

## Dragging anchor by the general cargo vessel *Celtic Spirit* and subsequent collisions with *Atlantic Explorer* and *Celtic Warrior* River Humber, England on 1 March 2018

### SUMMARY

At 0246<sup>1</sup> on 1 March 2018, the UK registered general cargo vessel *Celtic Spirit* dragged its anchor in heavy weather on the River Humber, England. The vessel subsequently collided with the research and survey vessel *Atlantic Explorer* and the general cargo vessel *Celtic Warrior*, which were also at anchor. All three vessels sustained shell plate damage, but there were no injuries and no pollution.

The MAIB investigation identified that:

- *Celtic Spirit* dragged its anchor because insufficient anchor cable had been deployed for the tidal range and environmental conditions experienced
- It was not immediately identified that *Celtic Spirit* was dragging its anchor because the anchor position monitoring was inadequate.
- *Celtic Spirit's* bridge watchkeeper did not alert Vessel Traffic Services or nearby vessels that his own ship was dragging anchor.
- *Celtic Spirit* was unable to manoeuvre in sufficient time to remedy the situation because its engine was not on immediate readiness, and class conditions relating to engine readiness while operating with only one anchor were not followed or understood.
- Lack of company guidance meant that there was an inconsistent approach to engine readiness on board sister vessels in the same fleet.
- *Atlantic Explorer* and *Celtic Warrior* were unable to weigh their anchors in the time available.

*Celtic Spirit's* owner, Charles M. Willie & Co (Shipping) Ltd, has taken action, with its fleet, to raise the standards of anchor watchkeeping and to clarify the term 'main engine stand-by'. ABP Humber has completed an anchorage review and has implemented measures designed to mitigate the risk factors identified during the investigation. No recommendations have been made in this report.



Image courtesy of Jayson Kinzett ([www.marinetraffic.com](http://www.marinetraffic.com))

<sup>1</sup> All times are UTC (time kept on board was UTC+1)

#### 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 such 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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## FACTUAL INFORMATION

### NARRATIVE

At 1630 on 28 February 2018, the general cargo vessel *Celtic Spirit* departed Groveport, England and headed down the River Trent to the Holme Hook anchorage on the River Humber (**Figure 1**). The master intended to load 40t of fuel from a bunker barge at the anchorage before commencing passage to Riga, Latvia. The vessel was in ballast and had a river pilot and a port authority marine apprentice on board.

The weather conditions on the River Humber began to deteriorate during *Celtic Spirit's* passage to the anchorage. This led the River Humber port authority to suspend pilotage operations.

At 1830, the inbound vessel, *Celtic Warrior*<sup>2</sup>, anchored at position D in the Hawke anchorage (**Figure 1 inset**), close to the mouth of the River Humber. With 5 shackles of cable in the water, the vessel began to drag its anchor. The vessel's pilot instructed that a further shackle of cable be payed out and reported the incident to Humber Vessel Traffic Services (VTS). With 6 shackles in the water, the anchor held and *Celtic Warrior* came to rest between positions D and E. Before leaving the vessel, the pilot advised the master to keep his engine on standby; the pilot also communicated this information to VTS. In response, the master kept the vessel's main engine running in bridge control.

At 2120, *Celtic Spirit* arrived at the Holme Hook anchorage. Its master ordered the crew to let go its starboard anchor and lower 4 shackles of anchor cable in to the water. Shortly after anchoring, the planned bunkering operation was aborted due to the bad weather. *Celtic Spirit* was unable to proceed on passage, and its master did not want to leave the port, due to insufficient bunkers. After liaison with the pilot on board and Humber VTS the master was advised to anchor his vessel in the Hawke anchorage. As he prepared to leave the Holme Hook anchorage, the master noticed that his vessel had dragged its anchor.

While on passage to the Hawke anchorage, VTS contacted *Celtic Spirit* and instructed its master to anchor in position H. The vessel arrived at the anchorage at 2255 and, in accordance with the advice given by its pilot, 5 shackles of cable were lowered into the water. The pilot monitored the vessel's position for about 15 minutes during which the anchor appeared to be holding and the vessel was riding on the cable with minimal pitching, rolling or yawing.

At 2300, *Celtic Spirit's* master handed over the bridge anchor watch to the second officer (2/O). On taking over the watch, the 2/O set variable range markers on the radar display based on Spurn Head to the east and the research and survey vessel *Atlantic Explorer*, which was anchored 3 cables to the north-west. The duty able-bodied seaman (AB), who had come to the bridge at the start of the watch, was released by the 2/O to conduct routine fire and deck rounds.

At 2315, the pilot advised *Celtic Spirit's* master that the bridge watchkeeper should remain alert with the vessel's engine on standby. Shortly afterwards, the pilot and the marine apprentice disembarked, and the master ordered the main engine to be stopped. The master and the vessel's engineer then went to rest in their cabins. The 2/O remained on watch on the bridge, where he completed chart corrections, routine administration tasks and fixed the vessel's position on a paper chart every 30 minutes.

At about 0246, *Celtic Spirit* began to drag anchor in a north-westerly direction (**Figure 2a**). Nine minutes later, in preparation for the watch handover, the vessel's 2/O looked at the radar screen and noticed that the distance to *Atlantic Explorer* had decreased. He plotted the vessel's position on the chart, which verified that the vessel was dragging its anchor, and called the master. He also called the engineer in his cabin and ordered him to start the main engine, and he instructed the duty AB, via hand-held radio, to go forward and check the anchor cable.

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<sup>2</sup> *Celtic Spirit* and *Celtic Warrior* were 'sister' vessels.

Reproduced from Admiralty Chart 1188 by permission of HMSO and the UK Hydrographic Office

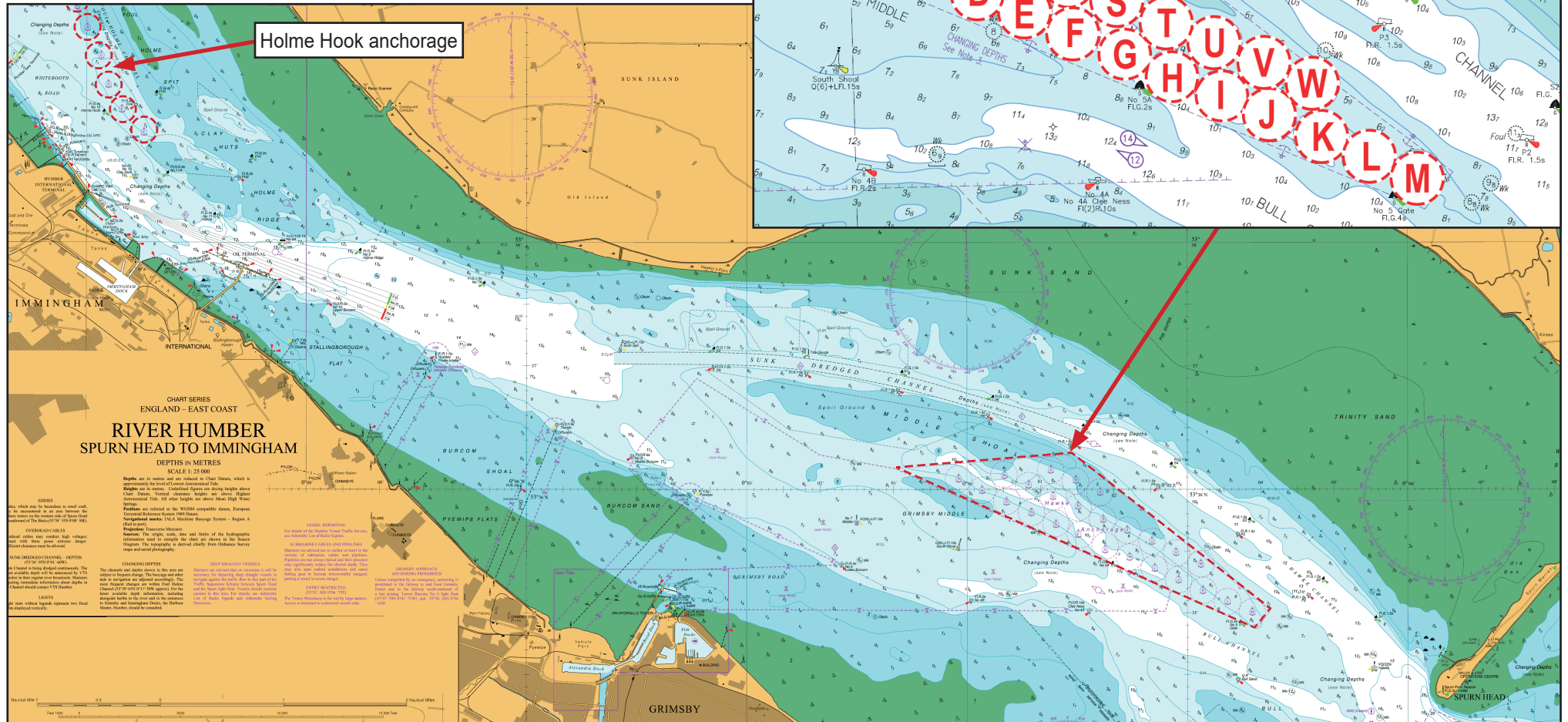


Figure 1: Extract of admiralty chart 1188 showing Holme Hook and Hawke anchorages

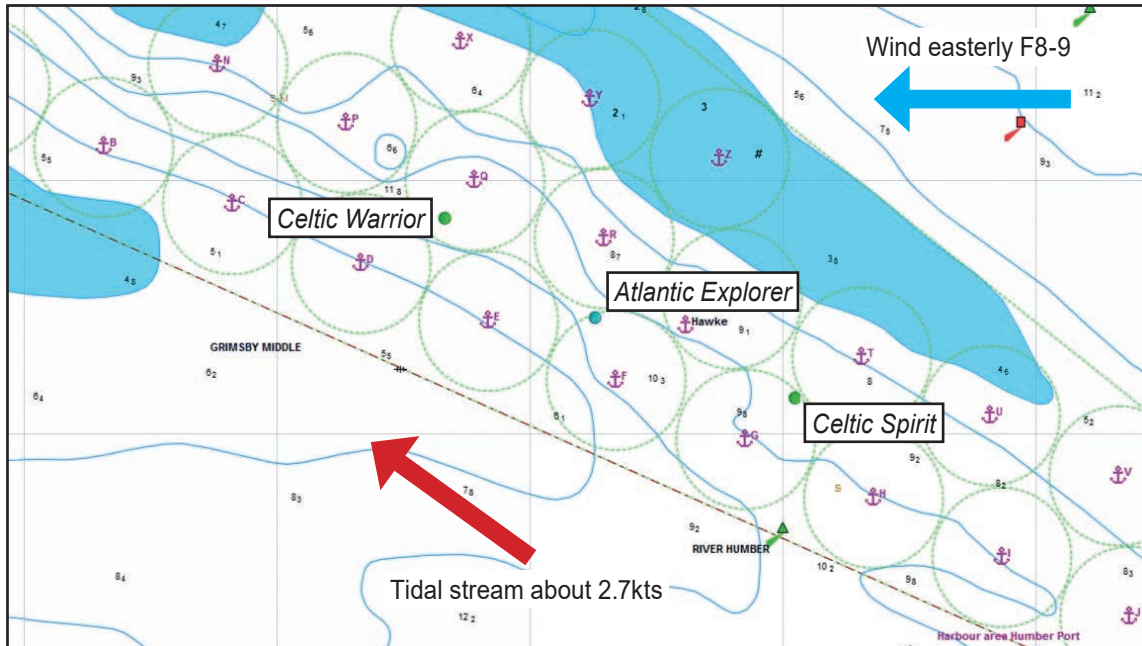


Figure 2a: 0246 *Celtic Spirit* starts dragging its anchor

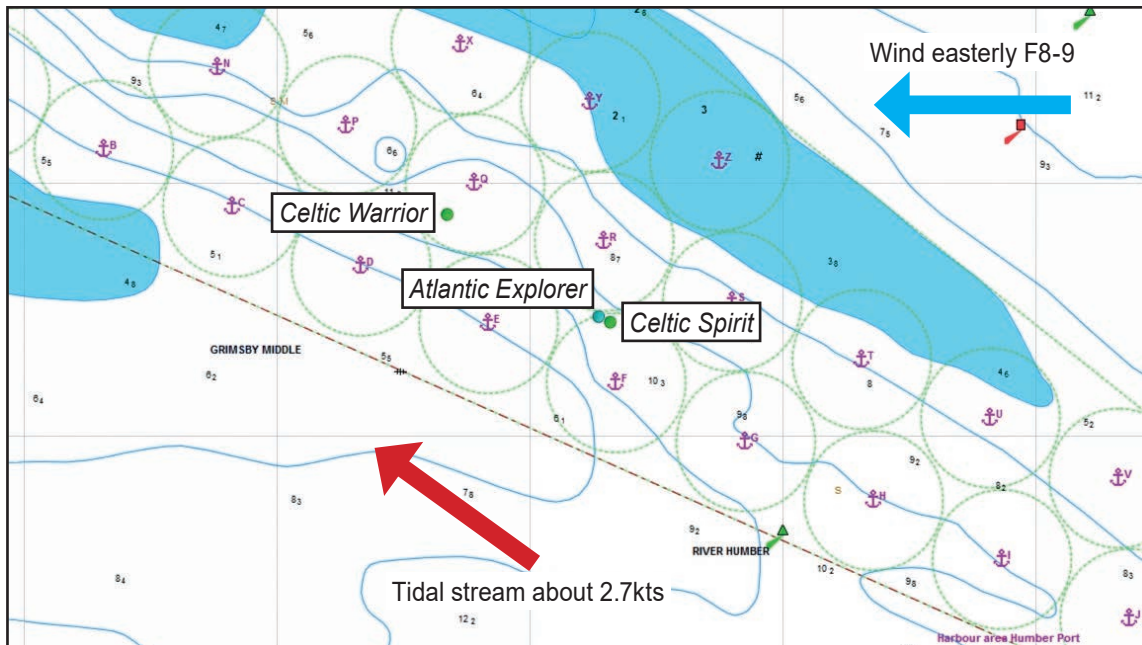


Figure 2b: 0312 *Celtic Spirit* collides with *Atlantic Explorer*

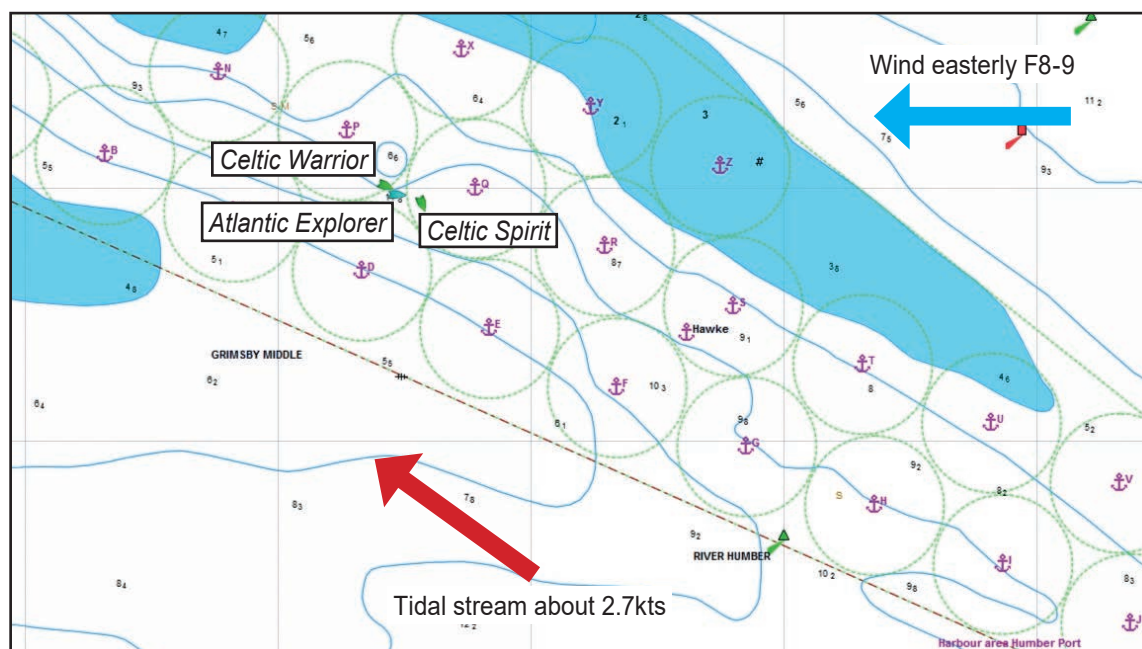


Figure 2c: The vessels drifting north-west after *Celtic Spirit*'s collision with *Celtic Warrior*

At 0300, *Celtic Spirit's* chief officer (C/O) arrived on the bridge to take over the anchor watch in accordance with the vessel's watch rota. The 2/O informed the C/O that the vessel was dragging anchor, then went below to hasten the engineer. On the way, the 2/O met another AB, who was about to come on duty, and instructed him to go forward and assist with the anchor windlass.

When the 2/O returned to the bridge he noticed that the ship's speed had increased to 0.9kt, and he was notified by the duty AB on the fo'c'sle that the anchor cable was tight.

At 0306, *Atlantic Explorer's* bridge watchkeeper called *Celtic Spirit* on very high frequency (VHF) radio channel 16 and warned:

*"You are dragging directly to me, your anchor is not holding, your speed is 0.9 and you are going directly to me."*

*Celtic Spirit's* 2/O acknowledged the call and advised that his engine was being prepared to start.

*Atlantic Explorer's* bridge watchkeeper called his engine room and instructed the duty engineer to start the main engines. He also alerted the vessel's master to the developing situation.

At 0308, Humber VTS called *Celtic Spirit* on VHF channel 16 and asked how long before its engine would be ready. The 2/O replied:

*"We are already preparing the engine; the engineer is in the engine room."*

When probed further by VTS, the 2/O predicted it would take 5 to 10 minutes to start the engine.

VTS then called *Atlantic Explorer* and asked if its engines were ready. The watchkeeper advised that they were not. VTS then warned that *Celtic Spirit* was dragging anchor and heading towards them. *Atlantic Explorer's* watchkeeper replied:

*"Yes, I see. I call them already and they are really really close, I think they will hit."*

While waiting for control of the main engine to be passed to the bridge, *Celtic Spirit's* C/O attempted to avoid the collision using the vessel's bow thruster. As he was doing this, the master arrived on the bridge and took over control at the manoeuvring position.

At 0310, VTS transmitted a warning to *Celtic Spirit* to advise that there was a risk of collision with *Atlantic Explorer*. Shortly afterwards, VTS called *Atlantic Explorer* and asked if any more anchor cable could be payed out. The bridge watchkeeper replied that 6 shackles out of an available 7 had already been payed out.

At 0312, *Celtic Spirit's* stern collided with *Atlantic Explorer's* bow (**Figure 2b**). At approximately the same time, *Celtic Spirit's* engineer started the main engine and passed control to the bridge. The master engaged ahead propulsion but was unable to manoeuvre clear because *Celtic Spirit's* stern was fouled on *Atlantic Explorer's* anchor cable. VTS contacted *Atlantic Explorer* to request a damage report, and also mobilised a tug from Immingham.

By that time, *Atlantic Explorer's* engines were running and in bridge control, but the vessel's manoeuvrability was hampered by its anchor cable and *Celtic Spirit*. The entangled vessels were set by the wind and tidal stream, at over 3kts, towards *Celtic Warrior*, which was anchored 2 cables to the north-west. *Celtic Warrior's* bridge watchkeeper had been monitoring the radio exchanges between VTS, *Celtic Spirit* and *Atlantic Explorer*, and had called the vessel's master and crew.

At 0316, VTS called *Celtic Warrior* on VHF channel 16 and asked if the vessel's engines were running. The bridge watchkeeper confirmed that they were. VTS then warned that *Celtic Spirit* and *Atlantic Explorer* were dragging anchor towards *Celtic Warrior* and advised the vessel to weigh anchor. *Celtic*

*Warrior's* master, who was on the bridge, immediately engaged astern propulsion but, shortly afterwards, at 0320, *Celtic Spirit's* port quarter collided with *Celtic Warrior's* bow. The impact caused *Celtic Spirit* to become detached from *Atlantic Explorer's* anchor cable and all three vessels began to set to the north-west (**Figure 2c**).

## POST-COLLISION EVENTS

At 0321, VTS advised three other vessels in the Hawke anchorage that were to the north-west of the collision, to start their engines, weigh anchor and reposition.

*Celtic Warrior* was unable to weigh its anchor as its anchor cable was leading underneath *Atlantic Explorer*. *Atlantic Explorer* was unable to either weigh or release its port anchor due to damage sustained during the collision with *Celtic Spirit*.

*Celtic Spirit's* master maintained a distance of about 3 cables from *Atlantic Explorer* and *Celtic Warrior* by using the ship's engine and bow thruster. The crew attempted to weigh the anchor, but with 1 shackle of cable remaining in the water the anchor windlass was unable to lift any more.

At 0515, the tug *Svitzer Laura* was made fast to *Celtic Spirit's* stern (**Figure 3**) as the cargo vessel's crew continued attempting to weigh anchor. Efforts to weigh anchor continued until 1011, when the windlass failed. This caused the anchor chain to run out and its bitter end to part. With *Svitzer Laura* standing by, *Celtic Spirit* made its way upriver and berthed alongside in Hull.

At 0650, *Celtic Warrior's* anchor was recovered, and the vessel was manoeuvred to a new anchorage position. While re-anchoring, the ship contacted and damaged the 5A green lateral buoy, which marked the northern boundary of the Bull Channel.

Later that day, *Celtic Warrior* berthed in Groveport to discharge cargo, and *Atlantic Explorer* went alongside in Grimsby to assess the damage sustained during the collision.

The following damage was sustained during the collisions:

- *Celtic Spirit* suffered structural damage to its weather deck, engine room shell plating and bulwark along its port quarter (**Figure 4**),
- *Atlantic Explorer* suffered damage to its shell plating at its bow and port shoulder, and damage to its anchor equipment,
- *Celtic Warrior* sustained shell plate damage to its bow.

On 9 April, *Celtic Spirit's* starboard anchor and cable were recovered intact. The anchor flukes were found to have fouled a large section of previously abandoned anchor cable.

## THE VESSELS

### *Celtic Spirit* and *Celtic Warrior*

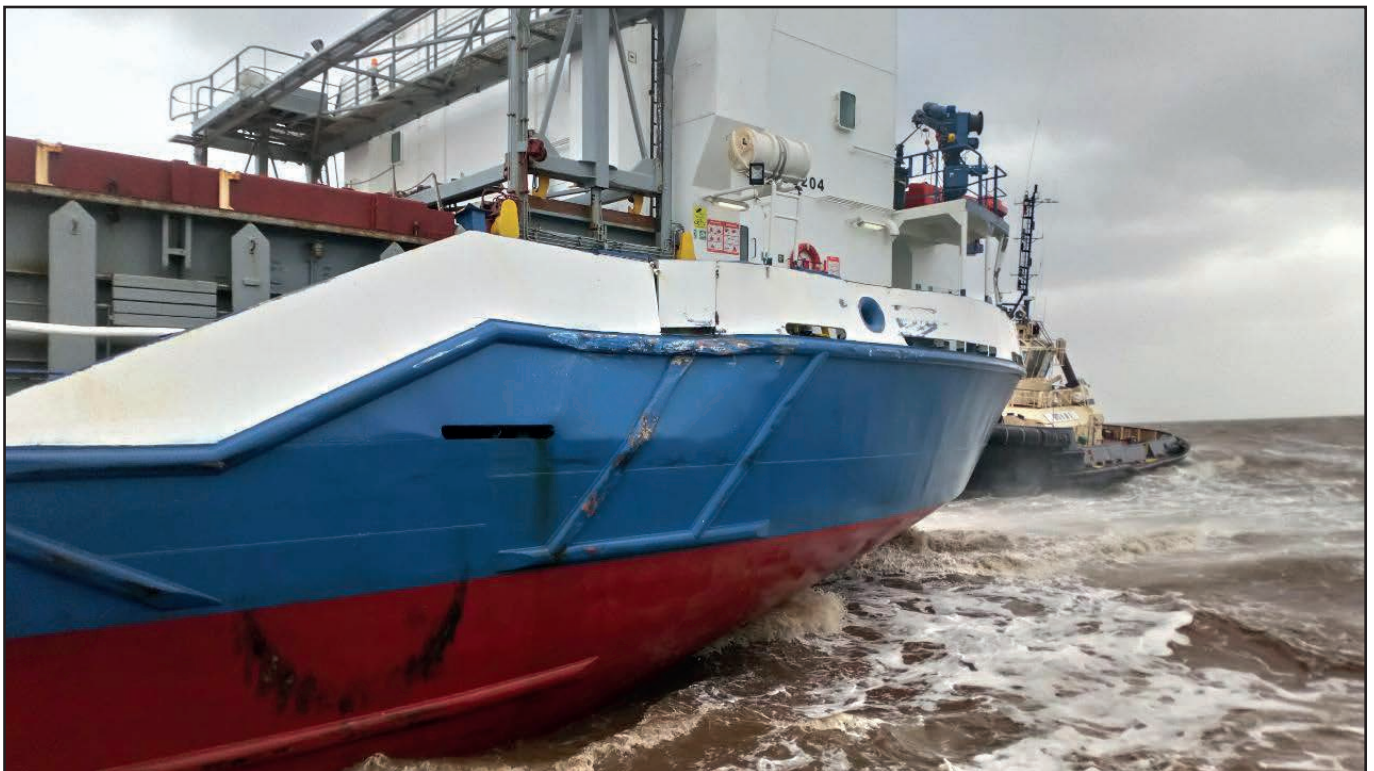
The UK registered general cargo vessels *Celtic Spirit* and *Celtic Warrior* were owned and operated by Charles M. Willie & Co. (Shipping) Ltd (CMW) and traded between the UK, Spain, Portugal, and the Baltic and Black Sea regions. CMW was a family-run business that owned and operated eight vessels and managed one other from its base in Cardiff.

*Celtic Spirit* and *Celtic Warrior* were near identical vessels. Each was equipped with two 1570kg HYT-12 high holding power anchors, each with 7 shackles of 36mm steel cable. It typically took about 20 minutes in calm weather conditions to weigh anchor when all 7 shackles of cable had been put in the water.

*Celtic Spirit* and *Celtic Warrior* each had a single 2200kW main propulsion engine driving a single controllable pitch propeller, and a 200kW bow thruster. Their engine rooms were certified as Unmanned Machinery Space.



**Figure 3:** *Svitzer Laura* made fast to *Celtic Spirit*



**Figure 4:** Damage to *Celtic Spirit*'s port side quarter

Navigation on board both vessels was conducted using paper charts, and their bridge navigation equipment included:

- A chart table sited on the aft port side of the bridge.
- An electronic navigation chart system.
- Displays for an X-band radar and an S-band radar.
- Two GPS receivers, both of which had an 'anchor watch alarm'<sup>3</sup> function.
- An Automatic Identification System (AIS) transceiver.
- A bridge navigation watch alarm system.

### ***Atlantic Explorer***

The Panama registered research and survey vessel *Atlantic Explorer* was owned by Atlantic Explorer Holdings and managed by Atlantic Marine and Aviation LLP. The vessel was employed in boulder removal for the Humber gateway windfarm. It had anchored in the Hawke anchorage on the 28 February and at the time of the accident had 6 shackles of cable in the water.

*Atlantic Explorer* had two main propulsion engines, which together produced 2200kW of power through a single fixed pitch propeller. The vessel also had dynamic positioning capability and was fitted with three 130kW Aquamaster thrusters and a 410kW stern thruster. *Atlantic Explorer's* engine room was constantly manned at sea.

### **ANCHOR LIMITATIONS ON BOARD *CELTIC SPIRIT***

In January 2018, while in heavy weather, the crown of *Celtic Spirit's* port anchor became detached from the shank and was lost. The vessel's Classification Society, Det Norske Veritas - Germanischer Lloyd (DNV-GL) was made aware of the incident and issued a condition of class, valid for 3 months, with the following restrictions:

1. *The main engine shall be kept in stand by while the vessel is at anchor.*
2. *When operating in estuary waters or congested waters a tug of sufficient power shall accompany the vessel, if deemed necessary by the vessel's master.*
3. *The vessel shall, when making notification of port entry or departure, inform the appropriate port state authorities in advance that the port side anchor is not ready for use.*
4. *When a pilot is taken on board, the vessel's master shall inform the pilot of the non-operational port side anchor.*

*Celtic Spirit's* superintendent confirmed to DNV-GL that the company understood the conditions and no further clarification was sought.

A replacement anchor had been delivered to Groveport before the vessel sailed, but had not been fitted. Before the vessel sailed, the pilot and the Humber port authority were made aware that the ship was operating with only one anchor.

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<sup>3</sup> A GPS anchor watch alarm monitors a ship's position and provides an audible alert in the event that the vessel moves outside of a predefined radius, based on a nominated position.



## CREW

*Celtic Spirit's* crew comprised a master, C/O, 2/O, engineer, motorman and three ABs. All the crew were appropriately qualified for their position on board. At sea, the deck officers worked a 4 hour on and 8 hour off watchkeeping routine. The engineer worked days and was the only crew member certificated to hold an engine room watch. The ABs' watch duties covered the hours of darkness and the motorman worked days and assisted on deck.

*Celtic Spirit's* master was a 52-year-old Polish national. He had held a Polish Certificate of Competency with a UK Certificate of Equivalent Competency since 2008 and had worked as master with CMW since 2012. He joined *Celtic Spirit* on 9 November 2017 and kept the 8 to 12 bridge watches at sea.

*Celtic Spirit's* 2/O was a 32-year old Russian national who had been employed as a deck officer since 2013. He had been on board *Celtic Spirit* for 4 months and was approaching the end of his third contract with CMW. At sea he kept the 12 to 4 watches.

*Celtic Warrior* had similar manning levels but also had a shore contractor working on board. *Atlantic Explorer* had a crew of 23.

## ENVIRONMENTAL CONDITIONS

The visibility was poor, with intermittent snow blizzards. The wind was easterly at Beaufort force 8 to 9 and the sea state was moderate.

It was 3 days before the spring tide. On 28 February low water at Grimsby was at 2307 (1.2m); on 1 March, the first high water was at 0513 (6.9m). While *Celtic Spirit* was at anchor, the tidal stream turned at 2352, began to set to the north-west and was predicted to reach a maximum rate of 2.7 knots at 0300. When *Celtic Spirit* began dragging its anchor the tidal height was 5.3m above chart datum.

## THE HAWKE ANCHORAGE

The Hawke anchorage (**Figure 1 inset**) was a short stay anchorage located to the north-west of the mouth of the Humber estuary. The seabed had a charted depth of between 8 and 10m, and the bottom composition was described as sand and mud. There were 25 designated anchorage positions, which were 2 cables in diameter and denominated alphabetically to enable VTS to easily direct ships to an anchorage position.

At the time of the collision, there were two other vessels in the anchorage to the east-south-east and three vessels to the north-west of the accident area.

## GUIDANCE FOR ANCHORING IN HEAVY WEATHER AND DRAGGING ANCHOR

A vessel's position should be checked at regular intervals while at anchor to confirm that it remains inside its swinging circle (**Figure 5**). All available means, both visual and electronic equipment such as GPS, radar and ECDIS, should be used to make an appraisal of the situation. If the vessel leaves the circle, it is likely to be dragging its anchor.

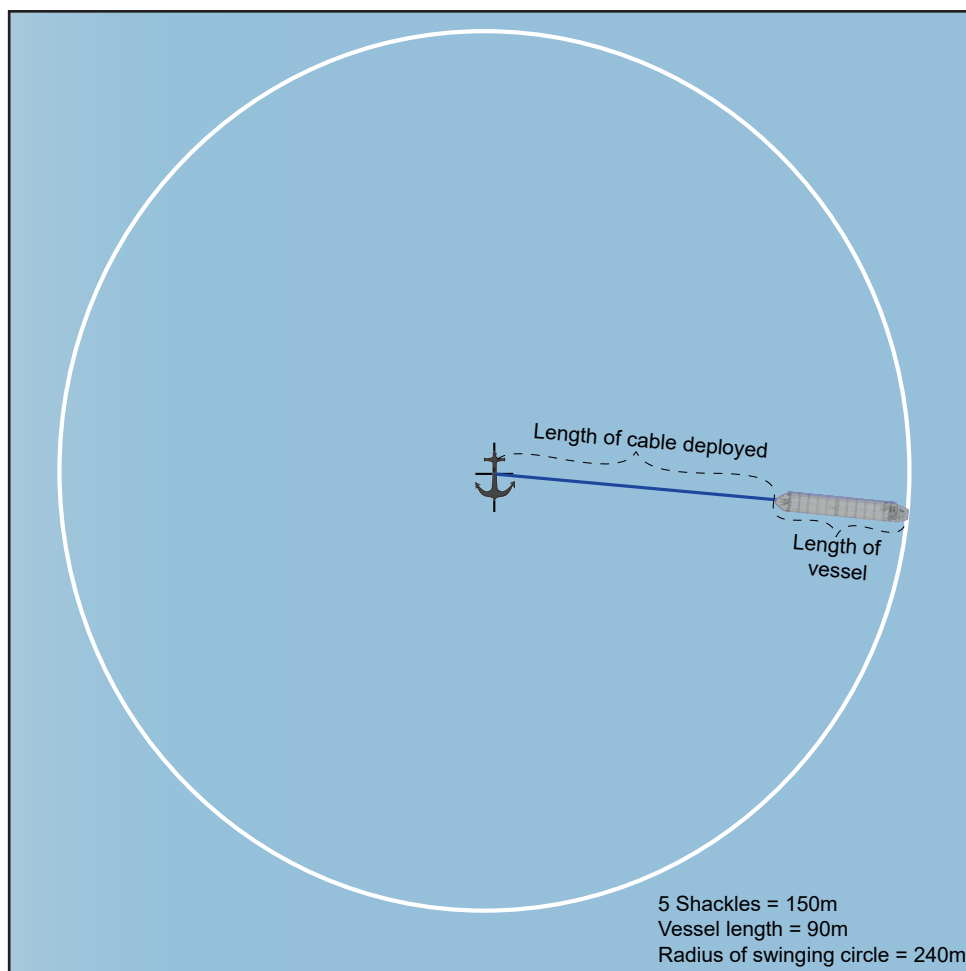
Heavy weather is the most likely reason for a vessel dragging anchor. Industry guidance on precautions to consider when anchoring in such conditions includes:

- Use the maximum amount of available anchor cable.
- Increase the efficiency of the bridge team by adding an extra lookout.
- Monitor the position of other anchored vessels.

- Use both radar and GPS anchor watch alarms.
- Keep the main propulsion machinery on immediate notice.
- Keep a safe distance from other anchored vessels, shoals and other dangers, leaving room for manoeuvring.
- Have the second anchor made ready for letting go.
- Deploy a second anchor to reduce yaw (a procedure that is seldom used by commercial vessels).
- Take on ballast to reduce windage.

Once a vessel starts dragging, the following steps should be considered:

- Call the master and muster the anchor party.
- Start the main engine, thrusters and steering gear.
- Alert VTS and nearby vessels.
- Deploy more cable or drop the second anchor before the vessel's speed increases.
- Weigh anchor and put to sea (in extreme conditions require the cable to be released).
- Allow vessel to drift in a controlled manner.



**Figure 5: Swinging circle**

## CELTIC SPIRIT'S SAFETY MANAGEMENT SYSTEM

CMW's safety management system (SMS) was developed in-house. The generic fleet-wide system was intended to meet the requirements of the International Safety Management Code. The SMS contained the following information related to anchoring:

- *Whilst at anchor Rule 30 of Colregs<sup>4</sup>. Should be adhered to.*
- *ICS Bridge Procedures Guide, master's Standing Orders and Night Order Book should be consulted.*
- *The vessel's position should be verified at regular intervals by bearing and distance and entered in the Deck Log Book.*

The International Chamber of Shipping's *Bridge Procedures Guide* provided generic guidance and a checklist to assist with anchorage planning and vessel position monitoring. It did not contain specific guidance on precautions to take when anchoring in heavy weather. The instructions set out by the master in his night order book reflected the guidance provided in his standing orders. He required the watchkeeper to: keep a sharp lookout; monitor the vessel's anchor position; call the engineer to start the engine, muster the crew forward and call the master to the bridge if the vessel starts dragging anchor.

## HUMBER VTS AND PILOTAGE

Humber VTS was manned 24 hours a day to monitor and control shipping in the rivers Humber, Ouse and Trent. The service included the allocation of designated anchorages, and pilotage was compulsory for all vessels 60m or over in length.

The port authority's generic risk assessment for anchoring operations considered the worst credible outcomes for vessels dragging anchor to be: damage to a pipeline, serious injury to personnel, major damage to vessel, major pollution and major impact on business. The most likely outcome listed in the risk assessment for dragging anchor was that the vessel would identify that dragging was occurring, and it would rectify the situation without consequence. The likely causes for dragging anchor included: adverse tide/current, adverse weather conditions, inadequate bridge resource management and inadequate vessel procedures. The control measures listed in the risk assessment included: the designation of anchorage positions, the port's general directions and notices to mariners, and VTS operational procedures.

The Humber VTS *Operations and Procedures Manual* highlighted that most vessel dragging incidents are attributed to high wind conditions. The procedure for monitoring vessels at anchor included the use of radar anchor guard alarms. Anchor guards were set for all the vessels at the Hawke anchorage, but due to the amount of movement in the prevailing weather conditions the alarms were sounding constantly. The harbour authority did not provide specific guidance to vessels in respect to engine readiness, and the operational status of anchoring equipment in heavy weather conditions.

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<sup>4</sup> The International Regulations for Preventing Collisions at Sea 1972 (Colregs) – Regulation 30 refers to the lights and shapes required to be shown by vessels at anchor.

## ANALYSIS

### THE DECISION TO ANCHOR IN HEAVY WEATHER

*Celtic Spirit's* master had left Groveport with the intention of taking bunkers and proceeding directly on passage to Riga. However, when the bunker barge was cancelled due to the weather conditions, the master was left with a choice of either proceeding to sea or anchoring in one of the designated anchorage areas until the weather abated sufficiently for bunkering to recommence.

*Celtic Spirit's* master did not want to proceed to sea due to his concern over low bunkers. His decision to use the Hawke anchorage as a layover was influenced by the advice of VTS and the pilot, and that other vessels, including a sister ship, were already at anchor. In addition, the Hawke anchorage was the only short-term anchorage available that would provide some shelter from the strong easterly wind.

In view of the limited choices available to *Celtic Spirit's* master, the decision to layover in the Hawke anchorage was logical. However, given the environmental conditions, the risk of dragging anchor was high and appropriate controls should have been put in place. Perhaps due to the change of plan and his concern regarding availability of bunkers, the master placed an undue level of reliance on VTS and the pilot, and he did not challenge the choice of either anchor position or the length of anchor cable recommended.

### SCOPE OF ANCHOR CABLE

*Celtic Spirit* had maintained its anchor position in gale force winds for 4 hours with 5 shackles of cable in the water. However, it was almost low water when the vessel was anchored, and the tidal stream was opposing the wind. When *Celtic Spirit* started to drag its anchor, the tidal stream had increased to 2.7kts and was acting in the same direction as the gale force winds.

For an anchor to achieve its maximum holding power, sufficient cable must lie along the seabed before rising to the hawse pipe. In this case, although the sand and mud seabed afforded reasonable holding ground, the change of the cable's scope caused by the prevailing winds, flooding tidal stream and the rising tide was enough to raise the catenary sufficient for the anchor to drag.

An anchor's holding power can also be adversely affected by yawing of the vessel and snatching of the anchor cable due to pitching, especially if the vessel is in ballast. However, in this case yawing and snatching are unlikely to have contributed to *Celtic Spirit* dragging as evidence indicates that the vessel was riding steadily at anchor.

There are several methods used to calculate the amount of cable to be used when anchoring. These include:

- number of shackles of cable =  $1.5\sqrt{\text{depth in metres}}$
- length of cables in metres = 6 to 10 x (depth of water in metres)

The required lengths of anchor cable derived from these formulae for position D at the Hawke anchorage, considering the predicted height of tide, vary between 3.4 and 5.6 shackles. The use of these types of formulae provide a valuable guide, but factors such as the strength of the wind and tidal stream, tidal range, nature of the seabed, sea conditions, vessel loading, the extent of safe water available and duration of stay must also be considered.

*Celtic Spirit* started dragging its anchor because insufficient anchor cable had been deployed in the prevailing environmental conditions. It was apparent that the master's use of 5 of *Celtic Spirit's* 7 shackles of cable was based solely on the pilot's advice. It was also evident that the pilot's advice did not adequately take into account the forecast winds and predicted tidal stream.

## ANCHOR WATCHES AND ENGINE READINESS

Continuous position monitoring is essential when anchoring in heavy weather and in close proximity to other anchored vessels. This is typically achieved by enhancing the anchor watch and the use of electronic navigation aids. Propulsion machinery readiness is also critical for the prevention and control of anchor dragging.

AIS data indicated that *Celtic Spirit* began to drag anchor at 0246. The 2/O did not recognise that the ship was dragging until 0255, which meant that 9 minutes had elapsed before the movement was identified. *Celtic Spirit* covered the 3 cables to *Atlantic Explorer* in 26 minutes. As it took 17 minutes for control of the engine to be passed to the bridge, the 2/O would have needed to recognise that the vessel was dragging anchor almost immediately to have had a chance of preventing the first collision.

The handover of the bridge anchor watch from *Celtic Spirit*'s master to its 2/O did not include fundamental information such as position monitoring frequency, the need to monitor for changes in strength of wind and tidal stream, and that the available GPS anchor watch alarms were not set. *Celtic Spirit*'s 2/O was on the bridge alone and was fixing the ship's position at 30-minute intervals while performing administration tasks. Given the prevailing winds, predicted tidal stream and the proximity of other vessels, the time between position fixes was too long and near-constant position monitoring was required, which could have been achieved by the use of the vessel's GPS anchor alarm.

The Humber pilots advised *Celtic Spirit*'s master to keep the vessel's engines on standby and the condition of class for operating with one anchor specified that the engine must remain on standby while at anchor. However, as soon as *Celtic Spirit*'s master was confident his anchor was holding, he ordered the engineer to stop the main engine. Once the engineer had shut down the engine he went to his cabin to rest, leaving the engine room unmanned.

There was no definition for 'main engine standby' in CMW's SMS and additional guidance was not requested by the company or the master when the 'condition of class' was issued. It is commonly accepted that the phrase 'main engine standby' means that the engine is maintained at immediate readiness to start and be made available to the bridge. This was achieved on board *Atlantic Explorer* through the maintenance of an engine room watch. This was not an option on board *Celtic Spirit* or *Celtic Warrior* as both vessels had only one certified engine room watchkeeper, but *Celtic Warrior* kept its engine running throughout in bridge control.

*Celtic Spirit*'s and *Celtic Warrior*'s masters were aware of the forecast weather conditions and the predicted tidal stream; they were also both conscious that the anchorage was congested. It is therefore surprising that they took a very different approach to engine readiness. That the masters adopted different levels of risk mitigation indicates a lack of company guidance. Given the proximity of other vessels, vigilant position monitoring and immediate engine readiness were both crucial to the avoidance and control of dragging anchor. Neither was achieved on board *Celtic Spirit*.

## THE COLLISIONS

The first collision between *Celtic Spirit* and *Atlantic Explorer* occurred about 17 minutes after *Celtic Spirit*'s 2/O had realised that his vessel was dragging its anchor. During this time *Celtic Spirit*'s engineer was preparing to start the vessel's main engine and pass its control to the bridge. Without a second anchor to deploy, the 2/O's options were extremely limited, and collision avoidance was almost solely reliant on other vessels getting out of *Celtic Spirit*'s way.

*Celtic Spirit*'s 2/O did not broadcast a warning to other vessels at the anchorage or alert VTS to the developing situation. By the time *Atlantic Explorer*'s watchkeeper realised that *Celtic Spirit* was dragging anchor and recognised the risk of collision, he had less than 6 minutes in which to react. This was insufficient time to start the vessel's engines, muster the deck crew, weigh anchor and manoeuvre out of

*Celtic Spirit's* path. Even had an immediate warning broadcast been made by *Celtic Spirit's* 2/O, there still might not have been sufficient time to avoid the first collision. However, an early warning broadcast would have given *Celtic Warrior's* bridge team 25 minutes to act, and, as its engine was already running and in bridge control, this might have been sufficient to avoid the second collision. Having said that, once *Celtic Warrior's* bridge team became aware that *Celtic Spirit* was dragging anchor towards them, they made no attempt to weigh anchor and reposition their vessel.

The collisions occurred because *Celtic Spirit's* crew were unable to arrest their vessel's drift and *Atlantic Explorer* and *Celtic Warrior* were unable to get out of its path. This was the result of the proximity of the anchored vessels to each other and the lack of readiness to respond, particularly on board *Celtic Spirit*.

## ROLE OF THE PORT

The extreme weather conditions on the River Humber on 28 February were unusual, but the possibility of vessels dragging anchor in the Hawke anchorage in such circumstances was foreseeable. During the evening, VTS received several reports of vessels dragging anchor, and pilotage was suspended. Despite this, *Celtic Spirit* was allocated an anchor berth 3 cables from *Atlantic Explorer* and in a line following the direction of the wind and tidal stream.

It is apparent that a more considered approach to the allocation of the anchor berths, by VTS, could have provided an enhanced safety margin for the vessels at the Hawke anchorage. Similarly, clearer and more consistent advice on engine readiness and the amount of anchor cable to use in heavy weather would have helped prevent these collisions.

## CONCLUSIONS

1. *Celtic Spirit* dragged its anchor because insufficient anchor cable had been deployed for the tidal range and environmental conditions experienced.
2. *Celtic Spirit's* watchkeeper did not immediately recognise the ship was dragging its anchor because the anchor position monitoring interval was not appropriate.
3. *Celtic Spirit's* watchkeeper did not alert VTS or nearby vessels that his own ship was dragging anchor.
4. *Celtic Spirit* was unable to manoeuvre quickly because its engines were not on immediate readiness. The vessel collided with *Atlantic Explorer* and *Celtic Warrior* because its crew were unable to arrest the vessel's drift and, due to the proximity of the vessels, there was insufficient time for them to get out of the way.
5. Lack of company guidance meant that there was an inconsistent approach to engine readiness on board sister vessels in the same fleet and class conditions relating to engine readiness while operating with only one anchor were not followed or understood.

## ACTION TAKEN

### ACTIONS TAKEN BY OTHER ORGANISATIONS

**Charles M. Willie & Co (Shipping) Ltd** has updated the company SMS and has issued to its fleet:

- A company memo intended to raise standards of anchor watchkeeping and to clarify the notice required of engines in rough weather.
- An onboard checklist for anchor watchkeeping in poor weather.
- Clarification of engine readiness for the term 'main engine stand-by'.

**Associated British Ports, Humber** has:

- Issued General Notice to VTS 02/2018 on 16 March 2018 - Allocation of anchorages and the monitoring of anchorages.
- Reviewed relevant marine risk assessments.
- Completed an anchorage review (as part of a group-wide response to the incident) for all Humber anchorages with designated anchorage positions, which resulted in:
  - Consideration of distance between vessels when anchoring, with reference to the combination of risk factors posed by the specific vessel and the strength and direction of the wind.
  - Consideration of current guidance on the use of specific anchorages within the Humber as shelter when the wind is from a northerly or easterly direction.

## RECOMMENDATIONS

In view of the actions already taken, no recommendations have been made.

## SHIP PARTICULARS

Vessel's name	<i>Celtic Spirit</i>	<i>Atlantic Explorer</i>	<i>Celtic Warrior</i>
Flag	UK	Panama	UK
Classification society	DNV-GL	PMDS	DNV-GL
IMO number	9136204	7924255	9129134
Type	General cargo	Survey	General cargo
Registered owner	Charles M. Willie & Co (Shipping) Ltd	Atlantic Explorer Holdings Ltd	Charles M. Willie & Co (Shipping) Ltd
Manager(s)	Charles M Willie	Atlantic Explorer Holdings Ltd	Charles M Willie
Year of build	1996	1980	1996
Construction	Steel	Steel	Steel
Length overall	89.72m	70.57m	89.72m
Gross tonnage	2840	1420	2842
Minimum safe manning	5	11	5
Authorised cargo	General cargo	Not applicable	General cargo

## VOYAGE PARTICULARS

Port of departure	Groveport	Grimsby	Swansea
Port of arrival	Riga (intended)	Grimsby	Groveport
Type of voyage	Ballast	Not applicable	Loaded
Cargo information	None	Not applicable	Glass - scrap
Manning	8	23	8

## MARINE CASUALTY INFORMATION

Date and time	1 March at 0246		
Type of marine casualty or incident	Serious Marine Casualty		
Location of incident	Hawke anchorage, River Humber, UK		
Place on board	Stern and quarter	Port bow and shoulder	Bow area
Injuries/fatalities	None	None	None
Damage	Deformed shell plating and structural damage. Anchor windlass failure. Lost starboard anchor and cable.	Shell plating deformed and damage to anchor equipment.	Deformation to the shell plating.
Ship operation	At anchor	At anchor	At anchor
Voyage segment	Departure	Arrival	Arrival
External & internal environment	Wind easterly force 8 to 9 with moderate seas. The predicted tidal stream was north-westerly at 2.7kts.		
Persons on board	8	23	9