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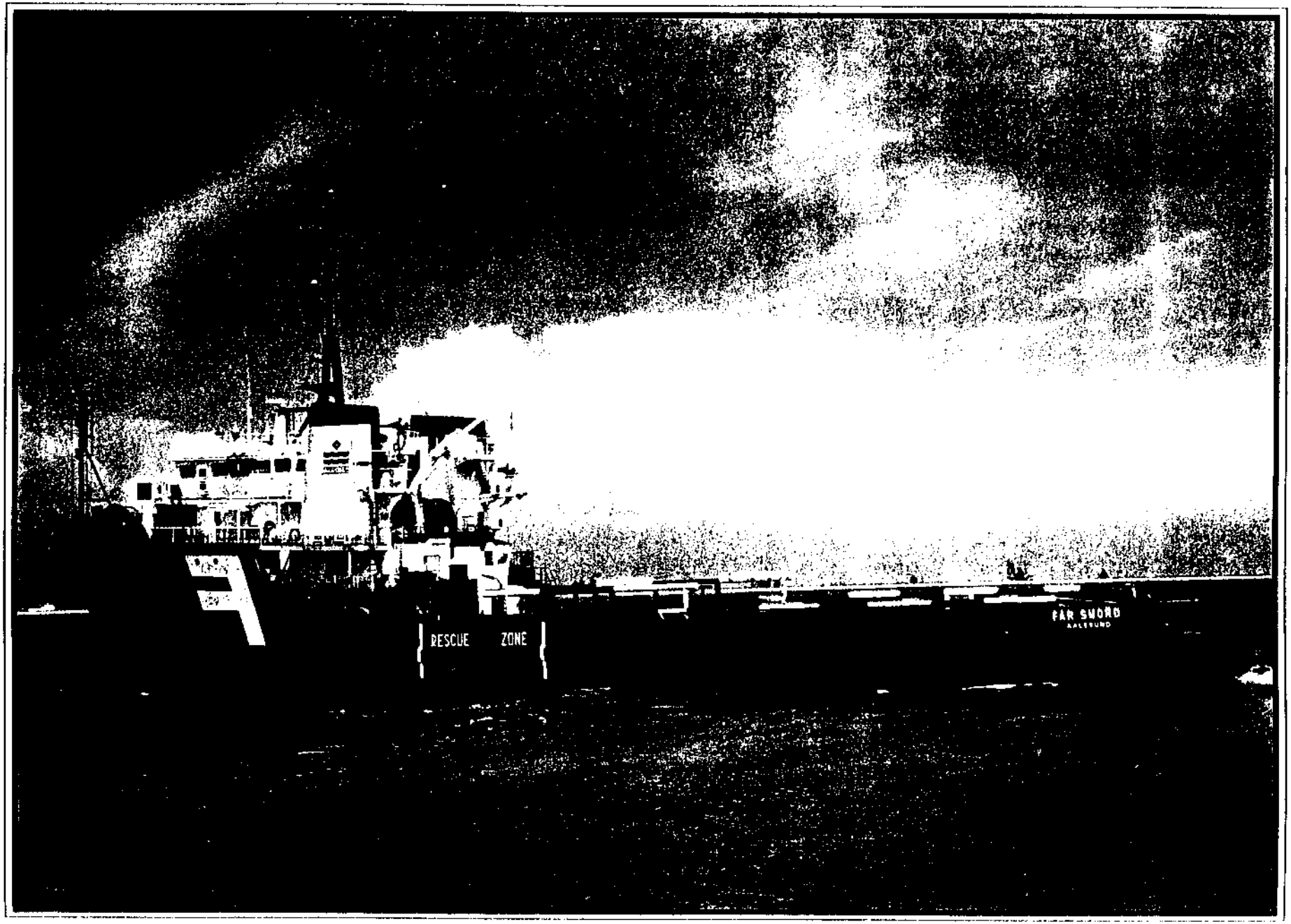


Far Sword

Summary

In January 1995, the offshore supply vessel Far Sword, along with the offshore supply vessel Lady Audrey, was engaged in support of the United States drilling vessel Glomar Robert F Bauer, operating in the North Gorgon field on the Northwest Shelf, in 720 m water depth, 43 nautical miles (80 km) north-west of Barrow Island.

During the evening of 23 January, operations commenced on recovering the Glomar Robert F Bauer's anchors, preparatory to a move to a new drilling location, Altair No.1, in the Medusa field, 54 nautical miles (100 km) west of Barrow Island.

Glomar Robert F Bauer uses an anchor buoy system, the anchor recovery operation requiring each anchor buoy to be taken on board one of the supply vessels and the anchor hauled from the sea bed using the buoy pennant wire.

On the morning of 24 January, while the three-man deck party of Far Sword was positioning an anchor buoy for securing on the aft deck, a sea broke over the stern and swept them up the deck. One of the seamen needed to be transferred to the Karratha hospital, where it was confirmed that he had a number of fractured ribs and a punctured right lung.

Information Sources

The Master, additional Master and watch ABs of Far Sword

The Master of Glomar Robert F Bauer

Narrative

Far Sword

Far Sword is a 1275 gross tonnage tug/ supply ship with deck cargo, anchor handling and fire fighting capability and is also an approved 'stand by rescue' vessel. Built as the Highland Light by Appledore Shipbuilders Ltd, UK in 1982, the vessel was acquired by Sverre Farstad & Co. A/S of Norway in 1988 and renamed Far Sword. It was chartered to Australian Offshore Services in 1993. After a period of operations in the Bass Strait with an Australian crew, the vessel was transferred to Asian operations and handed over to a Philippines crew. In August 1994, the vessel was assigned to Northwest Shelf operations and was picked up by another Australian crew in Singapore.

The vessel is of standard offshore supply vessel configuration with an overall length of 69.32 m and a maximum breadth of 15.96 m; it is powered by four 12 cylinder B&W diesel engines providing 9489 kW, driving two controllable pitch propellers. It has two Becker Split rudders and is also fitted with two controllable pitch thrusters forward and one aft. The bridge is equipped with two control stations, one forward and one aft, the after one being used during cargo transfer operations and anchor handling work.

The working deck extends 38 m aft of the deck housing and is 13 m wide between the safety barriers. The safety barriers are of solid steel plate construction surmounted by a 300 mm diameter pipe and, apart from at the ends, have only one break, located at mid length. The forward half of each barrier is further surmounted by a cargo rail, also of 300 mm pipe construction, supported by vertical 300 mm diameter pillars.

The vessel is equipped with two towing pins, hydraulically raised cylinders stowed flush with the deck, located just forward of the stern roller, one on each side of the centre line. They are raised so as to keep wires centrally located over the stern roller. Forward of the towing pins are two hydraulically raised Karmoy stoppers, vertical steel bars with 'U' top fittings of sufficient size to accommodate the large diameter working wires and chain links, they are referred to as 'Karm forks'.

The vessel is also equipped with a towing winch, two working winches, two spooling drums and two tugger winches, located across the after end of the accommodation housing. They are all controlled from a cab situated at the after end of the accommodation housing at the first deck level and to starboard of the main winches.

Far Sword is operated by two crews, working a five-week swing system. Normal complement is nine, comprising master, mate, chief and second engineers and five ratings—four ABs and a greaser. As there is no dedicated cook, the four ABs agree on a roster for manning the galley, usually a spell of nine days each, during which period they do not normally work on deck.

The master and mate, and the two engineers, work a two watch, six on, six off, routine, while the ABs work a

three watch system. Where two men are required on deck for cargo operations, between 0600 and 1800 the greaser, normally on day work, will work on deck, and between 1800 and 0600 the off-watch ABs are on call for two hours either side of their watch. For anchor handling operations, the three ABs and the greaser change to a two watch, six on six off, routine.

For anchor handling operations, as customary throughout the industry, an additional master and chief engineer are appointed to the vessel, to prevent the officers having to work unduly excessive hours.

Glomar Robert F Bauer

Glomar Robert F Bauer (the 'Bauer') is a United States registered drill ship built in 1983, with an overall length of 135 m, a beam of 23 m and a load displacement of 16256 tonnes. The vessel was designed for mobility, with a cruising speed of 12.5 knots, and is capable of drilling in water depths of up to 2,500 feet* (758 m), drilling to a maximum depth of 25,000 feet (7,584 m).

The drill tower is located at the vessel's mid length and there are two flare booms, located one on each side of the vessel, approximately 5 m forward of the drill tower. The vessel is equipped with four totally enclosed lifeboats, housed on gravity type davits, two forward and two aft, the forward ones being located immediately aft of the raised forecastle and bridge structure.

When on location, the Bauer is moored to a pattern of eight anchors, at approximately 1400 m radius, which are positioned and retrieved by the two attendant offshore supply vessels. Because of the great depth of water, a combination of cable and wire is used, 1800 feet (548.6 m) of cable attached to the anchor and the remainder wire, the join between cable and wire being known as the 'transition'. Each anchor is marked by a large, cylindrical steel buoy, measuring approximately 3.3 m x 2.5 m diameter, fitted with a steel 'T' piece, or 'crucifix' on top, and with a short chain 'pigtail', for ease of connection to wire pennants, on the underside. The buoy is attached to the anchor by a 60 mm diameter wire pennant, made up of 1000 feet (305 m) and 500 feet (152.5 m) lengths joined together. During operations in January 1995, each anchor buoy was attached to its anchor by 3500 feet (1067 m) of wire pennant.

Operational procedures

For cargo transfer operations, the Bauer has two Yokohama fenders, which are positioned over the side. The supply vessels do not normally make fast, but maintain position using the engines and thrusters, particularly if they are the designated 'stand by rescue' vessel, when regulations require that they be able to move off instantly. Deck cargo is lifted from, and loaded onto, the supply vessels by the Bauer's cranes.

For anchor retrieval operations, each anchor buoy has to be 'caught' by one of the attendant supply vessels. This requires the supply vessel crew, standing right at the stern, to lasso the buoy by throwing a light line right over the top of it. Using one of the tugger wires, chain retrieval gear is hauled around the buoy, holding it in the

* Glomar Robert F Bauer uses imperial measurements for depths and distances etc.

bight, and the two ends of the chain are shackled to the work wire. The buoy is then hauled over the stern roller and up the deck until the buoy pennant is in position to be secured by the Karm fork. The buoy is then chocked to prevent movement, the work wire slackened down and the retrieval gear removed. The tugger wire, led around appropriate dollies (deck leads) is then attached to the crucifix on top of the buoy, usually by means of a strop, after which the chain pigtail of the buoy is disconnected from the wire pennant. The buoy is then hauled up the deck and secured in position, to one side against the safety barrier.

The buoy pennant is then attached to the work wire, the weight taken on the winch and the Karm fork lowered. The anchor is then raised from the sea bed by hauling on the pennant, after which the Bauer heaves in on the anchor wire and cable. Once the Bauer has retrieved all the anchor wire and reached the transition, the supply vessel hauls in the rest of the pennant wire, raising the anchor to just below the stern roller. When the Bauer has retrieved all the anchor cable and housed the anchor, the buoy pennant is unspooled from the work drums and taken aboard the Bauer. Due to the lack of deck storage space on board the Bauer, the anchor buoys are stowed on board the supply vessels during rig location moves.

Operations January 1995

In January 1995, the Bauer was operating in the North Gorgon field under contract to the West Australian Petroleum Pty Ltd, drilling Chryszor No.1 in 720 m of water and attended by Far Sword and Lady Audrey, operating from the shore base at Point Murat, Exmouth.

As the water depth was too great for anchoring, the two supply vessels, when not running stores and equipment between Exmouth and the Bauer, cruised at slow speed in the vicinity of the drilling vessel. The two supply vessels alternated as stand by rescue boat, for which they took on board a special container of safety equipment and cruised within the anchor pattern.

The regular crew change aboard Far Sword took place in Exmouth on 3 January, the ratings of the original Singapore pick up crew rejoining for their third swing. The Master was joining the vessel for the first time, having previously been in command of Far Supplier. A cargo of water, fuel, bulk cement, equipment and provisions was loaded and the vessel proceeded to the drilling location.

During the next three weeks, Far Sword carried out two further cargo runs to and from the base at Exmouth, and alternated as stand by rescue boat with Lady Audrey. The drilling operation at Chryszor No.1 was completed and the Bauer retrieved the drill prior to relocation to the Altair No.1, 43 miles (80 km) to the south-west.

To assist with the anchor handling operations of the relocation, an additional master and chief engineer joined Far Sword at 1110 on 22 January, flying out to the Bauer by helicopter from Barrow Island. At this time Far Sword was alongside the Bauer, transferring cargo.

That afternoon, an operations meeting, to discuss the pending relocation and involving the Masters of the three vessels, was held aboard the Bauer. After this, Far Sword moved clear of the Bauer and spent the evening cruising. Throughout the day, the wind had been from the south-west at 10 knots and the sea slight with a low (1.5 m) south-westerly swell.

Early on the following morning (23rd) the Mate, the officer on watch, took the Far Sword back alongside the Bauer, which had requested further cargo operations. Riding head to wind, Far Sword was starboard side to the port side of the Bauer, the Mate using the forward and aft thrusters at 40 per cent pitch to keep the vessel against the Yokohama fenders.

The additional Master took over the watch at 0400 and, although there was an increase in the wind, he found that he did not have to adjust the thruster controls to maintain position alongside. However, at about 0500, a train of larger waves passed through, causing the stern to swing towards the Bauer, necessitating an increase in thrust aft. This resulted in Far Sword moving bodily away from the Bauer, but the additional Master controlled this and manoeuvred the vessel back into position.

At about 0510, an even larger train of waves passed through, this time causing the bow to swing towards the Bauer and the vessel to roll heavily. The starboard bridgewing came into contact with the grating platform at the base of the Bauer's flare boom and the starboard bow came into contact with the channel track of the Bauer's forward lifeboat aft gravity davit. The latter caused two vertical splits in Far Sword's shell plating, in way of the aft porthole of the Mate's cabin.

Shortly after this incident, although the wave height was generally around 2 m, a number of larger waves were seen to pass along the Bauer's side. Measured against the Bauer's draught marks, these were around 16 feet (4.9 m) in height, but were considered to be not as large as the sea that had caused the vessel to roll heavily.

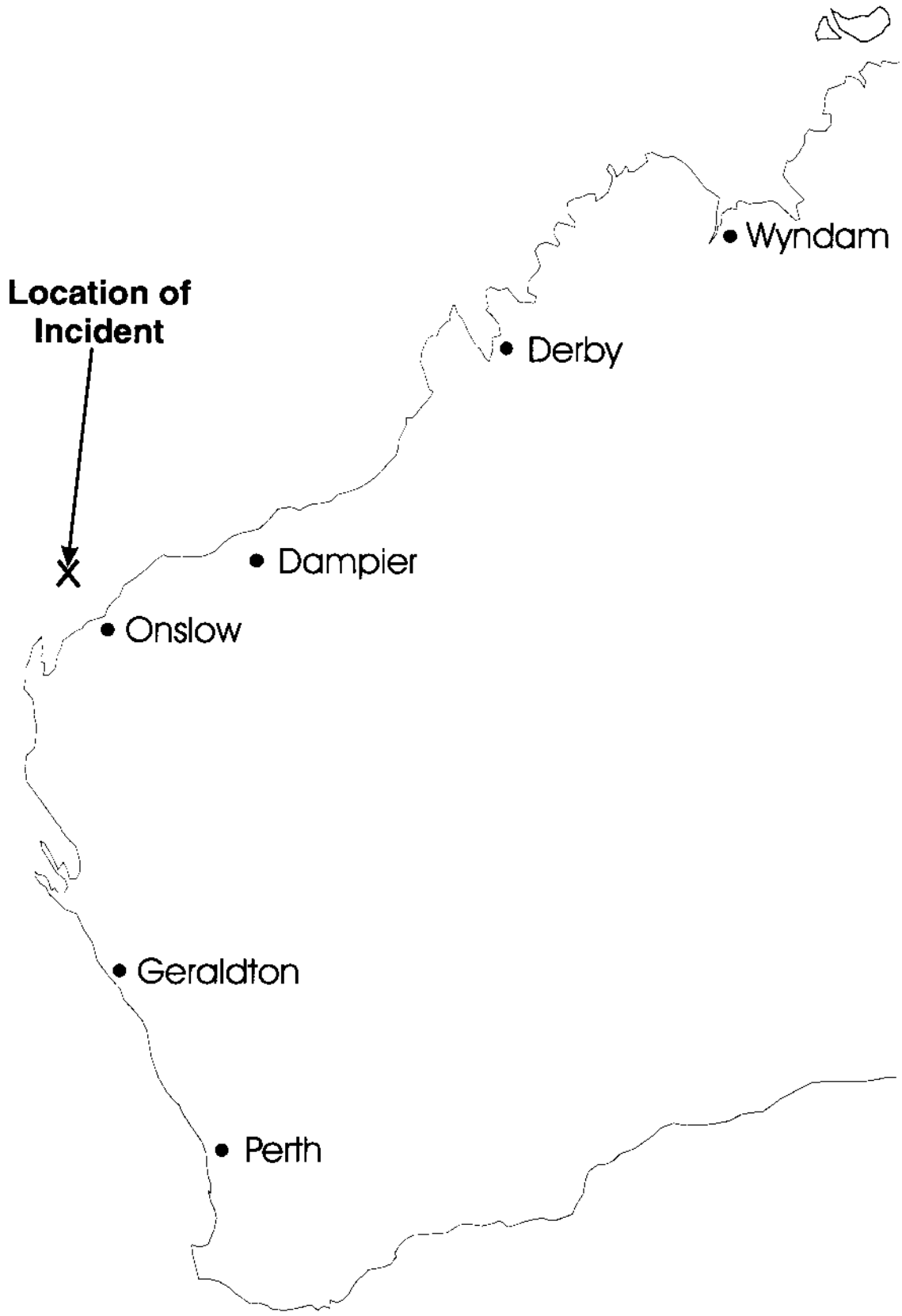
The Master took over the watch and moved Far Sword clear of the Bauer, so that the damage could be fully assessed. While the additional Master supervised temporary repairs, the Master took the vessel back alongside the Bauer to resume the cargo transfer.

At noon, the ratings changed from a three watch to a two watch system, whereby each two-man deck party worked six hours on and six hours off.

Cargo operations were completed at 1740, after which the Master of the Bauer instructed the Masters of the two supply vessels to immediately prepare for recovering anchors.

The incident

As soon as the cargo operation was finished, the Master manoeuvred Far Sword clear of the Bauer and called all the vessel's company to the bridge for a 'toolbox' (safety) meeting to discuss the operation. The Master had not conducted a rig move with this particular crew and he was aware that, for some of them at least, their experience was limited, and the first buoys would be recovered at night. As well as distributing job safety analysis


Location of Incident
Wyndam
Derby
Dampier
Onslow
Geraldton
Perth

sheets covering the various operational procedures, he advised everyone to do things slowly and safely.

The Mate and the duty ratings (an AB and the Greaser) then went about preparing the deck for buoy catching and anchor handling, and the Master adjusted ballast to trim the vessel slightly by the head, so as to increase the freeboard at the stern roller. The wind at that time (1800) was recorded as being from the south-west at 15 to 20 knots, the sea from the south-west at 0.5 m and the swell from the south-west at 1.5 m to 2 m.

As soon as all was ready, the Master, with the additional Master observing, manoeuvred Far Sword up to the first buoy, no.3, manoeuvring stern first up into the wind. Sunset was at 1915 and the aft deck illumination, six floodlights and two searchlights, attached to the fire fighting monitor platforms immediately abaft the twin funnels, were switched on.

All those working on deck were wearing Company issue boiler suits, safety helmets and boots, leather working gloves and, while lassoing the buoys, flotation vests.

As the ratings experienced difficulty in lassoing the buoy, the additonal Master went aft and took over from the Greaser at one end of the lasso line and the buoy was caught at 2045. No further difficulties were experienced; the buoy was hauled on board at 2100, and by 2150 had been secured right forward on the starboard side and the work wire shackled to the buoy pennant wire. Heaving on the buoy pennant wire, to lift the anchor off the bottom, commenced at 2205, at which time the additional Master went to bed. At 2250, 1000 feet (305 m) of buoy pennant had been spooled on the work drum and the Bauer started to heave in on the no.3 anchor.

At midnight, the AB and Greaser were relieved by the two ABs of the next watch, and the Second Engineer took over at the winch controls. The wind at this time was recorded as being from the south-west at 20 to 25 knots, the sea from the south-west at one metre and the swell also from the south-west at two to three metres. At 0035 on 24 January, the Bauer had retrieved all the wire of no.3 anchor and commenced heaving on the anchor cable, the Far Sword hauling in on the buoy pennant until the anchor was hanging off the stern. The additional Master relieved the Mate on deck at about 0100 and at 0115, the retrieval of no.3 anchor was completed, with the buoy pennant being passed from Far Sword to the Bauer. Far Sword then received some equipment from the Bauer, before proceeding to no.2 anchor buoy.

While no.3 anchor buoy pennant was being hauled in, a small amount of water slopped up over the stern roller, but it was nothing to cause concern.

While Far Sword was backing up to no.2 buoy, into the wind and sea, quite a lot of water was shipped over the stern, coming aboard at about knee height and causing all three men on deck to lose their footing causing at one time or another. The Master held the vessel close up to the buoy but, because of the sea and swell, the buoy was rising and falling from well above the stern roller to well below and the ratings had great difficulty lassoing it.

Eventually, after discussion with the Master and the Bauer, those on deck decided to just lasso the crucifix on top of the buoy, and this was achieved, quite quickly, at 0230.

Because water was being shipped over the stern, the Master asked those on deck if they considered it safe to continue and, after discussion, they agreed that it was. However, at one stage, one of the ABs, the older of the two on deck, expressed fear and the view that he should not be there, but the additional Master did his best to reassure him.

Once the buoy was caught, everything progressed smoothly, the buoy being hauled on board at 0245. The retrieval gear was removed and the port tugger wire secured to the crucifix after being passed around the dolly lead at mid length on the port side, across the deck and around the after pillar of the cargo rail. The buoy chain pigtail was then disconnected from the pennant and the buoy hauled up the deck, However, before it was in its intended stowage position, the buoy came up against the tugger wire leading across the deck. The additional Master quickly discussed with the two ABs what needed to be done, then a rope was used to lash the buoy crucifix to the port cargo rail, after which the additional Master signalled to the Second Engineer to slacken back on the tugger wire. He then instructed the younger of the two ABs to lift the wire from the dolly lead and to pass it around the dolly lead further up the deck.

At this time, about 0330, the Master observed a series of large waves coming up astern and called a warning over the loud hailer system to those on deck, all of whom heard it.

The additional Master, concerned about the lightly secured buoy, instructed the younger AB to replace the tugger wire over the original dolly lead and signalled the Second Engineer to take up the slack on the wire. Before he could see whether his instructions were being followed, his feet were swept from under him, causing him to fall backwards. He was swept up the deck, completely submerged, and fetched up against the 'J'* hook, stowed right forward against the port safety barrier. Getting to his feet, he noted a number of items sloshing around in the water, which was about 45 cm deep.

The younger AB, on hearing the warning, looked over his shoulder and saw a 'wall of water', about twice his own height, at the stern. He dropped the tugger wire, wrapped his arms around the horizontal 300 mm pipe immediately above the dolly lead and held on to a wire and a small pipe on the outboard side of the pipe. The water that came up the deck swept his legs from under him, caused him to lose his grip, and he was swept through the gap in the safety barrier. After the water had subsided, he waited a few seconds before moving back, apparently none the worse for the experience, onto the work deck, where the water, about 15 cm deep, was still swirling around.

The older AB had moved to the centre line and, facing aft, had picked up the slackened tugger wire with both hands, to carry it along the deck. On hearing

* A large steel hook used for recovering anchors when anchor buoys have broken adrift.

the Master's warning, he looked up and and saw a 'wall of water 4 m – 5 m high'. Realising there was nowhere for him to go, he braced himself and hung onto the tugger wire, hoping that it would go taut. The water coming up the deck knocked him backwards and, still clutching the tugger wire to his chest, he was 'bounced' up the deck, submerged on his back. Although it had a chin strap, his safety helmet was swept off and he was concerned about hitting his head against the bulkhead or some other obstruction, but came to a stop about 2 m from the bulkhead. As his head cleared the water he took a deep gulp of air and felt a sharp stabbing pain in his back.

The additional Master called out to the two ABs and received an affirmative response from the younger one. He then moved across to the older AB, who appeared to be slow in getting to his feet, and realised that something was wrong. The AB said that he was in pain, had hurt his back, would be all right, but needed to sit down. The additional Master helped the AB into the winchroom and then signalled to the Master to call the Mate. He and the younger AB then set about securing the buoy in the correct place.

After discussion between the Master, the additional Master and the younger AB, it was decided, as no more heavy waves had broken over the stern and conditions appeared to have eased, to continue with the operation, and the work wire was connected up to the buoy pennant. However, after discussion with the Bauer, and because of concerns for the injured AB, it was decided to abort the retrieval of no.2 anchor. The buoy was reconnected to the pennant and slipped overboard, this being accomplished by 0550.

After having been helped to his cabin, the older AB had showered and then gone to the messroom, where he set the tables for breakfast and did some peggying*. However, the pain in his back continued and he started to get pains in the front of his chest. The Master and additional Master considered that he must have broken some ribs and asked for assistance from the Bauer. At 0900, the sea conditions had eased sufficiently for the Medical Orderly aboard the Bauer to be transferred to Far Sword and he agreed that the AB had most probably broken some ribs.

The AB was lifted off Far Sword at 0950 and then evacuated from the Bauer by helicopter and taken to Barrow Island, where he was put aboard the scheduled flight to Karratha. Examination at Karratha hospital revealed that, in addition to broken ribs, he had a punctured lung.

After completing his watch, the younger AB found that he had bruising on his right elbow and knee. In fetching up against the 'J' hook, the additional Master had received a 100 mm gash along his right shin, severe bruising to his right thigh and lower right leg, and bruising to his left thigh.

Conditions at the Bauer continued to improve throughout the late morning of 24 January and anchor retrieval resumed at 1330.

* General cleaning of accommodation.

Comment and Analysis

The AB was injured as a result of being knocked over and swept up the deck by a wave breaking over the stern while he was engaged in work associated with anchor retrieval for the drilling vessel. Although the primary cause of the accident was the wave breaking over the stern, there are a number of other issues that need to be considered, including procedures and experience of personnel.

Sea condition

At the start of the anchor retrieval operation, the sea state was moderate and caused no one to have reservations about starting. Although there had been a gradual increase in both wind and sea conditions by the time retrieval of no.2 buoy was commenced, they had not become what is termed 'marginal' until no.2 buoy was on deck.

Both the Master and the additional Master referred to an abnormal wave, and the two ABs on deck described the wave as towering about 4 m above the stern roller. The Master described a series of larger waves, which would have caused Far Sword to pitch more heavily and, with the stern in the trough, the sea would have towered above those on the aft deck. However, the stern would have started to rise to the wave before it actually broke over the stern. The Master and the Second Engineer estimated the depth as about two feet (61cm) at the stern roller, but the younger AB considered he was struck at hip height (about 90cm).

Far Sword had experienced a similar series of larger waves the night before, when contact with the Bauer resulted in damage to the hull plating on the starboard bow.

Although the Altair No.1 location was about 43 miles (80 km) to the south-west of the Chryszor No.1 location, the general sea conditions would not be too dissimilar, both being at the edge of the continental shelf. On 29/30 January 1995, the wave period in the area of Altair No.1 was between four and six seconds. On 30 January 1995, a long residual Indian Ocean Swell, varying in length from four wave crests to 10 wave crests, or between about 200 m and 500 m, was evident from the air. Such a swell, not readily noticable at sea level, would account for the occasional and irregular larger waves observed by those on Far Sword. It is also apparent that a wind increase, with a resulting wave height increase, in the early hours of the morning, is a relatively common occurrence in that area.

Anchor retrieval aboard Lady Audrey had commenced at 0015 on 24 January, at which time the wind was recorded as being south-west at 15 knots, the sea at 1 m and the swell at 2 m, occasionally 3 m. Whilst the first anchor was being retrieved, waves broke over the stern on two occasions. That anchor retrieval was completed at 0400, at which time the wind was recorded as being south–west at 20 – 25 knots, the sea at 1.5 m and the swell 3 – 4 m. The Master advised the Bauer at this time that he was suspending operations until conditions improved. The heavy swell was still running at daylight.

It is considered that on the morning of 24 January 1995, although the sea state had increased, Far Sword was caught by a particularly large wave, or sequence of waves. However, it is to be noted that such waves should be expected in that area, particularly with wind speeds in excess of 20 knots, and this should be borne in mind when contemplating conducting anchor handling operations at night.

Night time visibility

Although the illumination of the working deck aboard Far Sword is good, the Master also used the two searchlights to supplement the floodlights. The Master stated that he was able to see through the glare of the lights and was able to keep a watchful eye for larger waves coming up astern. However, his range of visibility was probably limited to no more than 50 m.

Both the Master and the Second Engineer thought that the warning to those on deck was given about 20 seconds before the wave broke over the stern. None of those on deck would have been more than 10 m from the mid-length breaks in the safety barriers and 20 seconds should have been ample time for them to move to safety. However, from the statements of the two ABs who were on deck, it is apparent that when they looked up on hearing the warning, the stern of Far Sword was already falling into the trough preceding the large wave.

The wave period was probably around six seconds, providing a wave speed of 9 m/sec and a wave length of 54 m, about the range of the Master's visibility astern. The water would have struck those on deck only two seconds after the wave broke over the stern, probably less than eight seconds in all after the warning was given. Certainly the older of the two ABs, caught near the centre line, felt that he had no time to move to safety and the younger one instinctively threw his arms around the barrier top, rather than moving through the gap in the port safety barrier, less than one metre forward of him. Also, the additional Master had time only to issue directions for trying to secure the buoy before he was washed off his feet.

The limited visibility at night, resulting in a greatly reduced time for warning of the approach of larger waves, should be borne in mind when judging marginal conditions during anchor handling operations.

Crew experience

Only one of the five ratings on board Far Sword on 24 January 1995 had been employed aboard offshore industry vessels for a number of years, on a regular basis. As the only rating who could be considered to be experienced in offshore industry operations, at the time of the anchor handling operations he was on roster in the galley.

Because of the ratings' lack of experience in, and unfamiliarity with, the type of work, the various activities all took longer than would normally be expected, thus increasing their exposure time on the open deck. This unfamiliarity also resulted in the older of the two ABs preparing to carry the tugger wire aft, instead of forward as required, which in turn resulted in him being knocked onto his back, with the tugger wire on top of him, pinning him down.

The injured AB, although in his early 50s, was well built and in good physical condition. In the past he had, on occasion, worked as a rigger on high-rise building sites, without fear. However, he admitted to being frightened while lassoing and picking up no.2 anchor buoy. While his fear is quite understandable, it does raise the question, when considered along with his limited experience on offshore supply vessels, of his suitability for appointment to Far Sword.

All ratings for Australian vessels are drawn from a single roster. Where a new crew is required for an offshore vessel, the majority, or even all, of those appointed may not have served on an offshore vessel for a considerable time, if at all. Inexperience and unfamiliarity with specialised operational procedures having particular hazards significantly increases the chances of accidents occuring, and conflicts with safety principles.

Operational planning

The offshore oil industry operates on a '24 working hours a day' basis and the only normally accepted reason to interrupt operations is adverse weather. Thus, when cargo transfer operations were completed, late in the afternoon of 23 January, the supply vessel Masters were instructed to prepare to start retrieving anchors for the rig move. This resulted in the relatively inexperienced ratings aboard Far Sword working the first two anchors during the hours of darkness.

The Master of Far Sword, aware of the inexperience of the majority of the ratings, had intended to spend time on 23 January going through all the operational procedures with the crew, explaining all that had to be done. However, the need to carry out temporary repairs to the bow plating, coupled with the continuing cargo transfer operations, resulted in time not being available. The only discussion that took place was during a fifteen minute toolbox meeting, held on the bridge immediately before the crew turned-to to prepare the necessary equipment.

The tugger wire was not led around the appropriate leads for correctly positioning no.2 buoy on the starboard side of the deck. As a result of the need to reposition the tugger wire, the deck squad exposure time was extended and the AB was caught in the middle of the deck, near the centre line. Full pre-planning of the operation should have ensured the use of the appropriate leads.

Safety barrier design

The solid plate design of the Far Sword safety barriers, together with their height, means that crew members working on the aft deck are very restricted in their ability to move to safety when a wave breaks over the stern. With virtually nowhere to go, the natural instinct to climb up on to the safety barrier rail is replaced by one to grab hold of the closest object and to hang on. This is neither an effective, nor a desirable situation.

Rig anchor equipment

The advancement of drilling technology has enabled drilling to take

place in deeper water than was previously possible. Amongst the techniques developed was the chaser system for anchor recovery. The chaser system obviated the need for anchor buoys and long, heavy pennants, except in areas where the nature of the seabed made the use of piggyback* anchors necessary. While the chaser system made anchor handling work possible in rougher sea conditions, more importantly, it made the anchor handling procedure much safer for the supply vessel crews, in that their exposure time on deck was greatly reduced and there were no buoys to be lassoed, moved across the deck and secured. Where the large cylindrical type of anchor buoy has to be handled on deck during rough weather conditions, there is the ever present danger, should a wave break over the stern, of a crew member being washed under the buoy and crushed by it.

Despite the chaser system having been available for a number of years and the fact that piggyback anchors were not required at the Chryszor and Altair drilling locations, the Bauer was not equipped with the system, still relying on an anchor buoy system. The equipment aboard a rig is seen by the Inspector to be an aspect that should be considered, in terms of minimising crew exposure time, when determining the suitability of a rig for contractual drilling operations.

* Two or more anchors used in series to increase the holding power.

Conclusions

These conclusions identify the different factors contributing to the accident and should not be read as apportioning blame or liability to any particular person or organisation.

The injury to the rating was the result of a number of factors that, combined with the increasing sea conditions, made the anchor recovery a marginal operation:

1. The inexperience of the ratings in anchor handling operations resulted in a lengthier operation and extended exposure time.

2. The inexperienced ratings had to start the anchor handling operation during hours of darkness.

3. The '24 hours a day' regime inhibited the Master from holding a lengthy operational and safety discussion with the crew before commencing anchor retrieval operations and from considering delaying operations until daylight.

4. The lack of detailed planning resulted in the tugger wire not being deployed correctly.

5. The solid design of the vessel's safety barrier provided very limited escape routes to the deck party, instilling an instinct to grab and hold on to the nearest object, rather than to move outboard of the barrier, or to climb up on it.

6. The Bauer was not equipped with chain chasers, using instead an anchor buoy system, necessitating a long exposure time for the stand by vessels' crews during anchor handling operations.

Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, if a report, or part of a report, relates to a person's affairs to a material extent, the Inspector must, if it is reasonable to do so, give the person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The report was sent to the Master, the additional Master and to the two watch ABs.

A submission was received from the additional Master, who kindly provided some useful suggestions and further comment on safety barrier design, rig anchor buoys and operational practices.

Subsequent Action

On 1 February 1995, West Australian Petroleum Pty Limited wrote to the masters of Far Sword and Lady Audrey, instructing them that they should not allow commercial considerations to affect their decisions concerning the safety of the crew. The letter supported the masters' discretion to delay or discontinue anchor handling operations when, due to darkness, the inability to see approaching larger wave trains constituted a risk to crew working on deck.

On 3 February 1995, the Petroleum Operations Division of the Western Australian Department of Minerals and Energy issued a 'Safety Alert'. This 'Safety Alert' stated that to limit the exposure of personnel working on deck consideration should be given to:

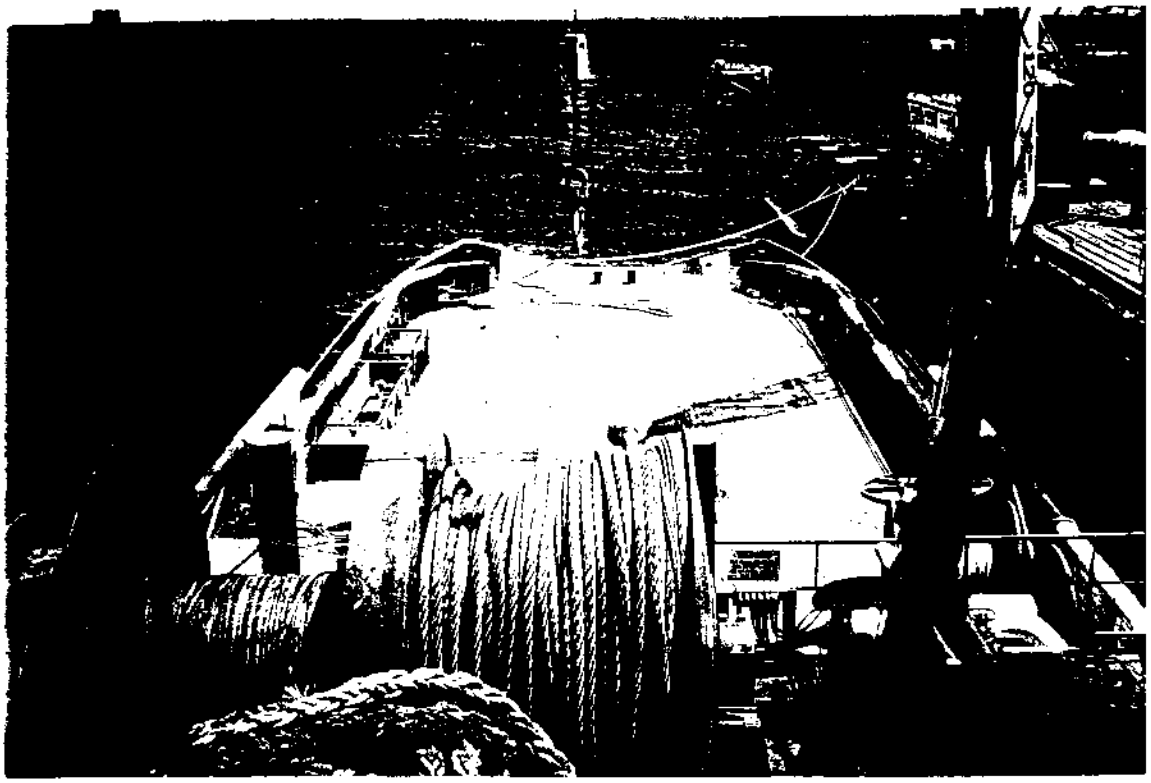
- Ceasing deck work when poor visibility and marginal sea and weather conditions combine to create a hazardous situation.
- The use of anchor chasers in lieu of anchors with buoys and pennants.
- The experience of those required to work on deck in marginal sea and weather conditions.
- Under no circumstances should pressure of work be used to override prudent safety considerations.

Details of Vessel

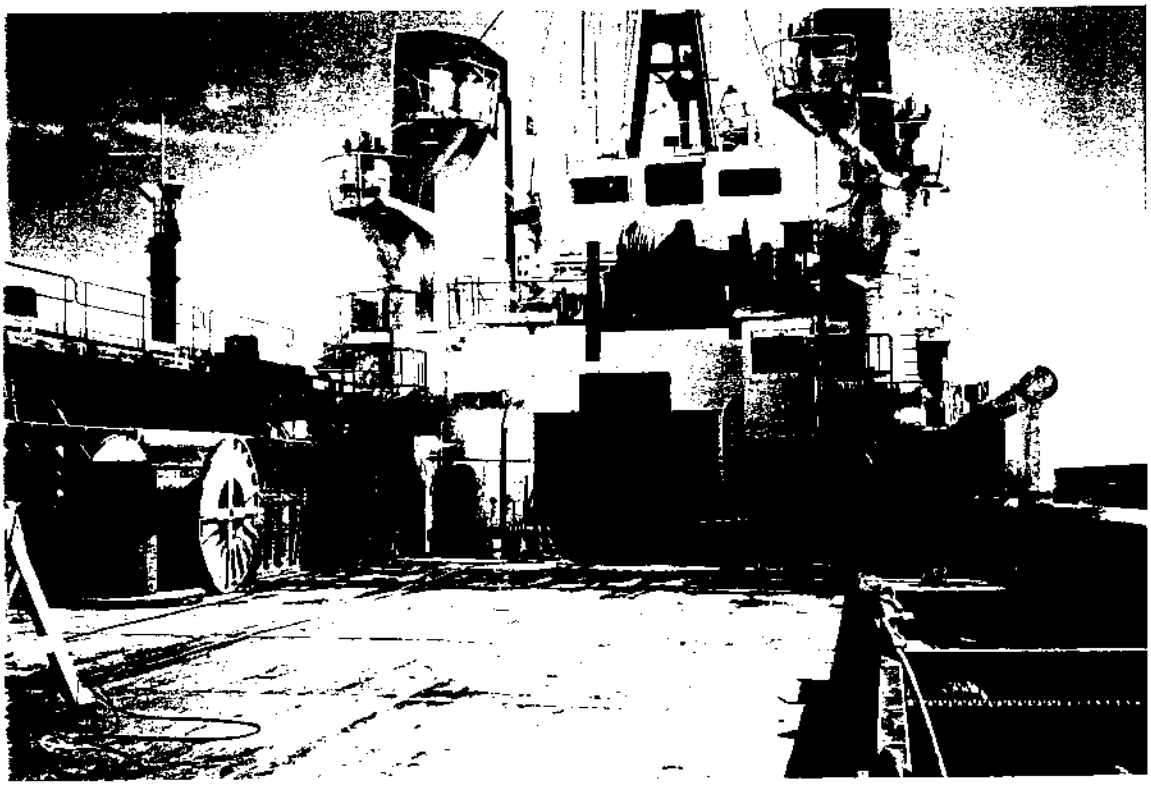
Name	Far Sword
IMO Number	8003979
Flag	Norwegian
Port of Registry	Aalesund
Classification Society	Lloyds Register of Shipping
Type of vessel	Tug/Supply ship
Owner	Sverre Farstad & Co. A/S
Operator	Australian Offshore Services
Year of Build	1982
Place	Appledore, UK
Gross Tonnage	1275
Nett Tonnage	559
Length overall	69.32 m
Breadth	15.96 m
Engine	Four B&W 12 cylinder Alpha diesel
Engine power	9489 kW
Bollard pull	147.3 tonnes
Crew	11 Australian

Wind and sea conditions from Far Sword log book

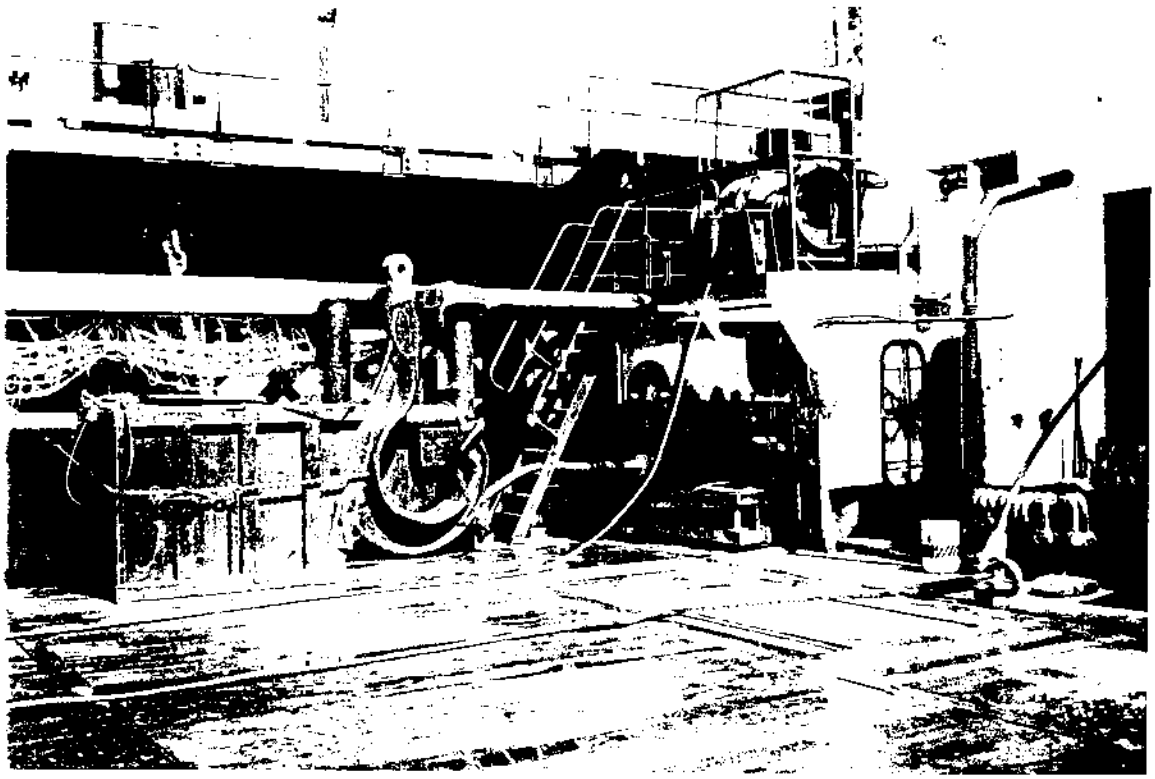
	Date					
	19th	20th	21st	22nd	23rd	24th
Time			**Wind**			
0600	WSW 15	WSW 25	WSW 10	SW 10	SW 18/22	SW 20/25
1200	SW 15	WSW 20	W 8	SW 10	SW 18/22	SW 15/20
1800	SW 17	WSW 10	W 5	SW 10	SW 15/25	SW 15/20
2400	SW 17	SW 10	SW 5	SW 10	SW 20/25	SW 20
			Sea			
0600	WSW 0.3	WSW 1.5	WSW 0.3	SW 0.3	SW 0.5	SW 0.5
1200	SW 0.3	WSW 1.5	WSW 0.1	SW 0.1	SW 0.5	SW 0.5
1800	SW 0.5	WSW 0.5	SW O.2	SW 0.1	SW 0.5	SW 1.0
2400	SW 0.5	SW 0.3	SW 0.2	SW 0.1	SW 1.0	SW 1.0
			Swell			
0600	CON 1.5	CON 2.0	W 1.5	SW 1.5	SW 1.5/2	SW 1.5/2
1200	CON 1.5	W'LY 2.5	W 1.5	SW 1.5	SW 1.5/2	SW 1.5/2
1800	SW 1.5	W 2.0	SW 1.0	SW 1.5	SW 1.5/2	SW 2.0
2400	SW 1.5	W 2.0	SW 1.0	SW 1.5	SW 2.0/3	SW 2.0



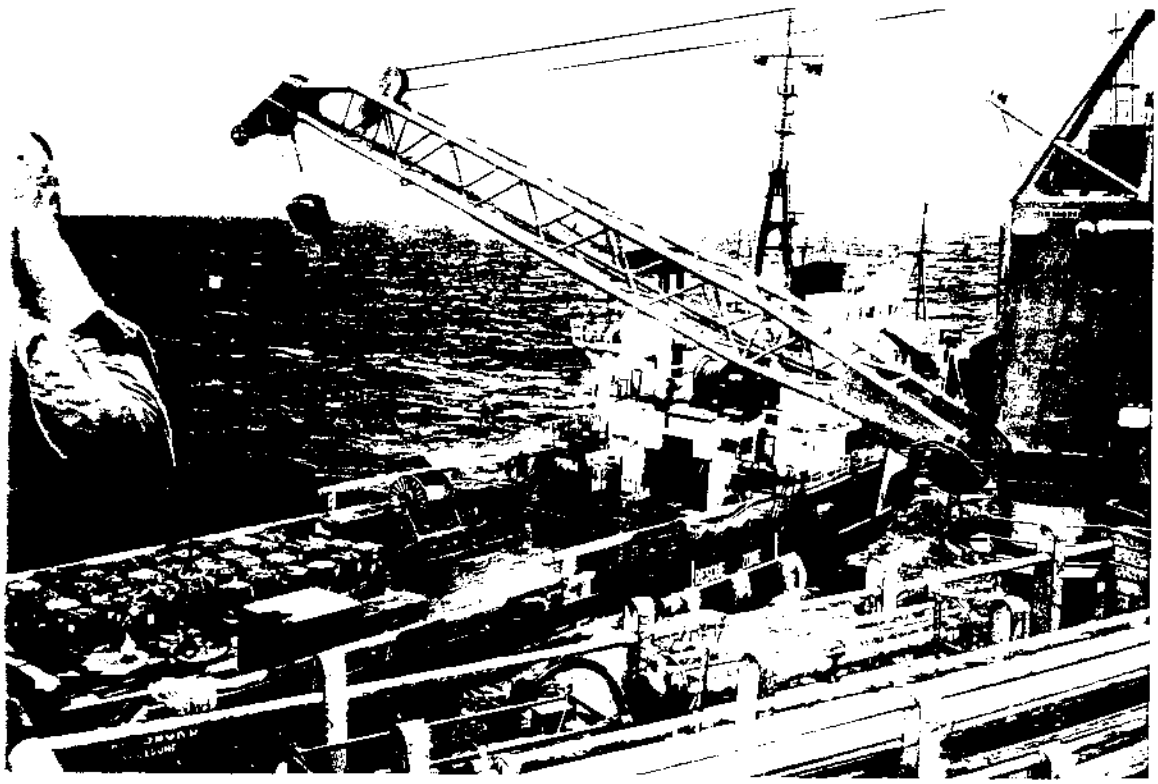
Aft deck viewed from bridge



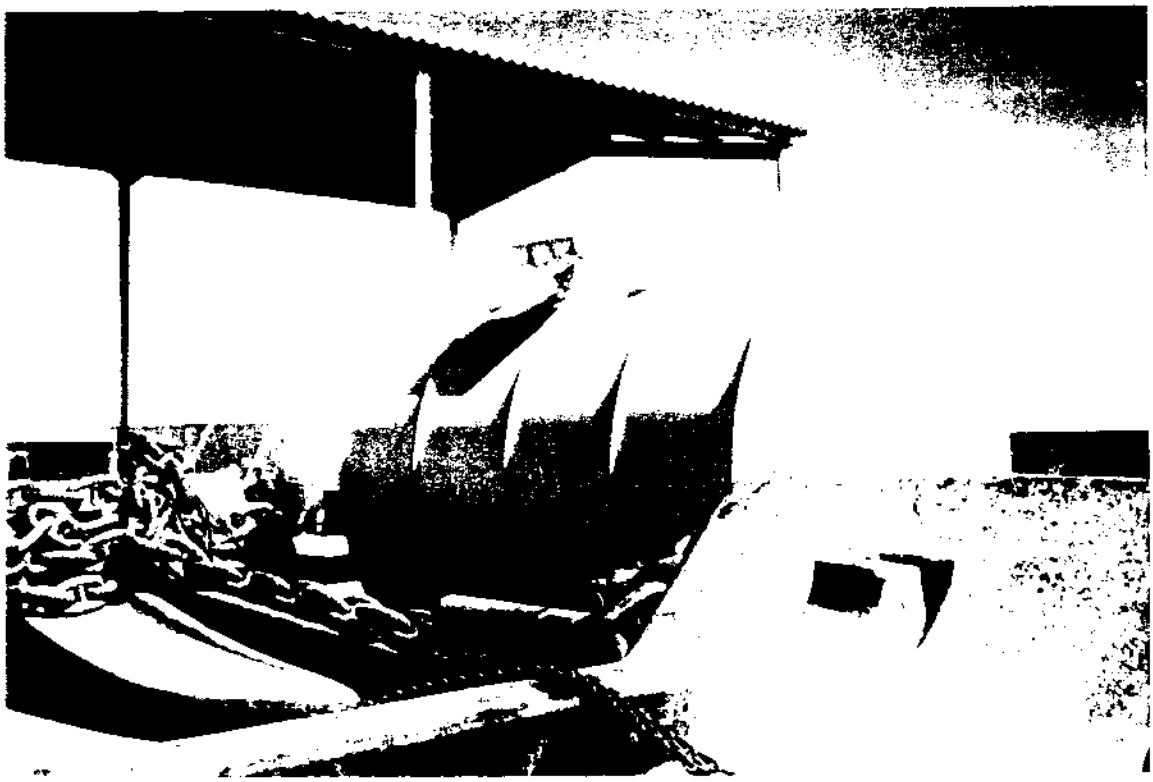
Aft deck viewed from stern



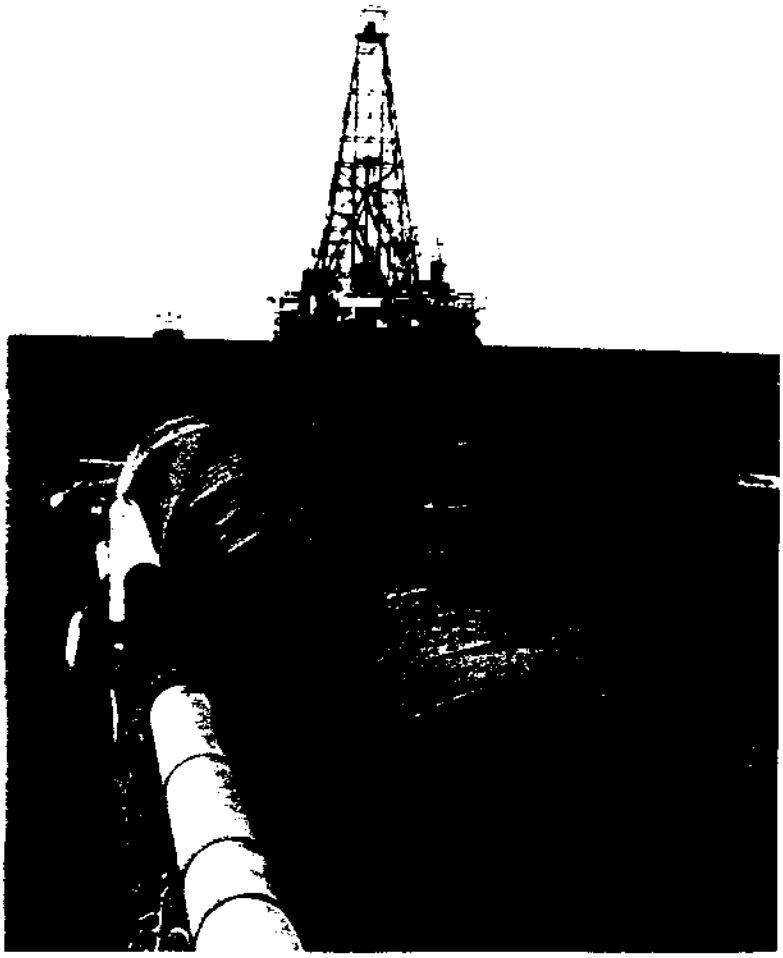
Aft deck port side showing location of stowed 'J' hook



Far Sword clearing from Glomar Robert F Bauer



Anchor buoy



Anchor buoys stowed on deck during relocation move of Glomar Robert F Bauer

above photograph, courtesy of Capt D Wharington, Australian Offshore Services.