Independent investigation into the fast rescue boat incident on board the Isle of Man registered liquefied natural gas tanker British Sapphire off Darwin, Northern Territory on 16 May 2010.
Independent investigation into the fast rescue boat incident on board the Isle of Man registered liquefied natural gas tanker

*British Sapphire*

off Darwin, Northern Territory

16 May 2010
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Abstract

On 16 May 2010, the chief engineer of *British Sapphire* was being medically evacuated using the ship’s fast rescue boat for the transfer. The fast rescue boat party consisted of the chief mate, second mate and fourth engineer. The chief engineer, second mate and fourth engineer were injured when, during the launch, the ship’s fast rescue boat dropped 18 m and impacted the water below.

The investigation determined that, in the process of lowering the rescue boat, the wave compensator mechanism on the fast rescue boat’s davit was activated early, before the rescue boat had reached the water. A fail safe interlock device should have prevented this by placing the wave compensator into standby mode, only becoming operational when the fast rescue boat was waterborne. However, the electrical installation of the interlock was incorrect and meant it could not work as designed, allowing the wave compensation unit to always operate and the fast rescue boat to make the uncontrolled descent to the sea.

The investigation identified safety issues relating to the commissioning, maintenance, testing, operating instructions and procedures for the fast rescue boat’s wave compensator and its safety interlock system. Further safety issues were identified relating to the job hazard analysis for the use of the fast rescue boat, crew resource management principles and approved training courses for fast rescue boats.

The ATSB is satisfied that the safety action taken by BP Shipping and Davit International addresses these safety issues. The ATSB remains concerned about the adequacy of training in the use of wave compensation units on fast rescue boat davits and has released a safety advisory notice to national and international maritime training institutions about this safety issue.
The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

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

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

**Purpose of safety investigations**

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

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

**Developing safety action**

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

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.
When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

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

**Occurrence:** accident or incident.

**Safety factor:** an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

**Contributing safety factor:** a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

**Other safety factor:** a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

**Other key finding:** any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which ‘saved the day’ or played an important role in reducing the risk associated with an occurrence.

**Safety issue:** a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

**Risk level:** The ATSB’s assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety actions taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical** safety issue: associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.

- **Significant** safety issue: associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.

- **Minor** safety issue: associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

**Safety action:** the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.
EXECUTIVE SUMMARY

At about 0645\(^1\) on 16 May 2010, off the port of Darwin, Northern Territory, the fast rescue boat (FRB) from the Isle of Man registered liquefied natural gas tanker \textit{British Sapphire} made an uncontrolled descent of about 18 m, impacting with the water below.

\textit{British Sapphire} had departed from Yung An, Taiwan on 10 May 2010 for Withnell Bay, Western Australia. The voyage proceeded without incident until 14 May when the chief engineer reported to the master that he felt ill, with pain in his upper left arm and chest. It was decided that the chief engineer should be evacuated from the ship for medical reasons (medivac), so the master diverted to Darwin.

Early on 16 May, preparations for the medivac were made. It had been decided that the chief engineer would be transferred to the police launch \textit{Beagle Bay} using the FRB. The crew for the FRB consisted on the chief mate, second mate and fourth engineer, along with the chief engineer. On the deck of the ship for the operation were the third mate, boatswain (bosun) and two able seamen.

Once permission for launching was given, the bosun lifted the FRB from its cradle before swinging it outboard of the ship. As the fourth engineer reached for the winch brake release wire, the third mate reached across to the remote control unit and pressed the wave compensator button. Immediately, the FRB descended, until it hit the water about 18 m below at high speed.

As a result of the impact, the second mate, the chief engineer and the fourth engineer all suffered serious injuries but the medivac transfer of the chief engineer continued and was completed. The FRB was recovered without incident and \textit{British Sapphire} resumed the passage to Withnell Bay.

The injuries to the second mate and fourth engineer were subsequently assessed and, as \textit{British Sapphire} was still close to Darwin, it was decided that the two men should also be medivaced ashore. The police launch \textit{Beagle Bay} returned to the ship and the injured crew were transferred using the accommodation ladder. The \textit{British Sapphire} then resumed the passage to Withnell Bay, arriving there on 22 May.

The Australian Transport Safety Bureau’s investigation determined that a safety interlock should have operated to prevent the operation of the wave compensation unit before the rescue boat had reached the water. It did not, so the wave compensation unit operated immediately and allowed the FRB to make an uncontrolled descent to the sea. The electrical installation of the safety interlock was found to be incorrect, so that it could not work as designed.

The investigation identified ten safety issues relating to: the electrical wiring of the wave compensator; the crew training in relation to the wave compensator; the manufacturer’s manuals relating to the wave compensator; the ship’s operating procedures relating to the wave compensator; the job hazard analysis for the use of the fast rescue boat; crew resource management principles; acceptance testing of the fast rescue boat davit; the on board maintenance and return to service procedures for the fast rescue boat davit; and approved training courses for fast rescue boats.

\(^1\) Coordinated Universal Time (UTC) + 8 hours.
The ATSB is satisfied that the safety action taken by BP Shipping and Davit International addresses these safety issues. The ATSB remains concerned about the adequacy of training in the use of wave compensation units on fast rescue boat davits and has released a safety advisory notice to national and international maritime training institutions about this safety issue.
1 FACTUAL INFORMATION

1.1 British Sapphire

British Sapphire is a liquefied natural gas (LNG) tanker (Figure 1). The ship was built in 2008 by Hyundai Heavy Industries, Korea, and has an overall length of 288.4 m and a beam of 44.2 m. At its summer draught of 12.2 m, the ship has a deadweight of 84,303 tonnes.

British Sapphire is of double hull construction, with four cargo tanks located forward of the accommodation superstructure. The ship has a cargo carrying capacity of 151,945 m³ (with tanks 98% full).

Figure 1: British Sapphire

Propulsive power is provided through a diesel-electric system. The ship has two Wartsila 12V50DF and two Wartsila 9L50DF diesel generator sets that are designed to run either on ‘boil-off’ gas from the cargo tanks or on diesel fuel. The generators provide power for two electric propulsion motors that each develop 14,860 kW at 720 rpm. The propulsion motors drive a single, fixed-pitch propeller through a reduction gearbox and give the ship a service speed of 21 knots².

At the time of the incident, British Sapphire was owned by RBSSAF (19), United Kingdom. The ship was managed and operated by BP Shipping, United Kingdom, registered in the Isle of Man and classed with Lloyd’s Register (LR).

² One knot, or one nautical mile per hour equals 1.852 kilometres per hour
British Sapphire had a crew of 30, comprising British, Polish and Filipino nationals. The crew held appropriate qualifications and necessary endorsements to enable them to sail on board the ship.

The master held a British master’s qualification and had 33 years of seagoing experience on a variety of ships. He joined BP Shipping in 2001 as chief mate before gaining command in 2003. In 2008, he took delivery of British Sapphire and had been the ship’s master since that time.

The chief mate began his seagoing career in 1994 as an ordinary seaman and in 2008 he obtained his Polish master’s qualification. He joined BP Shipping in 2006 working on liquefied petroleum gas (LPG) tankers. In 2009, he joined British Sapphire for a 2 month familiarisation voyage before sailing as chief mate. This was his second assignment as chief mate on board British Sapphire and he had been on board for 1 week.

British Sapphire had three second mates on board at the time of the incident. However, only one was directly involved with the incident. The second mate involved in the incident began his career with BP Shipping as a deck assistant in 2004. He had a Polish chief mate’s qualification and was on his seventh contract as second mate. He had been on board for about 3 months.

The third mate obtained his Polish officer of the watch qualification in 2004 before joining BP Shipping in 2004. He had been on board for 3 weeks and this was his first contract on board British Sapphire. However, he had spent 5 months on one of its sister ships.

The chief engineer began his seagoing career as a cadet in 1980. He had sailed on a variety of ships. In 1992, he obtained his British chief engineer’s qualifications before working as a chief engineer in 1995. He joined BP Shipping in 2007, completing his first trip with the company as second engineer before returning to chief engineer. He first sailed on board British Sapphire in 2008, on its maiden voyage, and had been the ship’s chief engineer since that time. At the time of the incident, he had been on board for nearly 4 months.

The fourth engineer began his seagoing career as a cadet before he obtained his British watchkeeper’s certificate in 2005. This was his first assignment as fourth engineer, having previously completed two 3 month assignments as junior engineer. It was his first assignment on board British Sapphire and he had been on board for about 6 weeks.

The boatswain (bosun) began his seagoing career in the Philippines in 1990. He joined BP Shipping in 1996 as an able seaman before being promoted to bosun in 2006. This was his first assignment on board British Sapphire and he had been on board for approximately 1 month.

1.2 Fast rescue boat and davit

British Sapphire was fitted with a Fassmer (F)RR 6.5 ID-SF rigid hull inflatable fast rescue boat (FRB) and a Davit International D-NPS.FR.30 davit. The davit was mounted on the ship’s port quarter (Figure 2) and was fitted with a hydraulic winch motor giving hoisting and lowering speeds of 48 m/min.

The FRB was 6.46 m in length and was fitted with a Bukh and Steyr 144TI diesel engine and a Hamilton 213 water jet. The FRB could carry a maximum of 18
persons and, when empty, it weighed 2,200 kg. The FRB could be launched from a control stand located aft of the davit using a remote control unit (Figure 3) or from inside the boat, using a winch brake release wire.

Figure 2: Fast rescue boat and davit

Figure 3: Fast rescue boat davit remote control
1.2.1 Wave compensation unit

The FRB davit on *British Sapphire* was fitted with a hydraulically powered wave compensation unit. The wave compensation unit was designed to ensure that when the FRB was riding the sea swell there was continuous tension on the fall wire.

Under normal situations, the lifting capacity of the davit winch system was approximately 3000 kg. When the wave compensation unit was active, this lifting capacity was reduced by approximately 90% to around 300 kg. With the wave compensator activated, the davit winch would continuously tension the fall wire but would have insufficient power to lift the FRB.

With the FRB in the water and the wave compensation unit activated, if the FRB moved into the trough of a swell, the weight of the FRB would overcome the reduced power of the winch allowing the fall wire to pay out. As the FRB moved up on a swell, the winch would take up any slack in the fall wire to allow the FRB to ride the swell while tension was maintained on the fall wire. In addition, as the winch was continuously tensioning the fall wire, when the hook was released from FRB, the fall wire would immediately begin to heave in.

Given that activation of the wave compensation unit reduced the lifting capacity of the fall wire winch, there was a risk of an uncontrolled descent of the FRB if it was not first waterborne. The manufacturer’s instruction for the wave compensation unit on board *British Sapphire* stated that the wave compensation unit should only be activated when the FRB was waterborne. The wave compensation unit only operated when the ‘wave compensator button’ on the remote control unit was pressed. As an additional safety measure, to prevent the wave compensation unit from activating if the wave compensator button was pressed before the FRB was waterborne, the system was fitted with a safety interlock.

The safety interlock was activated by weight on the fall wire which was led through a sheave attached to a shock absorber and then over the davit head to the fall hook and the FRB (Figure 4). A magnetic switch was mounted on the shock absorber (Figure 5). The magnetic switch was designed so that when there was no weight on the fall wire, the switch was normally closed in the electrical circuit for the safety interlock. When more than 850 kg was suspended on the fall wire, the shock absorber was compressed sufficiently to open the magnetic switch contact in the safety circuit. Pressing the ‘wave compensator button’ on the remote control unit with the magnetic switch contact open would place the wave compensation unit in ‘standby mode’. In this mode, the wave compensator would not activate until the magnetic switch contact was closed, i.e. when there was less than 850 kg on the fall wire once the FRB was waterborne.

Once the wave compensator was active, it continued to operate to keep tension on the fall wire until either the emergency stop button was pressed or the winch control hoist was operated. Importantly, once it had been activated, pressing the ‘wave compensator button’ on the remote control unit did not turn the function off.
Figure 4: Fast rescue boat and davit general arrangement

Figure 5: Magnet and limit switch mounted on the shock absorber
1.3 The incident

On 10 May 2010, *British Sapphire* departed from Yung An, Taiwan, bound for Withnell Bay, Australia.

The initial part of the voyage proceeded without incident until 14 May when, at around 1130, the chief engineer reported to the master that he felt ill and had pain in his upper left arm and chest. The master obtained advice from the ship’s telemedical provider ashore and, after discussing the situation with the ship’s superintendent, it was decided to arrange a medical evacuation (medivac) for the chief engineer.

At this time, the ship was near Indonesia and the master considered a number of options to medivac the chief engineer. He decided that the chief engineer should be landed in Australia and the ship’s course was altered so that it could proceed via Darwin in the Northern Territory.

The master contacted the Australian Rescue Coordination Centre (RCC) to arrange the medivac. The options for transfer were discussed and the master mentioned to the RCC the option of using the ship’s FRB to transfer the chief engineer to a suitable launch, as they had recently done for another medivac 10 days earlier. During this previous medivac, the conditions were calm, so the second mate, the officer in charge on the deck, did not use the wave compensator and did not explain its use to any other member of the crew.

On 15 May at 1302, the RCC confirmed that the transfer would take place on 16 May to the police launch *Beagle Bay* in the vicinity of the Darwin pilot boarding ground (Figure 6). That evening, the chief mate prepared the paperwork required for the launching of the FRB, including a working at height permit and a job hazard analysis (JHA).

At about 0450 on 16 May, the chief mate was advised that the transfer would happen at about 0630 so the chief mate then asked the bosun and two able seamen to prepare the FRB. At about 0500, the bridge watchkeeper called the second mate and told him that he would be required for the transfer. The second mate went to the FRB where he saw the chief mate, the bosun and the seamen preparing the FRB for use. He then left the area as he knew it would be some time before the boat would be ready.

At about 0540, the fourth engineer was asked to join the FRB team. When he arrived at the FRB, he tested the FRB’s engine and then discussed the transfer with the chief mate before reading the JHA and signing it. The chief mate assigned the fourth engineer to control the lowering of the FRB from within the boat.

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3 All times referred to in this report are ship’s times. Prior to 0830 on 16 May, the ship’s time was Coordinated Universal Time (UTC) + 8 hours. At 0830 on 16 May, the ship’s clocks were advanced to UTC + 9 ½ hours.
At about this time, the chief mate held a ‘toolbox talk’ with the bosun and the two able seamen. They discussed the transfer and it was agreed the bosun would control the davit to raise the FRB from the cradle before swinging it outboard. Only the forward painter was to be used to stabilise the FRB, with the descent being controlled from within the boat by the fourth engineer. The bosun and one of the seamen then signed the JHA. At some time after this the second mate returned to the FRB.

At about 0600, the third mate received a call from the chief mate to come to the FRB to supervise the launch and recovery of the boat. Upon arrival, the third mate and the bosun were briefed by the chief mate about the transfer, with the third mate assigned as in charge on the deck by the chief mate.

At interview the chief officer, third mate and bosun had different recollections of the briefing given by the chief mate as to when the wave compensator should be activated. The chief mate recalled that he had instructed the third mate and bosun to activate the wave compensator when the boat was just in or just above the water. However, the third mate understood that the wave compensator should be activated as soon as the boat was outboard and lowering was to commence. Finally, the bosun indicated that he was to activate the wave compensator once the boat was in the water and the hook had been released.

At about 0614, the master was informed that the FRB was ready for launch. The chief engineer was on the bridge and the master asked him to go down to the FRB as the launch was approaching. When the chief engineer got to the boat, the FRB crew were already on board. He climbed into the boat and his baggage was loaded onto the FRB’s deck. The chief engineer sat in the bow of the boat, slightly to the port side. The fourth engineer was sitting on the starboard side amidships looking inboard. The chief mate was in the coxswain’s seat and the second mate was aft on the starboard side.
At about 0630, the master turned *British Sapphire* to port to create a lee on the port quarter for the transfer. The ship was making good about 3 knots. The master then gave permission for the FRB to be launched.

At about 0645, the bosun lifted the FRB from its cradle before swinging it outboard of the ship. Once the FRB was outboard, the chief mate gave the fourth engineer permission to start lowering the boat.

As the fourth engineer reached for the winch brake release wire, the third mate reached across and pressed the wave compensator button on the remote control unit as he believed he had been instructed to by the chief mate. Immediately, the FRB descended, until it hit the water about 18 m below at high speed.

After the FRB hit the water, all the occupants of the FRB were dazed. The chief mate asked the others if they were okay. The second mate said he was injured and could not assist with the transfer while the fourth engineer was in pain but was able to move and assist. The chief engineer was winded and felt sore.

Meanwhile, as the boat fell, the master had heard an unreeling sound, like a winch going too fast. He went to the port bridge wing and saw the FRB in the water. He could see people moving in the boat and immediately attempted to contact them via hand-held radio but got no response from anyone on the FRB.

On board the FRB, the chief mate and the fourth engineer decided to continue with the medivac transfer. The FRB’s engine was started and the fourth engineer released the fall hook. The fall wire then retracted at high speed before the bosun pressed the emergency stop button. The chief mate then released the forward painter and moved the FRB away from the ship.

By 0655, the chief engineer had been transferred to the police launch *Beagle Bay* and the FRB returned to *British Sapphire*. By 0702, the boat had been recovered without incident and the master had resumed the passage to Withnell Bay.

The chief mate, the second mate and the fourth engineer were all able to disembark the FRB without assistance, but the second mate had to be helped to his cabin. The chief mate visited both the second mate and fourth engineer in their cabins to see how they were. He then went to see the master and detailed what had happened, including the injuries to the second mate and the fourth engineer.

The master checked on the two men, before contacting the ship’s superintendent. As *British Sapphire* was still close to Darwin, it was decided that the injured crew should also be medivaced off the ship.

At 0807 the ship was turned back towards Darwin and the master contacted the port to arrange for the paramedics to return to the ship.

At 1200, the police launch *Beagle Bay* had returned to *British Sapphire* and two paramedics boarded the ship. The paramedics assessed the injured crew and determined that they both needed hospital treatment. After discussion with the master, and given the incident with the FRB, it was decided that the best way to transfer the injured crew to the launch was via the ship’s accommodation ladder.

By 1311, the transfer of the injured crew was complete and *British Sapphire* then departed the port.

On 22 May, *British Sapphire* arrived in Withnell Bay.
2 ANALYSIS

2.1 Evidence

On 22 May 2010, two investigators from the Australian Transport Safety Bureau (ATSB) attended British Sapphire in Withnell Bay, Western Australia. The master, the chief mate, the third mate and the boatswain (bosun) were interviewed and each provided their account of the incident. Copies of relevant documents and records were taken, including the official log book, bridge movement book, safety management system procedures, and maintenance records for the fast rescue boat (FRB).

On 24 May, the investigators interviewed the second mate, the chief engineer and the fourth engineer in Darwin, Northern Territory.

During the course of the investigation further information was obtained from BP Shipping and Davit International.

2.2 The incident

On 16 May 2010, three of British Sapphire’s crew members were injured when the ship’s FRB dropped 18 m during the medical evacuation (medivac) of the chief engineer.

During the launching of the FRB, the third mate pressed the wave compensator button on the davit remote control. When this button was pressed, the safety interlock should have operated and the wave compensation unit should have gone into standby mode, only becoming operational when the FRB was waterborne.

However, when the button was pressed, the safety interlock did not work as designed. Consequently, the wave compensation unit operated immediately and allowed the FRB to make the uncontrolled descent to the sea.

2.2.1 Safety interlock fault diagnosis

The safety interlock fitted to the wave compensation system on the FRB davit was designed to prevent the system becoming operational until the boat was waterborne. When properly installed, the weight of the FRB on the fall wire should have compressed the shock absorber sufficiently to keep the magnetic switch actuated and the normally closed load control contact (S26, Figure 7) open in the safety interlock circuit. In this condition, depressing the wave compensator button on the davit remote control would only place the wave compensation system on standby. However, when activated during this incident on 16 May, the system did not operate as designed.

Following the incident, Davit International and BP Shipping worked in conjunction to develop a testing routine for the wave compensation system. This testing routine was then sent to British Sapphire and its three sister ships (British Emerald, British Ruby and British Diamond) so that each ship’s wave compensation system could be tested.
The crew on board *British Sapphire* conducted a continuity test on the shock absorber mounted compensator magnetic switch. The switch operated as expected; opening when the weight was on the fall wire and closing when the weight came off. This verified the function of the switch itself.

They then activated the wave compensator system by pushing the compensator button while the weight of the FRB was on the fall and the wire shock absorber was compressed (magnetic switch in the open position). The wave compensator lamp on the remote control unit illuminated and the FRB made an uncontrolled descent to the water.

Finally, the crew pressed the wave compensator button while the FRB was in the water (i.e. no weight on the fall and magnetic switch in the closed position). The wave compensator became active and the fall wire tensioned as expected.

The crew then compared the compensator system electrical connections with the circuits shown on the on board electrical drawings for the system. All the electrical connections were found to be consistent with the drawings.

The tests carried out on board *British Sapphire* confirmed that the compensator system did not operate as designed. However, tests did not identify the source of the problem.

Similar tests were carried out on board the three sister ships, with the wave compensator not working correctly on any of them. However, a crucial discovery was made when the engineers on board one of the ships noticed that the electrical drawings had been altered in red pen. As a result of this finding, BP Shipping asked Davit International to supply a set of ‘original’ electrical drawings. These drawings were then forwarded to the ships for further checking.

The ‘original’ drawings were different to the ships’ drawings and the on board electrical wiring. When the engineers traced out the differences, they identified that the wave compensator magnetic switches on board *British Sapphire, British Emerald* and *British Ruby* had been bypassed (Figure 7). Hence the opening and closing of the magnetic switches was not having any effect on the operation of the wave compensator systems as the safety interlock was bypassed. The wave compensator on *British Diamond* was also not working but this was due to mechanical issues, which were resolved, and not as a result of the magnetic switch being bypassed.
There was no evidence to indicate that the wiring had ever been changed on board *British Sapphire*, *British Emerald* and *British Ruby*, so it is likely that the wave compensator safety interlocks on board the three ships had not worked since commissioning as the magnetic switches had been bypassed since the system had been installed.

### 2.3 FRB davit manufacture and installation

On 4 July 2007, Davit International issued a certificate of testing of life-saving launching appliances, stating that the launching appliance was tested and that the tests performed did not reveal any defects. The certificate stated:

- That the launching appliance corresponded with drawings approved by Lloyd’s Register (LR), and
- That the driven system for turning and slewing of the launching appliance possessed stored mechanical energy.

In addition, the FRB davit was supplied with a European Community (EC) declaration of conformity. This declaration was also issued on 4 July 2007 and was issued by the notified body, Germanischer Lloyd (GL). The declaration stated that the FRB davit had been examined in accordance with the conformity-assessment of modules B and D of the European Council Directive 96/98/EC.

Under the conformity-assessment, GL, as the notified body, were required to ascertain and attest that a specimen, representative of the production envisaged, complied with the provisions of the international instruments that applied to it. Davit International was then required to operate an approved quality system for production, final product inspection and testing that ensured the FRB davit conformed to type.

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As part of Davit International’s quality assurance program, the wave compensation unit supplied to British Sapphire was tested at the factory on 3 July 2007 and was found to be working.

After manufacture, the FRB davit was transferred to the shipyard where it was fitted to British Sapphire. After delivery of the FRB davit, no commissioning or testing was done by Davit International and it is not known whether any other testing was done on the FRB davit as part of the installation process.

BP Shipping reported that following completion of the ship and during delivery, it had not been possible to launch the FRB because of poor sea states. Consequently, the ship’s master was requested to carry out a launch when the opportunity presented itself. The launch was reported as having been carried out but it is unknown if the wave compensation function or safety interlock was checked.

While there are no records to indicate whether the wave compensator system was appropriately tested at the time of the ship’s delivery, there were a series of documents that stated that the davit system was appropriately designed and, at the time of manufacture, tested. However, the tests and inspections carried out after the incident on board British Sapphire on 16 May 2010 showed that the wave compensation safety interlock had been electrically bypassed and, as a result, could not have operated as designed. It could not be determined exactly when by-passing of the magnetic switches was done.

2.4 Davit maintenance

British Sapphire and its sister ships had a planned maintenance system which included the FRB davit. The periodic maintenance planned for the davit was based on the requirements contained in the Davit International instruction manual for the FRB davit and included work orders for weekly, monthly, two monthly, three monthly, yearly and five yearly services.

The weekly, monthly and three monthly services were performed by the crew while the yearly works were to be performed by approved service agents.

On board maintenance

While the weekly, monthly and three monthly works made no reference to the wave compensator or limit switches, they all included the procedure for recommissioning as follows:

Where practical and applicable, carry out test run. Confirm all operating parameters and indicators are within normal limits.

However, the maintenance work orders did not specify what constituted a test run. Davit International advised that even in relatively calm waters it would have been possible to test the wave compensator as waves of 10-20 cm would have resulted in visible rotation of the winch drum.

When interviewed, the chief engineer said he had some understanding of the function of the wave compensator while the fourth engineer was not even aware of its existence until after the incident. None of the crew interviewed, including the chief engineer or fourth engineer, knew about the safety interlock. While the on board maintenance was being conducted it is likely that the crew’s unfamiliarity...
with the system would have impacted their ability to properly conduct maintenance on it.

Even if maintainers are not familiar with equipment, it is important that maintenance procedures are detailed enough to do the required tasks and return the equipment to service in a safe state. It is likely that the crew’s unfamiliarity with the system combined with the lack of sufficiently detailed instructions for the maintenance, and subsequent ‘test run’, had allowed the problem with the wave compensator safety interlock to go undetected during periodic maintenance performed on board in the time leading up to the incident.

**Annual Maintenance**

The yearly maintenance works were carried out by an approved davit and lifeboat service agent. The next yearly maintenance was due on 16 August 2010. The yearly maintenance work order for the winch included the following instructions:

- Where fitted check all limit and magnetic switches for contact wear, moving parts, conductors, screw and terminal tightness and correct function.
- Function test prior to returning to service.

The yearly maintenance work order for the winch was the only work order which made any reference to limit or magnetic switches. This work order required all limit and magnetic switches to be checked but it did not list or specify the location of the limit switches which had to be checked.

In addition, the yearly winch maintenance also required a function test to be carried out prior to return to service. Once again, the maintenance work order did not specify what constituted a function test.

The last yearly maintenance on the davit was conducted by an approved service agent on 16 August 2009 as per the requirements. This inspection did not identify any problems with the davit. With the safety interlock wired as it was found following the incident, the safety interlock on the wave compensator on *British Sapphire* could never have been tested once it was in service. This also suggests that the previous annual maintenance on the davit was deficient and that the approved service agents were not sufficiently familiar with the operation of the wave compensator safety interlock.

### 2.5 Manuals and procedures

*British Sapphire* safety management system (SMS) contained a number of procedures which dealt with the launching and recovery of the FRB. These included:

- Davit International instruction manual for the fast rescue boat handling system,
- Bridge systems and equipment operating manual,
- Procedures to launch and recover the rescue boat (located on the bulkhead adjacent to the FRB davit),

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5 Approved under International Maritime Organisation (IMO) circulars MSC.1/ Circ. 1206 and 1277
• SOLAS training manual, and
• Rescue boat launching and recovery procedure (located on the control box for the FRB davit).

The primary source of information was the Davit International manual for the FRB handling system. This manual detailed the various ways in which the FRB could be launched and recovered. These instructions included the use of the wave compensator for launch and recovery.

The instruction for launch using wave compensation stated:

As soon as the craft is waterborne stop lowering and make sure the wave compensation button on the portable remote control station is pressed once. The wave compensation will tension the wire rope automatically. To stop wave compensation bring the appropriate lever on the control desk one time in hoisting or lowering position.

The instruction for launch using the wave compensator gives some indication of the function of the wave compensator and how to deactivate it. It also stated that the wave compensator button should only be pressed once the FRB was waterborne but it gave no rationale as to what could happen if the button was pressed before this or why it should only be used when the boat was waterborne. In addition, it did not describe what would happen with the fall hook once it was released from the boat.

The instruction for recovery using wave compensation stated:

Make sure the wire rope falls contains slack and fasten the suspension in the boat hook.

Start wave compensation by means of the push button situated on the portable remote control station.

Start hoisting from the portable remote control station on deck. Wave compensation will be switched off automatically.

The instruction for recovery using the wave compensation did not detail what activation of the system would do. However, it did state that hoisting would automatically switch off the wave compensator.

Later in the manual, it described the portable remote control station and the functions which were integrated into the unit, including:

WAVE COMPENSATION ON; with this push button the wave compensation mode can be activated. This mode is deactivated, as soon as the hoisting/lowering lever of the electric proportional control valve is operated. The button indicator enlightens as soon as the button is activated.

While the instruction manual did not provide a detailed description of the wave compensator, including its function or that of the safety interlock it was the only guidance available to the crew on the use of the wave compensator for both launch and recovery or how the wave compensator was deactivated.

None of guidance which was available to British Sapphire’s crew contained any detail on the function or use of the wave compensator or the associated safety interlock. The guidance was also inconsistent in its approach to launching and recovering the FRB with the instructions placing different emphasis on what was required.
While the manufacturer’s instruction manual provided the most information, it was not readily available at the launch location. Two different ship’s procedures for the launch and recovery for the FRB were located by the davit. While these procedures were similar, they were not identical and neither made reference to the use of the wave compensator for launching and only one considered the use of the wave compensator for recovery. Davit International also supplied a handling pictogram which can be displayed at the launch location which stated in step ten of the launching sequence that ‘if necessary use wave compensation when waterborne only’, however this was not displayed on British Sapphire.

In summary, the manuals and procedures on board British Sapphire were inconsistent, did not assist the crew in the operation of the davit and FRB when using the wave compensator, nor did they provide sufficient information about the wave compensator, its safety system or any associated hazards.

2.6 Training and drills

BP Shipping had a ‘training passport’ to ensure that ships’ crews were competent in certain areas of ship board operations. The training passport included a certificate of familiarisation in fast rescue craft, where training had been provided on board by a person who had attended a shore based training establishment. The familiarisation included the davits themselves, safety checks, dangers involved and launching and recovery procedures.

However, the training passport was applicable across BP Shipping’s entire fleet. The fleet contained a variety of vessels, all fitted with different FRBs and davits, some with and some without wave compensation units. Consequently, nothing was specific to British Sapphire’s equipment or the hazards associated with it.

In addition to this generic familiarisation, British Sapphire’s crew conducted training and drills using the FRB at least once a month. The chief mate stated that, during the drills, different crew members were presented with the opportunity to operate the FRB. As a result, the chief mate would usually be in charge on the deck and operate the davit’s remote control. The chief mate also stated that he often used the wave compensator to keep tension on the fall wire but would only activate it once the FRB was in the water. Consequently, during these drills, it is unlikely that any other crew member would have had the opportunity to use the remote control unit or the wave compensator.

In order to minimise the risks, British Sapphire’s FRB drills were usually carried out in calm conditions. Furthermore, the previous time the FRB had been launched was for a medivac on 4 May 2010 the conditions were calm, so the second mate, the officer in charge on the deck, did not use the wave compensator and did not explain its use to any other member of the crew.

Consequently, only the chief mate had used the wave compensator. Of the rest of the crew interviewed after the incident, the chief engineer and the third mate said that they had some understanding of the function of the wave compensator but had never used it. However, the third mate cannot have been familiar with the system, and the prescribed procedure for its use, given his actions in pressing the wave compensator button with the FRB 18 m above the water.
While regular drills were conducted on board *British Sapphire*, the crew were not sufficiently familiar with the wave compensator unit, how it operated or the hazards associated with its use.

### 2.6.1 FRB duty allocations

The FRB muster list stated that the chief mate, the third engineer and one able-bodied seaman (AB) made up the boat party. The second mate was in charge on deck, with the bosun and another AB. However, at the time of the incident, those in the boat and on deck were not as prescribed by the muster list. The FRB was crewed by the chief mate, the second mate and the fourth engineer. The third mate, the bosun and two ABs were on deck.

The third mate had been in charge on deck during FRB launching and recovery before on other ships. However, 16 May was the first time he had been in charge on board *British Sapphire*. The bosun had observed the operation of the davit remote control during the medivac on 4 May 2010 but he had never actually operated it. In addition, the fourth engineer stated that he had never been involved in a FRB drill and this was his first time in the boat but that he had observed the previous medivac.

While *British Sapphire*’s muster list specified the roles for individuals when operating the FRB, the drills on board the ship were conducted in such a way that those members of the FRB crew and launch/recovery party were not able to get the required practice and experience in those roles. When it came to using the specific equipment for the launching of the FRB, they did not know how things operated.

While it is important for crew to be able to train in other roles, they must first have the required level of competence in the role they are required to fulfil according to the muster list. This combination of not operating according to the muster list and not conducting drills according to the muster list resulted in crew not being fully familiar with their roles at the time of the incident.

### 2.7 Resource management

On the morning of 16 May, when considering the launching of the FRB, a number of resource management issues were present, of which an effective briefing may be considered the most important to the accident.

A good briefing should allow the entire team to develop a shared mental model of what is going to happen and how it is going to be done with defined roles, responsibilities and limits. A key to a good briefing is communication which should be open, interactive and closed loop to ensure that communications are clear and understood.

The briefings undertaken by the chief mate did not include everyone together in a single briefing before the operation was to start. As a result, it was unlikely that the crew would have formed a shared mental model or clear understanding of their roles and responsibilities during the operation. This is indicated through the confusion between the chief mate, the third mate and the bosun regarding when the wave compensator should be activated, and who would activate it.

When the chief mate briefed the third mate and the bosun the understanding reached by each of the three differed. The chief mate recalled that he had instructed the third
mate and bosun to activate the wave compensator when the boat was just in or just above the water. However, the third mate understood that the wave compensator should be activated as soon as the boat was outboard and lowering ready to commence. Finally, the bosun indicated that he was to activate the wave compensator once the boat was in the water and the hook had been released. There was no closed loop in the briefing process.

If good resource management principles had been taught to all the crew, and then applied across all operations, this may have positively influenced the actions and performance of the crew both before and during the operation to launch the FRB.

2.8 Job Hazard Analysis

The job hazard analysis (JHA) for launching the FRB was prepared by the chief mate and signed on the day of the incident. The JHA was a generic one which could be modified on board as required. However, on this occasion, the chief mate did not make any amendments to it.

The JHA detailed a sequence of steps for the launch and recovery of the FRB, the potential hazards, hazard effects and the risk mitigation for each step. Importantly, however, the steps detailed in the JHA were not the same as those contained in the FRB davit manuals or ship’s procedures.

In addition, the JHA did not identify the wave compensation unit in either the sequence of steps, hazards or risk mitigation. In the JHA, one of the prescribed steps was to assess the weather and sea conditions with the hazard of injury and damage. However, the mitigation did not mention the use of the wave compensator, the very device which was designed to reduce the risk in sea swell conditions to keep tension on the fall wire.

The process undertaken to complete the JHA did not consider the use of the wave compensation as either one of the sequence of steps, the hazards associated with its use or as a risk mitigation for other hazards. This indicates that the crew who completed and subsequently signed the JHA were not familiar with the launching system, in particular the operation of the wave compensator.

2.9 International training requirements

In 1978, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) established basic requirements on training, certification and watchkeeping for seafarers on an international level. Previous to STCW the standards of training, certification and watchkeeping of officers and ratings varied widely.

The STCW Convention prescribe minimum standards relating to training, certification and watchkeeping for seafarers which flag States are obliged to meet or exceed. The regulations contained in the STCW Convention are supported by sections in the STCW Code. As the international minimum standard, training establishments will deliver approved STCW courses that meet the requirements of the STCW Code. These courses are usually based on the IMO model course and audited by the relevant flag State’s marine safety authority or their delegate.
Section A-VI/2 of the STCW Code covers the mandatory minimum requirements for the issue of certificates of proficiency in survival craft, rescue boats and fast rescue boats. It states the knowledge, understanding and proficiency required for the minimum standard of competence include:

- Various types of device used for launching survival craft and rescue boats,
- Methods of launching survival craft into a rough sea,
- Methods of recovering survival craft,
- Methods of launching and recovering rescue boats in a rough sea.

There is no specific mention of wave compensation units or their operation in the STCW Code. However, a knowledge, understanding and proficiency in their use could be included in any of the requirements listed above.

During the investigation into the FRB incident on board *British Sapphire*, the ATSB contacted a number of Australian and international training establishments that deliver approved STCW courses in the proficiency in survival craft and rescue boats (other than fast rescue boats) and proficiency in fast rescue boats to determine if wave compensators were covered as part of their courses.

None of the training establishments contacted specifically covered wave compensators as part of their courses, although some advised they may discuss them in the course of their training. Several training establishments were not even aware of what a wave compensator was or their function.

Whilst the requirements of the STCW Code are quite generic, it is reasonable to expect that training establishments keep up with the latest developments in the maritime industry, with respect to wave compensation units, to ensure their courses provide students with the required knowledge to safely work in the maritime industry.
3 FINDINGS

3.1 Context

At about 0645 on 16 May 2010, off the port of Darwin, Northern Territory, the fast rescue boat (FRB) from the Isle of Man registered liquefied natural gas tanker *British Sapphire* made an uncontrolled descent of about 18 m, impacting with the water below, and resulted in the injury of several crew members on board the FRB.

At the time of the incident, *British Sapphire* was en route from Yung An, Taiwan, to Withnell Bay, Western Australia and had diverted to Darwin for a medical evacuation.

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

3.2 Contributing safety factors

- On 16 May 2010, during the launching of *British Sapphire*’s fast rescue boat, the third mate pressed the wave compensator button on the davit remote control while the boat was suspended 18 m above the water.

- *British Sapphire*’s fast rescue boat davit wave compensator safety interlock did not operate as designed to prevent the fast rescue boat from free falling to the water.

- It was found that the safety interlocks on the wave compensator systems on board *British Sapphire*, *British Emerald* and *British Ruby* had been electrically by-passed thereby preventing them from functioning. As a result, the wave compensators on board all three ships could be engaged regardless of whether the fast rescue boats were waterborne or suspended from the fall wire. [Significant safety issue]

- The maintenance and testing of the fast rescue boat davit by approved service agents had not identified that the wave compensator safety interlock was not correctly functioning on board *British Sapphire*. [Significant safety issue]

- The training provided to the crew did not ensure they were sufficiently familiar with the function or operation of the wave compensator or its safety interlock. [Minor safety issue]

- Davit International’s fast rescue boat davit manual did not provide sufficient guidance for the crew in the operation of the wave compensator and its safety interlock. [Minor safety issue]

- *British Sapphire*’s fast rescue boat davit procedures did not provide sufficient guidance for the crew in the operation of the wave compensator. [Minor safety issue]

- The job hazard analysis for the operation of the fast rescue boat was incomplete and did not include an assessment of the hazards associated with the operation of the wave compensator. [Minor safety issue]
• The crew did not use resource management principles to ensure that they had a shared mental model of the task that they were carrying out. As a result, there was confusion amongst the various crew members as to their roles and responsibilities at the time of the incident. [Minor safety issue]

3.3 Other safety factors

• There was no evidence to indicate that the operation of British Sapphire’s (or its sister ships’) fast rescue boat davit’s wave compensator and safety interlock had been adequately tested at the time of the ship’s delivery to ensure its safe operation. [Significant safety issue]

• The planned maintenance system on board British Sapphire did not include a specific requirement to maintain or test the wave compensator or its safety interlock on the fast rescue boat davit. As a result, the crew had not identified the issue with the wave compensator safety interlock during periodic maintenance. [Significant safety issue]

• The planned maintenance system on board British Sapphire did not detail a procedure for a recommissioning test following maintenance on the fast rescue boat davit. As a result, any recommissioning test that was done after on board maintenance had not identified the issue with the wave compensator safety interlock prior to the incident. [Minor safety issue]

• The fast rescue boat crew was not the same as that documented on the muster list. They were undertaking different tasks to those that they were practised in, tasks they were probably not completely familiar with.

• Training institutions delivering approved STCW courses are not keeping up to date with the introduction of wave compensation units to ensure their courses provide students with the knowledge required to safely operate these units. [Minor safety issue]

3.4 Other key findings

• The fast rescue boat descended approximately 18 m uncontrolled and impacted with the water resulting in serious injuries to the crew.

• The third mate and the rest of crew were not familiar with the function or operation of the wave compensator or its safety interlock.
The safety issues identified during this investigation are listed in the Findings and Safety Actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

4.1 Davit International

4.1.1 Wave compensator wiring

*Significant safety issue*

It was found that the safety interlocks on the wave compensator systems on board *British Sapphire*, *British Emerald* and *British Ruby* had been electrically by-passed thereby preventing them from functioning. As a result, the wave compensators on board all three ships could be engaged regardless of whether the fast rescue boats were waterborne or suspended from the fall wire.

*Action taken by Davit International*

The ATSB has been advised that Davit International after sales department will contact owners of ships with similar wave compensation safety switch systems to check if a similar problem can occur. In addition, Davit International will put an additional warning in instruction manuals and send revised pages to owners with the same or similar wave compensation systems.

*ATSB assessment of action taken*

The ATSB is satisfied that the action proposed by Davit International adequately addresses the safety issue.

4.1.2 Manuals for the fast rescue boat davit

*Minor safety issue*

Davit International’s fast rescue boat davit manual did not provide sufficient guidance for the crew in the operation of the wave compensator and its safety interlock.
**Action taken by Davit International**

The ATSB has been advised that Davit International submitted the complete instruction manual to Lloyd’s Register and as such it is approved. The manual consists of 86 pages and correct use of the wave compensation is mentioned on manual pages: 11, 13, 20 and 35. The limit switch its number/marking/function/diagram is mentioned on pages: 25, 52, 64 and 70.

However, Davit International has reviewed the manual and will put on pages 10, 11, and 12 of instruction manual the additional sentence:

! Use wave compensation only with survival craft waterborne!

Davit International will send the revised pages of the manual to ship-owners with the same or similar wave compensation safety interlock systems.

**ATSB assessment of action taken**

The ATSB is satisfied that the action proposed by Davit International adequately addresses the safety issue.

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**4.2 BP Shipping**

**4.2.1 Crew training with the wave compensator**

*Minor safety issue*

The training provided to the crew did not ensure they were sufficiently familiar with the function or operation of the wave compensator or its safety interlock.

**Action taken by BP Shipping**

The ATSB has been advised that BP Shipping (BPS) is producing a training DVD that will cover:

- Routine checks and maintenance of boats and davits including
  - Limit switches
  - Engine and small gear checks
  - Bilge pump, steering and interlocks
- Job Hazard Analysis and Risk Assessment
- Launching and recovery of the boat
- Wave compensator for Gem, Virtue and C Class vessels
- Operation of the boat and the recovery of casualties from the water
- Emergency operations and breakdowns
- Contingency planning
The DVD will be BP Shipping specific but will be produced in conjunction with the rescue boat manufacturers and the davit manufacturers as well as having input from Flag and Class.

The DVD will be complete by the second half of 2011 and will be on the vessels by the end of 2011.

**ATSB assessment of action taken or response**

The ATSB is satisfied that the action proposed by BP Shipping adequately addresses the safety issue.

### 4.2.2 Procedures for the fast rescue boat davit

**Minor safety issue**

*British Sapphire’s* fast rescue boat davit procedures did not provide sufficient guidance for the crew in the operation of the wave compensator.

**Action taken by BP Shipping**

The ATSB has been advised that BP Shipping’s training DVD and improved signage will deal with this, however, the manufacturers’ procedures that form the basis of these procedures are clear in that the wave compensator button is not to be pressed until the boat is in the water.

Signs attached to the wandering control box will be fitted, reminding staff that the wave compensator button is only to be pressed when the boat is in the water. These signs already exist and were provided by the manufacturer for the wave compensation devices fitted to our Virtue and C Class vessels.

**ATSB assessment of action taken**

The ATSB is satisfied that the action proposed by BP Shipping adequately addresses the safety issue.

### 4.2.3 Job hazard analysis for the fast rescue boat

**Minor safety issue**

The job hazard analysis for the operation of the fast rescue boat was incomplete and did not include an assessment of the hazards associated with the operation of the wave compensator.

**Action taken by BP Shipping**

The ATSB has been advised that, from 2011, BP Shipping’s core group of seven dedicated Fleet Safety Training Officers are providing additional hazard awareness training on board and from late 2010, all sea staff briefings have included hazard awareness interventions and lessons learned focused on hazard awareness.
**ATSB assessment of action taken**

The ATSB is satisfied that the action taken by BP Shipping adequately addresses the safety issue.

### 4.2.4 Team resource management

**Minor safety issue**

The crew did not use resource management principles to ensure that they had a shared mental model of the task that they were carrying out. As a result there was confusion amongst the various crew members as to their roles and responsibilities at the time of the incident.

**Action taken by BP Shipping**

The ATSB has been advised that the BP Shipping Control of Work (CoW) procedure requires Tool Box Talks (TBT) to be carried out before any job is carried out. The CoW system is audited regularly by the vessel Shipboard Management Team and BP Shipping’s own internal auditors.

This is however only a snapshot. The TBT was incomplete on this occasion. Staff have been reminded of their obligations under the BP Shipping CoW system and the consequences of incomplete TBT’s have been highlighted in Fleet Safety Training Officers visits and the sea staff briefings being conducted after this incident.

The BP Shipping CoW system is being reviewed and updated. The requirement to carry out good quality TBT’s will be emphasised and tools will be provided to the Fleet to enable them to carry out better quality TBT’s. The review will be complete by the end of 2011 and guidance will have been issued then.

**ATSB assessment of action taken**

The ATSB is satisfied that the action taken by BP Shipping adequately addresses the safety issue.

### 4.2.5 Acceptance of the fast rescue boat davit

**Significant safety issue**

There was no evidence to indicate that the operation of British Sapphire’s (or its sister ships) fast rescue boat davit’s wave compensator and safety interlock had been adequately tested at the time of the ship’s delivery to ensure its safe operation.

**Action taken by BP Shipping**

The ATSB has been advised that BP Shipping has included a requirement within its design and construction standards for the commissioning of life saving appliances shall include full functional tests including all protective devices. The requirement will be included within the vessel contract specification.
**ATSB assessment of action taken**

The ATSB is satisfied that the action taken by BP Shipping adequately addresses the safety issue.

### 4.2.6 Maintenance of the fast rescue boat davit

**Significant safety issue**

The planned maintenance system on board *British Sapphire* did not include a specific requirement to maintain or test the wave compensator or its safety interlock on the fast rescue boat davit. As a result, the crew had not identified the issue with the wave compensator safety interlock during periodic maintenance.

**Action taken by BP Shipping**

The ATSB has been advised that BP Shipping has developed a vessel specific job description for those vessels with rescue boats fitted with wave compensation. This description has been included within and managed by the vessels’ Computerised Maintenance Management System (CMMS).

**ATSB assessment of action taken**

The ATSB is satisfied that the action taken by BP Shipping adequately addresses the safety issue.

### 4.2.7 Recommissioning of the fast rescue boat davit

**Minor safety issue**

The planned maintenance system on board *British Sapphire* did not detail a procedure for a recommissioning test following maintenance on the fast rescue boat davit. As a result, any recommissioning test that was done after on board maintenance had not identified the issue with the wave compensator safety interlock prior to the incident.

**Action taken by BP Shipping**

The ATSB has been advised that a requirement to complete a boat launch has been included in all invasive lifeboat and rescue boat davit maintenance job descriptions as follows.

Complete boat launch procedure as soon as possible post this maintenance to confirm satisfactory operation of all controls, indicators, components, limit switches, brakes and protection devices.

**ATSB assessment of action taken**

The ATSB is satisfied that the action taken by BP Shipping adequately addresses the safety issue.
4.3 Ship operators, ship masters and maritime training institutions

Minor safety issue

Training institutions delivering approved STCW courses are not keeping up to date with the introduction of wave compensation units to ensure their courses provide students with the knowledge required to safely operate these units.

ATSB Safety Advisory Notice MO-2010-004-SAN-016

The Australian Transport Safety Bureau advises that ship operators, ship masters and maritime training institutions should consider the safety implications of this safety issue and take action where considered appropriate.
APPENDIX A: EVENTS AND CONDITIONS CHART

On 10 May 2010, British Sapphire departs Yung An, Taiwan.

The ship's destination is Withnell Bay, Western Australia.

At about 1130 on 14 May, the chief engineer reports feeling unwell to the master.

The master obtains advice from the company telemedical advice service.

A medical evacuation (medivac) is advised.

Although the ship is near Indonesia, Darwin is seen by the master as the preferred port for the medivac.

At 0545 on 15 May, the master obtains Australian telemedical advice.

This advice also recommends a medivac.

The medivac will be by the ship's fast rescue boat (FRB) to a police launch.

At about 0500 on 16 May, the FRB is prepared for launching.

A Working at Height permit and Job Hazard Analysis are signed.

At about 0545, a 'toolbox talk' is held between the chief mate, the bosun and two crew.

The third mate, who will be in charge of the deck operation is not present.

The third mate and bosun have a different understanding of the operation.

Neither man has performed the role that he will be undertaking that day.

At about 0800, the chief mate briefs the third mate and bosun about the launching.

The third mate presses the wave compensator button.

He does not understand how the wave compensator works.

At about 0845, the bosun lifts the FRB from its cradle and swings it outboard.

The FRB descends uncontrolled 18m to the water below.

The FRB occupants are injured to varying degrees.

The ship's instructions in the compensator's use differs from the manufacturers.

The medivac goes ahead and the ship continues its voyage.

The master seeks medical advice and another medivac is recommended.

At 0807, the master turns British Sapphire back towards Darwin.

By 1311, the injured crew have left the ship and it resumes its voyage.
### British Sapphire

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<td>Net tonnage</td>
<td>31,576</td>
</tr>
<tr>
<td>Deadweight (summer)</td>
<td>84,303 tonnes</td>
</tr>
<tr>
<td>Summer draught</td>
<td>12.22 m</td>
</tr>
<tr>
<td>Length overall</td>
<td>288.43 m</td>
</tr>
<tr>
<td>Length between perpendiculars</td>
<td>275.00 m</td>
</tr>
<tr>
<td>Moulded breadth</td>
<td>44.20 m</td>
</tr>
<tr>
<td>Engine</td>
<td>2 x Wartsila 12V50DF &amp; 2 x Wartsila 9L50DF</td>
</tr>
<tr>
<td>Total power</td>
<td>29,126 kW</td>
</tr>
<tr>
<td>Speed</td>
<td>21.0 knots</td>
</tr>
<tr>
<td>Crew</td>
<td>30</td>
</tr>
</tbody>
</table>
APPENDIX C: SOURCES AND SUBMISSIONS

Sources of Information

*British Sapphire*’s master and crew
BP Shipping
Davit International

References

International Maritime Organisation (IMO) MSC.1/ Circ. 1206 and 1277
The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Section A-VI/2

Submissions

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

A draft of this report was provided to *British Sapphire*’s master, chief mate, second mate, third mate, chief engineer, fourth engineer and bosun, BP Shipping, Davit International, the Isle of Man Ship Registry and the Australian Maritime Safety Authority (AMSA).

Submissions were received from *British Sapphire*’s master, BP Shipping, Davit International, the Isle of Man Ship Registry and AMSA. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.
Independent investigation into the fast rescue boat incident on board the Isle of Man registered liquefied natural gas tanker

*British Sapphire*

off Darwin, Northern Territory

16 May 2010