Marine Safety Investigation Report No.198

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Australian Transport Safety Bureau

Lifeboat accident at Port Botany, NSW
20 October 2003

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Lifeboat accident injures officer aboard *Port Arthur*

On 20 October 2003, a class society surveyor was conducting a safety equipment survey on board the Panamanian tanker *Port Arthur* at the bulk liquid berth at Port Botany, NSW. During the survey, the hooks of the starboard lifeboat released and the boat fell almost vertically, bow first, into the harbour. Its crew of four suffered various injuries.

Port Arthur

Port Arthur is a product tanker of standard design with the cargo tanks forward of the engine room and accommodation superstructure (figure 1). The vessel has a length overall of 181.61 m and a deadweight of 41 490 tonnes at its summer draught of 11.77 m.

At the time of the incident, *Port Arthur* was owned by Catfor Maritime Inc and managed by Tanker Pacific Management (Singapore) Pte Ltd. Classed with NK, the tanker was built in 1992 by Imabari Zosen K K in Marugame, Japan as *Bellus* before its name was changed to *Port Arthur* in April 2001.

The ship had a complement of 25. The master and the majority of the officers and crew were Indian, the mate Romanian, the deck cadet Croatian, one of the two fitters was Turkish and the rest of the crew were Filipino. The master and officers were appropriately qualified.

FIGURE 1:
Port Arthur

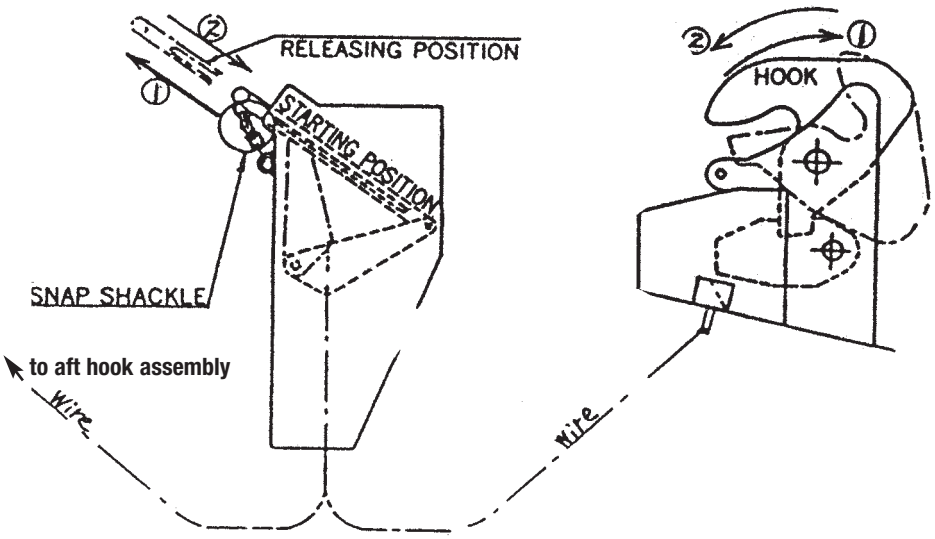
Lifeboats and release mechanisms

Port Arthur carries two 30 person totally enclosed lifeboats stowed in gravity davits on either side of the accommodation. The starboard lifeboat is the designated rescue boat. The lifeboats, manufactured by Ishihara Dockyard Company in Takasago, Japan, are 6.5 m in length and 2.4 m in breadth with a depth of 0.9 m. Each lifeboat is fitted with a CLMD 30 Daihatsu diesel engine, which gives the vessel a laden speed of 6.3 knots.

The lifeboat's controls including engine, helm, remote davit winch brake release and on-load hook release lever are located at the coxswain's control console aft. Seating for the rest of the crew is at the port and starboard sides of the boat. The lifeboats are designed to be boarded in the stowed position from embarkation platforms near the head of the davits. Crew board each boat via a large hatch on the inboard side. Smaller hatches are provided at the fore and aft ends of the boats to access the on-load release hooks.

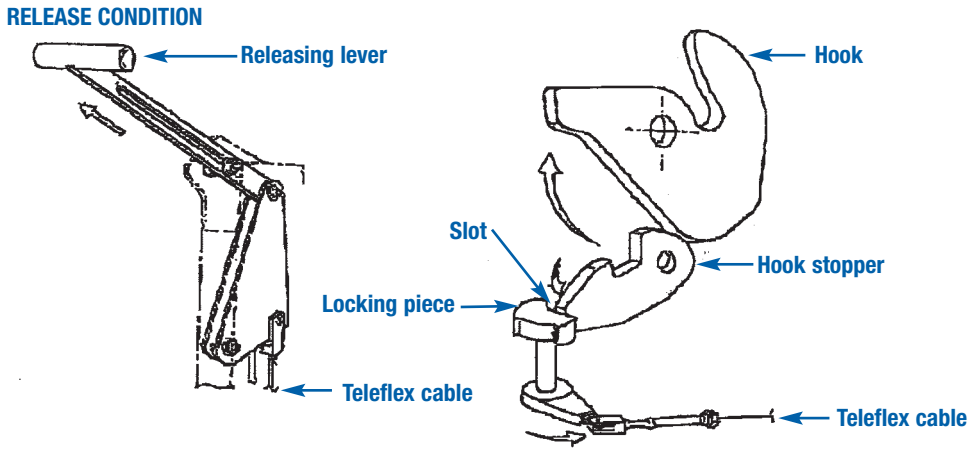
Each lifeboat is fitted with an on-load fall release system designed by the lifeboat manufacturer. The on-load release system (figure 2) consists of the release lever mounted on the starboard side of the steering console, the locking mechanisms for each hook and teleflex cables which connect the release lever to the hook mechanisms. There is no hydrostatic interlock, to prevent release of the hooks before a boat enters the water, fitted to either lifeboat.

FIGURE 2:
Diagram for use of releasing lever as supplied to ship



To release the hooks, a snap shackle securing the release lever is disconnected and the release lever is pulled upwards. The teleflex cables transmit the motion of the release lever to the 'locking pieces' in the operating mechanisms for each hook. The locking pieces are rotated in the horizontal plane until the ends of each 'hook stopper', which lock the tail of each hook, are free to rotate downwards into a slot in each locking piece. The hook stoppers then release the tail of each hook, allowing the hooks to rotate and open, releasing the lifeboat falls (figure 3).

FIGURE 3:
Layout of releasing system (supplied by manufacturer to ATSB)



The manufacturer's operating instructions for releasing the hooks state:

> Pull this releasing lever towards you the hook is released.

To reset the hooks:

> Return the bow and stern hooks to their original positions and then push in the releasing lever while pressing the hook heads by your hands. The lever will be inserted smoothly.

The action of rotating each hook into the closed position causes the tails of the hooks to engage with their respective hook stoppers and rotate them upward into the reset position. Resetting movement of the release lever will then rotate the locking pieces to secure the hook stoppers in this position.

A section on 'operational cautions on resetting' in the manufacturer's operating instructions states:

> When the hook heads have not returned to their original positions, the releasing lever can not be pushed in. Then, strongly push the hook heads to their original positions again. (Do not push the hook repeatedly with forcible power. It may damage the wire).

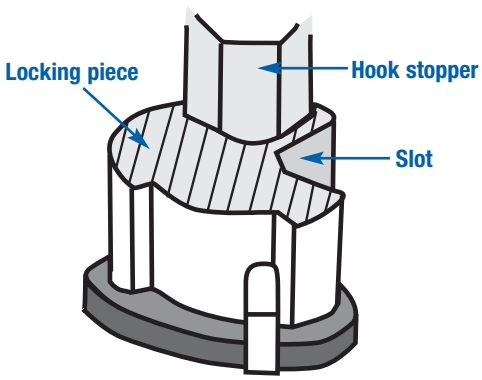
If excessive force on the release lever is required to reset the hooks, it will generally mean that the end of one hook stopper has not rotated clear of the slot in its locking piece and is preventing the locking piece from turning into the reset position. For the hooks to be fully reset and thus in a 'safe' condition the end of the hook stopper for each hook must be fully seated on the flat surface adjacent to the slot in its locking piece (figure 4).

Operating instructions for releasing and resetting the on-load release system were located adjacent to the release lever within each boat.

Previous boat drill

On 10 October 2003, while the ship was stopped en route from Kaohsiung to Port Botany, the starboard lifeboat was lowered to the sea. There was a slight sea and a low swell at the time. The boat's painters were secured,

FIGURE 4:
Hook stopper in fully reset position



the hooks were disengaged and the engine was tried out. Resetting the hooks proved difficult and numerous attempts were made to reset them. Eventually, using as much force as he could, the deck cadet pushed in the release lever to secure the hooks and the boat was recovered without further incident.

The incident

At 1236 on 20 October 2003, *Port Arthur* berthed port side to at the bulk liquid berth at Port Botany, NSW. That evening, during a safety equipment survey, the class surveyor instructed the master to lower the starboard lifeboat to the water and operate its on-load release system.

At about 1745, the boat, with the third mate, the deck cadet, the third engineer and an ordinary seaman (OS) on board was lowered. The master and the surveyor watched from the starboard bridge wing.

When the boat was about ten metres above the water the forward hook released, followed almost immediately by release of the after hook. The boat fell vertically, bow first, into the harbour. The third mate's seat belt broke when the lifeboat hit the water and he fell upside down, landing on his back and neck. The seat belt securing the third engineer also broke. The hull of the lifeboat sustained damage.

The cadet, fearing that the boat might sink, jumped into the water. Although the third mate

had a sore neck, he and the OS and the third engineer assisted the cadet back into the boat. The cadet appeared to have injured his back and, using the starboard accommodation ladder, he was assisted back on board the ship.

Preparations were then made to recover the boat. When the third mate was resetting the on-load release system, he found that the operating lever was under considerable tension. So much so, that when he removed the pin of the snap shackle securing the release lever, the shackle opened by itself, flew off and was lost in the boat. The release lever was then operated and the hooks were reset with some difficulty. When the hooks appeared to have been reset, the release lever was secured by two small shackles as a replacement for the snap shackle. The falls were then attached and the boat was partially hoisted to confirm that the hooks were holding.

Before the boat was recovered, the third mate, the OS and third engineer climbed up the embarkation ladder to the boat deck. The boat was hoisted to within a metre or so of the boat deck when the after hook released, leaving the boat suspended from the forward fall.

The boat was then carefully lowered back to the water and inspected. The forward deck of the lifeboat had been torn up in way of the base plate of the hook which itself had been partially detached. On board the ship, the forward davit was found to have been bent.

After this unsuccessful attempt to recover the lifeboat, its occupants at the time of the incident were transported to hospital. The OS, third engineer and the cadet were found fit for duty, but the third mate had sustained a fracture of the cervical spine and was hospitalised before being repatriated.

The following evening, the lifeboat falls were shackled to the attachments for the hooks and the boat was recovered.

Evidence

On 21 October 2003, the day after the incident, the ATSB interviewed the master, officers and crew involved in the incident. The third mate was interviewed in hospital the following day.

Copies of the instructions for the on-load release system and other relevant information including information from the ship's safety manual were obtained. Log books indicated that boat drills had been held at the appropriate times and that the lifeboats on *Port Arthur* had been swung out or lowered every 3 months.

Contributory factors

Based on the statements of the crew relating to the lifeboat drill on 10 October and their observations of the pre-loaded state of the release lever after the incident on 20 October, it is evident that the on-load release system had not been correctly reset on 10 October. Given that, on 20 October, both hooks released almost simultaneously, it is probable that, at that time, both hook stoppers were not correctly seated on top of their respective locking pieces.

In this condition, the ends of each hook stopper were probably bearing on the slightly tapered faces inside their locking piece slots. The turning force being transmitted via the teleflex cables to each locking piece by the loaded release lever was the only force preventing the hook stoppers from rotating downward and releasing the loaded hooks. While the boat was successfully recovered on 10 October, the system was in an extremely dangerous condition and prone to spontaneous release if the hook load became high enough.

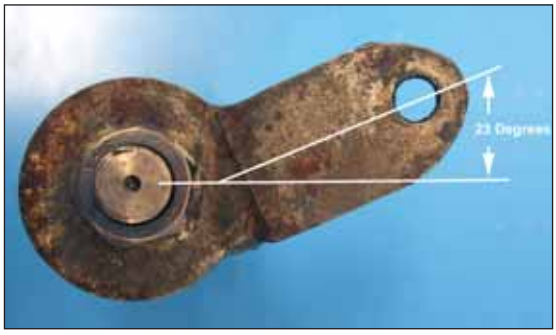
It was difficult for the ship's crew to verify visually whether or not the hooks were correctly reset. The tops of the locking pieces and the hook stoppers were not visible under the hook cover plates from within the boat. There were no inspection ports in the hook cover plates to allow the relative positions of the hook stoppers and locking pieces to be observed. The primary indication that the hooks may not have been correctly reset would have been the large amount of force required to move the operating lever to the reset positon.

When the lifeboat was being lowered on 20 October, the forward hook released as, or shortly after, the davits hit their stops at deck level. It is likely that the higher than normal transient load on the lifeboat falls at this time

caused the forward hook to open which, in turn, increased the load on the after hook which was also forced open.

An examination of the lifeboat releasing mechanism on 21 October revealed that the connecting lug at the base of the locking piece for attachment of the teleflex cable for the after hook was bent through an angle of about 23° (figure 5). While it was not possible to determine when the lug had been deformed, it is possible that it was in this condition on 10 October 2003. The deformation in the lug would have resulted in lost resetting motion and could account for the after hook not being fully reset when the boat was recovered on 10 October.

FIGURE 5:
Bent connecting lug



When the cover plates for the hooks were removed to examine the hook mechanisms, the moving parts under the covers, including the hook stoppers and the tops of the locking pieces, were covered in a large buildup of debris including rust, grease and paint flakes (figure 6). It is likely that, over the previous 11 years of service, debris had filled the tolerance between the hook tails and their mating slots in the hook stoppers. As the debris built up in this space, it would have been progressively more difficult to reset the system with increasing amounts of hook stopper motion lost during the resetting operation.

FIGURE 6:
Locking piece and hook stopper covered in debris

Manufacturer's advice

The manufacturer was requested by the ATSB for advice on the cause of the accident. Two similar incidents had been reported to the manufacturer when lifeboat hooks on other ships had spontaneously released under load. One of the incidents was as a result of buckling of the push-pull (teleflex) cable, the other as a result of corrosion of the hook system.

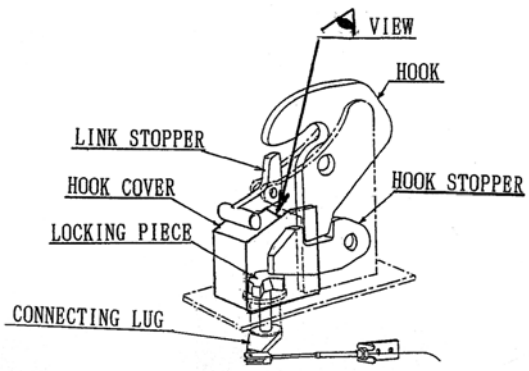
The manufacturer's drawings showed that, after February 1994, the release system had been modified. The hook cover plates had been provided with inspection ports to enable lifeboats' crews to determine visually when the hooks are correctly reset. However, on board *Port Arthur*, the original hooks were in use and the modified cover plates had not been fitted. In addition, the ship carried only the original drawings. There was no advice as to how the crew could determine that the hooks had been correctly reset.

With respect to the incident on *Port Arthur*, the manufacturers stated, in part:

> ...there are three possible reasons.
>
> 1. The push-pull cable was buckled before by some reason and the release system could not be normally reset at the last reset operation.
> 2. The hook was not reset completely at the last operation ....
> 3. The release system had corrosion, the movement was not smooth and there was some resistance. Because of this, the release system could not be normally reset.

Commenting on the ATSB's draft report on the incident, the submission from Ishihara Dockyard read in part:

> ...The report is saying "It was not possible for the ship's crew to verify visually whether or not the hooks were correctly reset. ...this is not true. The condition of the locking piece and the hook stopper can be verified visually from upside as shown in the figure below. The top of the locking piece is visible from upside. We provided the peep hole to the hook cover in order to make the checking work ...more easily.



> If the crew had the intention of confirming the reset condition on 10 October 2003, they could see the inside from upside. But it is naturally supposed that, if they did so, it was difficult to confirm clearly the locking condition under the such dirty condition shown in Fig 6 of your report.
>
> ...We were surprised to know that the connection lug of the after hook was bent about 23 degree so large. We think this is very peculiar. The connecting lug is so rigid that it cannot be bent by human power during the operation even if it is abnormal.
>
> ...We agree your recommendations.

Despite the manufacturer's assertion that the condition of the locking pieces and the hook stoppers could be verified visually as shown above, there were no instructions on this procedure on board the ship. As well, the amount of debris within the hook assemblies would have made it very difficult to determine with certainty whether or not the hooks were fully reset.

Maintenance and training

International Maritime Organization guidelines require that a full set of maintenance manuals and instructions for lifeboats and their equipment be carried on ships. The maintenance manual for *Port Arthur*'s lifeboats contained only two brief instructions for the hook release mechanisms and these, in tabular form, required that the hooks be operated during training drills and checked for rust every week. Grease was to be applied once a year to the appropriate parts of the releasing gear. While the operation and greasing of the system may have been carried out in accordance with the instructions, the poor condition of the components under the hook cover plates is evidence that the maintenance regime was ineffective.

After the difficulty experienced with resetting the hooks on the starboard lifeboat on 10 October, the crew made no attempt to determine the reason for the problem. The master was on his third contract on the ship and had apparently not experienced any previous problems with the lifeboat on-load release mechanisms.

In addition, while the third mate and the deck cadet said they were familiar with the use of the release mechanism for the hooks, both officers were under the impression, mistakenly, that the hooks released automatically when the boat took the water. It would appear that training for the ship's crew in the maintenance and the operation of the release system for the lifeboats was deficient.

Commenting on the ATSB's draft report on the incident, the submission from Tanker Pacific Management (Singapore) read in part:

> ... We have fitted inspection ports in four lifeboats (including those of *Port Arthur*) to enable crew to check visually that the hook is properly reset in the locked position.
>
> .....Installation of an inspection port in this and similar lifeboats will help our crew to check that the locking mechanism is free of debris and that the greasing regime is effective.
>
> Our safety management system at the time of the incident required the master to ensure that

all officers were conversant with the release mechanism of the lifeboats, as detailed in the manufacturer's handbook, kept on board.

... we have emphasized again to our senior officers the importance of ensuring, through regular on board training and drills, that all ship staff are familiar with the operating principles of the life boat hook release mechanism, both in theory and practice.

Conclusions

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

1. The on-load release hooks had not been correctly reset after the starboard lifeboat was lowered to the sea on 10 October 2003.
2. There were significant amounts of rust, grease and other debris within the hook mechanisms which resulted in one or both hooks being difficult to reset.
3. The connecting lug at the base of the locking piece on the after hook was deformed, possibly resulting in the incorrect resetting of that hook.
4. As there were no inspection ports in the hook cover plates, it was difficult for the lifeboat's crew to check the relative positions of the locking pieces and hook stoppers.
5. There was no attempt made to establish why it had been so difficult to reset the hooks on 10 October 2003.
6. The maintenance manual did not contain sufficient information for the ship's personnel to maintain the release mechanisms in the appropriate manner, nor was there any advice in the manual that servicing should be carried out by suitably qualified or trained personnel.
7. The manufacturer did not advise the owners that new hook cover plates could be fitted to lifeboats built prior to February 1994.
8. No advice on earlier incidents involving their on-load release mechanism was promulgated by the manufacturer to ships fitted with the same equipment.
9. Training in the maintenance and operation of the lifeboat on-load release system for the ship's crew was deficient.

Recommendations

MR20040031

Ishihara Dockyard Company should ensure that all shipowners and operators of ships equipped with their lifeboats are advised of incidents involving their on-load release systems and that advice of design changes is promulgated to all such vessels.

MR20040032

Manufacturers of on-load release systems for lifeboats should ensure that ships using their equipment are provided with detailed instructions for the operation and maintenance of such systems in accordance with the requirements of Regulation 36 of Chapter III of the International Convention for the Safety of Life at Sea 1974 and its Protocol of 1988.

MR20040033

Shipowners and operators should examine their safety management systems in respect of lifeboat on-load release systems and ensure that crew training, maintenance regimes and operational safeguards are commensurate with the considerable risks associated with these systems.

MR20040034

ISM accreditation authorities should ensure that ships' safety management systems contain crew training, maintenance regimes and operational safeguards which are commensurate with the considerable risks associated with operating lifeboats fitted with on-load release systems.

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Media Release

29 Nov 2004
MR2004/38

SHIP'S OFFICER SERIOUSLY INJURED IN LIFEBOAT ACCIDENT

The ATSB has found that the third officer of the Panamanian tanker *Port Arthur* suffered a fracture of his cervical spine during a lifeboat drill on 20 October 2003. Three other crew in the lifeboat escaped serious injury when the boat fell 10 metres into Port Botany after its suspension hooks opened prematurely while it was being launched.

The Australian Transport Safety Bureau (ATSB) has released its investigation report into the accident which concludes that the lifeboat's on-load release hooks had not been correctly reset when the boat was last lowered. Lack of effective maintenance had made the hooks difficult to reset and their design made it difficult for the crew to confirm whether or not the hooks were correctly reset.

The ATSB's report recommends that manufacturers of lifeboats and on-load release systems ensure that shipowners and operators of ships are advised of on-load release system incidents and that design changes are promulgated to all vessels fitted with their equipment. The report also recommends that manufacturers of on-load release systems ensure ships using their equipment are provided with detailed instructions for the operation and maintenance of those systems.

Since it was formed in 1999, the ATSB has issued reports on four previous lifeboat accidents, three of which were also associated with improperly reset on-load release hooks.

In September 2002 the ATSB released a safety bulletin on lifeboat accidents which was widely distributed to the maritime community as well as to the International Maritime Organization. The bulletin points out that:

> Relatively complex designs, together with a poor understanding of their operation by ship's crews, insufficient maintenance and less than adequate manufacturer's instructions have led to the involuntary release of one or both hooks. The largest number of accidents, just over half of those reported, were caused by the unintentional release of hooks while on-load.

With regard to ship's safety management systems, the report recommends that shipowners, ship operators and International Safety Management accreditation authorities ensure that, with respect to crew training, maintenance and operational safeguards, such systems contain procedures commensurate with the considerable risks associated with lifeboat on-load release systems.

Copies of the report may be downloaded from the internet site at www.atsb.gov.au or obtained from the ATSB by telephoning (02) 6274 6478 or 1800 020 61

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