

**Departmental investigation
into the death of the Master of the
Danish flag vessel
ARKTIS GRACE
at Townsville on
12 October 1996**



Report No. 99



Australia
Department of Workplace Relations
and Small Business

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Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into the death of the Master of the
Danish flag vessel
ARKTIS GRACE
at Townsville on 12 October 1996

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Investigations into marine casualties occurring within the Commonwealth's jurisdiction are conducted under the provisions of the Navigation (Marine Casualty) Regulations, made pursuant to subsections 425 (1) (ea) and 425 (1AAA) of the *Navigation Act 1912*. The Regulations provide discretionary powers to the Inspector to investigate incidents as defined by the Regulations. Where an investigation is undertaken the Inspector must submit a report to the Secretary of the Department.

It is Departmental policy to publish such reports in full as an educational tool to increase awareness of the causes of marine incidents so as to improve safety at sea and enhance the protection of the marine environment.

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Summary

The small general cargo/container vessel, *Arktis Grace* arrived in the port of Townsville on 16 August 1996 after a voyage from Papua New Guinea. The voyage had been at reduced speed due to machinery problems. It had no cargo to discharge and remained in Townsville to complete repairs. On 12 October, 1996 the ship was still lying at no. 6 wharf in Townsville, awaiting spares for the main gearbox.

The 53-year-old Master was due to pay off from the ship on 15 October and to return to his home in Denmark for leave. On the evening of Saturday 12 October, he and his friend of long standing, the Chief Engineer, went ashore for a farewell dinner. They started the evening with drinks at an hotel near the docks, then went into town for dinner and finally to another hotel before returning on board *Arktis Grace* at about 2145 that evening.

The Chief Engineer boarded the ship first, while the Master paid the taxi driver. Shortly afterwards, the crew heard a loud crash and felt the ship shudder. The gangway was found tipped on its side and the Master was seen floating face down in the water between the ship's side and the wharf.

The Chief Engineer and a crew member jumped into the water in an attempt to save him. The Master was a big man weighing about 140 kg and, despite their efforts, he was later found to have drowned.

The incident was investigated by the Marine Incident Investigation Unit under the provisions of the Navigation (Marine Casualty) Regulations.

Sources of information

The officers and crew, *Arktis Grace*

Queensland Police Service

The Coroner, Townsville

Townsville Port Authority

Danish Maritime Authority

Federal Office of Road Safety

Acknowledgement

Photos courtesy of Queensland Police Service

Arktis Grace

Arktis Grace is a Danish flag general cargo/container vessel of 1829 gross tonnage, having its accommodation aft and two hatches. It has a length of 79.57 m, a beam of 13.25 m and a moulded depth of 6.4 m. It can carry 42 TEUs in the hold, 76 TEUs on deck and is fitted for 10 refrigerated containers. The vessel is equipped with two derricks, one of 25 and 40 tonne SWL at no. 1 hatch, the other of 25 and 32 tonne SWL at no. 2 hatch. The ship is strengthened for ice navigation.

The main engine is a 6 cylinder MAK of 749 kW driving, through a gearbox, a single screw and a 207 kVA shaft generator. The ship is classed with Lloyd's Register as a 100A1 UMS Ice class 1D vessel.

Arktis Grace was built in 1988 by North Sea Shipyard Ltd. at Ringkøbing, Denmark. It is owned and operated by Elite Shipping of Hellerup in Denmark.

As a general cargo/container vessel, *Arktis Grace* is employed mainly trading between the Papua New Guinean ports of Port Moresby and Lae, and Townsville in Queensland. At the time of the incident the ship had a crew of nine consisting of the Master, Chief Engineer, Chief Officer, cook, an oiler, two able seamen and two ordinary seamen.

The Master was a Danish national, the Chief Engineer was Icelandic and the Chief Officer and remainder of the crew were Filipinos.

Decks and access

Above the main deck at the aft end of the ship there is an "upper deck" upon which is situated the ship's superstructure. At the port of Townsville, the level



Gangway arrangement of Arktis Grace



Wharf

Space between the ship and the wharf, into which the Master fell.

above the waterline of this upper deck makes it the most suitable position from which to rig a gangway to the wharf and a break, with a hinged gate, is provided in the bulwark for this purpose, slightly forward of the access door to the accommodation.

The gangway, which belongs to the vessel, is constructed of aluminium alloy and is 7.3 m in length with a width of 0.63 m. (See diagram, page 10) It is fitted with five stanchions on each side with hand-ropes running through eyes at the top and at mid-height. The stanchions are 1.29 m high, measured from the underside of the gangway. The end of the gangway which connects to the ship is fitted with two hooks which rest over a steel bar fitted across the bottom of the break in the bulwark. The hooks do not encircle the bar, so the gangway is free to lift off vertically. The other end of the gangway is fitted with a roller which rests on the wharf. The two sides of the gangway are enclosed by a net which runs underneath it and which is secured to the top hand-ropes along three quarters of the length of the gangway. The end of the gangway on board the vessel is secured by leading the ends of the hand-ropes over the bulwark and tying them off to eyes on the deck and to a scupper pipe. (See photo next page)

The incident

On Saturday 12 October 1996, *Arktis Grace* was lying at no. 6 berth in Townsville where it had been since 16 August awaiting spare parts from Germany for the completion of repair work on its main propulsion gearbox. The gearbox had sustained damage during the voyage from Papua New Guinea to Townsville and the voyage had been completed at much reduced speed.

The Master had completed four months on the vessel and was due to fly home to Denmark on the following Tuesday, 15 October, for three months leave. He had worked for Elite Shipping for over ten years and had sailed with the Chief Engineer in *Arktis Grace* for a year and a half. The Chief Engineer had been with the company for four and a half years. They had become long-standing friends and decided to go ashore together for a farewell dinner in Townsville.

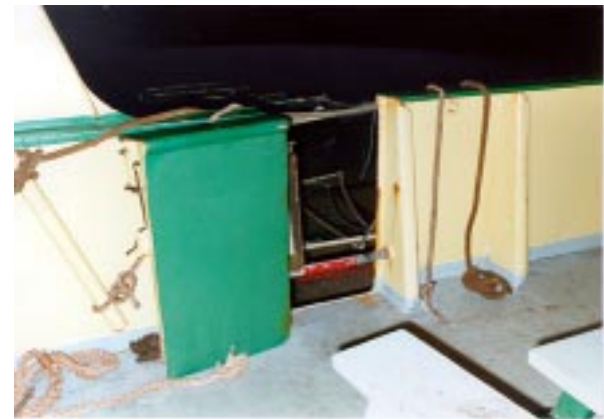
At about 1740 that evening, the Master and Chief Engineer left the ship and took a taxi to a local hotel, just outside the docks area, for a drink. Having spent about an hour at the hotel, they then took a taxi to a small restaurant near the city centre, arriving there at about 1900.

After dinner, the two men walked to another hotel, just a few doors down from the restaurant, for another drink or two, before getting a taxi back to *Arktis Grace* where they arrived very shortly after 2145.

The taxi delivered them right to the foot of the gangway and the Chief Engineer, anxious not to miss any more of a serial on television which he had been following, raced on board. The Master, meanwhile settled the fare with the taxi driver. Once on board, the Chief



Tipped gangway shortly after the incident



Gangway shortly after the incident

Showing slack handropes and the manner in which they were secured.

Engineer went into the officers' mess room and turned on the television.

In the crew's messroom three of the ship's crew were also watching television when they saw the Master and Chief Engineer arrive in the taxi. After about two minutes they heard a loud crash and felt a shudder through the ship. Looking through the scuttle¹ in the messroom, one of the ordinary seamen, who was the duty rating that evening, saw that the gangway was lying on its side. He asked the other crew members to help him get it back upright and they went out on deck. As they set about turning the gangway back up, they saw feet in the water under the wharf and, with their eyes beginning to adjust to the darkness, realised that it was the Master. In some panic, they started shouting that the captain had fallen overboard and yelled for help.

The Chief Engineer had been waiting for the Master for about three minutes when he heard the yelling and one of the ordinary seamen came into the mess and excitedly told him that "something had happened to the Master". He added that "the gangway was not good".

The Chief Engineer went out on deck to find the gangway tipped over and lying on its side. Knowing that the Master had been about to follow him on board, he looked down into the water, between the ship's side and the wharf, and saw the legs of the Master who was floating, face down, under the wharf. After taking off his trousers and shirt, he jumped in and turned the Master onto his back lifting his face above the surface. He shouted at the crew, who were gathering at the bulwark, to call for an ambulance.

The Master was a very large man, weighing about 140 kg, and the Chief Engineer had great difficulty keeping his head out of the water while he attempted to press on the Master's chest in the hope of expelling some of the water which had evidently entered his lungs. An ordinary seaman then jumped into the water and tried to assist the Chief Engineer in keeping the Master afloat. The Chief Engineer continued to shout at the crew to call an ambulance. The combined effect of the Master's bulk and the exertion of trying to keep his face out of the water while treading water themselves, resulted in their being unable to administer mouth-to-mouth resuscitation.

The Chief Officer, who had been sleeping and who had been awakened by the commotion, arrived on deck. Seeing the Chief Engineer and ordinary seaman supporting the unconscious Master in the water, he made for the ship's office from where he attempted to telephone for help but realised that he did not know what number to

¹Commonly referred to as a porthole

dial. No emergency telephone number was displayed at the telephone. At the suggestion of the ship's cook, he tried dialling 911; the emergency number used in the United States. After receiving a recorded message advising him that there was no such number, he went to the bridge and used the vessel's VHF radio on channel 16 to call the Port Authority and request an ambulance. The radio call for an ambulance was logged by the Townsville Port Authority as having been received at 2208.

Members of the crew set about lowering the vessel's pilot ladder. In response to shouts from the Chief Engineer for assistance from the crew, a lifebuoy was fetched from an emergency point on the wharf and thrown down by one of the seamen. This was placed under the Master's head. Also on instructions shouted by the Chief Engineer, still in the water and holding on to the ladder, other members of the crew made ready the crane which is fitted on the vessel for lowering the "man overboard" boat, while the cook and an able seaman fetched a Stokes litter² from the emergency point on the wharf.

After attaching ropes to the litter, it was lowered to the water. The Chief Engineer and the seaman in the water managed to manoeuvre the Master into the litter, but his weight was such that, even with all the hands available, the crew were unable to lift the litter from the water. After tying off the ropes at the bulwarks to support the litter and with the seaman in the water steadying the Master to prevent him falling out of the litter, they waited for the crane to be readied.

At 2210, the Port Authority patrol officer was carrying out a security check on one of the port buildings when he received a radio call from the Port Tower notifying him of the incident. He arrived at the vessel a few moments afterwards and asked the Chief Engineer about the condition of the Master. The Chief Engineer, still in the water, shouted to him to call an ambulance - urgently. On calling the Port Tower, he was told that the ambulance was already at one of the port gates and he was needed to guide it from the gate to berth no. 6.

The ambulance arrived at the vessel at 2215. The ambulance officer, with a resuscitator, climbed down the pilot ladder and examined the Master who was still lying in the water in the Stokes litter. It was soon ascertained that the Master was already dead and, at 2226, the Port Authority notified the Police of the death.

² Stretcher in the form of a metal basket used for evacuation of a casualty

The Port Authority officer, taking one of the crew with him, obtained a workboat from no. 4 berth which they manoeuvred to the position where the Master's body, in the litter, was being supported against the ship's side. With the help of other crew, they put the body in the workboat and took it to no. 4 berth from where, after being examined by police, it was later taken to the Townsville mortuary.

Comment and analysis

The Master

The Master, who was 53 years old, had been employed by Elite Shipping for approximately 12 years. He and the Chief Engineer had sailed together on *Arktis Grace* for a year and a half and had become good friends. He was well thought of and much liked by members of the Filipino crew and there was a friendly and co-operative atmosphere on board amongst the small ship's complement.

Alcohol

Evidence provided to the investigation indicates that the Master was, at least, a moderate drinker. He was observed having a drink with the Chief Engineer in the latter's cabin at mid-day and, from accounts provided by staff at the hotels and restaurant which he and the Chief Engineer had visited that evening, he had consumed a significant amount of alcohol whilst ashore before the dinner, during the meal and afterwards; approximately 12 to 14 standard³ drinks.

The Federal Office of Road Safety uses a formula for the rough estimation of blood alcohol level based on the number of standard drinks consumed, the time spent drinking, and body weight. It is:

$$\frac{(\text{No. of standard drinks} \times 10 - \text{Hours drinking} \times 7.5)}{\text{Wt. in kgs} \times K} = \text{Blood alcohol in gms/100mls of blood}$$

(K is a constant and is 6.8 for males,
5.5 for females)

The body's metabolism is usually capable of processing, for an average person, about 7.5 grams of alcohol per hour. The Master had been drinking, while ashore, over a period of four hours, hence his blood alcohol level when he returned on board could be expected to have been around 0.10 gms/100 mls of blood. At this level of blood alcohol it is expected that his sense of balance would be impaired to some degree.

³A Standard drink is defined as one containing 10 gms of alcohol, and equates approximately to one 60 ml glass of wine, one 30 ml nip of spirits or 285 mls (a middy) of beer.

Autopsy result

The post-mortem report stated that the Master had died from drowning. There were no indications of his having suffered a head injury during his fall from the gangway. In what appeared to contradict all the other evidence, including the Police report, an analysis of a blood sample, reportedly taken from his body and analysed by the Queensland State Analyst in Brisbane, indicated nil alcohol content.

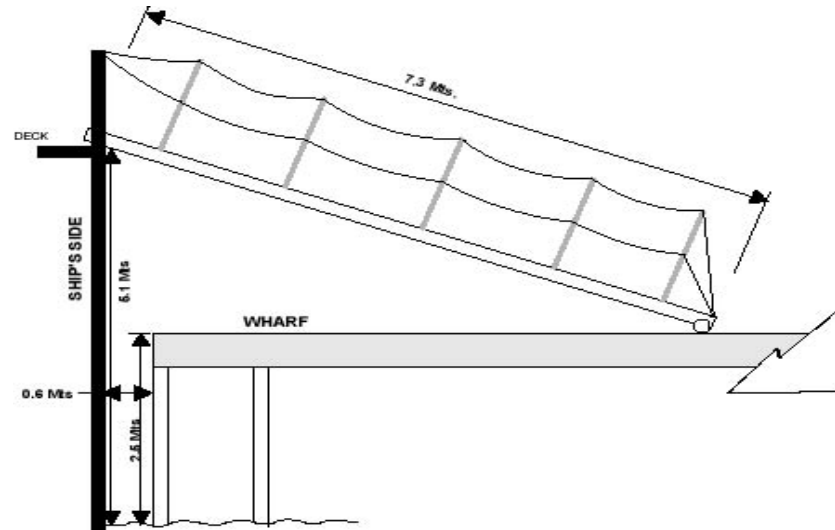
This result was queried by the Inspector with the Townsville Coroner. The query initiated an internal inquiry with the Forensic Biology Section of the Queensland Department of Health which, after conducting lengthy DNA testing, found that there was evidence that the blood sample upon which the reading of 0% alcohol was based, and for which the certificate was issued, had most likely been taken from a road accident victim who had died on the same day. The blood alcohol level of the other sample, supposedly taken from the road accident, victim was .291%.

In a letter from the Townsville Coroner, it was stated that it was likely that the certificate issued in the name of the road accident victim was, in fact, that relating to the Master of *Arktis Grace*, thus indicating that the actual blood alcohol level of the Master of *Arktis Grace*, at the time he died, was .291%

The gangway

A diagram showing the approximate geometry of the gangway, is shown on page 10. The dimensions given are as at 2145 on Saturday 12 October, when the Master and Chief Engineer returned on board. The state of the tide at that time was 2.7 metres above datum.

Arktis Grace had been alongside no. 6 berth, where the incident occurred, since its arrival at Townsville in



Dimension of gangway

Arktis Grace gangway at Townsville as at 21.45 on Saturday 12 October 1996

mid-August and had neither loaded nor discharged cargo. Between that date and the 12 October, the highest tide had been 3.8 metres above datum, on 28 August, and the lowest had been 0.1 metres, giving a maximum rise and fall of the tide of approximately 3.7 metres. From the configuration of the gangway at a tide of 2.7 metres (shown on page 10), it is evident that, at a tide of 0.1 metres, the deck of the vessel would be exactly level with the edge of the wharf and the gangway would be resting horizontally on the wharf.

At the highest tide of 3.8 metres, the gangway would have assumed an angle of 30° with the wharf. This change in angle of 30° would also apply to the stanchions which would move from vertical, at the lowest tide, to 30° from the vertical at the highest tide. This change in geometry would have an effect on the length of the hand-ropes on the gangway.

Hand-ropes

Assuming that the hand-ropes were quite taut at the highest tide and that no adjustments were made to take up the slack on succeeding lower tides, the difference in length, between the highest and lowest tides, of the upper hand-ropes amounts to some 0.64 metres. This dimension is the change in distance between the bulwark and the top of the first stanchion closest to it. This slack, however, would become distributed along the length of the gangway as the ropes were free to move through the eyes on the stanchions and, for this reason, it may not have been readily noticed by the deck watchkeepers.

Following on from the above estimations, the length of slack in the upper hand-ropes at a tide of 2.7 metres, such as existed at the time that the Master returned on board, would have been approximately 0.22 metres.

The above calculations take no account of any possible stretch in the ropes, but serve to illustrate the degree of slack that may have been produced by the tides while *Arktis Grace* was alongside in Townsville.

Tipping moment exerted on gangway

The Master weighed approximately 140 kg and was 193 cm in height. The centre of gravity of the human body is at approximately $2/3$ height, (depending on the position of the arms), or in this instance at about 127 cms. This is approximately 23 cms higher than the height of the top of the stanchions, which are 129 cms high if measured

from the underside of the gangway. The width of the gangway, where it rests on the ship and on the wharf, is only 63 cms. Once a vertical line, drawn through his centre of gravity, moved outside the edge of the gangway, his weight would exert an unstable or capsizing moment which would tend to tip the gangway over.

With a length of slack measuring 0.22 metres in the upper hand-ropes and the stanchions 1.6 metres apart, the upper hand-ropes could be displaced 0.42 metres to one side before again becoming taut. This distance would allow the centre of gravity of the Master to move well outside the edge of the gangway.

This simple analysis ignores any possible dynamic effect which would be induced by, for example, a lurch to one side. Such a dynamic effect, considering the weight of the Master, the height of his centre of gravity and the narrowness of the gangway, would greatly increase the tipping moment.

The call for assistance

The exact time at which the gangway tipped and the Master fell is not certain. However, from statements provided by those involved, it would have been between 2145 and 2150. The Port Authority logged the VHF radio call from the Chief Officer asking for an ambulance at 2208. There appears to have been an unexplained delay of a minimum of 18 minutes between the incident and the request for assistance. This delay is partly explained by the lack of knowledge on board of the emergency telephone number to be called and the absence of any sign displaying it near the telephone. The fact, however, that the Chief Engineer, in the water supporting the Master, had to call out several times to those on deck to call for an ambulance would indicate that there was a considerable delay before any attempt to make the call was initiated.

Watchkeepers duties

The ship had no standing orders relating to the duties of the deck watchkeepers, neither were there any written check lists. Instructions for the watchkeepers, when given, were verbal and very general in nature. It became apparent during the investigation that, although the deck watchkeepers were conscious of their responsibilities for checking and adjusting the vessel's six mooring lines, they were not conscious of similar responsibilities for the hand-ropes on the gangway and no evidence was found to suggest that these had been tended for a

considerable period of time, possibly since before the date of the tides mentioned previously.

Gangway requirements under Marine Orders

Foreign flag vessels in Australian waters and ports are subject to the requirements of the Navigation Act 1912, and hence to Marine Orders, made under that Act.

In Part 23, Section 8 of Marine Orders, under the heading “Means of access to ships in port”, at 8.2.1 it states:

A safe means of access must be:

(c) well secured to prevent accidental displacement...

and *(g) properly rigged and adjusted to allow for any changes in tidal levels and the ships trim and freeboard.*

It is evident that on the evening of 12 October 1996, the gangway leading on board *Arktis Grace* was not sufficiently secured to prevent accidental displacement as required under (c) above.

In addition, evidence received during the investigation indicates that insufficient attention was paid to adjusting the gangway hand-ropes to allow for changes in tidal levels, as required under (g) above.

Safety net

The gangway had a safety net rigged as shown in the photograph on page 4. This net, passing underneath and up the sides of the gangway, enclosed the spaces between and under the hand-ropes and as such would prevent a person from falling through the ropes. It does not, however, offer any protection for a person, as in this instance, falling *off* the gangway, for example, *over* the hand-ropes - a more likely occurrence if they were slack.

At Marine Orders Part 23, 8.2.4, there is a requirement relating to safety nets where it states:

Adequate precautions must be taken to protect persons from injury by falling from an accommodation ladder or a gangway

(a) by use of screens or netting properly secured to prevent a person falling through the sides...

This requirement was met by the net rigged on the gangway of *Arktis Grace*. It did not, however, offer protection from injury to the Master who fell *off* the gangway as indicated above.

For many years it was customary on vessels, where it was a practical proposition as the gap between the wharf and the ship's side was not large, to rig a cargo net suspended underneath the gangway for just such a purpose. Had such a net been rigged in this instance, it is likely the Master would have been caught by it. There is a requirement for such a net in Marine Orders only in the case of a suspended accommodation ladder resting against the ship's side, where one is required under the lower end. (Part 23, 8.2.4 (b))

Danish Regulations relating to gangways state only the following:

A: A ship above 500 GT is to be fitted with an accommodation ladder with adjustable steps. The accommodation ladder is to be useable at angles between 0-55°.

or

B: A gangway useable at angles between 0-35° plus an accommodation ladder with fixed steps useable at angles between 20-50°. Net under gangway/accommodation ladder to be used where required.

Port Authority regulations

On the date that *Arktis Grace* arrived in Townsville, applicable regulations relating to gangways were contained in the Townsville Port Authority By-laws of 1988.

In these By-laws, under the heading "Gangway and Safety Net" it stated:

5.25(a) At times when any vessel is moored to a wharf the Master shall provide a safe and sufficient gangway or gangways with proper handrails and so placed as to enable persons to safely come from and go on board such vessel. And at

5.25(c) The Master shall cause to be provided beneath every such gangway a sufficient safety net so placed as to prevent any persons from falling into the water from that gangway.

These By-laws however, although current when *Arktis Grace* arrived in Townsville, were superseded by a new

“Port Operations Manual” on 8 October 1996, just four days before the death of the Master. The new manual contained no reference to either gangways or safety nets. Nevertheless, the By-laws were applicable for the seven weeks that the ship was in Townsville before the incident, and although a safety net was provided which met the requirements of Marine Orders, that same net clearly did not meet the requirement of 5.25(c) in those By-laws. Such a net, if in position during the seven preceding weeks, would undoubtedly have still been in place on 12 October when the Master died.

Subsequent action

Townsville Port Authority now provides a laminated list of emergency and other “helpful” telephone numbers, which is placed on board with the Authority’s ship telephones.

A Port of Townsville Information Booklet and local telephone directory are also placed on board ships.

The requirement for a safety net on gangways has now been included in the replacement Port Operations Manual, issued by the Townsville Port Authority.

Conclusions

These conclusions identify the different factors which contributed to the circumstances and causes of the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

It is concluded that:

1. The Master of *Arktis Grace* died by drowning, after falling from the vessel's gangway into the gap between the ship's side and the wharf.
2. The hand-ropes of the gangway were sufficiently slack to allow the Master's centre of gravity to move outside the edge of the narrow gangway and for his weight to tip it over.
3. The hand-ropes had not been tended and tensioned regularly by the deck watch as the vessel rose and fell with the tides.
4. The Chief Engineer and the ordinary seaman in the water did all they could to try to save the Master.
5. There was an excessive delay before an ambulance was called, explained in part by the fact that none of those on board knew the emergency number to call, and the number was not displayed in a prominent position adjacent to the telephone.
6. The Inspector considers that the consumption of alcohol in the hours preceding his death, which led to an apparent blood alcohol level of .291%, was a significant factor in the impairment of the Master's sense of balance on the gangway.
7. Had a safety net been rigged underneath the gangway, as required by the Port of Townsville By-laws during the weeks immediately preceding the incident, it may have prevented the Master from falling into the water.

Details of Arktis Grace

IMO No.	8619015
Flag	Denmark
Classification Society	Lloyd's Register
Ship Type	General cargo/container
Builder	North Sea Shipyard Ltd, Ringkøbing, Denmark
Year Built	1988
Owner	Elite Shipping of Hellerup - Denmark
Operator	Elite Shipping of Hellerup - Denmark
Gross tonnage	1829
Length overall	79.57 m
Beam	13.25 m
Depth (moulded)	6.4 m
Engine	MAK, 6 cylinder
Engine power	749 kW
Service speed	11.5 knots
Crew	9 Master, Danish Chief Engineer, Icelandic Others, Filipinos