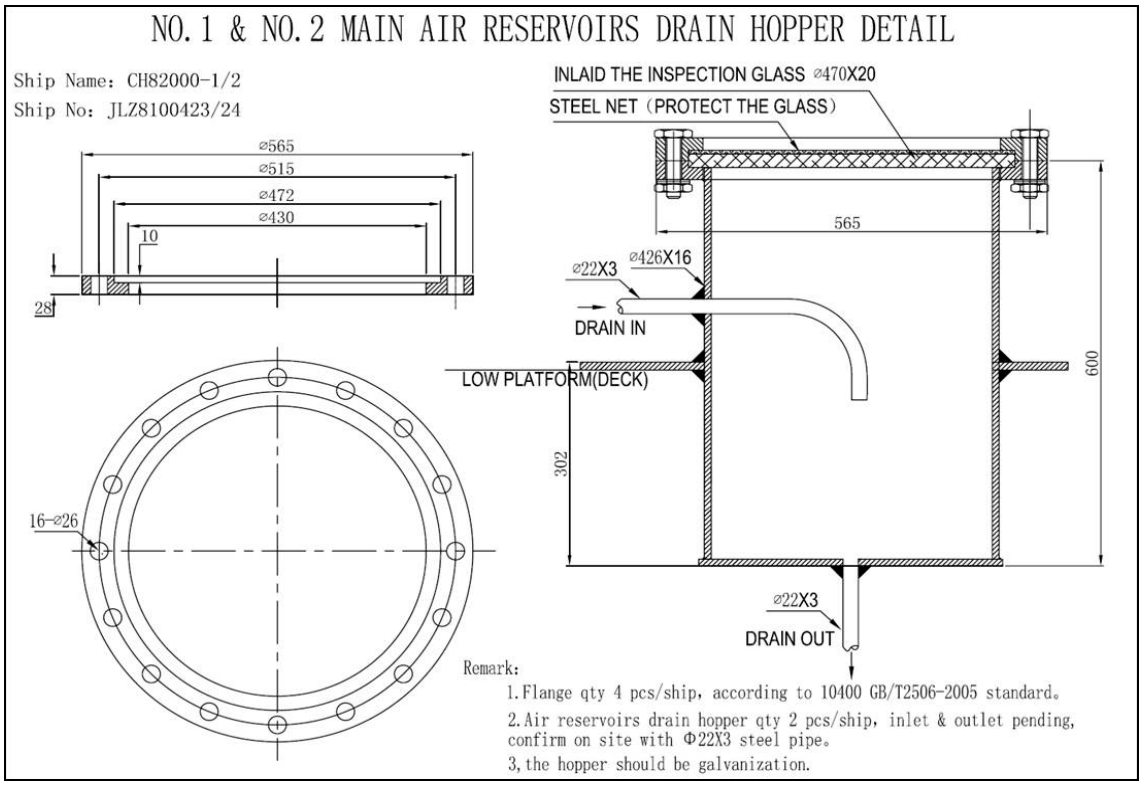
5 Unloading of air compressors involves draining the air pressure in the lines from all stages of compression. This relieves the pressure in the cylinders of the air compressor and reduces starting loads.

Main air receiver condensate drainage pots

The main air receiver condensate drainage pots were heavy steel cylinders about 600 mm high and 426 mm in diameter mounted into the deck adjacent to the air receivers (Figure 3). The top of each consisted of a toughened glass inspection cover clamped to the steel cylinder by a steel flange plate (Figure 4). The drain from the air receiver entered the cylinder from the side and was then directed toward the bottom. The outlet drain line was fitted in the centre of the bottom of the pot.

It was normal practice to drain the condensate from the air receivers at least three times per day and, additionally, when preparing to start the main engine. When interviewed, the ship's engineers stated that in the days preceding the accident it was normal for the drainage pot drain hole to be covered by condensate when draining the air receiver. The normal routine they followed was to open the first of the drain valves about 1 to 2 turns and then regulate the flow of condensate by opening the second valve a similar amount. When so doing, the engineers stated that it took tens of seconds for the condensate to be drained from the receiver.

Figure 4: Main air receiver condensate drainage pot



Source: Jiangsu Jinling Shipyard

Safety analysis

Drainage pot explosion

Pressure accumulation tests, conducted after the accident by the shipyard, showed that under full air flow conditions the pressure within the drainage pot could rise to around 10 bar. That is, even under optimal conditions, the restrictions inherent in the drain system resulted in significant pressure build up within the drainage pot. These restrictions included pipe and bend friction, pipe diameter and length and poor flow patterns through the observation pot.

The addition of liquid (condensate) to the system would exacerbate the flow restrictions as liquid flows more slowly than air. Once a quantity of liquid entered the drainage pot, the restriction created by any liquid blocking the pot's discharge hole and then flowing more slowly through the drain piping would result in a further increase in pressure inside the drainage pot.

It is likely that on 20 March 2013, when the fourth engineer opened the drain valves from the main air receiver between one and two turns, the condensate which had accumulated in the air receiver overnight flowed into the drainage pot in sufficient quantity to cover the bottom of the pot and the discharge hole.

Figure 5: Draining condensate from number one main air receiver, after the accident

Source: Brian White and Associates

This flow of liquid was probably followed by a marked increase in pressure due to the inrush of pressurised air (about 30 bar) from the receiver. This pressure increase in the drainage pot was sufficient to fracture the observation glass, leading to its catastrophic failure.

The positioning of the drain valves behind the observation pot meant that the fourth engineer's upper body was positioned directly over the observation glass (Figure 5) and therefore in the path of the explosive force and debris exiting the pot.

The exact cause of the failure of the glass remains unknown, as the small fragments of glass remaining were unsuitable for testing.

Condensate drainage pots

The condensate drain pots fitted on board *Nireas* were not of a design normally fitted by the Jiangsu Jinling shipyard, or commonly encountered on board ships. They were a modification that was implemented at the request of the shipowner's representative during the building of a previous ship (*Doric Liberty*) for the owners of *Nireas*. This design was then carried over to the building of *Nireas*.

During sea trials for *Doric Liberty*, the owner's representative requested that the condensate drain pot design be altered to eliminate splashing of condensate witnessed during draining. He provided notes outlining his ideas including the fitting of glass observation windows and protective mesh and insisted an alternate design be manufactured and fitted.

The shipyard complied with the request and produced a design and drawings which were accepted by the shipowner's representative. The new pots were then fitted on board *Doric Liberty*.

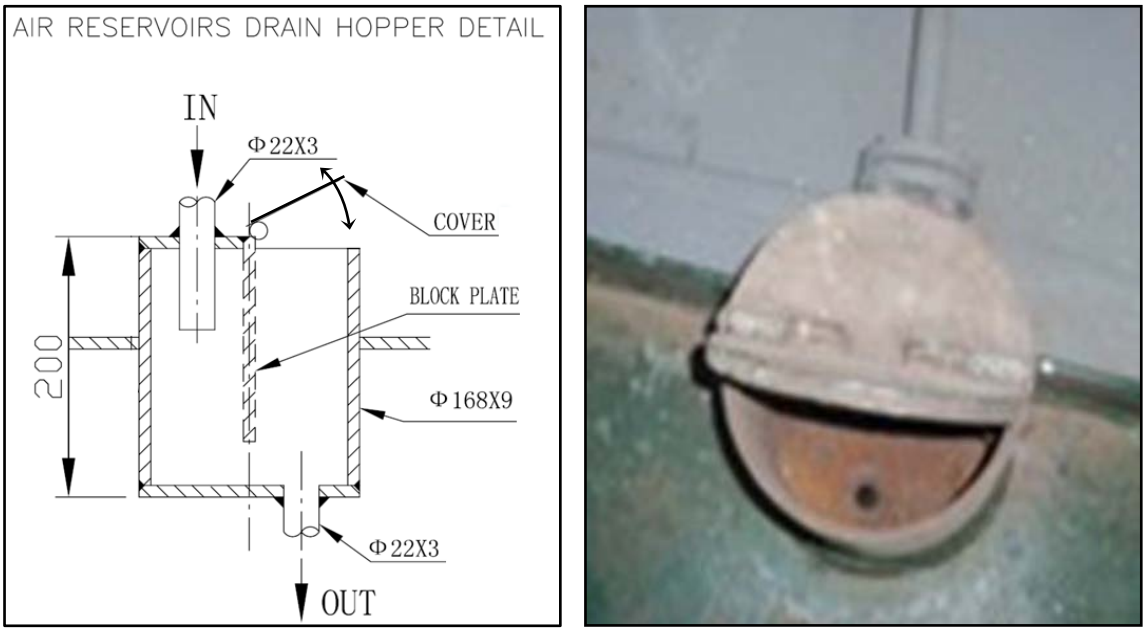
Doric Liberty was delivered and put into service on 28 June 2012. The design of the new drainage pots was noticed by another shipowner and was incorporated into the fit-out of *Minoan Grace* which was delivered by the shipyard on 30 September. The design was then incorporated into the fit-out of *Nireas*.

Design and testing

The original drainage pot (hopper) design used by Jiangsu Jinling Shipyard (Figure 6) incorporated an internal block plate to contain and limit condensate splashing and a hinged cover to allow for observation of the contents of the drainage pot and its outlet hole. This is a design commonly found on board ships and is a proven and reliable method of draining pressurised systems whilst limiting condensate splashing and allowing for visual checks during draining. However, the final positioning of the inlet pipe and the block plate combined with the quantity of condensate in the bottom of the hopper may, at times, lead to splashing of condensate out the cover.

In this arrangement, should any pressure accumulate in the drainage pot, such as due to the outlet becoming blocked, the pressure is exhausted to atmosphere via the non-sealing, hinged cover.

Figure 6: Original Jiangsu Jinling shipyard design of condensate drainage pot



Source: Jiangsu Jinling Shipyard

In the modified design, the hinged cover is replaced by a glass observation window and any condensate splashing is eliminated because the chamber is sealed (Figure 4). The alterations to the design included increasing the size of the chamber (by about 20 times), the use of significantly thicker materials and the use of glass rated to 16 bar.[6]

The new drainage pot design and associated drawings were completed and the drainage pots were fabricated and installed. They were then tested for leaks and free flow, by filling them with water and allowing it to drain, prior to use.

The design of the drainage pots suggests that some consideration was given to the likelihood of pressure accumulation. However, no quantitative engineering analysis of the design was

[6] A sample of the glass was tested by the shipyard after the accident and found to fail at 16.2 bar.

undertaken and no operational risk analysis was carried out. As a result, the possibility of an over-pressurisation of the observation glass was not identified and appropriately treated.

Furthermore, the conditions under which the drainage pots were to operate were not appropriately considered and planned for. Without regular planned repairs and maintenance, aging, repeated pressure cycling and possible mechanical damage would have eventually resulted in a reduction in the serviceability of the drainage pots. That is, when considering the working conditions, and component deterioration over time, failure of the observation glass at some time in the future, was almost inevitable. Importantly, any failure would probably occur while the operator was positioned over the observation glass to operate the valves or to look into the pot.

Approval

Nireas was designed, constructed and surveyed to the classification (class) rules of Lloyd's Register. Consequently, Lloyd's Register conducted a review of the ship's design plans, attended its construction, attended various key component production facilities and attended sea trials to verify compliance and conformance with class rules.

Since compressed air systems are a vital service on board a ship, they are subjected to class scrutiny. Many of the components of the system, including the air compressors, air receivers, safety valves and pressure piping are covered by class rules. However, the drainage systems and their components, particularly open ended piping, are not regarded as being under pressure and are not normally considered to be classed items.

The information and drawings available on board *Nireas* at the time of this investigation included the final (approved) drawing for the compressed air system. The system schematic included in the document showed the drains from the air receivers leading directly to the engine room with no mention of the modified drainage pots or the closed drain system leading to a single drain outlet many metres away in the after bilge. This document also included the advice that 'Pressure piping systems having working pressure exceeding 7 bar are to be surveyed at the manufacturer's works to the attending surveyor's satisfaction.'

It was also a Lloyd's Register requirement for the ship builder to submit any modifications or additions to scantlings, arrangements or equipment shown on the approved plans prior to their installation.

Therefore, the modified drainage pots and the enclosed drain system should have been brought to the attention of Lloyd's Register by the shipyard and subject to design scrutiny prior to being installed and used, as this was both a modification and exposed to pressures in excess of 7 bar. It is important to note that acceptance of a design by a shipowner's representative does not constitute approval and any such modification still requires thorough and proper engineering scrutiny and approval by class.

The shipyard indicated that important components and systems required full engineering design and consideration. In submission, they provided copies of 'The regulation of design modification procedure' which covered the actions to take when a modification to the original ship design was required. This document stated that when a modification was required by the ship owner:

- the modification was to be checked against the ship specifications and class requirements
- the ship owner was to be involved in the planning and agree to the modification, including cost
- the ship yard office director was to approve the modification
- the modification was to be checked for class approval requirements.

Furthermore, the office director was to '…check the modification whether exceeds rule's requirement, the building specification's requirement and shipyard's design standard, whether is safe and reasonable design.' (sic)

The shipyard was unable to provide verification that these requirements were followed in the case of the drainage pots fitted on board *Nireas*.

When approached by the owner's representative for *Doric Liberty*, the shipyard accepted the requirement that the modification was to be completed but then assumed the drainage system was open to atmosphere and not in need of further analysis. They did not submit the modification plan/design for risk analysis, engineering scrutiny and testing or forward it to class for appraisal and approval.

When it came time to fit the modified drain system in *Nireas*, *Doric Liberty* had been operating for more than 4 months with no reported issues, as had *Minoan Grace*, for more than 1 month. It is likely that the shipyard, and others, therefore assumed that the modification was safe and suitable for fitting on board *Nireas*.

Despite having a procedure requiring all modifications to be checked and verified, the shipyard manufactured and fitted a flawed design of condensate drain system in ships it was building. The reported safe operation of two ships fitted with the same system had reinforced the misconception that this design was safe, the design process was appropriate and that the modified system did not need risk and engineering analysis before fitting in other ships.

Condensate drain systems of similar design

During the course of the investigation, it was brought to the attention of the ATSB that similar designs of drainage pots had been, and continued to be, fitted on board ships by various shipyards around the world.

Figure 7: Similar design of condensate drain pot fitted on board another ship

Source: Pacific Basin Shipping

These systems all include a closed observation pot with a glass viewing window similar to that fitted on board *Nireas*. Some of these drainage arrangements even have multiple system drains feeding a single pot (Figure 7).

Findings

On 20 March 2013, an engineer on board the bulk carrier *Nireas* was carrying out the routine task of draining water from the ship's main air receiver when the air receiver drainage pot observation window exploded. The engineer was fatally injured by flying debris from the observation window.

From the evidence available, the following findings are made with respect to the accident. They should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance. A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

Contributing factors

- The drainage pot observation glass failed catastrophically when the pot was subjected to significant air pressure from the pressurised (about 30 bar) air receiver. Pressure accumulated in the drainage pot when liquid condensate from the air receiver restricted the flow of air and liquid out of the pot into the drain piping and to bilge.
- The shipyard did not follow its own procedure for fitting a modification required by the ship owner's representative. Consequently, the shipyard did not conduct appropriate engineering analysis or testing of the condensate drain system prior to fitting it. They were, therefore, unable to establish the extent or impact of pressure accumulation and operating conditions on the system.
- Both the shipyard and the owner's representative considered the drain system to be open and therefore not prone to pressure accumulation. They did not appropriately consider the significance of any possible pressure build-up in the drainage pot.
- **The condensate drainage pots fitted to *Nireas*' main air receivers were not fit for purpose as they were not capable of withstanding the internal pressures that were likely to accumulate in service. [Safety issue]**

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisations. In addressing those issues, the ATSB prefers to encourage relevant organisations to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Condensate drainage pot design

Number:	MO-2013-005-SI-01
Issue owner:	Laskaridis Shipping / Jiangsu Jinling Shipyard / Lloyds Register / Australian Maritime Safety Authority
Type of operation:	Shore-based operations and Shipboard operations
Who it affects:	Regulators, classification societies, masters, owners and operators of ships

Safety issue description:

The condensate drainage pots fitted to *Nireas*' main air receivers were not fit for purpose as they were not capable of withstanding the internal pressures that were likely to accumulate in service.

Proactive safety action taken by: Laskaridis Shipping

Laskaridis Shipping has confirmed that the observation glasses were removed from the remaining drainage pots on board *Nireas* and its sister ship. The drainage pots were then modified under the supervision of Lloyd's Register. At that time, the glasses were replaced by steel plates which covered 2/3 of the drainage pot diameter, with the remaining area open to atmosphere.

New operating instructions and modified chief engineer's standing orders have been posted in the engine room detailing the recommended draining method and instructing operators to wear goggles when using the system.

The company has also carried out a review of the condensate drain arrangements on all of its ships.

Proactive safety action taken by: Jiangsu Jinling Shipyard

The Jiangsu Jinling Shipyard contacted ships it had built with this design of condensate drain system, informed them of the accident and requested they remove the drainage pot observation glasses and replace them with hinged covers. The shipyard then reassessed the risks associated with condensate drain system designs they used, informed all employees of the accident and took measures to improve communication with shipowners and classification societies when modifications were requested.

The shipyard notified the ATSB that they have 'the related procedure and they will continually obey all existed procedures or rules during the shipbuilding construction, especially after the lesson of "NIREAS" accident' and they 'shall enhance and strictly implement our design modification procedure.'

Proactive safety action taken by: Lloyd's Register

On 22 March, Lloyd's Register issued the master of *Nireas* with a condition of class requiring the design of the drainage arrangements to be examined and verified. Lloyd's Register conducted an

investigation into the accident, alerted its shipyard surveyors to the associated safety issues and notified the owners of other ships classed with Lloyd's Register that were believed to be fitted with similar arrangements.

Lloyd's Register also oversaw the modifications made to the drainage arrangements on board *Nireas* and, in July 2013, lifted the condition of class.

Proactive safety action taken by: the Australian Maritime Safety Authority

In July 2013, the Australian Maritime Safety Authority (AMSA) issued Marine Notice 11/2013 to draw industry attention to this accident and request that appropriate action be taken should such a system be encountered. A copy of this notice is included with this report as Appendix A.

AMSA informed the ATSB that information regarding this accident had been passed to other marine regulators around the world and that all ships subjected to a Port State Control (PSC) visit by AMSA surveyors are provided with a digital copy of all current Marine Notices, including this one.

AMSA also stated that this Marine Notice was in the process of being updated as a result of this investigation. The updated version of this Marine Notice and all other current Marine Notices are available at the AMSA website: www.amsa.gov.au

ATSB safety advisory notice to: All classification societies

Action number: MO-2013-005-SAN-001

The Australian Transport Safety Bureau advises that all classification societies should consider the safety implications of the installation and use of closed condensate drainage/inspection systems and take action to identify and validate the design of any such systems on board ships.

Current status of the safety issue:

Issue status:	Adequately addressed
Justification:	The actions taken by Laskaridis Shipping and the Jiangsu Jinling Shipyard should adequately address this safety issue with respect to *Nireas* and its sister ships. The actions taken by AMSA and the ATSB safety advisory notice should ensure that the broader shipping industry is aware of this safety issue.

General details

Occurrence details

Date and time:	20 March 2013 – 0744 LT (UTC + 10 hours)	
Occurrence category:	Accident	
Primary occurrence type:	Fatality	
Location:	At anchor off Gladstone, Queensland	
	Latitude: 23° 50.60' S	Longitude: 151° 36.00' E

Ship details

Ship name	Nireas
IMO number	9611905
Call sign	D5BC8
Flag	Liberia
Classification society	Lloyd's Register
Ship type	Bulk carrier
Builder	Jiangsu Jinling Shipyard, Nanjing, China
Year built	2012
Owners:	Ocean Strength Navigation
Operators:	Laskaridis Shipping, Athens, Greece
Manager	Laskaridis Shipping, Athens, Greece
Gross tonnage	44,128
Deadweight (summer)	82,067.1 t
Summer draught	12.20 m
Length overall	229.02 m
Moulded breadth	20.05 m
Moulded depth	20.05 m
Main engine	Hyundai MAN-B&W 6S60MC-C7
Total power	13,560 kW
Speed	14.1 knots

Sources and submissions

Sources of information

On 20 March 2013, investigators from the Australian Transport Safety Bureau (ATSB) attended *Nireas* while the ship was at anchor off Gladstone, Queensland. The master and directly involved crew members were interviewed and each provided their account of the accident. Photographs of the ship and copies of relevant documents were obtained, including log books, statutory certificates, reports, manuals and procedures.

During the course of the investigation further information was provided by Laskaridis Shipping, Jiangsu Jinling Shipyard, Chios Navigation (Hellas), the North of England P&I Association, Brian White & Associates, the Queensland Police Service, Pacific Basin Shipping and Lloyd's Register.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the master, the chief mate and the chief, first, second and third engineers of *Nireas*, Laskaridis Shipping, Chios Navigation, Jiangsu Jinling Shipyard, Lloyd's Register, the Australian Maritime Safety Authority (AMSA), Maritime Safety Queensland (MSQ), the Liberian International Ship and Corporate Registry (LISCR – Liberian Registry), the Ministry of Infrastructure of Ukraine, the International Association of Classification Societies (IACS), Pacific Basin Shipping, Hakodate Dockyard and Brian White and Associates.

Submissions were received from the Australian Maritime Safety Authority, Laskaridis Shipping, Chios Navigation, Jiangsu Jinling Shipyard, Lloyd's Register, Brian White and Associates and Pacific Basin Shipping. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Appendices

Appendix A - Australian Maritime Safety Authority Marine Notice 11/2013

Australian Government
Australian Maritime Safety Authority

MARINE NOTICE

Marine Notice 11/2013

Fatality resulting from air reservoir drainage operation

The purpose of this Marine Notice is to draw industry attention to a fatality on board a foreign flagged vessel in Australian waters.

The fatality occurred while draining the accumulated oily water emulsion from the ship's main air reservoirs.

The main air reservoirs (normally two on each ship) situated in the engine room, store air at high pressure.

The maximum pressure of air stored within these reservoirs typically varies from 2.5 to 3.0 MPa. Main air compressors, mostly reciprocating multi-staged inter-cooled type, are used to charge the air reservoirs.

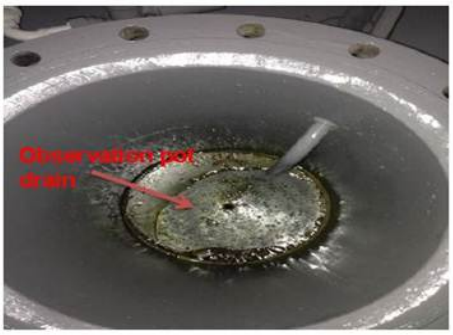
Due to the high pressure within the reservoirs, moisture contained in the compressed air reaches its dew point in the cooler atmosphere within the reservoirs and condenses to form droplets of water. The water collects at the bottom of the reservoir. Particles of air compressor lubricating oil are also carried over with the compressed air and mix with the collected water to form an emulsion inside the air reservoir.

The accumulated emulsions are regularly drained using drain valves located at the lowest level of the reservoirs to avoid damage to machinery and to avoid rust forming inside the air reservoirs.

On this vessel the blow down pipe from the reservoir after the drain valve is led to a small cylindrical observation pot, the top of which is covered by an observation glass attached in place by bolts and a flat steel retaining ring. At the bottom of the pot a small hole of approximately 10-12 mm is drilled which allows the emulsion to be drained and led away for disposal.

Although, it is not clear as to the actual sequence of events, it is understood that the fourth engineer was fatally injured when the glass on the observation pot of a main air reservoir exploded and the flying debris struck his face.

The design of this kind of blow down arrangement is relatively new and only a small number of vessels are found fitted with them.



All ship owner/managers, seafarers, classification society and independent surveyors, and all other stakeholders who come across a vessel with similar drainage arrangements are requested to take notice of this tragic incident and take appropriate actions.

The incident is currently under investigation by the 'Australian Transport Safety Bureau' (ATSB). A preliminary report is available on ATSB website at: http://www.atsb.gov.au/publications/safety-investigation-reports.aspx?Mode=Marine

Mick Kinley
Deputy Chief Executive Officer
10 July 2013

Australian Maritime Safety Authority
GPO Box 2181
CANBERRA ACT 2601

File reference: 2013/1036

Internet address for all current Marine Notices: www.amsa.gov.au

Page 1 of 1

This Marine Notice has been updated; the latest version is available at the AMSA website: www.amsa.gov.au

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Australian Transport Safety Bureau

24 Hours *1800 020 616*
Web *www.atsb.gov.au*
Twitter *@ATSBinfo*
Email *atsbinfo@atsb.gov.au*

Investigation

ATSB Transport Safety Report
Marine Occurrence Investigation

Crew member fatality on board the bulk carrier *Nireas*, Gladstone anchorage, Qld, 20 March 2013

299-MO-2013-005
Final – 4 March 2014