

Report on the investigation into the girding and capsizing
of the mooring launch

Asterix

at Fawley Marine Terminal, Southampton, UK

30 March 2015



Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2012 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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GLOSSARY OF ABBREVIATIONS, ACRONYMS AND TERMS

ABP	-	Associated British Ports
AIS	-	Automatic identification system
Bit	-	A post to which a rope is secured (also spelt Bitt)
bkW	-	brake kilowatt
BML	-	Boatmaster's licence
BTA	-	British Tugowners Association
COSWP	-	Code of Safe Working Practices for Merchant Seamen consolidated edition 2010 ¹
CPP	-	Controllable Pitch Propeller
DNV GL	-	Det Norske Veritas Germanischer Lloyd
ETA	-	European Tug Owners Association
FMT	-	Fawley Marine Terminal
Girting	-	Risk of capsizing due to high athwartships towing forces
Gog rope	-	A rope used to prevent girting
GPS	-	Global Positioning System
gt	-	Gross tonnage
kt(s)	-	knot(s)
m	-	metre(s)
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
nm	-	nautical mile(s)
NWA	-	National Workboat Association
PMSC	-	Port Marine Safety Code
RYA	-	Royal Yachting Association
SAR	-	Search and rescue
SCV	-	Small Commercial Vessel (Code)
SMS	-	Safety Management System
STCW	-	Standards of Training, Certification and Watchkeeping 1978, as amended (STCW Convention)
T	-	True

¹ Replaced with Code of Safe Working Practices for Merchant Seafarers 2015 edition in September 2015

t - tonne(s)
URN - Unique Reference Number
UTC - Universal co-ordinated time
VHF - Very High Frequency

TIMES: all times used in this report are local (UTC +1) unless otherwise stated



Asterix



Donizetti

SYNOPSIS



At approximately 07:00 on 30 March 2015, the mooring launch *Asterix* girted and capsized while assisting the small chemical tanker *Donizetti* to manoeuvre from berth 6 at Fawley Marine Terminal, Southampton, UK. *Asterix*'s deckhand escaped from the upturned hull and was rescued promptly. However, the coxswain was trapped inside the partially flooded wheelhouse for more than an hour before the launch began to roll upright, when he was sighted and rescued. *Asterix* subsequently sank and, despite successful salvage, was later declared a constructive total loss. Both the coxswain and the deckhand were treated for shock and hypothermia but released from hospital within hours of the accident. There was neither material damage nor injury to personnel on *Donizetti*.

The MAIB investigation established that:

- *Asterix*'s coxswain was not advised that *Donizetti* was about to come ahead, and as the tanker increased speed he was unable to manoeuvre the mooring launch to run alongside it.
- *Donizetti*'s master, the pilot and *Asterix*'s coxswain did not share a common, detailed understanding of the plan, and once the operation commenced opportunities were missed for key information to be exchanged.
- Solent Towage Ltd's risk assessments, procedural instructions and guidance, and in-house training relating to launch towing operations lacked the necessary detail to inform launch crews of the appropriate use of gog ropes as mitigation against girting.
- The launch crews did not drill sufficiently in the use of the manually operated towing hook emergency release under load conditions, so they were ill-prepared to apply the increased force required to operate the system when it was under tension.

Although the intent of The Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations 2015 is for masters engaged in towing operations to have a knowledge of the danger of girting and how to prevent it, anomalies currently exist in respect of towage endorsement qualification requirements. Until such time as these anomalies may be rectified, the Maritime and Coastguard Agency has been recommended to inform tug operators and port authorities of the importance of ensuring that masters engaged in towing operations have the necessary knowledge and skills.

Solent Towage Ltd's parent company, Østensjø Rederi AS, has completed an internal investigation with a resulting action plan aimed at preventing future similar accidents. A recommendation has been made to Østensjø Rederi AS to have full regard to the findings and references to best practice included in this investigation report in implementing its action plan.

Further recommendations have been made to Associated British Ports Southampton with regard to reviewing its assessment of towage operations within the port, and to the National Workboat Association with regard to taking account of the findings of this investigation report in its ongoing development of guidance on towing operations.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ASTERIX*, *DONIZETTI* AND THE ACCIDENT

SHIP PARTICULARS		
Vessel's name	<i>Asterix</i>	<i>Donizetti</i>
Flag	UK	Luxembourg
Certifying authority/ classification society	Society of Consulting Marine Engineers and Ship Surveyors	DNV GL
URN/IMO number	S13WB0131230	9174098
Type	Mooring launch ²	Chemical tanker
Registered owner	Østensjø Rederi AS	Bera Beteiligungsgesellschaft
Manager(s)	Solent Towage Ltd	Gesellschaft Für Oeltransporte M.B.H
Construction	Steel	Steel
Year of build	2013	2000
Length overall	13.08m	99.95m
Registered length	13.08m	95.85m
Gross tonnage	25.41	2335
VOYAGE PARTICULARS		
Port of departure	Fawley	Fawley
Port of arrival	Fawley (intended)	Rotterdam
Type of voyage	Commercial	Commercial
Cargo information	Not applicable	Ballast
Manning	2	11
MARINE CASUALTY INFORMATION		
Date and time	30/03/2015 1907 UTC	
Type of marine casualty or incident	Very Serious Marine Casualty	
Location of incident	Fawley Marine Terminal, Southampton, UK	
Injuries/fatalities	Two injuries	0
Damage/environmental impact	Declared constructive total loss	None
Ship operation	Towing	Manoeuvring
Voyage segment	Departure	Departure
External & internal environment	Wind west-south-west force 4 to 5. Visibility good.	
Persons on board	2	11

² *Asterix* was marketed by the manufacturer as a twin screw tug/workboat. It is referred to by the owners as both a harbour tug and mooring launch. For the purpose of this report the term mooring launch is used to describe the vessel.

At around 1600, *Donizetti* completed cargo discharge and commenced preparations for departure, which was scheduled for 2000. At 1945, a pilot boarded and, shortly afterwards, there was an exchange between the pilot and the master. The pilot advised of his intention to utilise a tug to assist in manoeuvring the vessel off the berth. He considered that with a wind speed gusting to 25 knots and pushing the vessel onto the berth, an obstruction astern and another vessel berthed 30m ahead of *Donizetti*, it would be prudent to employ a mooring launch to assist, if necessary, in lifting the vessel's stern off the berth. At approximately 2000, *Asterix* came alongside and, at the request of the launch coxswain and with the agreement of the pilot, the towline was made fast through *Donizetti*'s starboard quarter fairlead (**Figure 2**).

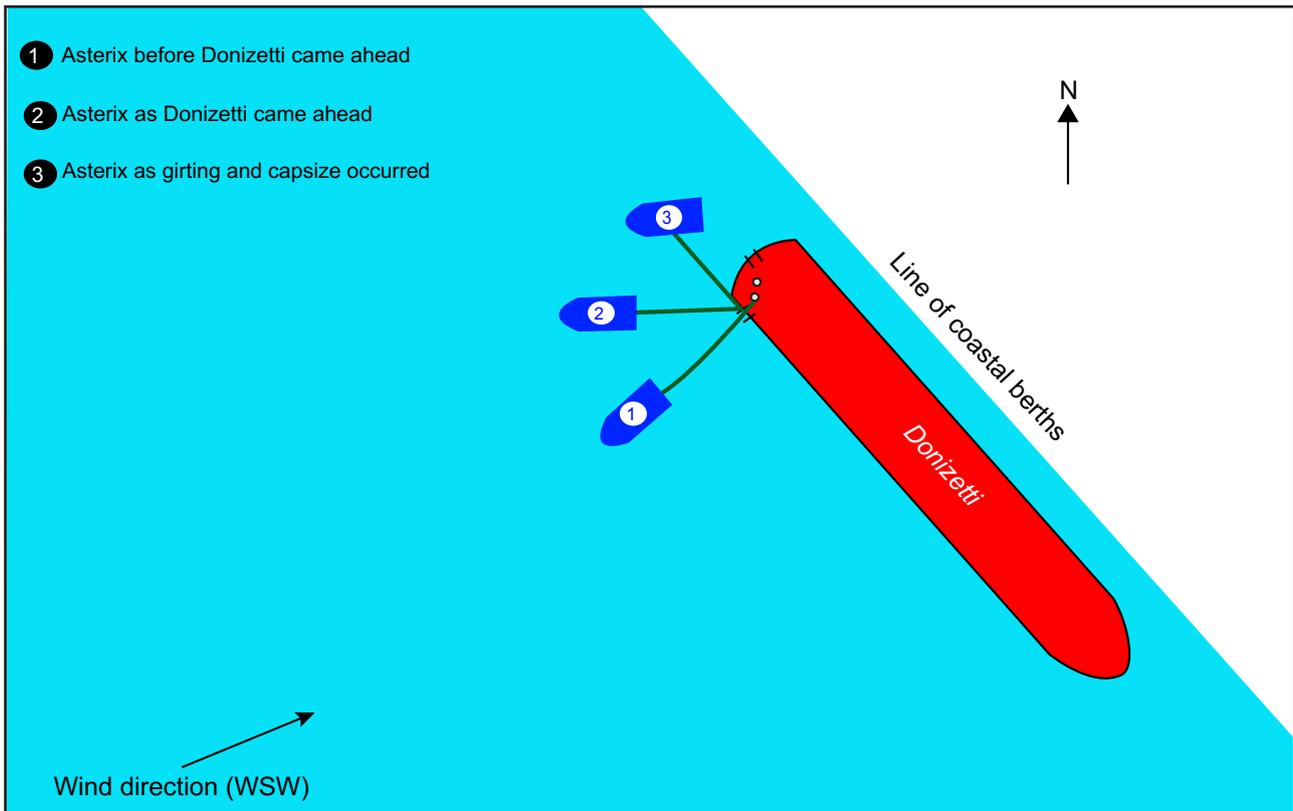


Figure 2: Indicative relative movement of *Asterix*

At 2001, the pilot ordered the launch coxswain to make a 'tight line'³. *Donizetti*'s master ordered port full rudder, dead slow ahead on the controllable pitch propeller (CPP) and bow thrust to starboard. At the same time the headlines, stern lines and after spring were released. The forward spring was left attached to allow the vessel to move bodily off the berth. At approximately 2005, *Donizetti* began to move off the berth and the master brought the CPP control to zero. The vessel then began to drift astern as weight came on the forward spring, and the pilot called for clearance distances from the obstruction astern to be reported. The forward spring was then let go, and it is reported that the order '*Asterix* all easy' was passed by the pilot and acknowledged by the launch coxswain. The master moved the CPP control ahead and *Donizetti*'s speed increased to between 2 and 4kts ahead (**Figure 3**). *Asterix*'s coxswain attempted to turn the launch to port, applying port rudder with the

³ Tight line – The pilot intended that *Asterix* should use just sufficient power to keep the towline clear of the water.

starboard engine ahead and the port engine astern. At about 2006, the pilot ordered the launch to 'run with me', which the coxswain acknowledged. The pilot then ordered the launch to 'come in and let go', which was again acknowledged.

A crew member at *Donizetti's* stern overheard on VHF radio the pilot's order for the launch to let go, and waved it in. He immediately noticed that the launch appeared unable to respond and was listing to port. He instructed *Donizetti's* bridge team by VHF radio to stop engines, and received no response. On board *Asterix*, the coxswain was unable to regain control and requested advice from his deckhand, who was completing logbook entries in the wheelhouse and had not been aware of the launch's situation. The deckhand told the coxswain to put the engines to neutral and to operate the towing hook emergency release. The coxswain attempted to operate the emergency release by pulling on the handle suspended from the wheelhouse deckhead above his head. The coxswain's attempt was unsuccessful and the deckhand left the wheelhouse and attempted to release the towing hook by pulling directly on the emergency release wire; again, this was unsuccessful. *Donizetti's* crew member repeated his instruction to the bridge team to stop engines. The master then asked for clarification and, on receiving it, brought the CPP control to zero.

At 2007, *Asterix* listed further to port and capsized with the towline remaining attached to *Donizetti*. The pilot sent members of *Donizetti's* bridge team to confirm the position and condition of the launch. Following the report of the capsize, *Donizetti's* master released a manoverboard lifebuoy and marker; at the same time, the pilot made a series of emergency calls on VHF radio following which a search and rescue (SAR) operation was initiated.

As *Asterix* capsized, the coxswain was trapped in the wheelhouse by the inrush of water through the open wheelhouse door. The deckhand was initially trapped under the launch but was able to swim clear and reach the surface. The deckhand was located by a shore worker, who kept him in view while calling for assistance. As the deckhand drifted towards a vessel on the adjacent berth, a pilot ladder was lowered and the shore worker was able to descend the ladder and assist the deckhand from the water. The deckhand was then given first-aid treatment on board the vessel until the emergency services arrived and transported him to hospital.

Donizetti continued to make headway along the line of coastal berths and ahead propulsion was applied, as required, to counteract the effect of the wind and prevent collision with the vessels moored alongside. At approximately 2014, *Donizetti* was adjacent to the south dolphin (**Figure 1**), at which point the tug *Apex* was manoeuvred alongside the vessel to hold it in position. *Asterix* remained inverted and connected to *Donizetti* by its towline. The mooring launch *Ibex* then came alongside *Donizetti*, took the towline and, by 2030, *Asterix* had been secured, still upturned, to the dolphin. Meanwhile, Solent Towage Ltd shore management attempted to source diving support to search the vessel.

The SAR efforts continued, with no positive reports as to whether the coxswain was still in the wheelhouse or had escaped into the water. At around 2117, *Asterix* began to roll on to its side and, as the wheelhouse windows came into view, the coxswain could be seen still trapped inside. A crewman from one of the attending tug crews tied a rope around his waist and jumped into the water to attempt a rescue. He

Reproduced from Admiralty Chart BA 2038-0 by permission of the Controller of HMSO and the UK Hydrographic Office.

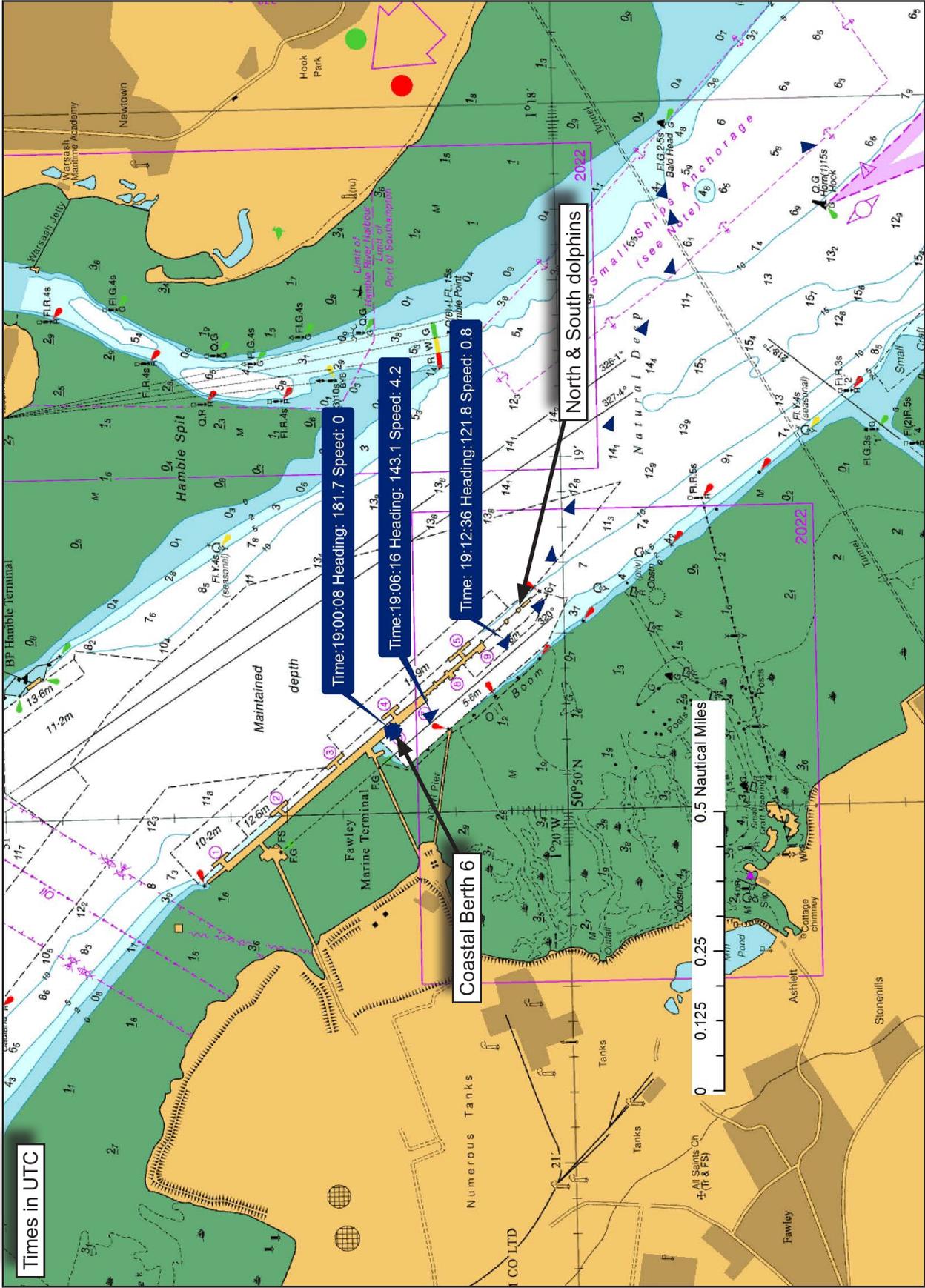


Figure 3: Donizetti automatic identification system track (times shown are in UTC)

was passed a sledge hammer and was then able to break a window and pull the coxswain out of the wheelhouse. The coxswain was transferred to a rescue boat and then brought ashore and transported to hospital.

At approximately 2123, *Asterix* sank, still attached to the south dolphin by its towline.

Donizetti anchored overnight. The vessel's crew and the pilot were tested for the consumption of alcohol; all results were negative.

Asterix's coxswain and deckhand were released from hospital in the early hours of the following day. Both men had been treated for shock and hypothermia.

1.3 SALVAGE

Following the sinking an underwater dive survey was conducted on *Asterix*, which confirmed that the vessel had settled on the bottom with a list of approximately 15°. There was no evidence of external damage. The divers also established that there was no sign of pollution from the vessel; notwithstanding this, measures were taken to prevent fuel leakage, and an anti-pollution boom was rigged around the accident site.

Asterix was recovered from the seabed on 10 April 2015. A floating crane lifted the vessel until the main deck was at sea level. The vessel was then manoeuvred alongside the south dolphin, where residual water was pumped out. Once secure alongside, the vessel was examined by MAIB inspectors.

1.4 VESSEL AND PERSONNEL BACKGROUND

1.4.1 *Asterix*

Asterix was a mooring launch operated by Solent Towage Ltd and based at FMT. It had been delivered to Solent Towage Ltd from the builder in November 2013 to replace a smaller, less capable vessel of the same name.

Asterix was operated as a UK registered workboat, certified as a Category 2 vessel under the Maritime and Coastguard Agency's (MCA) Small Commercial Vessel (SCV) Code. Although, as a Category 2 vessel, *Asterix* was permitted to operate up to 60 miles offshore, it was only operated within 20 miles of the coast, which was within the SCV Code Category 3 limits. As a consequence, the crew only possessed the qualifications necessary to comply with the Category 3 requirements.

Asterix was one of two mooring launches that also fulfilled the function of small harbour tugs. It was manned by two crewmen: one acting as coxswain and one as deckhand. If both were qualified to be coxswain, they rotated duties for each task. The launch crews operated a two-shift routine: a day shift of 0600 to 1800 and a night shift of 1800 to 0600. *Asterix*'s crew at the time of the accident had commenced their shift at 1800, with the assistance to *Donizetti* being the first task of the shift.

The coxswain, a 27-year old UK national, held a Royal Yachting Association (RYA)/MCA Yachtmaster Coastal certificate of competence endorsed for power-driven craft. He did not hold a commercial endorsement for the certificate. By the end of November 2011 he had satisfactorily undertaken an in-house launch crew training

programme provided by the management company, Solent Towage Ltd, on the previous *Asterix*. However, he had not completed a similar programme for the current vessel.

The deckhand was 44 years old and also a UK national. He had been employed by Solent Towage Ltd for approximately 10 years prior to which he had worked in the commercial fishing industry, acting as either skipper or mate on a number of fishing vessels. He held an RYA/MCA Yachtmaster Coastal certificate of competence endorsed for power-driven craft with a commercial endorsement. He was designated as a senior coxswain within the company and had provided significant input to the training of *Asterix*'s coxswain at the time of the accident.

1.4.2 *Donizetti*

Donizetti was a small chemical tanker of 2335gt trading around Europe and the Mediterranean Sea on a series of 'spot market' contracts. The vessel, which was berthed at FMT's coastal berth 6, had discharged cargo at the ExxonMobil refinery and was preparing to sail to Rotterdam in ballast. *Donizetti* had visited Fawley on a number of occasions and usually sailed from the port without the assistance of a launch.

The vessel was equipped with a CPP, a bow thruster and an active (Becker) rudder. It was not fitted with a voyage data recorder (VDR).

The vessel was manned with European officers and Filipino crew, and the working language was English.

Donizetti's master was a 46-year old Polish national who had been master since 2007. He had sailed on either *Donizetti* or its sister vessel *Puccini* since attaining command.

1.4.3 Southampton pilot

The pilot assigned to *Donizetti* for departure from FMT held a 1st class unrestricted pilot qualification and had been a pilot at Southampton since 1989.

1.5 OPERATING ENVIRONMENT

1.5.1 Fawley Marine Terminal minimum towage criteria

The FMT operator, ExxonMobil Fawley, defined the minimum towage criteria for vessels using the terminal. Vessels of 91.5m in length and over were mandated to employ a minimum of one mooring boat for departure. Notwithstanding this, depending upon the vessel's machinery configuration and prevailing weather conditions, there was sufficient evidence available to conclude that pilots often waived the requirement. FMT towage criteria are included in Associated British Ports (ABP) Port of Southampton Port Users Information and Navigational Guidelines. The towage criteria were developed jointly by ExxonMobil Fawley, ABP Southampton and Solent Towage Ltd.

1.5.2 Environmental conditions

On 30 March 2015, high tide was predicted for 2038 with a height of 3.7m.

The wind was west-south-west force 4 to 5 and visibility was good.

1.5.3 Fawley Marine Terminal

Situated on the west shore of Southampton Water, the ExxonMobil refinery at Fawley was the largest in the UK, covering approximately 5 square miles. FMT was 1.5 kilometres long and the largest independently owned terminal in Europe. With nine berths, it could accommodate coasters or part-laden tankers of up to 350,000 tonnes deadweight, and handled in the region of 2,000 ship movements each year. The nine berths comprised ocean berths numbered 1 to 5 and coastal berths numbered 6 to 9 (**Figure 1**). The berths were numbered from north to south, the ocean berths being located on the eastern side and the coastal berths on the western side of the terminal jetty. Vessels using the coastal berths were constrained by draught, displacement and length.

Berth	Depth Below Datum (m)	Maximum Berthing Displacement (t)	Maximum Length of Vessel (m)
1	10.2	51,000	200
2	12.6	83,000	276
3	12.6	66,000	276
4	14.9	179,000	276
5	14.9	244,000	368
6	5.6	4,900	96
7	5.6	3,600	96
8	5.6	3,600	96
9	6.6	8,200	124

Table 1: Fawley Marine Terminal: vessel constraints

Although *Donizetti's* overall length of 99.95m exceeded the maximum length criterion of 96m for berth 6, the restriction had been waived following an assessment by FMT superintendents.

When departing from the coastal berths, the accepted practice was for the departing vessel to pass approximately 25m off any vessels moored on the remaining coastal berths. Therefore, with an average ship beam of 15m plus an effective topline length of approximately 20m, this left very little sea room between the launch and the oil boom, which was often less than 5m.

1.6 VESSEL PARTICULARS

Asterix was a Damen Stan Tug 1205, marketed by the manufacturer as a twin-screw tug/workboat for inland water, harbour and coastal service.

The manufacturer offered the following description of the vessel:

'The single chine hull and the superstructure are of an all welded steel construction. The hull is divided into four watertight compartments. Around the hull at deck level a heavy-duty steel sheerstrake is provided. A bulwark is placed

all around the main deck. The superstructure is placed well inboard and is resiliently mounted to reduce noise levels. Aft of the superstructure is a spacious deck. A double pole towing bit is located on the aft deck. The vessel is propelled by two marine diesel engines, each driving a fixed pitch propeller. These engines have a closed cooling water system and are electrically started.'

Principal dimensions

Length overall (including pushbow)	13.08m
Beam overall (including rubber D-fender)	5.28m
Depth at side (at half length)	2.30m
Displacement (lightship)	52t
Power total	442bkW
Speed (maximum)	9.7kts
Bollard pull (maximum)	13.08t

The vessel was fitted with the following hatch covers and doors:

- An engine room escape hatch cover and an aft peak entrance hatch cover on a raised coaming on the after deck.
- An accommodation entrance hatch cover on a raised coaming in the wheelhouse.
- An escape/store hatch cover on a raised coaming on the fore deck.
- A flush hatch cover fitted in the fore deck for access to the fore peak.
- A flush hatch cover on the main deck to facilitate removal of the engines.
- A door between the engine room and the accommodation.
- An entrance door in the aft bulkhead of the wheelhouse.

At the time of the sinking, all hatch covers and doors were closed and secured with the exception of the accommodation entrance hatch cover in the wheelhouse and the wheelhouse entrance door, both of which were found hooked open when the launch was later recovered (**Figures 4 and 5**).

Each of the main engines was a Volvo marine propulsion engine model D9 MH driving a fixed pitch propeller through a reduction gearbox. Main engine speed and ahead/astern gearbox position was achieved through electronic remote control with one handle for each engine located on the wheelhouse control console. When the vessel was salvaged, both handles were found in the 'full ahead' position (**Figure 6**).

The launch steering system comprised two high-performance type streamlined double plate rudders. The rudders were fitted adjacent to each propulsion unit with interconnected rudder stocks. The rudders were operated by a hydraulic steering

cylinder mounted to a rudder stock lever. The steering cylinder was operated by a steering wheel at the conning position or a rudder tiller installed on the wheelhouse



Figure 4: Accommodation hatch cover (hooked open)

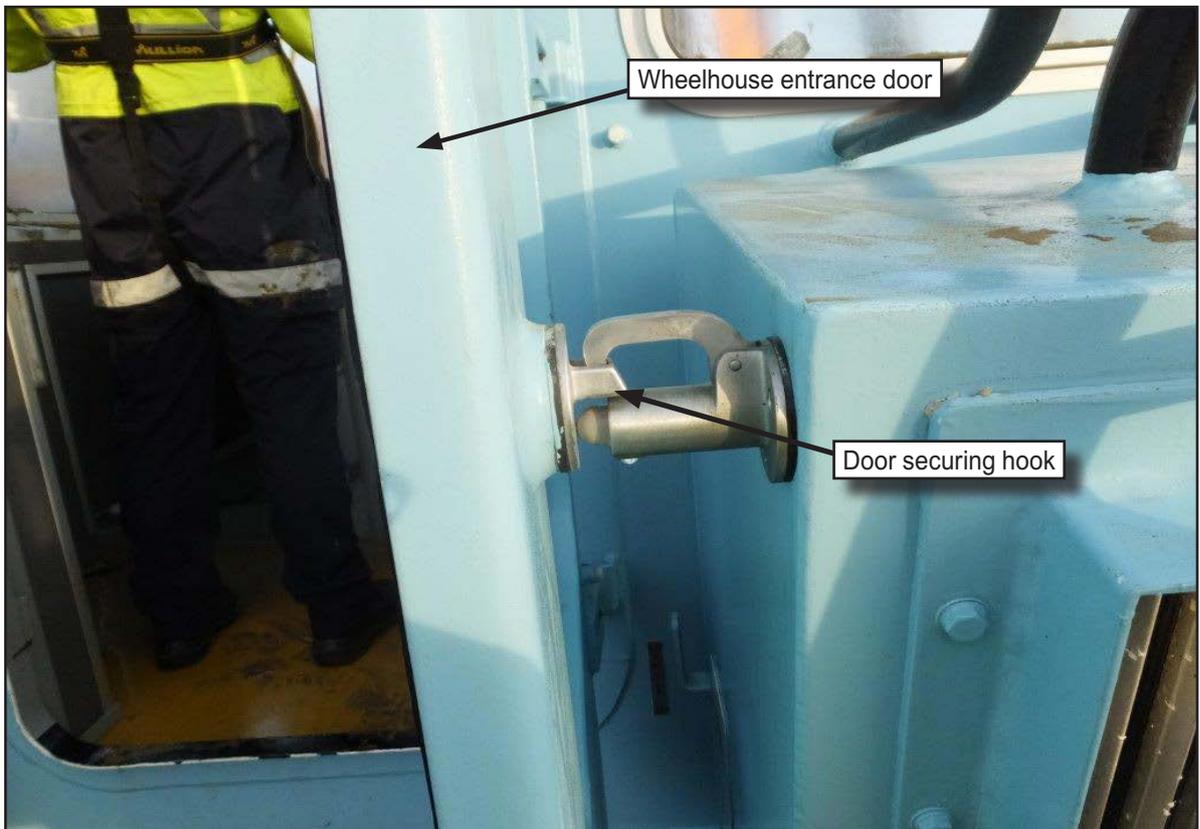


Figure 5: Wheelhouse entrance door (hooked open)

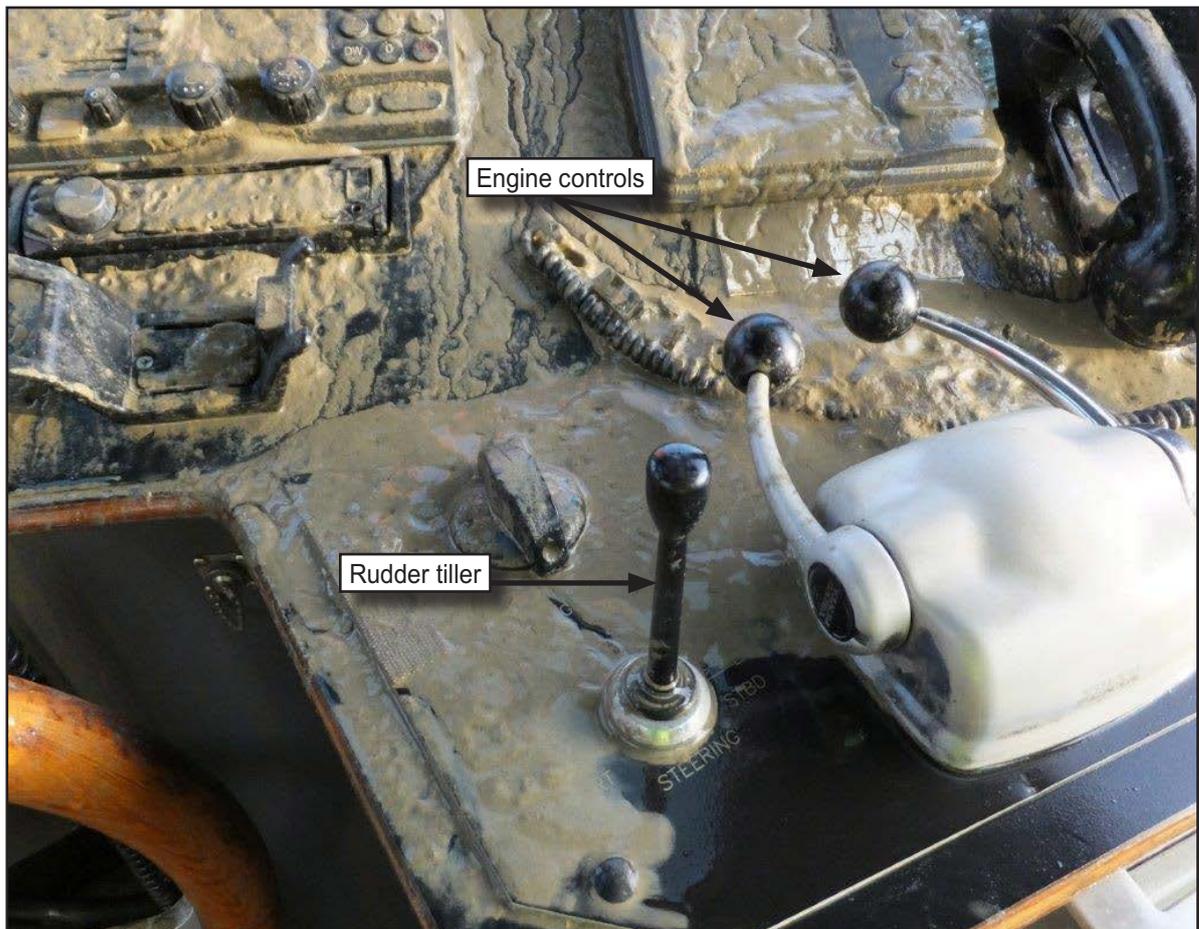


Figure 6: Asterix manoeuvring controls

console. At the time of the accident, the steering was being controlled using the tiller (**Figure 6**). When the vessel was recovered, the rudder indicator showed 10° to port, which corresponded to the actual rudder angle.

The launch was fitted with a Mampaey quick-release disc type towing hook located on the main deck just aft of the wheelhouse. The hook was designed to rotate through approximately 180° with a tow attached (**Figure 7**). The towing hook had a safe working load of 15t with a test load of 30t. It had an emergency release mechanism, which was activated by pulling on a wire. The wire was connected to an operating handle suspended from the deckhead of the wheelhouse and ran through a raised pulley forward of the towing hook before connecting to the hook release mechanism (**Figures 8, 9 and 10**). This model of towing hook could be fitted with either air or hydraulic actuators to complement the manual emergency release, but these options had not been specified for the build of *Asterix*. When the vessel was salvaged, the towing hook release mechanism was found to have only partially activated, with the towline's eye still located on the closed hook.

Shortly after *Asterix* was delivered, at the request of the owner, the manufacturer had fitted a bracket and staple between the engine room and aft peak hatches. The purpose of the staple was to allow the use of a gog rope to move the towing point further aft. An H-shaped bit, the structure of which supported the towing hook, was used to secure one end of the gog rope. When the vessel was recovered, the gog rope was found leading through the staple, with one end secured to the bit and the towline passing through a ring attached to its other end (**Figures 11 and 12**).



Figure 7: Towing hook (as found following salvage)



Figure 8: Towing hook emergency release handle



Figure 9: Towing hook emergency release wire

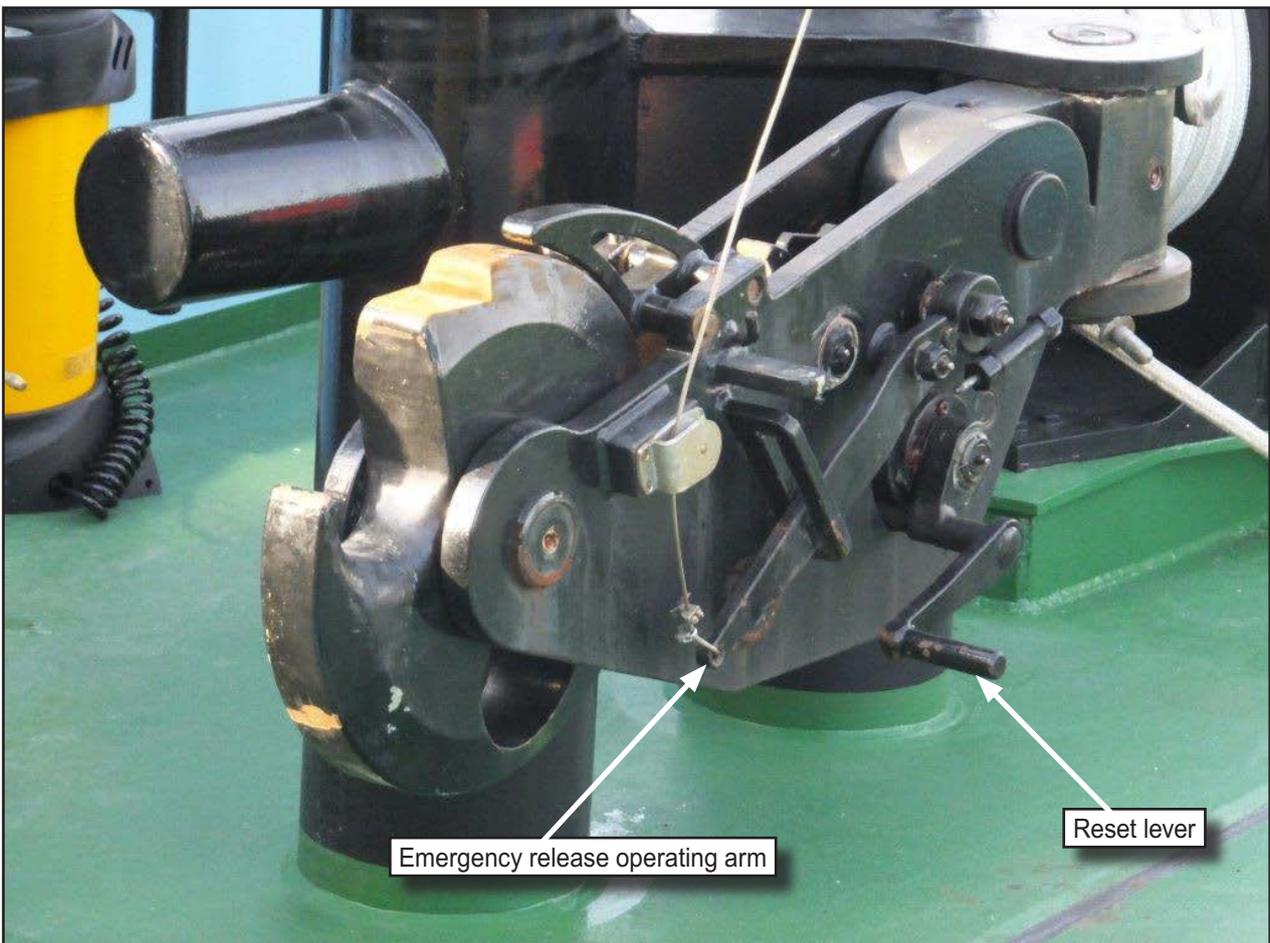


Figure 10: Towing hook emergency release arrangement



Figure 11: Gog rope staple

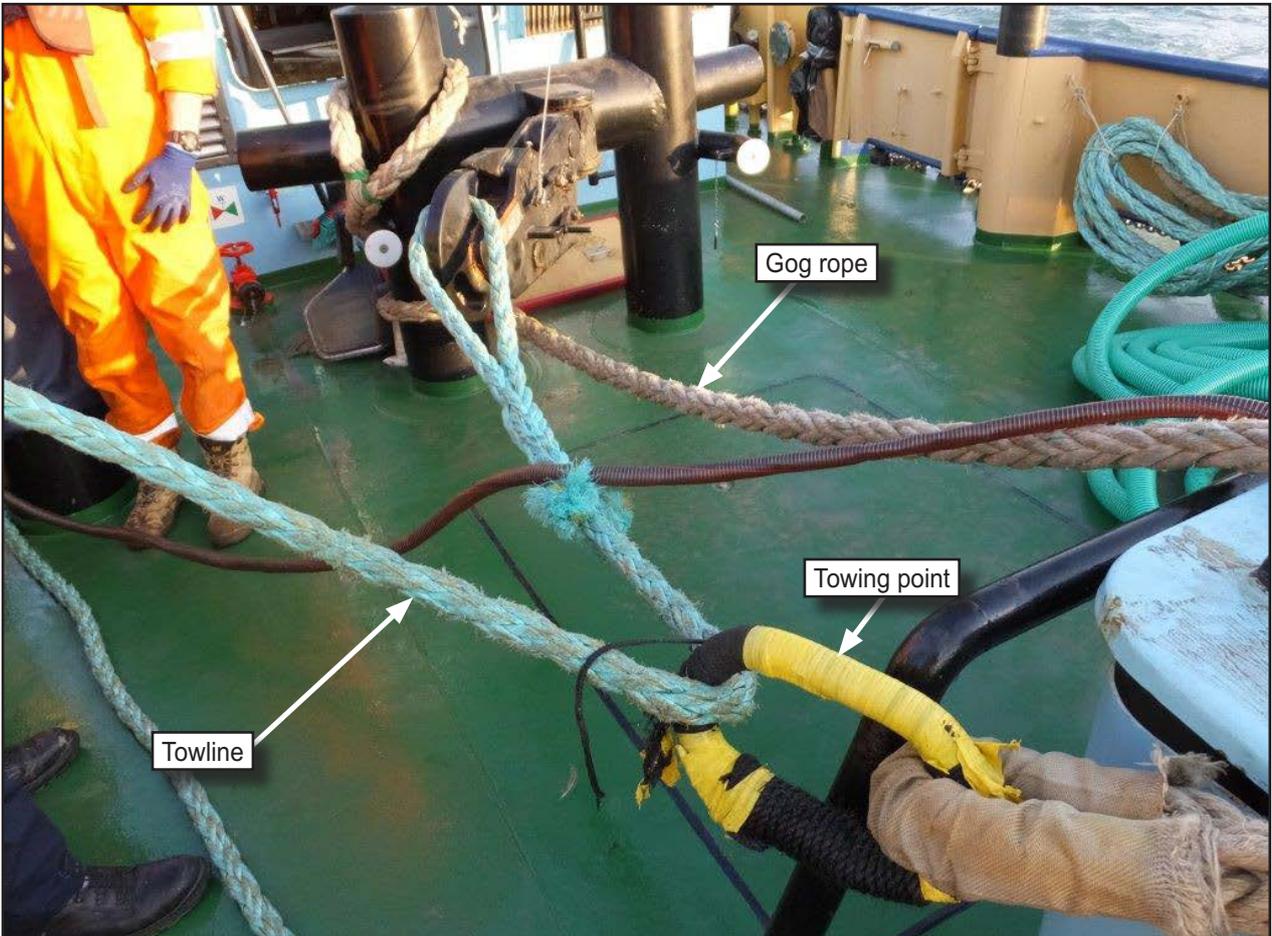


Figure 12: Gog rope arrangement (as found following salvage)

1.7 SOLENT TOWAGE LTD

1.7.1 Background

Solent Towage Ltd had provided tug services at FMT since 1993. The parent company, Østensjø Rederi AS, which was formed in 1973 and is based in Haugesund, Norway, provides services in the offshore and towage sectors of the marine industry.

1.7.2 Vessels

At the time of the accident, Solent Towage Ltd operated four tugs: *Phenix*, *Apex*, *Vortex* and *Lomax*. It also operated three mooring launches: *Asterix*, *Ibex* and *Tempest*. *Asterix* and *Ibex* had a towing capability and were also operated as small harbour tugs.

1.7.3 Safety management system

Østensjø Rederi AS maintained an overarching safety management system (SMS), which included job descriptions and responsibilities, and instructions relating to towing operations in general, and the condition monitoring and testing of towing equipment. It also included instructions relating specifically to the familiarisation of mooring launch crews.

The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 place a duty on employers to identify inherent risks and take measures to remove or minimise those risks. To support its procedures and in compliance with these Regulations, Østensjø Rederi AS conducted risk assessments relating to tug operations at FMT. Girting was recognised as a hazard with a corrective action requiring use of a gog rope on every tow, and the crew to be aware of girting and its potential consequences (**Annex A**).

1.7.4 Tug crew manning and training

The working pattern for Solent Towage Ltd crews was a 2-week on/2-week off rota. Each shift consisted of a minimum of 17 personnel: three tug crews (each comprised a tug master, chief engineer and mate) plus eight crewmen to man the mooring launches and to act as additional crew on the tugs as required. These eight crewmen were signed on as part of the crew of either *Apex* or *Phenix*.

The tug masters were responsible for the training and management of the crews assigned to their vessel. The tug masters managed the working pattern during the 2-week period to ensure that crews were available for each tug on a 24-hour basis. Although each tug master had responsibility for a particular mooring launch, the mooring launch crew could be assigned from either of the 'mother tugs'. The duty tug master received a daily briefing from FMT managers on likely shipping movements. However, the tugs and mooring launches remained at short notice to deploy.

Apex's master was responsible for the management (maintenance etc.) of *Asterix*, and *Lomax's* master was responsible for that of *Ibex* and *Tempest*. In practice, the chief engineer of the responsible tug allocated maintenance tasks to the mooring launch crews at the start of the 2-week shift. The crews then carried out the necessary work and reported back to him.

Two senior coxswains fulfilled the role of 'mooring launch manager'. This involved assisting with and overseeing maintenance activities and training of the launch crews. For a number of years, the mooring launch managers had been solely responsible for this training and, in consultation with the tug masters, they decided when a crewman was ready to take on the role of mooring launch coxswain. Recently, the training role had been expanded to allow other senior coxswains to oversee the training.

Mooring launch crew members followed a company in-house training programme to qualify as a launch coxswain (**Annex B**). This comprised seven elements: five specific topics covering towing procedures plus two covering operational awareness. The specific training activities were supplemented with a record of towage manoeuvres for a total of six operational tows. To qualify as a coxswain, a crewman needed to complete each element to the satisfaction of a senior coxswain, who then signed the trainee's record sheet. Once all elements had been successfully achieved, the record was required to be verified by the responsible tug master.

Mooring launch coxswains became senior coxswains through a combination of time served with the company and recommendations from the tug masters, not all of whom had experience of operating the mooring launches.

Launch coxswains met statutory qualification requirements by attaining the RYA/MCA Yachtmaster Coastal certificate of competence endorsed for power-driven craft.

There was a programme of joint interactive training involving the tug masters and mates of *Phenix*, *Apex*, *Vortex* and *Lomax*, and Southampton pilots, which included simulator training. This joint training initiative had not been extended to include the mooring launch coxswains.

1.8 SOUTHAMPTON PILOTS

Pilots operating in the port of Southampton were employed and trained by ABP. The latest pilot training schedule was introduced by the harbourmaster in February 2013. This was a structured training programme, taking pilots from trainee through to 1st class unrestricted pilot. On completion of each of the training phases, the trainees were interviewed by an examination board consisting of the pilotage manager and one or more senior 1st class unrestricted pilots.

During the initial 13-week training schedule, trainee pilots had to undertake a minimum of 12 trips on tugs. This requirement included at least two trips on the mooring launches *Asterix* and *Ibex* at FMT. In respect of local knowledge, the trainee pilots had to be aware of tug names, types, characteristics and procedures.

To progress to lower 2nd class pilot, a trainee was required to complete an additional six trips on tugs. A further six tug trips plus a minimum of two trips on the Solent Towage Ltd mooring launches were required for progression to upper 2nd class pilot. To qualify as a 1st class unrestricted pilot there was a requirement to undertake an appropriate ship/tug simulator course.

1.9 OTHER TECHNICAL INVESTIGATIONS

1.9.1 Towline loading

Following the accident, Damen Shipyards Gorinchem's research department calculated possible towline loadings prior to *Asterix* capsizing. The calculations were estimations based on a number of assumptions relating to *Donizetti*'s speed and *Asterix*'s propulsion settings. With *Donizetti* making 5kts of headway, and the towline crossing *Asterix*'s beam (i.e. at 90°), zero thrust from *Asterix* resulted in towline loading of 5t and maximum thrust resulted in towline loading of 11t. The maximum calculated loading was therefore comfortably within the 15t safe working load of the hook.

1.9.2 Towing hook emergency release

Testing of the towing hook emergency release was conducted by Mampaey at the Mennens test facility, Dongen, The Netherlands. The testing was carried out to a test protocol developed by Mampaey and was witnessed by representatives of the MAIB, Solent Towage Ltd, Østensjø Rederi AS, Damen Shipyards Gorinchem and Scandinavian Underwriters Agency.

An initial examination of the hook found that it was in good condition with evidence of satisfactory maintenance. However, there was some evidence of light corrosion and lack of lubrication. Østensjø Rederi AS's maintenance regime was discussed and agreed to be entirely satisfactory on the premise that it was diligently adhered to. During the testing, witness marks on the hook indicated that, at some point, it had been incorrectly set. In view of this, the test procedure was expanded to include testing the emergency release with the hook set in this incorrect position.

The hook was initially secured into a hydraulic test rig and loaded to its maximum test load of 30t to prove the hook and test rig (**Figure 13**).

The hook was then loaded to 15t, 20t, 25t and 30t. At each of these settings, the emergency release operated satisfactorily.

After the 30t release, the hook did not fully reset. Investigation revealed that a build-up of corrosion on the mating face of the hook and the roller release weight prevented the hook from fully resetting. Notwithstanding the incomplete reset, the emergency release remained functional.

It was noted that the loading needed to manually operate the emergency release increased in a linear relationship to the load applied to the hook. A load cell attached to the release mechanism lever with a manual pull to operate the release gave the following readings:

- At a hook loading of 15t the required release load was 18kg.
- At a hook loading of 20t the required release load was 24kg.

Following the 20t test, the hook was greased and the release cord attached to an electric hoist to demonstrate the effect of a steady pull on the release wire as opposed to a rapidly applied manual pull. In this case the load required during a steady pull against a 20t hook load varied between 42kg and 44kg.



Figure 13: Towing hook emergency release testing

It was also noted that the angle of the release wire at the connection to the emergency release lever had an effect on the load required to release the hook.

On completion of the programmed tests, the hook was set in the 'incorrect' position and tested at 15t. The hook successfully held the 15t load and the emergency release operated correctly.

A 15t load test of the hook in an inverted position was satisfactory, indicating that the emergency release should have operated at that hook loading with the vessel at any angle of heel.

1.10 USE OF A GOG ROPE

A gog rope is used to move the effective towing point closer to the towing vessel's stern. This prevents the towline from being taken across the towing vessel's beam, and therefore reduces the danger of girting. Gog ropes are commonplace on conventional tugs in the UK, and are commonly used when a tug is running astern behind a vessel to act as braking/steering tug. While moving the towing point aft reduces the risk of girting and capsize, it can restrict manoeuvrability by reducing the tug's ability to turn on its own axis. It is therefore advantageous to have the gog rope led from a winch, which can then be used to vary the length of the gog rope. Although the gog rope cannot be shortened when it is under tension, a winch allows a permanently rigged gog rope to be rapidly adjusted to suit the requirements of each particular towage operation.

Asterix did not have a gog rope winch but used a gog rope secured to a strong point, adjacent to the towing hook, running through a staple located towards the aft end of the deck.

1.11 REGULATIONS AND GUIDANCE

1.11.1 Small Commercial Vessel Code

The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998 apply to UK small workboats and pilot boats wherever they may be and other small workboats operating from UK ports while in UK waters. Regulation 8 enables alternative standards contained in the SCV Code to be used to fulfil the requirements of the Regulations. The SCV Code is annexed to Marine Guidance Note (MGN) 280 (M).

The SCV Code details requirements for a Category 2 vessel and crew qualification requirements to conduct operations in Category 3 areas. *Asterix* met the requirements of the SCV Code. However, the coxswain at the time of the accident had not applied for the required commercial endorsement for his RYA/MCA Yachtmaster Coastal certificate of competence.

From the range of acceptable qualifications listed in the SCV Code for operations conducted in Category 3 areas, Solent Towage Ltd chose to qualify its crews using the RYA/MCA Yachtmaster Coastal certificate of competence. The criteria for this qualification did not include any elements relating to towage or tug operations.

With regard to towing arrangements, SCV Code requirements include the following:

'25.2.2.1 The design of the towing gear should minimise the overturning moment due to the lead of the towline.'

25.2.2.2 The towing hook or towline should have a positive means of release which can be relied upon to function correctly under all operating conditions.'

1.11.2 Code of Safe Working Practices for Merchant Seamen

In accordance with The Merchant Shipping (Code of Safe Working Practices for Merchant Seamen) Regulations 1998, copies of the Code of Safe Working Practices for Merchant Seamen (COSWP) were required to be carried on all UK ships other than fishing vessels and pleasure craft.

The following are relevant extracts:

'Chapter 25 – Anchoring, Mooring and Towing Operations

25.1.1 Based on the findings of the risk assessment, appropriate control measures should be put into place to protect those who may be affected...

25.5.3 Prior to towing operations being undertaken, the master should establish suitable means of communication, exchange relevant information (eg speed of vessel), and agree a plan for the tow with the tug master.

25.5.7 ...The tug master should be kept informed of engine movements, proposed use of thrusts etc...

Chapter 33 – Port Towage Industry

33.1.2 Before beginning towing operations, a comprehensive plan of action should be prepared, taking account of all relevant factors, including sea-state, visibility and the findings of the risk assessment.

33.2.1 The watertight integrity of the tug should be maintained at all times. When a tug is engaged on any towage operation all watertight openings should be securely fastened.

33.2.2 All watertight openings should be marked with a sign stating that they are to remain closed during towage operations. Any such openings used whilst moving about the tug during a towage operation should be re-secured immediately after use...

33.3.2 The emergency release mechanism on towing hooks and winches should be tested, both locally and where fitted, remotely, at frequent intervals to ensure correct operation.

33.4.1 Before commencing a tow the master should determine which towing gear is suitable for the operation and instruct the crew accordingly.

33.5.1 A suitable bridled/gog rope/wire should be used where it is identified, through the position of the tug in assisting the tow or the nature of the operation, that the tow line is likely to reach such an angle to the fore and aft line of the tug that a 'girting' situation may arise.

33.6.2 During towage operations the towing gear, equipment and personnel should be continually monitored and any change in circumstances immediately relayed to the master. This is particularly important on tugs where the master has a restricted view of those areas/personnel.

33.6.3 During all towing operations where a tug is made fast to the tow, the crew should be aware that the tow may have to be released in an emergency situation, and that this may occur without any warning.

33.7.1 Prior to undertaking the tow, relevant information should be exchanged and an effective means of communication established between the tug and tow...

33.7.2 ... the Tug Master should ensure that the crew are aware of the intended operation.'

1.11.3 European Tug Owners Association

The European Tug Owners Association (ETA), whose members include Østensjø Rederi AS and Solent Towage Ltd, its UK subsidiary, has issued Guidelines for Safe Harbour Towage Operation (1st edition dated February 2015).

This guidance states:

‘Conventional tugs connected at the stern of the vessel being assisted will have to work in the traditional way. This requires a lot of skill and experience from the tug master and is considered to be the most inherently dangerous towing method for such a tug, due to the high risk of being pulled over sideways, which is called ‘girting’.’

It goes on to note:

‘Conventional (single or twin propeller) tugs require the most skills when it comes to manoeuvrability, i.e. the ability to turn around on its own axis quickly, which means that the tug master must anticipate the dynamics of an operation.’

The fixed propellers have great efficiency in the forward mode, but the directional power must be supplied by rudders and, in the case of twin screw tugs, also by the propellers operating in opposite directions.’

Chapter 9 of the ETA guidance focuses on the training and education of pilots:

‘ETA strongly recommends that pilots should periodically attend on board tugs during harbour towing operations and ideally should find time to attend on both the bow tug and the stern tug.’

Pilots may have done so during their initial training period, but as they progress further through their career whilst qualifying to handle larger vessels, they may tend to forget how it feels to be at the other end. Therefore by attending periodically on board a tug during a live harbour towing operation and, if opportunity exists, by attending simulator sessions ideally together with the tug masters, they will constantly keep in mind the tug masters’ concerns and the tug masters can gain insight in the pilots concerns. This will eventually work to the benefit of the tugs’ crews and the crews of the assisted vessels because it will undoubtedly have an effect on the safety of all parties concerned.’

1.11.4 Port Marine Safety Code

The Department for Transport’s Port Marine Safety Code (March 2015) (PMSC) applies to all harbour authorities in the UK that have statutory powers and duties. It also strongly recommends that facilities outside of harbour areas such as berths, terminals and marinas should seek to have safety management systems in place which comply with the PMSC.

The following is a relevant extract:

‘5.25 While any contract for the use of tugs is formally for the master of a vessel, the use of harbour tugs is one of the principal and most direct means open to a harbour authority to control risk. Authorities should determine, through risk assessment, appropriate guidance on the use of tugs in harbour areas. Recommendations should include the type of tugs and method of tow (where applicable) in addition to the number of tugs also where appropriate. Interested parties, including towage providers, users and pilots should be consulted in the preparation of such guidance.’

A Guide to Good Practice on Port Marine Operations (the Guide) was prepared in conjunction with the PMSC. Section 9 of the Guide is reproduced at **Annex C**.

1.11.5 Towage endorsements

Subject to a number of exemptions, The Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations 2015 apply, inter alia, to vessels other than passenger ships and tankers that do not proceed to sea. One of those exemptions applies when a vessel is operating in compliance with The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998, alternative standards for which are contained in the SCV Code (see section 1.11.1).

A Boatmasters' Licence (BML) is an acceptable qualification listed in the SCV Code for operations conducted in Category 3 areas⁴. Unlike an RYA/MCA Yachtmaster Coastal certificate of competence, a BML may require a specialist operations towing and pushing endorsement to comply with The Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations 2015. The towing and pushing endorsement syllabus is annexed to the Regulations and includes a requirement to demonstrate a knowledge of the awareness of girting. Accepted equivalents to the towing and pushing endorsement include either completion of a company SMS training programme for towing and pushing operations, or a General Towage Endorsement issued in accordance with the Voluntary Towage Endorsement Scheme.

The Voluntary Towage Endorsement Scheme, which is described in MGN 468 (M), was developed by the MCA at the request of the UK towage and workboat industry to help ensure that masters engaged in towage operations have the necessary skills for such specialist operations. It combines company training and self-study with a third party examination to confirm competence.

The voluntary training and endorsements are designed to complement the statutory certificates of competency required by tug masters and coxswains. The aims of the scheme are to:

- 'a) assist owners and operators engaged in towage work, or harbour masters, contractors and others when risk assessing towage operations, and*
- b) enable individuals to demonstrate that they are suitably experienced and competent to carry out such work.'*

The scheme has three endorsements:

- a. General Towage Endorsement
- b. Ship Assist Towage Endorsement
- c. Sea Towage Endorsement

The General Towage Endorsement is both a stand-alone qualification for towing and pushing in categorised waters or in limited coastal waters, and is a prerequisite for undertaking either the Ship Assist or Sea Towage Endorsements.

The General Towage Endorsement requires evidence of 120 days' service in vessels while engaged in general towage operations before a candidate can qualify for assessment.

⁴ A BML is an acceptable qualification for operations conducted only within the area limitation as defined on the certificate.

The Ship Assist Endorsement requires successful completion of the General Towing Endorsement plus evidence of 120 days' service in vessels engaged in ship assist operations.

The Sea Towing Endorsement requires successful completion of the General Towing Endorsement plus evidence of 180 days' service in vessels engaged in sea towing operations.

Assessment and certification is carried out by the National Workboat Association (NWA), which is the only body currently authorised by the MCA to do so. The NWA is currently developing guidance on towing operations.

Although knowledge of towing points and avoidance of girting in dynamic situations is covered in the training tasks of the Ship Assist Towing Endorsement, girting is not specifically covered in the General Towing Endorsement.

1.12 PREVIOUS ACCIDENTS

1.12.1 *Trijne*

On 8 September 1998, the workboat *Trijnie* was acting as a stern tug to the 7686grt tanker *Tillerman* for a manoeuvre to the entrance lock for Milford Docks. As *Trijnie* attempted a peel-off turn, from where it was running ahead on the tanker's starboard quarter to its port quarter, the towline became tight across the tug's port beam, heeling it over to port and allowing water over the after deck. Despite his best efforts, the coxswain could not break out of the girting, and *Trijnie* capsized and sank with the loss of its deckhand, whose body was later recovered from the wheelhouse.

The MAIB investigation⁵ found that *Trijnie* did not have a gog rope rigged; the emergency towing hook release wire was not connected; the operations manager who assigned *Trijnie* did not know what towing mode it would use; and *Tillerman's* pilot could not see the tug from the bridge, assuming that it had been running with the ship stern-to-stern, from which position it would have been relatively easy for the tug to position itself on the ship's port quarter. Furthermore, the pilot did not know that this was the first time that the tug coxswain had undertaken such an operation. Had *Trijne's* engine room hatch cover been properly secured, it is probable that the tug would have remained afloat longer than it did.

1.12.2 *Flying Phantom*

On 19 December 2007, the tug *Flying Phantom* girted and sank with the loss of the lives of three of its four crew members. It was acting as a bow tug for the bulk carrier *Red Jasmine* during a transit of the River Clyde in thick fog.

The MAIB investigation findings⁶ included that: the towline's emergency release system did not operate quickly enough to prevent the capsize; the procedure for testing the emergency release system varied between different tugs' crews; and the port side engine room door was left open.

⁵ Report published in July 1999

⁶ Report No 17/2008

1.12.3 *Ijsselstroom*

On 14 June 2009, the tug *Ijsselstroom*, a conventional twin-screw, twin-rudder tug, was tasked to act as the stern tug for a barge entering the port of Peterhead. The tug master chose to deploy the towline over the stern of the tug without the use of a gog rope. He planned to maintain his heading relative to the barge by using differential ahead power on the engines. As the lead tug increased speed, the tug master was unable to control *Ijsselstroom*'s yawing motion. Consequently, the tug took a large sheer to starboard, girted and capsized.

The MAIB investigation⁷ found that the tug owner relied too heavily on the individual knowledge and experience of its tug masters. It did not have a formal training programme and its tug masters' knowledge and experience had not been assessed.

Ijsselstroom's master was unfamiliar with the towline's emergency release system. He had not tested or witnessed its effect and did not operate it when the tug got into difficulties.

The pilot, who was positioned on the lead tug, and *Ijsselstroom*'s master had not conducted a briefing prior to the operation. Consequently, the pilot was unaware of whether *Ijsselstroom* was towing over its bow or stern, and had no knowledge of its operational limitations.

1.12.4 *Llanddwyn Island*

On 1 March 2010, a deckhand on board the workboat *Llanddwyn Island* was struck by a towing hawser after it had parted during a towing operation.

The MAIB investigation⁸ found that the use of commercially endorsed RYA certificates alone, as acceptable qualifications for the operation of workboats, was highly questionable. The report went on to note that the introduction of voluntary towing endorsements would have a positive impact on the safety of towing operations if workboat owners and authorities commissioning workboat services insist that skippers hold the relevant towing endorsements for the work undertaken.

⁷ Report No 4/2010

⁸ Report No 14/2010

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 OVERVIEW

Asterix girted and capsized while assisting *Donizetti* off the berth because the lead of the towline was pulling across the launch as the tanker started to move ahead. There is no evidence that any of the crew were suffering from fatigue and, therefore, it is not considered a contributing factor to this accident.

Factors contributing to the accident included:

- That the pilot, master and launch coxswain did not share a common, detailed understanding of the plan.
- That the launch crews did not have sufficient understanding of the use of gog ropes, and the gog rope was not adjusted appropriately prior to the task.
- That there was insufficient communication between vessels, and insufficient monitoring of the launch during the operation.
- The operator's mitigations against the risk of a mooring launch girting during towing were inadequate.

2.3 RISK ASSESSMENT AND CONTROL MEASURES

2.3.1 General risk assessment

Although predominantly used as a mooring launch, *Asterix* was intended to be used for towing/ship assist operations, so the risks associated with these activities and an appropriate towing arrangement needed to be assessed, as promoted in COSWP section 33.4.1.

Østensjø Rederi AS's risk assessment of mooring launch operations at FMT recognised girting as a hazard. The company chose to mitigate against girting by instructing the crews to use a gog rope on every tow, and a bracket and staple had been retrofitted to *Asterix* for this purpose. The requirement to use a gog rope on every tow assumed that a risk of girting existed on every tow, and that the launch crews were proficient in adjusting the gog rope to maximise its preventive effect.

Given that *Asterix*'s crew routinely kept the gog rope at a set length, it is evident that the coxswains did not know how to use a gog rope to best effect. Instructions on the use of gog ropes were not included in the company's SMS, nor had the launch crews received specific training in their use.

2.3.2 Gog rope

The task required *Asterix* to assist *Donizetti* in manoeuvring sideways away from berth 6 at FMT. There is conflicting evidence about the detail of the tasking exchanged between the pilot and the launch coxswain prior to the operation. However, based on previous experience, the pilot and launch coxswain both expected that, once the vessel was far enough off the berth, *Asterix* would turn through approximately 90° to run alongside the vessel as it gathered headway until the pilot ordered the towline to be let go. Once *Donizetti* had started to make headway, *Asterix*'s ability to manoeuvre was essential for the launch to run with the tanker.

The gog rope on *Asterix* was set at an intermediate length that was neither short enough to move the towing point sufficiently aft to prevent girting nor long enough to facilitate maximum manoeuvrability. With the gog rope set in that position, once the towline came under heavy load, the ability of the mooring launch to turn on its axis was significantly reduced. Furthermore, with the gog rope secured to the H-shaped bit, once the towline was under tension it was not possible for the crew to rapidly and safely adjust the gog rope to move the towing point.

A gog rope winch, if fitted, would have enabled the crew to lengthen the gog rope to improve *Asterix*'s manoeuvrability at a critical point in the operation. However, a thorough assessment of the task prior to commencement, underpinned by appropriate training and guidance, would have enabled the launch coxswain to make a more informed decision about whether a gog rope was required and, if so, what the optimum arrangement should have been.

2.3.3 Alternative arrangements

Asterix's tasking did not require the launch to assist *Donizetti* in a braking capacity or to otherwise apply tension on the towline other than in a direction directly astern of the launch. Consequently, with additional controls in place, such as effective proactive communications between the pilot and the coxswain at defined stages of the operation, the risk of girting could have been low. In such circumstances, as COSWP section 33.5.1 implies, it would have been reasonable not to have used a gog rope, allowing the coxswain to achieve maximum manoeuvrability using the engines and rudder. However, *Donizetti* was manoeuvred ahead before *Asterix* could be turned. In the absence of additional controls, a gog rope might have been effective in preventing the girting provided that it was of a length to position the towing point sufficiently aft.

Given that there was a strong wind blowing onto the berth, an alternative approach could have been to agree that once *Donizetti* was far enough from the berth the towline would be released before the tanker came ahead. This arrangement would have allowed the tanker to gather headway swiftly, without the constraint of waiting for the weight to come off the towline and the launch to turn to run alongside and gather headway itself. From the launch coxswain's perspective, such a plan would have removed the need for the launch to be turned, potentially with the towline under load.

2.3.4 Launch tasking

The company's SMS contained no specific procedures for the different operations that *Asterix* could be called on to perform. Although not contributory to this accident, short notice deployment of a mooring launch could prevent a thorough assessment of the task being completed and an appropriate towing arrangement being determined.

If generic plans for each type of towing operation, including task-specific risk assessments, were developed and documented in the company's SMS, these could be used, in conjunction with the daily briefing from FMT managers, to prepare crews in advance of deployment.

2.4 SITUATION AWARENESS

2.4.1 *Donizetti's* pilot

Asterix's coxswain received no warning that *Donizetti* was starting to move ahead, and so was unable to react in sufficient time to the effect of the tanker's forward movement. Although *Donizetti's* master had autonomously moved the CPP control ahead, the pilot could have intervened to counter the master's decision until *Asterix's* coxswain had been advised of the intended forward movement. However, the pilot was not monitoring the launch and so did not realise the significance of the master's engine movement. Had *Asterix's* coxswain been warned that *Donizetti* was about to be manoeuvred ahead or had already started to move ahead, he might have been able to turn the mooring launch to run with the tanker before additional loading came onto the towline. Alternatively, he could have informed the pilot of any doubt he might have had in his ability to turn the launch to run with the tanker before it gathered headway. The pilot was very experienced and had previously completed a number of trips on tugs and a ship/tug simulator course as part of his training and progression to his 1st class unrestricted pilot status. However, his subsequent reliance on tug masters and launch coxswains to act autonomously and to inform him when in doubt or difficulty appears to have diminished the value he placed on proactive and detailed communication.

The need to establish communications, agree a plan and continually exchange information, including engine movements, is promoted in sections 25.5.3 and 25.5.7 of COSWP, and was a significant finding in the MAIB investigations into the capsizing and foundering of *Trijne* in 1998, and the loss of *Ijsselstroom* in 2009.

2.4.2 *Asterix's* coxswain

The point at which *Asterix's* coxswain realised that he had lost control of the launch is unclear. He had already been unsuccessful in his attempt to turn the launch to port by the time the pilot instructed *Asterix* to 'run with me' and then 'come in and let go'. His unqualified acknowledgement to the pilot on both occasions suggests either that he had not recognised that *Asterix* was in danger of capsizing, indicating a low perception of risk, or that he was reluctant to voice his concern to the pilot. Once the coxswain realised that he could no longer manoeuvre *Asterix* effectively, he asked the deckhand for advice. Unfortunately, by that stage the situation was irrecoverable by manoeuvre alone.

Notwithstanding that *Asterix*'s gog rope did not provide the palliative effect the coxswain might have been expecting, he was not sufficiently trained or experienced to make an early assessment that an extremely hazardous situation was developing. The only way of easing the tension on the towline was for *Donizetti* to cease making headway, and that could only happen once the launch coxswain had notified the pilot of his predicament.

It is possible that the coxswain's low perception of risk had been influenced by the routine nature of the towage operation, and by the use of a gog rope for every tow, without incident. However, the hazards of towing are such that use of a gog rope cannot be learned by trial and error, and effective theoretical training is necessary.

2.4.3 *Asterix*'s deckhand

Asterix's deckhand was completing logbook entries in the launch's wheelhouse and so, initially, was unaware that the coxswain was losing control of his vessel.

Asterix was designed with a forward-facing conning position. The rudder tiller and engine controls were located on a console in such a position that, when manoeuvring the launch, it was natural for the coxswain to face away from the tow. Furthermore, owing to the proximity of the oil pollution boom and adjacent shallow water, it was important that the coxswain was able to concentrate on the positioning of the mooring launch relative to these hazards. Consequently, the coxswain needed the assistance of the deckhand in order to monitor the situation effectively.

The need for crew to continually monitor the towage operation and to be ready for the tow to be released in an emergency is promoted in sections 33.6.2 and 33.6.3 of COSWP.

The deckhand had allowed himself to become distracted with routine paperwork, indicating a low perception of risk. As with the coxswain, contributing factors are likely to have been the routine nature of the towage operation, and that a gog rope was being used to reduce the risk of girting.

When alerted to the coxswain's loss of control, the deckhand's advice to him, to put the engines to neutral, was appropriate, and would probably have prevented *Asterix* from capsizing had the gog rope been short enough to position the towing point sufficiently aft. It is unclear whether the coxswain acted on the deckhand's advice: both engine control handles were found in the 'full ahead' position following salvage, but it is possible that they were inadvertently moved during the accident or during the salvage operation. In either event, the intermediate positioning of the gog rope would have reduced the effectiveness of the deckhand's advice to place the engine in neutral.

The deckhand's loss of situation awareness compromised his ability to support the coxswain. Had he been monitoring the operation, his greater experience should have recognised that the coxswain was losing control at an earlier stage, and he might then have been able to more positively influence the outcome.

2.5 TRAINING

2.5.1 Mooring launch crew training

All crew training relating to towage operations was carried out in-house, using senior coxswains as trainers. Neither the trainers nor the training programmes were subject to any independent control or verification. Although a desired attribute for employment by Østensjø Rederi AS was that deckhands had 36 months' sea time, this was not an absolute condition of employment. Further, the training from deckhand to coxswain did not have a specified minimum duration, nor did it have any criteria against which to confirm achievement of specific standards. With several trainers and limited training guidance/ objectives, the training of coxswains could be subjective and result in a considerable variation in standards.

The in-house training required to become a mooring launch coxswain did not recognise the level of skill and experience required to prevent girting. The ETA guidance on the use of vessels with conventional machinery installations (twin fixed pitch propellers and twin rudders) for stern-to-stern towage highlights the need for tug masters to anticipate the dynamics of such operations. Although *Asterix's* coxswain attempted to turn the launch in the manner recommended in the ETA guidance, he had not anticipated the potential danger of girting and the need to communicate his concerns to the pilot at an earlier stage.

A more comprehensive training programme, encompassing all aspects of Solent Towage Ltd's launch operations, would better prepare coxswains for their operational role and, importantly, increase their ability to react to developing emergencies. The lack of a formal training and assessment programme for tug masters was a significant finding in the MAIB investigation of the loss of *Ijsselstroom* in 2009.

There is a current lack of formal published guidance for the operators of small vessels engaged in towing operations on the merits of alternative towing arrangements and their potential effect on manoeuvrability, and on specific actions required to prevent girting.

2.5.2 Towage endorsement requirement anomalies

There are a number of ways in which personnel may become qualified to operate craft certified under the SCV Code, some of which might be more applicable to the vessel's specific mode of operation than others. While this arrangement provides personnel with flexibility over their route to qualification, it introduces anomalies around the level of training for specialist operations, such as towing, they are required to undertake. Further, a number of options exist to undertake specialist training for towing that do not have direct equivalence.

In terms of qualification to operate a vessel, such as *Asterix*, coxswains holding a BML would also require a towage endorsement, whereas coxswains holding an alternative qualification, as listed in Appendix 3 to the SCV Code, do not. As the coxswain of *Asterix* held an RYA/MCA Yachtmaster Coastal certificate of competence, his qualification did not need to be endorsed for towage operations. The acceptability of this situation was questioned by the MAIB following its investigation of the fatal accident on board the workboat *Llanddwyn Island* in 2010.

In terms of training for specialist operations, The Merchant Shipping (Boatmasters' Qualifications, Crew and Hours of Work) Regulations 2015, Annex 11, paragraph 10 lists the syllabus for the Towing and Pushing Endorsement. The syllabus requires candidates to have *a knowledge of the awareness of girting*, and to be able to describe *the placement of the gobline⁹ when required*. An accepted equivalent to a BML endorsement for towing and pushing can be obtained via the Voluntary Towage Endorsement Scheme. This method of obtaining specialist qualification would require the candidate to complete both the General Towage Endorsement and the supplementary Ship Assist Towage Endorsement of the Voluntary Towage Endorsement Scheme to ensure that the topic of girting and the use of gog ropes was adequately covered.

A further, acceptable equivalent to a BML endorsement for towing and pushing is the completion of a company's SMS training programme for towing and pushing operations. In these circumstances, the syllabus is derived by the company concerned, and the company is the sole judge of its fitness for purpose.

Asterix's coxswain held an RYA/MCA Yachtmaster certificate of competence that, had it been commercially endorsed, would have allowed him to conduct towing operations without any form of towage endorsement or completion of the company's training programme. In this instance, the coxswain had completed a company training programme, but it had not equipped him with the knowledge necessary to operate *Asterix* safely in the circumstances pertaining on 30 March 2015. Furthermore, as the deckhand on the day was a senior coxswain who had been involved in the coxswain's training, and that the gog rope on board the launch was not adjusted for each task, it is possible that other members of Solent Towage Ltd's launch crews did not understand how a gog rope should be used to reduce the risk of girting.

The MAIB investigation into the capsizing and foundering of *Trijne* in 1998 identified that its coxswain, who held a BML, lacked sufficient knowledge of the danger and action required to avoid girting.

The footnote in section 9.2.2 of A Guide to Good Practice on Port Marine Operations suggests that certification to MCA required standards means an STCW qualification or a BML, depending on tug or area of operation. It also suggests that relevant crew are expected to hold both a General Towage Endorsement and a Ship Assist Towage Endorsement.

2.5.3 Pilot continuation training

Pilots in the port of Southampton undergo a comprehensive training programme prior to appointment as a 1st class unrestricted pilot. At the time of this accident the training included a specified number of trips that included familiarisation on the Solent Towage Ltd mooring launches.

Once pilots had completed their 2nd class training and achieved 1st class unrestricted status, there was no requirement for further training on the mooring launches. That the mooring launches were regularly operated in the role of tugs to assist vessels to sail from FMT coastal berths was not factored into pilot continuation training. First class unrestricted pilots continued to attend joint simulator training, but only with tug masters from the larger, more capable tugs. Over time, lack of re-familiarisation

⁹ Gobline is an alternative term for gog rope.

training on the launches might have resulted in a reduced awareness that these small vessels had limited capability, being less powerful and significantly less manoeuvrable than the larger tugs in the port. The lack of training and interaction with launch coxswains is also likely to have had a negative impact on operational liaison.

Simulator training involving pilot and mooring launch coxswains, as promoted in chapter 9 of the ETA's Guidelines for Safe Harbour Towing Operation and section 9 of A Guide to Good Practice on Port Marine Operations, would enhance the working relationship between pilots and mooring launch crews, leading to a more cohesive and safer working environment. Simulator training could be complemented with a documented requirement for all pilots to take a specified number of trips on the mooring launches as part of their continued professional development.

2.6 EMERGENCY RELEASE

When *Asterix* was salvaged, the towing hook release mechanism was found to have only partially activated, with the towline's eye still located on the closed hook.

In accordance with the spirit of section 25.2.2.2 of the SCV Code, tests of the hook confirmed that the emergency release should have activated at all operating conditions up to the 15t safe working load of the hook.

With no mechanical assistance, the emergency release relied on the crew to operate the manual pull in order to release the towline. Tests of the hook demonstrated that, under load conditions, a steady pull required significantly more force to operate the release mechanism than a sharp pulling action, and that the required effort increased in proportion to the loading on the hook.

With the vessel listing severely and moving under the action of the imparted hydrodynamic forces, manual use of the emergency release could have been compromised. A release mechanism with mechanical assistance is more likely to produce consistent results and could be set to overcome the 15t safe working load of the hook in all vessel attitudes.

Frequent testing of the towing hook emergency release is promoted in section 33.3.2 of COSWP. Onboard testing of *Asterix*'s emergency release was carried out as a monthly maintenance routine, but the loading on the hook at the time of the test varied. Further, there was no requirement to record the name of the individual who tested the hook on each occasion.

The company's SMS did not require the towing hook release to be tested as part of a drill, so none of the crew training scenarios included discussing or operating the release during an emergency.

Incorporating the monthly routine towing hook emergency release into planned training scenarios would increase the mooring launch crews' emergency awareness, and therefore their preparedness to take appropriate and rapid action in the event of a developing emergency. Formally documented drills could also ensure that all crew members are practised in the release procedure.

A lack of familiarity with the towline emergency release system was a significant finding in the MAIB investigations of the capsizing and foundering of *Trijne* in 1998, and the loss of *Ijsselstroom* in 2009. Variation in testing procedures was also a finding in the MAIB investigation of the girding and loss of *Flying Phantom* in 2007.

2.7 WATERTIGHT INTEGRITY

Asterix capsized due to girding, which caused the vessel to heel to an angle that resulted in deck edge immersion with floodwater then entering the wheelhouse through the open entrance doorway. This in turn led to the vessel's inversion. With the vessel upturned, floodwater was able to enter the machinery spaces through the now submerged compartment vents. As the vessel began to roll, water from the wheelhouse was able to enter the accommodation through the open entrance hatchway, compounding the machinery space flooding.

It was fortunate that insufficient water entered the vessel during the capsizing to cause it to sink immediately, and that sufficient air remained in the wheelhouse to allow the coxswain to survive until he was rescued over an hour later. In different circumstances, such as those surrounding the capsizing and foundering of *Trijne* in 1998, the vessel might have sunk more rapidly, with the coxswain still trapped inside.

The wheelhouse entrance door is reported to have been shut until the deckhand opened it in his attempt to activate the emergency release by pulling on the wire. However, evidence suggests that the accommodation entrance hatch cover was routinely left open to allow free access so, as the vessel listed, water entering the wheelhouse was able to flow down into the accommodation area.

The company's SMS required all weather deck doors and hatches, and all watertight doors to be secured before the start of any towing operation. However, contrary to the guidance in COSWP sections 33.2.1 and .2, neither the hatch from the wheelhouse to the accommodation nor the door from the wheelhouse to the weather deck had signs indicating this requirement. To ensure that the watertight integrity of mooring launches is maintained at all times when towing, the relevant openings should be clearly marked, and the importance of this requirement reinforced to crews through regular training.

A finding of the MAIB's investigation of the girding and loss of *Flying Phantom* in 2007 was that the port engine room door was left open, which reduced the tug's residual stability and, therefore, its ability to right itself.

2.8 EMERGENCY RESPONSE

Following the capsizing of *Asterix*, the response from both FMT jetty staff and Solent Towage Ltd standby crews was rapid and effective. The action of the FMT shore worker who spotted the launch's deckhand, maintained visual contact and then assisted him from the water, ensured that this aspect of the rescue was conducted without delay.

Solent Towage Ltd crews immediately readied and tasked other tugs to aid with the search for the missing coxswain, and the bravery of the tug crewman who jumped into the water to rescue the trapped coxswain was commendable.

Throughout the search and rescue phase of the incident, Solent Towage Ltd shore management did its utmost to locate and activate diving support in an attempt to search the upturned vessel.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. Although girting was recognised as a hazard, Østensjø Rederei AS's risk assessment's control measure was simply to use a gog rope on every tow. This assumed that a risk of girting existed on every tow, and that the launch crew were proficient in adjusting the gog rope to maximise its preventive effect. [2.3.1]
2. It is evident that *Asterix's* coxswain was not sufficiently trained or experienced to use the gog rope to best effect, or to make an early assessment that an extremely hazardous situation was developing. [2.3.1, 2.4.2]
3. *Asterix's* gog rope was set at an intermediate length that was neither short enough to move the towing point sufficiently aft to prevent girting nor long enough to facilitate maximum manoeuvrability. [2.3.2]
4. With the gog rope secured to the H-shaped bit, it was not possible for the crew to rapidly and safely adjust the towing point when the towline was under tension. [2.3.2]
5. With additional controls in place, such as effective proactive communications between the pilot and *Asterix's* coxswain at defined stages of the operation, the risk of girting could have been reduced. [2.3.3, 2.5.1]
6. *Donizetti's* pilot relied on tug masters and launch coxswains to act autonomously and to inform him when in doubt or difficulty. This practice appears to have diminished the value he placed on proactive and detailed communication. [2.4.1]
7. *Asterix's* coxswain and deckhand showed a low perception of risk, which delayed their response to the developing situation. This is likely to have been influenced by the routine nature of the towage operation, and by the use of a gog rope for every tow. [2.4.2, 2.4.3]
8. *Asterix's* coxswain did not anticipate the potential danger of girting and the need to communicate his concerns to the pilot at an earlier stage. [2.5.1]
9. The company's launch crew training programme for coxswains did not recognise the level of skill and experience required to prevent girting, and did not have any criteria against which to confirm achievement of specific standards. [2.5.1]
10. There is a current lack of formal published guidance for the operators of small vessels engaged in towing operations, including specific actions required to prevent girting. [2.5.1]
11. A lack of joint training and interaction between pilots and mooring launch coxswains in Southampton is likely to have had a negative impact on operational liaison. [2.5.3]
12. The effort required to operate *Asterix's* towing hook emergency manual release mechanism increased in proportion to the loading on the hook. Østensjø Rederei AS's SMS did not require the release to be tested as part of a drill, and so the mooring launch crews lacked preparedness to take appropriate and rapid action in the event of a developing emergency. [2.6]

3.2 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. *Asterix's* coxswain's RYA/MCA Yachtmaster certificate of competence, if commercially endorsed, would have allowed him to operate without any form of towage endorsement or completion of the company's training programme contrary to the guidance contained within the PMSC Guide to Good Practice. [2.5.2]
2. As *Asterix* began to roll following its capsizing, water from the wheelhouse was able to enter the accommodation through the open hatchway. In different circumstances, the vessel might have sunk more rapidly with the coxswain still trapped inside the wheelhouse. [2.7]

SECTION 4 - ACTION TAKEN

Østensjø Rederi AS has:

Completed an internal investigation with a resulting action plan, which includes the following:

- Delivery of a fleet-wide presentation on its investigation findings.
- Provision of risk assessment training for crews.
- Joint training for pilots and mooring launch crews.
- Installation of hydraulic or pneumatic back-up towline emergency release system, where possible.
- Evaluation and discussion with crews on the use of gog ropes and winches.
- Update of towing hook maintenance and testing procedures.
- Evaluation of the feasibility of lowering the staple position and modifying the towing hook emergency release lever on similar vessels.
- Installation of foot-operated 'press-to-talk' switches for VHF radios.
- Review of qualifications, and internal training and assessment programme for mooring launch crews.
- Development of an operations manual for mooring launches.
- Development of suitable and sufficient risk assessments for all operations involving mooring launches.
- Provision of clear operating instructions for towline emergency release mechanisms.
- Provision of new role requirements for mooring launch coxswains.
- Development of an operation checklist to include confirmation of a pilot's passage plan.

ABP Southampton:

- Has revised its pilot training schedule to include annual tripping on mooring launches.
- Is investigating the use of simulation for pilot and mooring launch crew joint training.

SECTION 5 - RECOMMENDATIONS

Østensjø Rederi AS is recommended to:

- 2016/117** In implementing its action plan, have full regard to the findings and references to best practice included in this investigation report. In particular, it should:
- Review and enhance its risk assessment relating to the hazard of girting.
 - Introduce comprehensive instructions and guidance relating to operations requiring the use of a gog rope.
 - Enhance its in-house training and assessment programme to ensure mooring launch coxswains attain the competence requirements of the Voluntary Towage Endorsement Scheme, including the necessary skill and experience required to prevent girting.
 - Emphasise the importance of proactive and detailed communication with pilots both before and during a towing operation.
 - Include towline emergency release as an emergency drill training requirement; and
 - Ensure its instruction for closing hatch covers and doors before a towing operation is implemented and supplemented using appropriate training and signage.

Associated British Ports Southampton is recommended to:

- 2016/118** Review its assessment of towage operations within the port of Southampton to ensure, in accordance with the Port Marine Safety Code, that mooring launches operating in the port are fit for the purpose to which they are assigned. In particular, it should:
- Review its requirements for the competence and training of coxswains.
 - Ensure pilots engage in proactive and detailed communication with coxswains both before and during a towing operation; and
 - Ensure pilots engage in joint training with mooring launch crews as a means of enhancing operational liaison.

The National Workboat Association is recommended to:

- 2016/119** In its ongoing development of guidance on towing operations, have full regard to the findings and references to best practice included in this investigation report. In particular, the guidance should include:
- Specific information on the danger of girting and the action required to avoid it.
 - The correct use of a gog rope.

- The need for proactive and detailed communication between launch coxswains and pilots both before and during a towing operation.
- Crew emergency preparedness in the form of regular drills in operating the towline emergency release system; and
- The need to close all relevant watertight and weathertight hatch covers and doors, so as to maintain the towing vessel's watertight integrity, prior to commencing a towing operation.

The **Maritime and Coastguard Agency** is recommended to:

2016/120 Inform tug operators and port authorities of the importance of ensuring that masters engaged in towing operations have the necessary knowledge and skills.

The **UK Major Ports Group** is recommended to:

2016/121 Promulgate to its members the findings and references to best practice included in this investigation report, with particular regard to the need for proactive and detailed communication between pilots and launch coxswains both before and during a towing operation, and that coxswains engaged in towage operations at least meet the competence requirements of the Voluntary Towage Endorsement Scheme.

Safety recommendations shall in no case create a presumption of blame or liability

