Report on the investigation of the grounding of

mv *Thunder*

at the approaches to the Dee Estuary

10 August 2006

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
United Kingdom
SO15 2DZ

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Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 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

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Front Cover photograph courtesy of Captain Charles H.J. Allister

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AIS	-	Automatic identification system
BA	-	British Admiralty
BMT	-	British Maritime Technology
BST	-	British summer time
CHA	-	Competent harbour authority
DfT	-	Department for Transport
DPA	-	Designated person ashore
ETA	-	Estimated time of arrival
EA	-	Environment Agency
GPS	-	Global positioning system
ILO	-	International Labour Organisation
ISM	-	International Safety Management Code
LLA	-	Local Lighthouse Authority
LOA	-	Length Overall
gt	-	gross tonnage
HRO	-	Harbour Revision Order
MAIB	-	Marine Accident Investigation Branch
MCA	-	Maritime and Coastguard Agency
MOA	-	Mostyn Operational Area
NTM	-	Notice to Mariners
OOW	-	Officer of the watch
PEC	-	Pilotage exemption certificate
PMSC	-	Port Marine Safety Code
SHA	-	Statutory harbour authority
SMS	-	Safety management system
STCW	-	Standards of Training, Certification and Watchkeeping
UKC	-	under keel clearance
UKHO	-	United Kingdom Hydrographic Office
UTC	-	Universal time constant
VHF	-	Very high frequency
VTS	-	Vessel Traffic Services

Mostyn Channel	South running channel between Mostyn Deep and Mostyn Docks (see insert A on BA chart 1953 - Figure 6)
Mostyn Docks Limited	Mostyn Docks Limited is the statutory harbour authority for the port, and is a wholly owned subsidiary of the Port of Mostyn Limited.
Mostyn Operational Area	That part of the Dee Conservancy area through which vessels navigating to and from the Port of Mostyn pass.
Mostyn Outer Channel	Comprises the Inner Passage, Welsh Channel and the locally named South Hoyle Channel.

Photograph courtesy of Captain Charles H.J. Allister

SYNOPSIS

Narrative

At 2100 BST on 9 August 2006, the Antigua and Barbuda registered general cargo vessel *Thunder* anchored in the Wild Road anchorage off the port of Mostyn. Three shackles of cable were veered in 24m of water. The wind was gusting to 29 knots and a tidal stream of 2.5 knots was running. Overnight the vessel dragged her anchor, and in the early morning of the following day, during the last of the ebb tide, she grounded.

The vessel had navigated the Mostyn Outer Channel without an appropriate navigational chart. The master achieved this using a set of GPS waypoints and the position of a 'preferred' anchorage which had been sent to him in an email by the ship's Mostyn agent. The master had changed his original plan of anchoring close to the North Rhyl buoy, at the entrance to the Mostyn Outer Channel, based upon information received from the agent that provided details of the preferred anchorage.

The master was not called by the OOW overnight. When he arrived on the bridge at 0800 the following morning he discovered that the vessel was lying aground on a sandbank 2.5 cables south-east of the preferred anchorage. There was no damage sustained by the vessel, no injuries to the crew and no pollution. The master did not report that his vessel had grounded. During the forenoon, the Mostyn harbourmaster received a report from Liverpool Coastguard that a vessel was aground in his area. He checked the position of *Thunder* on AIS and, content that she was lying in the Wild Road anchorage, took no further action.

During the next high water, the master was unable to manoeuvre the vessel clear of the bank, and the prevailing wind and tide caused her to drag further inshore. The vessel was now lying in the statutory harbour authority (SHA) area of the Dee Conservancy and was in danger of becoming neaped[1]. At 1625 on 10 August, *Thunder* was observed by the Dee Conservancy harbourmaster stranded off the Point of Ayr; this was the first official recognition that the vessel had grounded.

When he was made aware of the accident, the Mostyn harbourmaster spoke to the master of *Thunder* and advised him of the most effective way to manoeuvre clear of the bank at the next high water, shortly after midnight.

Thunder floated free at 0010 on 11 August. Once clear of the shallow water, a Mostyn pilot boarded the vessel and familiarised the master with channel lights and marks. He provided the master with a local chart, and advice on where to anchor. Due to deteriorating weather conditions, the pilot left the vessel shortly afterwards.

Analysis

The master was aware that an appropriate chart was not available on board. Although he had requested its supply from the Mostyn agent and the cargo operator, he did not notify the company marine superintendent, whose responsibility it was to ensure provision of nautical publications.

[1] Neaped – As the tidal range reduces towards Neap tides, there is insufficient water at High Water to refloat the vessel.

The Mostyn agent had taken it upon himself to send the waypoints for the approach channel, the position of a preferred anchorage and a pilot boarding area to the master. He had not consulted the harbourmaster about their accuracy or reliability.

The Port of Mostyn port passage plan includes an area known as the Outer Channel, not currently part of a CHA or an SHA. In 2001, a risk assessment identified the need for compulsory Pilotage in this approach channel which has not yet been implemented. The port operates information only VTS within its CHA limits, but has no control or monitoring function over vessels in the Outer Channel which at 'South Hoyle' is a 'one way only' channel for larger vessels. The port passage plan failed to: manage shipping movements in the Outer Channel, define minimum under keel clearance for vessels, and examine the suitability of the Wild Road anchorage and promulgate the information.

To support the requirement for compulsory pilotage, identified by risk assessment and by Trinity House, a draft harbour revision order (HRO) was promoted by Mostyn Docks Limited in 2001. Opposition to the HRO, and the subsequent delay, saw final submission in 2003 which, together with a draft HRO submitted by the EA, resulted in a public inquiry in 2005, the results of which are still awaited.

Recommendations

The Port of Mostyn has been recommended to reinstate its recommended pilotage service from the North Rhyl buoy to the port; promulgate a comprehensive port passage plan; and ensure that all charts and hydrographic publications are amended to reflect the revised procedures. The emergency response procedures for marine accidents should be reviewed, ensuring that the necessary actions for each emergency are identified.

Reederei Erwin Strahlmann has been recommended to revise its SMS to include guidance for masters on anchoring and maintaining a safe navigational watch while at anchor.

The MCA has been recommended to conduct a PMSC verification check on the Port of Mostyn.

The Secretary of State for Transport has been recommended, in considering his decisions on the Harbour Revision Orders, to take into account the need to clarify the status of the Mostyn Outer Channel.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *THUNDER* AND ACCIDENT

Vessel details

Registered owner	:	Partenreederei MS Thunder
Manager(s)	:	Reederei Erwin Strahlmann
Port of registry	:	St John's
Flag	:	Antigua and Barbuda
Type	:	Single hold, general cargo
Built	:	22 December 1984, Wewelsfleth, Germany
Classification society	:	Germanischer Lloyd
Construction	:	Steel
Length overall	:	82.30 metres
Gross tonnage	:	1559 tonnes
Engine power and/or type	:	Deutz diesel type SBA 8M 528, 441kW at 620 rpm
Service speed	:	10.0 knots
Other relevant info	:	1 bow thruster 132Kw

Accident details

Time and date	:	0500 BST 10 August 2006
Location of accident	:	53 21.61N 003 18.54W. Five cables north east of the Point of Ayr Old Lighthouse.
Persons on board	:	7
Injuries/fatalities	:	None
Damage	:	None

1.2 BACKGROUND

Thunder is owned by Partenreederei MS Thunder, Marne, Germany and is one of 53 similar vessels managed by Reederei Erwin Strahlmann, of Germany. The vessel was registered in St John's, Antigua and Barbuda and has held the previous names *Sandfield, Paloma,* and *Landkirchen*.

The accident was reported by the Dee Conservancy harbourmaster who also conducted an initial investigation into the incident. The investigation report was received by the MAIB on 25 August 2006, 14 days after the accident.

1.3 ENVIRONMENTAL CONDITIONS

1.3.1 Weather system

The surface analysis chart for 1800 UTC on 9 August 2006 showed a low pressure system 1000mb, situated north-east of Scotland. The system was generating west to north-westerly winds, Beaufort force 5 to 6 over the Dee Estuary, occasionally gusting up to 29 knots.

1.3.2 Tides

The predicted and recorded tidal data for the Port of Mostyn is shown in table 1. Admiralty Sailing Direction NP37 refers to a maximum easterly spring rate of 2.5 knots in the general direction of the channel. However, spring tide conditions can see sudden rushes of short duration with rates up to 4 knots between 3hr 45min and 1hr 45min before high water at Liverpool.

Table 1

DATE	PREDICTED		RECORDED		DIFFERENCE	
	TIME (BST)	HEIGHT (metres)	TIME (BST)	HEIGHT (metres)	TIME (minutes)	HEIGHT (metres)
09 AUG	1827	1.41	-	-	-	-
	2352	9.29	2356	9.23	+ 4	- 0.06
10 AUG	0655	0.83	0708	0.78	+15	- 0.05
	1221	9.22	1230	8.99	+9	-0.23
	1914	1.01	1930	0.91	+16	-0.10
11 AUG	0036	9.57	0040	9.46	+4	-0.11
	0741	0.48	0810	0.40	+29	-0.08
	1305	9.42	1310	9.02	+5	-0.40

1.4 NARRATIVE

All times are British Summer Time (UTC +1).

1.4.1 Planned voyage

Thunder was due to undertake a voyage charter and had sailed in ballast from Newport, South Wales, at 1855 on 7 August 2006. The vessel was bound for Shoreham to load a cargo of scrap steel.

1.4.2 Sequence of events: pre-anchoring

At 1330 on 8 August 2006, as *Thunder* was abeam of Lizard Point en route to Shoreham, her master received a mobile telephone call from the vessel's cargo handling operator, Echoship, based in Denmark. The master was informed that a new charter had been arranged which required him to proceed to the Port of Mostyn, in the Dee estuary, to load a cargo of steel coil. The cargo operator requested that the master inform him of: the distance to run to Mostyn, the vessel's ETA and the prevailing weather conditions.

At 1330, the OOW altered the vessel's course to 281 and the passage to Mostyn commenced. Weather conditions were favourable; the wind was southerly force 2, forecast to veer north-west, and the visibility was good. The sea conditions were benign, and *Thunder* made good an average speed over the ground of 10.1 knots.

The master, together with the mate, checked the passage charts from Lizard Point to Mostyn and identified that BA chart 1953 'England and Wales Approaches to the River Dee' was not held on board.

At 1420, Echoship received an email from *Thunder*'s master **(Annex A)** which answered their earlier questions; informed them that BA chart 1953 was not held; and, for that reason, requested that a pilot board the vessel at the Liverpool Bar. The master had assumed that this would be the boarding position, having previously embarked a pilot for Raynes Jetty - Llanddulas, 17 miles west of Mostyn, from the same position.

At 1542, Echoship emailed a copy of the master's request to the agent at the Port of Mostyn and confirmed that, in accordance with Mostyn's anticipated breakdown of disbursements, funds would be transferred the following morning **(Annex B)**.

At 1658, the master, in accordance with the instructions in ALRS volume 6(1), provided the agent at the Port of Mostyn with the vessel's arrival information 28 hours in advance of the planned ETA **(Annex C)**. He requested that the pilot board from the Liverpool Bar, and once again requested provision of BA chart 1953. The vessel's mobile telephone number was also passed.

At 1748, the Mostyn agent, believing that *Thunder* had a subscription-only email service and would not be able to receive his email direct[2], responded to the master's earlier email by replying to Echoship **(Annex D)**, for onward transmission to the vessel. This email provided the following information:

- That the '*pilot normally boards at the Dee Buoy pilot station*';
- A set of GPS waypoints which would allow the master to navigate from the North Rhyl buoy to the Dee buoy without BA chart 1953;
- And the position of the 'preferred anchorage' – the Wild Road anchorage.

Twenty one minutes later, at 1709, Echoship re-transmitted the email to *Thunder*. The master's interpretation of this email was that his vessel should anchor in the preferred anchorage. This would require him to navigate the Mostyn Outer Channel without an

[2] This was not the case as *Thunder* was fitted with communications equipment capable of receiving and transmitting emails as required.

appropriate navigational chart, using the GPS waypoints provided by the agent. The master attempted to call the Mostyn agent, using the telephone number in ALRS volume 6(1), seeking clarification, but there was no answer.

Overnight 08/09 August, the master considered the options available to him. He was not content to navigate the Mostyn Outer Channel without an appropriate chart, and decided that the safest option would be to anchor west of the North Rhyl buoy to await either a pilot, or BA chart 1953.

The master believed that the waypoint and preferred anchorage information had been issued and approved by a qualified mariner. However, the master was uneasy with the lack of communication about the arrangements for a pilot, and at 0710 on 9 August sent an email to the Mostyn agent **(Annex E)** expressing this concern and noting the possibility of failing light at the time of arrival and his concern about the shallow depths identified on BA chart 1978. Still unaware of his predicted time of berthing, the master stated that it was his intention to anchor west of the North Rhyl buoy if it was necessary for him to anchor. Crucially, he requested confirmation from the Mostyn agent that his previous emails had been received. The master did not receive a response to that email.

Throughout 9 August, as *Thunder* continued on passage toward Mostyn, the master became increasingly uneasy with the options available to him on arrival and the level of support offered by the Mostyn agent. He discussed the suitability of the 'preferred anchorage' position with the mate. Both men believed that the position had been identified by an experienced pilot or harbourmaster, but still assessed that the safest option was to anchor at the North Rhyl anchorage. However, as the vessel neared Mostyn, the master decided to anchor *Thunder* in the 'preferred anchorage' position, based on his belief that:

- the pilot would probably board from the 'preferred anchorage';
- the preferred anchorage position would only have been provided if it offered the best protection from the elements;
- commercially the ship was required at the preferred anchorage to reduce pilotage disbursements, and to serve notice of readiness.

At 2000, using BA chart 1978 'Great Ormes Head to Liverpool' and with the Mostyn agent's waypoints in the GPS, *Thunder*'s master commenced his approach to the Mostyn Outer Channel from one mile west of the North Rhyl buoy. The mate was on the helm, and the echo sounder was on. The one remaining hour of daylight assisted identification of the navigation marks defining the channel boundaries, and other than keeping to the correct side of the navigation marks, the master was totally reliant on GPS cross track error for safe navigation. He was completely unaware of any navigational dangers that might have been present.

At 2100, using the 'preferred anchorage' waypoint for guidance, *Thunder* let go the port anchor in 24 metres of water. Three shackles of cable were veered and the cable was secured with the third joining shackle on deck. The navigation logbook showed that on completion of anchoring, the bridge of *Thunder* laid in position Lat 53º 21.61'N Long 003º 18.56'W, on the edge of the Mostyn Bank **(Annex F)** and in the jurisdiction of the Mostyn Docks Limited competent harbour authority (CHA).

1.4.3 Sequence of events: post-anchoring

Once anchored, the master attempted to communicate with the Port of Mostyn using VHF radio channels 14 and 16. Receiving no acknowledgement, he attempted to communicate by mobile telephone but, similarly, there was no response to his call. The wind was from the north-west Beaufort force 6, and the spring tide was flooding easterly at about 2.5 knots.

The master fixed the vessel's position at midnight (shortly after high water at 2352) on the only chart available to him, BA 1978. As he handed over the anchor watch to the third officer, he was content that *Thunder* was lying to the port anchor, 3 shackles on deck, in safe water. Although an anchor drag alarm was an integral part of the GPS, it was not activated, and the master felt more content using the indicated GPS latitude and longitude to two decimal places to monitor the vessel's position.

Between midnight and 0800 on 10 August, while the master was resting, *Thunder* dragged anchor and grounded on the Mostyn Bank. At no point during the night was he called and advised of the situation, the mate believing that this was a normal condition of the anchorage. When the master took over the watch again at 0800, there was no water around the vessel; the anchor cable was visible along the surface of the sandy beach, but the anchor was submerged in the deeper part of the Mostyn Outer Channel. The master, without the benefit of the larger scale BA chart 1953, also assumed this to be a normal condition for the anchorage. The master again attempted to call the Port of Mostyn on VHF radio channels 14 and 16, but there was no response.

In accordance with the procedures for stranding **(Annex G)** contained within the company's SMS, the master instructed the crew to take soundings of all tanks. The chief engineer took the opportunity to step ashore and carry out a visual inspection of the hull, rudder and propeller. All tanks were confirmed intact, and the visual inspection revealed no apparent damage to the hull or fittings. The configuration of the ballast was not adjusted during this period.

With only BA chart 1978 for reference, the master could not determine with certainty the exact drying height. In his own mind he was confident that at high water the vessel would refloat sufficiently for him to manoeuvre clear of the Mostyn Bank and return to the 'preferred anchorage'.

At around 1100, 1½ hours before high water, the vessel refloated. However, the combination of the spring flood tide and the force 5 to 6 north-westerly wind caused the vessel to shudder from wave impact and the anchor cable to vibrate and jump due to the load force being applied. The master went forward to examine the anchor cable, and confirmed that the anchor was dragging.

The master returned to the bridge and attempted to ease the weight on the anchor cable using the main engine, rudder and bow thruster. The attempt was unsuccessful and *Thunder* continued to drag closer inshore. At 1200, the ship's logbook recorded her position as Lat 53º21.5'N Long 003º18.46'W.

The vessel swung to the south east with the onset of the spring ebb tide. The master continued to try and manoeuvre the vessel clear of the bank and into deeper water by heaving in the port anchor while using the main engine, rudder and bow thruster to

turn the vessel. The attempt was unsuccessful, and at approximately 1330 the vessel grounded again, in position Lat 53º21.38N Long 003 18.37W, an area with a drying height above chart datum of approximately 6.5 metres.

Thunder was now lying in the jurisdiction of the Dee Conservancy statutory harbour authority (SHA), and the Mostyn Docks Limited CHA **(Figures 1 and 2)**.

1.4.4 Involvement of the local harbour authorities

At 0909 on 10 August, Liverpool coastguard received a call from the coxswain of the Hoylake lifeboat reporting *Thunder* aground off the Point of Ayr. At 0915, Liverpool coastguard called the Mostyn harbourmaster by telephone and asked whether he could confirm that *Thunder* was aground off the Point of Ayr. Based on the information which had been passed to him by the Mostyn agent, the harbourmaster believed *Thunder* was anchored in the vicinity of the North Rhyl buoy. To provide confirmation for the coastguard, he logged on to the Liverpool AIS website and identified *Thunder* off the Point of Ayr. He advised the coastguard that the vessel 'looked ok' and was at anchor in the Wild Road anchorage. The coastguard accepted the explanation and closed the incident.

At about 1030, the harbourmaster was due to begin survey operations and, as the survey launch left the harbour entrance, *Thunder* became visible to the harbourmaster for the first time. He recalled seeing the vessel surrounded by water and yawing in the 20 knot breeze. *Thunder* was not scheduled to berth for a further 24 hours, and the harbourmaster made no attempt to establish communications with the vessel during the period of surveying operations. At 1400, the harbourmaster left the port and returned home to rest prior to undertaking a pilotage act planned for midnight 10 August.

At 1200 on 10 August, the ship's commercial agent, appointed from Mostyn Maritime Services, telephoned the vessel and informed the master that he would not be berthing until midday on 11 August. The master acknowledged the intention, but did not report that *Thunder* had been aground.

At 1625, the Dee Conservancy harbourmaster was accompanying a colleague around the Dee Estuary and observed a vessel aground and stranded high on the bank off the Point of Ayr. He immediately contacted the Mostyn harbourmaster to find out if he was aware of the situation. The Mostyn harbourmaster was not aware, but did recall his telephone conversation with Liverpool coastguard earlier that day.

A weekly vessel movements schedule, prepared by the Mostyn harbourmaster, was designed to keep the Dee Conservancy harbourmaster abreast of shipping movements in and out of the Port of Mostyn. On this occasion, however, the short notice charter arrangements meant that *Thunder* had not been included on the schedule. As a consequence, the Dee Conservancy harbourmaster was unaware of the vessel's identity. He did, however, make arrangements to visit *Thunder* between 1830 and 2100, during the period of low water, in company with the Environment Agency (EA) waterways manager. The master was informed of his obligations, and was advised of the potential for the vessel to become neaped should the next attempt to refloat at midnight be unsuccessful.

The Dee Conservancy harbourmaster also informed the Mostyn Harbourmaster that, because *Thunder* was now lying in the jurisdiction of the Dee Conservancy, he would be carrying out a full investigation of the accident.

Photographs courtesy of Captain Charles H.J. Allister Figures 1 and 2

Thunder aground pm 10 August on the Mostyn Bank

1.4.5 Sequence of events: refloating

The master had waited until 1400 on 10 August to contact the vessel's owner, and inform the DPA of the situation. He advised the DPA that he was convinced *Thunder* would refloat at the next high water. The DPA began contingency planning measures, making arrangements for a towage contract should the master not refloat *Thunder* on the next high water.

During the afternoon, the master discharged all unnecessary salt water ballast, which reduced *Thunder*'s draught to 1.8m even keel, a reduction of 60cm.

At 1700, after obtaining vessel particulars from the agent's office, the harbourmaster contacted *Thunder*'s master by mobile telephone and briefed him on the most effective way to manoeuvre clear, once the vessel was afloat. With *Thunder* lying on a heading of 120º, and with 26 knots of wind approaching from directly astern, the master was briefed to use full astern power and, keeping the bow to the bank, sternboard into the main channel and let the stern seek the wind.

Although the harbourmaster considered putting a pilot on board at low water, he was scheduled to conduct another pilotage act at midnight and there was insufficient time for the stand-by pilot to arrive. Consequently, the master was left to manoeuvre his own vessel, although from 2300 the Mostyn pilot boat was standing by in the area of the Wild Road anchorage with a pilot, and the harbourmaster on board to provide advice.

At 2345, the master made an entry in the ship's logbook, '*vessel prepared for manoeuvres as per checklists*', although he had still not been provided with BA chart 1953, first requested 58 hours earlier. High water was predicted to occur at 0036 on 11 August. The wind was from 294º at a speed of 22 knots, occasionally gusting 26 knots. *Thunder*'s engine remained on 5 minutes notice for readiness.

At 0010 on 11 August, *Thunder* floated free - the master manoeuvring in accordance with the advice provided by the harbourmaster. Once she was in deeper water, the pilot called the master on VHF radio, giving him a course to steer to a safe anchorage 2 cables west of the Dee buoy.

In fact, *Thunder* was not making good the course given due to extremely poor manoeuvrability caused by the exposure of the majority of the propeller and rudder above the waterline, a consequence of the earlier de-ballasting operation. The master reported a maximum attainable speed of 2 knots.

The pilot became aware that *Thunder* was not making good the course given, and decided to try and board the vessel. At 0035 he boarded *Thunder*, handed the master an out of date copy of BA chart 1953, and advised him of the course he needed to steer and the relevant visual and radar navigation marks. Due to deteriorating weather, the pilot felt it necessary to leave the vessel 15 minutes later at 0050.

Once again observing *Thunder*'s manoeuvring from the pilot boat, the pilot became aware that the vessel was intending to pass to the north of the Dee south cardinal buoy. The pilot again contacted the vessel by VHF radio and instructed the master to pass to the south of the Dee buoy.

At 0110, *Thunder* anchored two cables west of the Dee buoy, using the port anchor with 6 shackles of cable veered. On completion of anchoring and satisfying himself that the vessel was safe, the master, who was feeling extremely tired after the day's events, went below to sleep. He left night orders instructing the bridge watchkeepers to use the engine and bow thruster as necessary to reduce any undue strain on the anchor cable, and reduce the risk of the vessel dragging further.

Overnight the vessel ballasted, which resulted in draughts of 2.36m forward and 2.78m aft. In the morning, it became apparent that *Thunder* had dragged anchor overnight, the stern being no more than 5m from the Dee buoy. However, she remained in this position until 1240 when the Mostyn pilot boarded. *Thunder* eventually berthed starboard side alongside number three berth in the Port of Mostyn at 1420.

1.4.6 Actions post arrival in Port of Mostyn

A local MCA surveyor attended *Thunder* on arrival and conducted a port state control inspection that revealed four deficiencies:

- The gross tonnage specified in words and figures on the certificate of registry did not agree.
- The cargo securing manual was not approved by the Flag State.
- No chart was available on board for the arrival port (rectified during inspection).
- The SMS did not deal with a change of orders to a port where the vessel did not have appropriate chart coverage.

The Dee Conservancy harbourmaster boarded the vessel in the capacity of investigating officer, interviewed the master in connection with his vessel's stranding, and advised him that the incident should be reported to the MAIB. He provided the master with a copy of the EA publication 'Marine Safety in the Dee Conservancy – a guide to safe navigation' and a copy of the Dee Conservancy Local Notice to Mariners Number 3/2006 which provided guidance for the statutory reporting of accidents and serious injuries.

1.5 HYDROGRAPHIC PUBLICATIONS

1.5.1 BA chart 1978 – Great Ormes Head to Liverpool (Scale 1:75000)

A new edition of BA chart 1978 - edition number 8, which allowed WGS 84 positions to be plotted directly onto the chart, was published by the UKHO on 25 October 2001. This edition was available to *Thunder*'s master and had been corrected by weekly Notice to Mariners (NTM) up to, and including, week 30 of 2006.

As part of the updating process, edition 8 no longer displayed the buoys marking the Welsh Channel or the Mostyn Inner channel. A note on the chart explains that:

> "*These channels are liable to frequent change and there may be less water than charted. The buoys are moved as necessary*"

Edition 8 marked these channels by pecked lines, and the legend 'buoyed channel'. A pilot boarding symbol for the Port of Mostyn was displayed in the centre of the channel at Wild Road, and an 'important note' displayed on the chart advised mariners to '*always use the largest scale chart appropriate*'. The magenta outline of BA chart 1953 was displayed on BA chart 1978.

1.5.2 BA chart 1953 – Approaches to the River Dee (Scale 1:25000)

A new edition of BA chart 1953 – edition number 6 **(Figure 3)**, was published by the UKHO on 11 May 2006. The chart provided large scale coverage of the Welsh Channel, Wild Road, Mostyn Deep, and a separate plan provided larger scale coverage of the Mostyn Channel up to and including Mostyn Docks. Due to the late change of orders, this chart was not available to *Thunder*'s master. Although the master had requested its provision from the Mostyn agent and the vessel's cargo operator, Echoship, the vessel's owner was unaware that the master was not in possession of BA chart 1953.

The previous edition of BA chart 1953 – edition number 5 **(Figure 4)**, was published on 25 October 2001. This chart displayed pilot boarding points for Mostyn in the centre of the channel at Wild Road, and seven cables south east of the North Rhyl buoy. On edition 6, the pilot boarding position near the North Rhyl buoy had been removed, and two directional lights had been added: the West Hoyle Spit (Earwig) light beacon (perch pile)[3], and a second light located ashore 4.5 cables southwest of Mostyn Docks. On edition 6, the recommended anchorage at Wild Road remained in the same position, while the recommended anchorage in the Mostyn Deep had been moved 4 cables west to the south side of the channel.

1.5.3 Sailing Direction NP37 – West Coasts of England and Wales

The latest edition of Sailing Direction NP37, edition 16/2005 published by the UKHO on 18 August 2005 was available to *Thunder'*s master.

Since its publication, NP37 - edition 16 has been the subject of two amendments that affected the Port of Mostyn, or the approach channel. The first amendment, NTM 48/05, informed the reader about the location of the precision direction light. The second amendment, NTM 13/06, replaced paragraph 8.49:

> "*For Mostyn Docks it is recommended that a Pilot is embarked at the outer boarding position 7 cables ESE of the North Rhyl Light-buoy. Alternatively pilots board near Dee Light-buoy (53º22.0'N 003º18.8'W)*"

with:

> "*Pilots board near Dee Light-buoy (53º22.0N 003º18.7'W)*"

Both amendments were originated by the Mostyn harbourmaster, and were available to *Thunder*'s master.

1.6 ANCHORING PLAN

1.6.1 Initial planning

Passage planning to Mostyn was conducted jointly by the mate and the master. Because BA chart 1953 was not available, the master's intention was to anchor in the vicinity of the North Rhyl buoy. He appreciated that although the anchorage was exposed to the wind and sea at all states of tide, it provided unlimited swinging room, and was clear of immediate navigational dangers. Furthermore, the anchorage was recommended in the Sailing Directions for deep draught vessels and, therefore, the master considered it a safe option.

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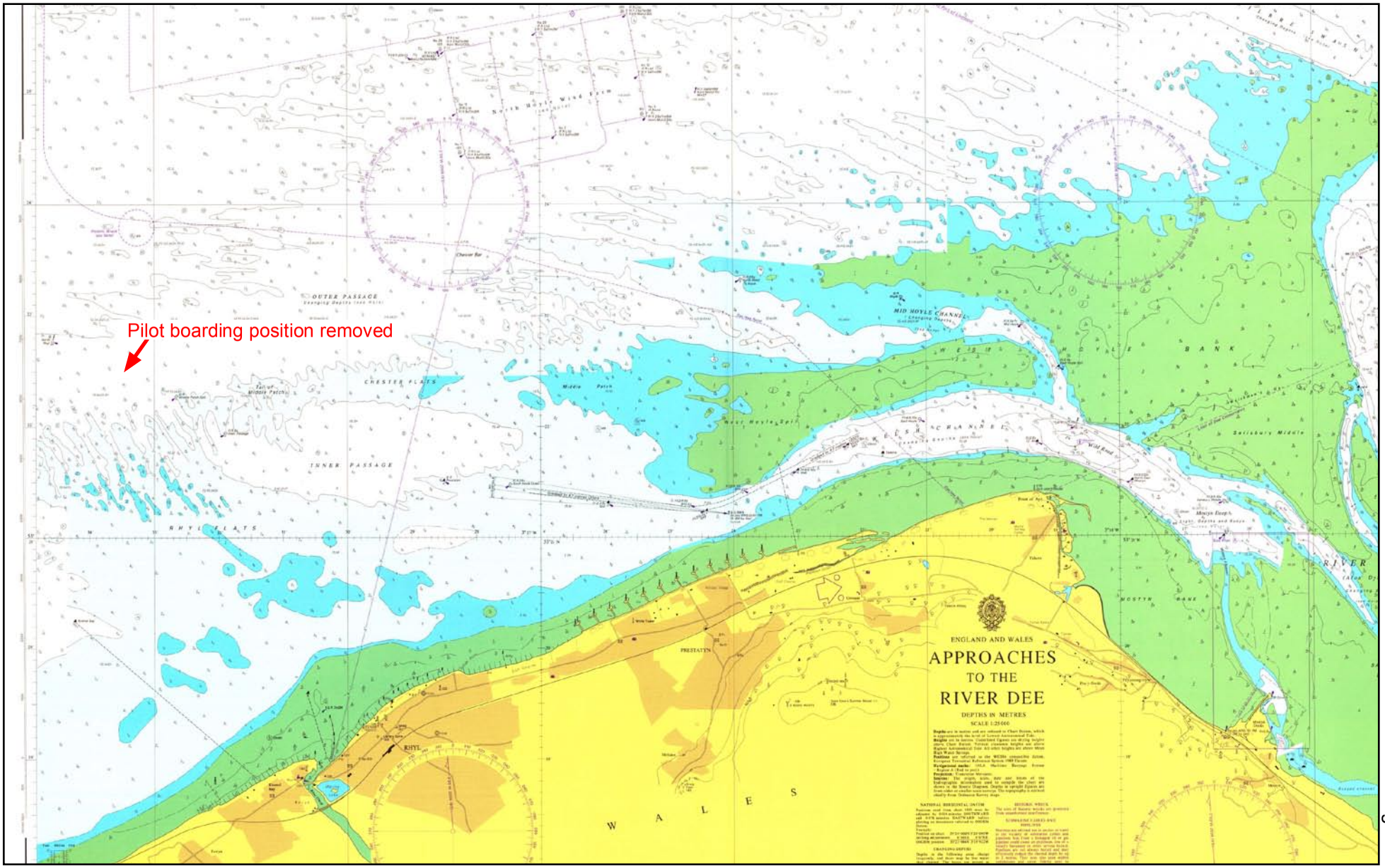
[3] The West Hoyle Spit precision direction light is remotely activated as authorised by the Mostyn Harbour Authority. The perch pile also broadcasts wind, tide and current information to Mostyn and suitably equipped vessels.

Reproduced from Admiralty Chart 1953 by permission of
the Controller of HMSO and the UK Hydrographic Office



BA Chart 1953 Edition No 6

Figure 3

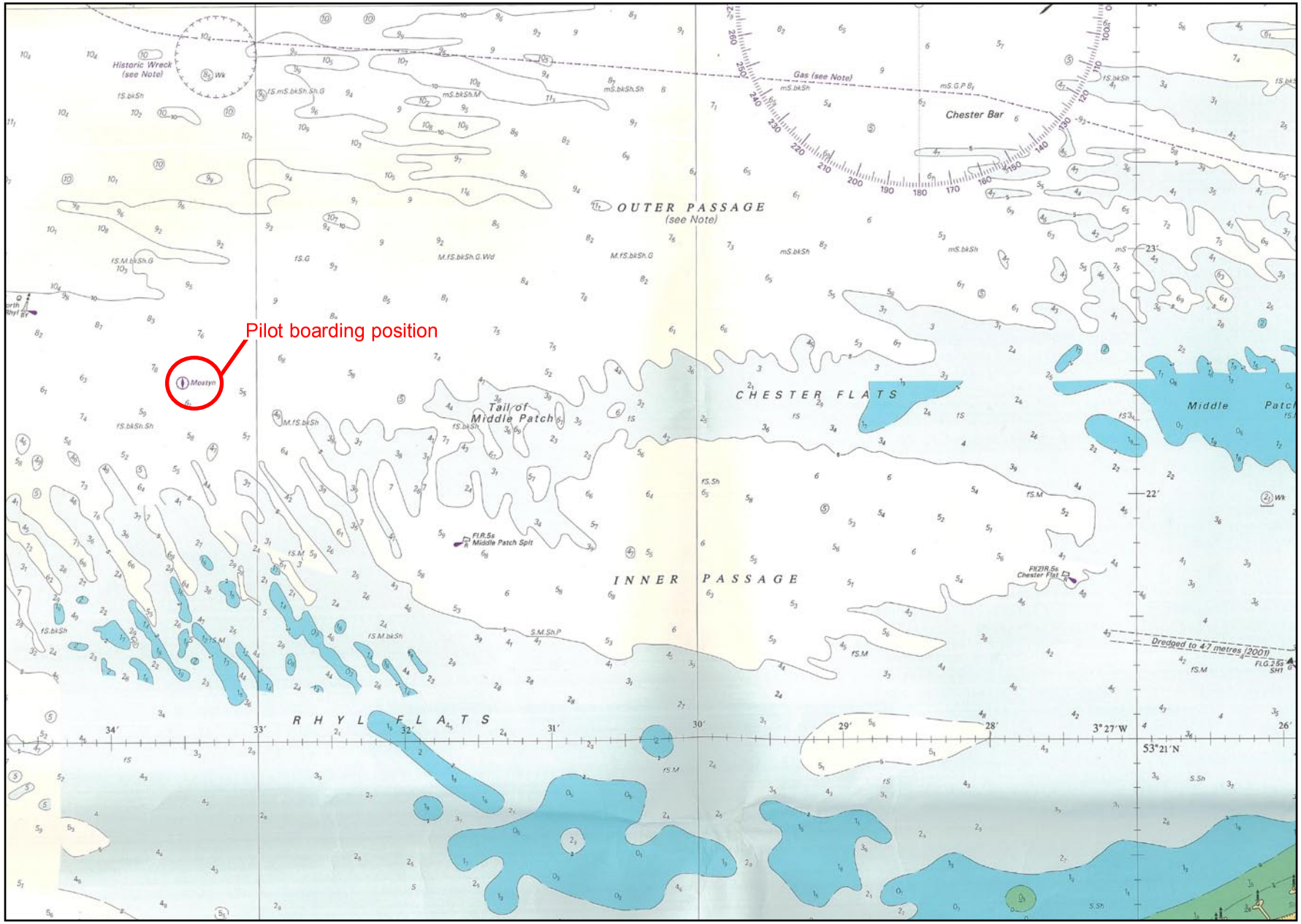


Figure 4

Extract of BA Chart 1953 Edition No 5

1.6.2 Seamanship aspects

During the period of *Thunder*'s stay at anchor, the spring tidal range was predicted to exceed 9m, and the wind was forecast to remain in excess of 20 knots from the north-west. Aware of these constraints, the master planned to let go the port anchor and veer three shackles of cable, holding on when the third joining shackle was on the deck. The distance from the preferred anchorage position to the Mostyn Bank was approximately 167 metres which, given the master's intention to veer 3 shackles of cable, reduced the margin of error to less than 10.6 metres.

1.6.3 Bridge anchor watch

The instructions for maintaining a safe navigational watch at anchor are laid down in the STWC Code Section A-VIII/2 part 3-1 and are shown at **(Annex H)**.

1.7 REEDERIE ERWIN STRAHLMANN – SAFETY MANAGEMENT

The company safety management certificate was issued by Germanischer Lloyd on 10 August 2005.

There were two aspects of the safety management system directly relevant to this accident:

- Procedure VA-015 voyage planning.
- NP-005 Situations and actions for grounding and stranding.

Procedure VA-015 was comprehensive. It provided the bridge team with clear guidelines on the requirements for planning a voyage and, as part of the process it explained individual responsibility. The procedure for ordering, updating, and correcting nautical publications was explained; it referred the reader back to the voyage planning section whenever it became necessary to order missing or out of date charts. The voyage planning section stated:

'*the actualisation of nautical charts and publications should be checked (if all corrections have already been inserted); missing or outdated nautical charts and other publications must be ordered for delivery before a voyage commences*'

The procedure did not account for a change of voyage plan, and the subsequent action that was required to be taken by the master.

The company's grounding and stranding procedure checklist required that:

- The master:
    - Inform the company emergency response team.
    - Inform other vessels by VHF.
    - Inform the coastal radio station.
    - Display by day three black balls, by night two all round red lights and two all round white lights fore and aft.
    - Flood ballast tanks to avoid ship shifting further ashore.
    - Drop anchor.
    - Calculate tides.
    - Plan refloating operation.

- The mate:
    - Check available depth of water around the vessel.
    - Investigate the type of seabed.
    - Note the state of tide.

1.8 THE PILOTAGE ACT 1987

Under the Pilotage Act 1987 a CHA is defined as any harbour authority:

> *which has statutory powers in relation to the regulation of shipping movements and the safety of navigation within its harbour, and*
>
> *whose harbour falls wholly or partly within an active former pilotage district.*

By definition, the Mostyn Docks Limited CHA is responsible for the regulation of shipping movements, and the safety of navigation within its area of jurisdiction.

The Pilotage Act 1987 requires that each CHA shall keep under consideration:

> *Whether any and, if so, what pilotage services need to be provided to secure the safety of ships navigating in or in the approaches to its harbour; and*
>
> *Whether in the interests of safety pilotage should be compulsory for ships navigating in any part of that harbour or its approaches and, if so, for what ships and in which circumstances and what pilotage services need to be provided for those ships.*

1.9 STATUTORY AND COMPETENT HARBOUR AUTHORITY LIMITS

The present SHA and CHA limits are shown on the chart at **Annex I**.

1.9.1 History and background – Dee Conservancy

The Dee Estuary provides an important commercial waterway from Broughton, manufacturing plant of the A380 airbus wings, and the Port of Mostyn. It is the subject of multiple conservation designations, and provides significant recreational space for leisure craft users.

Responsibility for conservancy has passed through several organisations since the implementation of the Dee Conservancy Act 1889. Currently, the EA is the designated conservancy and statutory harbour authority for the Dee estuary. The Ports Act 1991 transferred local lighthouse responsibilities from Trinity House to local harbour authorities, consequently the EA now holds responsibility as the local lighthouse authority in the estuary.

Pursuant to the implementation of the PMSC, in March 2000 the EA commissioned a review of its marine operations. The review examined how the agency discharged its duties and responsibilities, and provided an independent opinion of the steps required to ensure the safety of navigation in the estuary for the succeeding 20 to 50 years. Relevant to this investigation the review recommended:

- The best arrangement for navigational safety on the Dee Estuary would be a unitary conservancy and pilotage jurisdiction.
- This unitary authority should be a trust port. In the interim, a non-statutory Navigation Advisory Committee should be introduced.
- The EA should take immediate steps to obtain the necessary marine competency and appoint a harbourmaster.

- A harbour revision order should be promoted to allow the EA to charge dues to vessels transiting the conservancy jurisdiction.
- The EA and the Port of Mostyn should jointly implement the PMSC. This should include joint systems, such as navigational criteria, accident reporting, investigation and recording.

The immediate impact of the review was a thorough risk assessment of the EA's functions, followed by the appointment of a harbourmaster for the SHA of the Dee Conservancy.

1.9.2 History and background – Port of Mostyn

The Port of Mostyn is privately owned and has, historically, been associated with the import and export of local steel products, ro-ro passenger ferry operations, offshore wind farm construction and maintenance, and underwater pipe-laying. It is tidally constrained, and has required significant dredging of the inner channel to allow access for larger vessels **(Figures 5a and 5b)**.

Originally, Mostyn Docks Limited was in a Trinity House Pilotage District, which had jurisdiction for the safety of navigation, buoyage, and pilotage in the whole of the Dee Estuary and seaward to the North Rhyl buoy. With the introduction of the Pilotage Act 1987, the port applied for SHA jurisdiction for the whole of the estuary, excluding the Mostyn Outer Channel to the North Rhyl buoy. However, following local objection to the proposal, Mostyn reduced its SHA limits to an area immediately surrounding the port, and these were subsequently defined by the Mostyn Docks Harbour Empowerment Order 1988.

For a vessel to enter the Port of Mostyn, it must pass through the SHA of the Dee Conservancy before it can enter the smaller SHA of Mostyn. The area of the Dee Conservancy that the vessel must pass is the Mostyn Deep and the Mostyn Channel. This area is known as the Mostyn Operational Area (MOA) **(Figure 6)**, and it is the subject of a specific agreement between the Dee Conservancy and the Port of Mostyn. However, Mostyn is the CHA for pilotage in the whole of the Dee estuary[4], as defined by The Mostyn Docks (Pilotage) Harbour Revision Order 1989.

Prior to a public inquiry in 1996/7 which found in favour of port development and approved a capital dredge of the Mostyn Channel to a depth of 3m, vessels were constrained by a drying height of 3.25m alongside, and all shipping movements were conducted at high water. Two days either side of neap tides saw few shipping movements which, at that time, were vessels averaging 80 metres in length and 3.5 metres draught. Following the public inquiry approval, the port was substantially upgraded by the creation of new hard-standing, new jetties, and a new ro-ro terminal.

In 2001, P&O Ferries commenced operating from the port. However, the approval to dredge the inner channel to 3m, did not include permission for maintenance dredging, and the subsequent silting of the Mostyn Channel severely constrained the company's ability to operate a scheduled service. As the impact of the port's inability to conduct maintenance dredging worsened, coincidentally, the P&O Ferries' operation was suspended for commercial reasons.

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[4] Excluding the Mostyn Outer Channel

Port of Mostyn during redevelopment C1998

Port of Mostyn post redevelopment

Reproduced from Admiralty Chart 1953 by permission of
the Controller of HMSO and the UK Hydrographic Office

Chart showing the Mostyn Operational Area and the present limits of jurisdiction as the competent harbour authority

Figure 6

Currently the Port of Mostyn removes between 175,000 and 225,000 cubic metres of fine sand per annum. This allows a dredged depth of up to 2m to be maintained in the Mostyn Channel.

1.9.3 Mostyn Docks Limited - current pilotage requirements

Pilotage directions are issued by the Mostyn harbourmaster on behalf of the CHA. The directions were updated and re-promulgated as issue number 3a in 2004, and state that pilotage is compulsory in the Dee Estuary pilotage area for[5]:

- Ships carrying explosives or bulk dangerous cargo.
- Vessels engaged in towing where the length of the tow exceeds 50m.
- Fishing vessels 47.5m or more in length.
- All other vessels 20m in length or more.

An exemption from compulsory pilotage is provided for vessels less than 50m in length, where the person in charge of the navigation of the vessel has satisfied the harbourmaster that they have sufficient local knowledge to navigate safely within the Dee Estuary pilotage area.

The pilot boarding area is stated as the vicinity of the Dee buoy, Lat 53º 21.8'N Long 003º 18.6'W. The pilotage directions make no reference to an 'on request' Pilotage service in the Mostyn Outer Channel, for which the pilot boarding point would be in the vicinity of the North Rhyl Buoy. However, the directions do remind masters that nothing in the directions relieves them of their overriding obligation to ensure the safe conduct of their vessels.

1.10 THE MOSTYN OUTER CHANNEL

To seaward, the channel starts at the North Rhyl buoy, follows the Inner Passage, the area known as the South Hoyle Channel, and the Welsh Channel until its completion at the Dee buoy in the vicinity of the Wild Road recommended anchorage, a distance of 10 miles. The seabed is predominantly fine sand and mud, and the channel is prone to silting and seabed movement caused by complex flows into and out of the Dee estuary, and significant tidal streams. Chart datum depths in the channel described in the port passage plan vary from a maximum of 21m at the Dee buoy, down to 4m in the vicinity of Middle Patch Spit. The area of the channel in the vicinity of the directional light and south of the West Hoyle Spit, known as the South Hoyle Channel, was dredged to 4.7m in 2001. The dredged section stretches a distance of 3.3 miles and represents the narrowest part of the channel with a charted width of 80m at chart datum. A channel side slope gradient of about 1 in 5 proportionately increases the channel width as the tide rises. A gas pipeline lies across the Welsh Channel, to the east of the South Hoyle Channel. BA chart 1953 notes that the Outer Channel is subject to changing depths.

1.11 OUTER CHANNEL DEVELOPMENT

1.11.1 Initial risk assessment

In 2001, in anticipation of a P&O Ferries' service operating from the port, the harbourmaster arranged for a risk assessment of the proposed operations to be carried out. The assessment examined the South Hoyle Channel for the introduction of larger vessels but, due to the size and speed of the proposed ferries, the assessment focused heavily on the ferry operation and channel width.

[5] The pilotage directions lay down certain exemptions for compulsory pilotage.

Pertinent to this investigation, the risk assessment examined the hazards of a commercial vessel or P&O ferry grounding or stranding in the Mostyn Outer Channel or its approaches. The causes were identified as: human error; lack of a pilot or unfamiliarity with the area; failure to calculate the height of tide; or the vessel drifting out of the channel. The likely consequences were hull damage resulting in an oil spill, and that the vessel would have to await the next tide to refloat. Actions to minimise the risk were identified as: regular surveys, monitoring of navigational aids, and extending the harbour limits in order to have control of the risk area.

The risk assessment process helped the harbourmaster to identify that a number of new control measures were required which included the following:

- New pilotage directions recommending pilotage from the Middle Patch Spit buoy (7 cables south-east of the North Rhyl buoy).
- A monthly NTM, reminding mariners about their responsibilities when encountering vessels constrained by their draught.
- As soon as practicable, an HRO to extend the port limits to encompass the South Hoyle Channel and its approaches.
- The establishment of a sectored light to assist precise navigation.

Pursuant to the requirement for pilotage from the Middle Patch Spit buoy (7 cables south east of the North Rhyl buoy), the harbourmaster issued revised pilotage directions on 2 May 2001. Paragraph 3 of the directions advised mariners that:

'*The outer pilot boarding area is in the vicinity of the Middle Patch Spit Buoy, at Lat 53º 22.4'N Long 003º 33.0'W '.*

Compulsory pilotage commences at the inner boarding area, however it is strongly recommended that a pilot is embarked and landed at the outer boarding area, particularly if the master is unfamiliar with the area, or if the vessel is in excess of 100 metres in length '.

1.11.2 Trinity House

Historically, the marking of the Mostyn Outer Channel was the responsibility of Trinity House, based upon powers of general navigation.

At a meeting in November 2000, Mostyn Docks Ltd discussed a proposal with Trinity House to dredge an 80m wide channel to a depth of 5.0m below chart datum; establish a pile with a directional light; establish six new floating aids to navigation and, dependent upon the result of a hydrographic survey, reposition existing aids to navigation.

Relevant to this investigation, the same meeting discussed measures to control vessel movements in the channel and noted that:

- Either pilotage would be compulsory for vessels over a particular length (risk assessment to be carried out) or they would have to be in possession of a PEC. Pilot boarding was expected to be at the North Rhyl Buoy.
- One way traffic only in the dredged channel would be permitted with VTS control by VHF. Radar coverage for the area was not anticipated.

Trinity House had concerns over some of the proposals and suggested that a way of addressing these would be for the Port of Mostyn to apply for an extension of its jurisdiction limits to a position just west of the approach to the dredged channel, with compulsory pilotage/PEC arrangements in place from the North Rhyl Buoy inwards. Only then could Mostyn have control over vessel movements in the narrow dredged channel. An extension to the Port of Mostyn's jurisdiction limits would necessitate a rearrangement of responsibility of the existing aids to navigation, from Trinity House to Mostyn. The port would assume responsibility for all existing wrecks, as well as new ones inside the revised limits, and survey responsibilities. The meeting concluded with the Mostyn harbourmaster agreeing to consult with the EA and the DETR over his proposals.

In March 2001, the Mostyn harbourmaster wrote to Trinity House proposing alterations to the aids to navigation discussed at the November 2000 meeting. Principally, the changes were related to the number of buoys needed to mark the channel.

In its response dated 28 March 2001 (copies to the DETR, MCA, EA and United Kingdom Hydrographic Office) (UKHO), Trinity House reiterated its concern over the use of the South Hoyle Channel unless Port of Mostyn extended its limits of jurisdiction out to the west of the channel, had control of vessel movements in the channel, and had compulsory pilotage/PEC arrangements in place from the North Rhyl Buoy inwards. Some 4 months had elapsed since the initial meeting and, given that the aim was to commence ferry operations in July 2001, Trinity House would have expected to have received a copy of the draft HRO. Trinity House was precluded from granting its consent to establish aids to navigation to mark the South Hoyle Channel until such time as the limits of jurisdiction had been extended. It was not prepared to grant its approval to the establishment of the aids until such time as Mostyn Docks Ltd had the necessary powers in place to control vessel movements in the narrow dredged channel. A further concern was that until the position and characteristics of all aids to navigation had been resolved, the position of new pilotage reporting/boarding symbols finalised, and boundaries of the dredged channel passed to the UKHO, new editions of the relevant Admiralty Charts could not be finalised. The Port of Mostyn was urged to pursue the progression of its HRO.

On 2 April 2001, Mostyn responded to Trinity House by confirming that the port would apply for an HRO, and explained that the EA had simultaneously been undertaking a review of its navigational/conservancy responsibilities and wished to go to public consultation on the review before any HRO was applied for. Mostyn was happy to accommodate the EA's plans as long as the application could be made in a reasonable time. The letter expressed Mostyn's disappointment with the Trinity House response of 28 March, that not only was an HRO to be applied for, but it was now required to be in place. Aware of the potential delays in applying for and receiving an HRO, Mostyn requested advice from Trinity House as to any interim measures that might be applied.

On 18 April 2001, Trinity House wrote to the DETR and the MCA (copied to EA and the UKHO) referring to Mostyn's 2 April letter, and expressed their concern that the dredged channel was narrow in relation to the vessels using it, and that no effective means of vessel traffic control was in place for all vessel movements. Furthermore, Trinity House was not prepared to accept establishment of any additional aids to navigation, whether provided at local expense or not, until effective powers were in place to control all vessel movements.

Notes of a meeting, held at Trinity House on 30 April 2001 with the Port of Mostyn, reaffirmed that Mostyn still wished to promote an HRO, but that efforts were currently being frustrated by the EA going to consultation on the future of the River Dee conservancy. The EA had indicated that they would regard an application for an HRO by Mostyn as premature and it would be opposed, but they would be content for an interim solution. Trinity House confirmed its wish to assist and resolve the situation, and stated that the Port of Mostyn should, in the long term, have compulsory powers of pilotage. Concerned about liability arising from navigational aids situated outside of the Port of Mostyn, it was concluded that it might be preferable for the Port of Mostyn to apply under Section 34 of the Coast Protection Act 1949 for consent to provide buoys to replace the existing buoys in the channel. It was agreed that the Port of Mostyn could not impose compulsory pilotage without promoting an HRO, but the harbourmaster confirmed that the port would offer non-compulsory pilotage to all customers of the port. The Port of Mostyn anticipated that it would apply for the HRO on completion of the EA consultation, and in any event by the end of 2001.

1.11.3 Coast Protection Act 1949 – section 34 application

Under section 34 of the Coast Protection Act 1949 (as amended principally by section 36 of the Merchant Shipping Act 1988) the consent of the Secretary of State for Environment, Food and Rural Affairs (DEFRA) is required for:

- *the construction, alteration or improvement of any works on, under or over any part of the seashore lying below the level of mean high water springs;*
- *the deposit of any object or materials below the level of mean high water springs;*
- *the removal of any object or materials from the seashore below the level of mean low water springs (eg dredging).*

On 23 April 2001, the Port of Mostyn made applications to MAFF (now DEFRA) and DETR (now DfT) under the Coast Protection Act 1949 for the installation of a perch pile and 16 navigation buoys in the Mostyn Outer Channel. In response to DETR's request for comment on the application, Trinity House reiterated its concern that the outer dredged channel was narrow, particularly in respect to the size of the vessels that would need to use it. Trinity House continued to have concerns about the safe use of the channel and the risk for a serious incident to occur unless precautionary measures were taken. In an attempt to mitigate the risk, Trinity House was prepared to consent to Mostyn Docks Ltd establishing and maintaining aids to navigation, but laid down eight key provisions that should be met prior to granting that consent.

- *The Port of Mostyn to apply for a Harbour Revision Order extending their Harbour Limits and giving them powers, amongst other things, to establish aids to navigation, control vessel movements, and wreck marking/removal responsibilities. The application to be made by no later than 31 December 2001.*
- *The entire situation to be reviewed if the Harbour Revision Order has not been obtained within two years of the application being made.*
- *The Port of Mostyn commissioning an independent safety assessment of arrangements in place for the operation of the channel, and action any recommendations as soon as practicable.*
- *The Port of Mostyn to carry out regular surveys and maintenance dredging of the approach channel as necessary.*

- *Clear acceptance by the Port of Mostyn for dealing with any wrecks that occur either in or through the use of the channel.*
- *Issue by the Port of Mostyn at monthly intervals of Notices to Mariners warning of the regular use of the channel by vessels restricted in their ability to manoeuvre because of their size.*
- *Satisfactory arrangements for Pilotage or Pilotage Exemption being in place prior to the commencement of the Commercial Service.*
- *In addition any vessels engaged in establishing and/or maintaining the buoys and beacon to exhibit signals in accordance with the Collision Regulations.*

This notwithstanding, the commencement of the P&O Ferries Ltd's service was imminent, and section 34 consent, number 70078, was granted by the Secretary of State for Transport, Local Government and the Regions on 4 September 2001 **(Annex K)**. This consent contained many of the provisions laid down by Trinity House.

Port of Mostyn eventually submitted its HRO application on 17 April 2003.

On 2 June 2003, Trinity House wrote to DfT regarding the proposed Mostyn HRO. The letter addressed three issues:

- The need to define positions by latitude and longitude rather than by named navigational marks.
- The need to ensure that all navigation marks were inside the proposed limits of jurisdiction.
- Trinity House's preference for only one LLA (Local Lighthouse Authority), which, it was opined, should be the harbour authority, Mostyn Docks Limited.

1.11.4 Current Outer Channel maintenance

As the Mostyn Outer Channel's viability is essential to the Port of Mostyn, it is currently surveyed and maintained by the Mostyn harbourmaster in accordance with Condition 4 of the Coast Protection Act consent issued in September 2001.

In 2001, the South Hoyle Channel was dredged to a depth of 4.7m, and the harbourmaster's 2006 surveying programme showed that the intention was to conduct partial[6] surveys of the South Hoyle Channel and Welsh Channel, and normal surveys of the Rhyl Flats, Mid Hoyle channel, and Wild Road anchorage.

1.12 CURRENT HARBOUR REVISION ORDERS

The Mostyn HRO dated 17 April 2003, and the Dee Conservancy HRO dated 26 January 2005, conflicted and were subsequently scrutinised at a public inquiry held in November and December 2005:

- The proposed Dee Estuary Conservancy HRO does not seek to change the jurisdiction of the EA as conservancy, harbour and local lighthouse authority for the Dee Estuary. It does, however, seek to repeal the Agency's functions under the 1889 Act and earlier local legislation, and replace them with modern powers and duties relevant to its roles as conservancy, harbour and local lighthouse authority.

[6] The partial surveys involved a reduced number of lines.

- The proposed Mostyn Docks HRO seeks to extend Mostyn's existing jurisdiction as SHA for the Port of Mostyn, within a defined 500 metre wide channel from the Port out to the North Rhyl buoy. If made, this would remove the EA's jurisdiction as conservancy, harbour and local lighthouse authority over that part of the defined channel which presently lies within the Dee Conservancy. The HRO would also extend the area of Mostyn Docks Limited jurisdiction for the purposes of Pilotage, from the existing seaward limit to encompass the defined channel out to the North Rhyl buoy.

Neither harbour revision order would authorise dredging in the estuary, without further approvals from the recognised government bodies.

The main areas of disagreement between the Dee and Mostyn submissions were:

- Whether Mostyn or the EA was the appropriate body to have jurisdiction over the defined channel within the Dee Conservancy.
- Whether Mostyn Docks Ltd should have SHA jurisdiction over the extended conservancy area (the Mostyn Outer Channel).

At the start of this investigation the Secretary of State for Transport had not reached a decision on either HRO application. Consequently, the Chief Inspector of Marine Accidents wrote to the DfT suggesting that the Secretary of State defer decisions on those applications pending the outcome of this investigation, so that the Secretary of State could take account of any recommendations resulting from this investigation that proved to be relevant to the issues he would be addressing in reaching those decisions.

1.13 THE FUTURE OF THE PORT OF MOSTYN

In November 2005, an application was submitted to the Department of Trade and Industry and the National Assembly for Wales, to develop the Gwynt y Môr wind farm 13 to 15 kilometres off the coast of North Wales. The site is designed to consist of around 200 wind turbines, covering 48 square miles. Geographically the Port of Mostyn is well suited to provide the base port facilities required for the initial build and, in the longer term, maintenance support facilities. An increase in shipping movements to the Port of Mostyn associated with the project work could be reasonably expected.

The production of the Airbus A380 wings is expected to steadily increase over the next 3 to 4 years. A corresponding increase in shipping movements necessary to transport the wings from Broughton to Mostyn, and onward from Mostyn to Toulouse, France is probable.

As a competitive commercial organisation, the port welcomes new business development. Future short to medium term ambitions include reinstating a scheduled ferry operation from the port.

1.14 PORT MARINE SAFETY CODE

1.14.1 Accreditation

The Port Marine Safety Code was published by the DfT in March 2000. Both the Dee Conservancy and Mostyn Docks Limited indicated to the DfT their intent to seek accreditation with the PMSC.

To comply, it was necessary for both authorities to produce safety management systems (SMS) that had been based upon a formal risk assessment. Their target date for this was 31 December 2001. Although the Dee Conservancy SMS was completed by the end of 2001, key to accreditation with the PMSC was agreement over procedures for the Mostyn Operational Area (MOA), the part of the Dee Conservancy area through which vessels navigating to and from the Port of Mostyn pass.

Mostyn Docks Limited commissioned the services of British Maritime Technology (BMT) to assist in the risk assessment process. However, the Dee Conservancy harbourmaster considered that the risk assessment applicable to the MOA was neither thorough nor robust. The methodology was generic, and did not identify significant hazards relevant to the area and evaluate the risk associated with each of the hazards which could realistically cause or contribute to a hazardous event.

On 5 March 2002, the Dee Conservancy harbourmaster demonstrated to the Mostyn harbourmaster why he considered the methodology used in the risk assessments was unsuitable. It was agreed that a re-assessment of risk was necessary and would be undertaken. An amended and improved risk assessment was issued by Mostyn on 28 March 2002, which was considered acceptable to the Dee Conservancy.

In November 2002, the Dee Conservancy SMS was issued, which included the procedures for marine operations in the MOA, jointly agreed with the Mostyn Docks Limited in August 2002. The procedures were designed to ensure that marine operations carried out by the Port of Mostyn in the MOA were conducted in a manner that met the standards required by the PMSC.

In October 2002, DfT requested an update from Mostyn Docks Limited on their progress toward implementation of the PMSC. DfT was advised that the Mostyn SMS would complete development by the end of November 2002. On 4 November 2002, Mostyn Docks Limited commissioned Strategic Marine Services Limited to assist in the development of its SMS, with a deadline of the end of November for the final draft. The Dee Conservancy deputy harbourmaster, acting as a consultant with Strategic Marine Services, assisted in developing the document, which Mostyn Docks Limited finally issued on 13 December 2002.

Mostyn Docks Limited's final SMS was comprehensive and included joint arrangements for marine operations within the MOA and the requirement for a joint 6-monthly review of the SMS, specifically the MOA, by the Dee Conservancy harbourmaster. The SMS also identified the requirement for the position of a deputy harbourmaster, a position that has remained vacant since 2004.

In June 2003, an agreement between the EA and Mostyn Docks Limited regulating marine operations by the Port of Mostyn in the MOA was reached, and signed. As a result, in July 2003, the EA was able to confirm implementation of the PMSC in all parts of the Dee Conservancy, just before the DfT deadline.

Although the Port of Mostyn had reported its compliance with the PMSC in December 2002, DfT was concerned about the significant ferry operation using an approach channel that ran through the waters of a neighbouring authority. The port was alerted to these concerns, although they were abated by the decision to relocate the ferry service away from the port.

1.14.2 Audit regime

Mostyn Docks Limited's last SMS internal audit was undertaken by the designated person in November 2005. The audit form was comprehensive, and indicated that all was in order. The annual review compiled by the harbourmaster in October 2005 made reference to:

- No outstanding points arising from informal monitoring.
- Actions arising from two joint MOA inspections had been rectified, (pilots' authorisation documentation).
- There were no major deficiencies recorded from the five annual reviews conducted in the company of the Dee Conservancy harbourmaster.
- Two navigational accidents had occurred in the port over the audit period:
    - A vessel grounded leaving a berth on an ebb tide, and refloated at the next tide.
    - A dredger, *Tonne,* made contact with the quay and a moored vessel; an error caused by the master incorrectly switching between automatic and manual steering.

Independent external auditing had not been undertaken at Mostyn since the port achieved PMSC accreditation.

1.15 SIMILAR ACCIDENTS

1.15.1 Port of Mostyn

A table of accidents and incidents at Mostyn, drawn from Mostyn and Dee Conservancy records, is at **Annex J**. The table shows 10 incidents including:

- Five groundings and/or strandings;
- Two damage to buoys;
- One damage to fishing gear;
- One incident of restricted visibility from a vessel's wheelhouse;
- One incident of safe navigation compromised by the action of another vessel.

This history of groundings at the port was taken into account when MAIB made the decision to commence this investigation. However, when P&O Ferries Ltd was operating from Mostyn, a lot of attention was being focussed on the safety of the port. The grounding of *Thunder* occurred 2 years after the ferry operation ceased, in significantly different circumstances. The ferry groundings are therefore not considered further in the report.

1.15.2 Vessels dragging anchor

The MAIB database shows that since 1992 there have been 18 accidents in United Kingdom territorial waters that involved vessels dragging their anchor and subsequently grounding. A further 14 hazardous incidents were recorded that involved vessels dragging anchor but not grounding. Key factors to the groundings were: the chosen anchor position; the length of cable veered; weather conditions; and the main machinery's notice of readiness.

Analysis of MAIB's data shows that nearly all accidents where the vessels subsequently grounded had some common contributory factors:

- The anchorage had often been chosen against the master's better judgment, given the prevailing or the forecast weather conditions and the proximity of a lee shore. On occasions, the master's choice had been 'overridden' by instructions and requirements from a port authority or embarked pilot.
- In many cases the scope of cable in the given depth of water was substantially less than the minimum recommended.
- Only when the OOW had determined that the vessel was dragging, was an attempt made to veer more cable. Several groundings would probably have been avoided had the master thoroughly assessed the forecast weather and veered more cable before the vessel started dragging.
- The amount of cable used might not have been sufficient in itself to prevent a vessel dragging, but in many of the cases the main machinery notice of readiness was inadequate for the crew to deal promptly with the consequences once the vessel began to drag.
- On several occasions, monitoring of the vessel's position within its predicted swinging circle was inadequate, and therefore did not provide early warning to the OOW that the anchor had begun to drag.

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 FATIGUE

The manning on board *Thunder* allowed the bridge team to work a 4 hours on and 8 hours off watchkeeping routine. Although the hours of rest were recorded on a combined rest and overtime form, the records showed that for the months of July and August, hours of rest for bridge watchkeeping officers were equal to, or in excess of, 14 hours per day. On four occasions during the 2 month period rest hours were reduced to 12 hours per day.

The hours of rest obtained by the bridge watchkeeping officers on board *Thunder* were in excess of STCW and ILO requirements, and fatigue is not considered a contributory factor in the grounding on 10 August 2006.

2.3 VOYAGE PLANNING

2.3.1 Chart requirement

When the change of orders was received re-directing *Thunder* to the Port of Mostyn, both the master and the mate acted in accordance with the instructions given in the company's SMS for voyage planning. Availability of the required passage charts and publications was checked, and the absence of BA chart 1953 was identified. The company's SMS addressed voyage planning and obtaining charts while in port. However, it did not provide the master with either a procedure to follow in the event of a change of orders while on passage, or a process to obtain nautical publications should they be required.

The master took immediate steps to try and ensure supply of the missing chart by contacting, on two separate occasions, the vessel's cargo operator and the commercial agent at Mostyn. Critically, however, he did not inform the owner's marine superintendent who was ultimately responsible for ensuring that vessels were fully equipped with all necessary nautical publications. Consequently, the owner was unaware of the master's difficulties and therefore unable to provide him with the assistance that he required.

Only when he was in possession of BA chart 1953 could the master have made: a full navigational assessment of the approaches to the Dee Estuary; an informed decision on the most secure anchorage; and, if it was then deemed necessary, safely navigated *Thunder* through the Mostyn Outer Channel to the Wild Road anchorage.

2.3.2 Passage plan

Apprehensive that the critical chart for entering Mostyn was not available to him, he and the mate continued to plan by using the smaller scale BA chart 1978, and by referring to Admiralty Sailing Directions. Although the latest correction to the Sailing Direction was held on board, it had not been referred to. Consequently, the master was unaware of an amendment to the Sailing Directions which advised that the Mostyn pilot now boarded vessels at the Dee buoy, and not 7 cables ESE of the North Rhyl Light buoy.

Had the master been in possession of BA chart 1953 he would have noted the only pilot symbol laid close to the Dee buoy.

Having identified the shallow water areas surrounding the Mostyn Outer Channel on BA chart 1978, the master had no intention of navigating *Thunder* along the outer channel without either the largest scale chart available, or the services of a local pilot. Further, experience told him that, if necessary, by anchoring close to the North Rhyl buoy his vessel would be clear of immediate navigational dangers and a lee shore.

2.3.3 Decision making process

The master was confused by the email from the Mostyn agent that provided a series of waypoints, a 'preferred anchorage', and a declaration that the pilot boarding station was at the Dee buoy. He believed that the information had been sent, or authorised, by a senior professional with a maritime background. This was the single most important factor which, at the last moment, caused him to change his arrival plan.

He made the decision to navigate the Mostyn Outer Channel using the waypoints provided, and anchor in the 'preferred anchorage' ready to board a pilot as required. His decision was directly influenced by the information forwarded by the agent and, to some extent, a perceived commercial pressure for the vessel to be correctly positioned to allow him to tender a valid notice of readiness for loading.

Once the decision to proceed to the Wild Road inner anchorage had been made, the master navigated the vessel through a dangerous channel, without an appropriate navigational chart, to an unsuitable long term anchorage, without pilot assistance. Weather conditions were poor; daylight was fading, and tidal stream increasing. The action was contrary to good navigation and seamanship practice, was potentially dangerous, and could have resulted in far greater consequences for the vessel and crew.

Although the master had made several attempts to contact the port on VHF radio, the port did not maintain a continuous radio listening watch. Had an Outer Channel vessel traffic monitoring or reporting system been in operation, the master could have provided, and received, advice about his intended movements.

2.4 ANCHORING AND MONITORING

2.4.1 Scale of chart

By using BA chart 1978 to navigate to, and then anchor in the Wild Road anchorage, the master did not have the necessary detail to gain an appreciation of the dangers surrounding his vessel, and the bridge watchkeeper was unable to precisely fix, and monitor, the vessel's position within the swinging circle. The scale of chart in use did not provide the watchkeeper with sufficient information for him to quickly identify when the anchor started to drag.

2.4.2 Choice of anchorage

The master had previous experience of anchoring off United Kingdom ports, including ports with large tidal ranges. In that respect the Wild Road anchorage was no different.

At low states of tide, the width of the channel at Wild Road does restrict swinging room, and thus the amount of cable that can be veered. Unfortunately, the master decided to use three shackles in the belief that this was satisfactory for all coastal waters, and that veering additional cable would not help to prevent dragging. In this belief, the master showed a fundamental misunderstanding of the principles of anchoring.

One shackle of cable on *Thunder* was 25m in length. BA chart 1978 showed that the preferred anchorage position had a charted depth of approximately 15m and, with 9m rise of tide, the greatest expected depth at high water was 24m. Information regarding the type and quality of the holding ground was not available from the Sailing Direction, or BA chart 1978.

Using the formula[7]: Number of shackles required = 1.5 x √ depth in m

Number of shackles = 1.5 x 4.89 = 7.3

The predicted swinging circle (anchor to stern) was:

- 3 shackles of cable (75m) + length of *Thunder* (82m) = 157m.
- 7 shackles of cable (175m) + length of *Thunder* (82m) = 257m.

At low water, the channel width was just sufficient for the vessel to swing safely provided the master deployed only 3 shackles of cable. Had he correctly calculated the amount of cable required (7.3 shackles), he would have realised that his vessel could not remain safely at anchor in the Wild Roads anchorage for anything more than a brief period. Given the weather, tide, depth of water, and the proximity of navigational danger, the scope of cable deployed was insufficient to hold the vessel securely in position.

The scale of the chart in use prevented the master from gaining a better appreciation of the safe water available to the north and west of Wild Road, and the benefits, given the prevailing wind, that could have been gained by biasing his anchorage in that direction.

Given the master's experience and the prevailing weather, tide, depth of water, and the proximity of navigational danger, it is surprising that he chose to anchor where he did and with so little cable, despite the apparent instruction that it was the 'preferred anchorage'.

2.4.3 Bridge anchor watch

On completion of anchoring, full bridge anchor watches were maintained. Nevertheless, it was evident on this occasion that important aspects of the guidance for ships at anchor, provided in STCW 95, had gone unheeded:

1. The ability of the bridge watchkeeper to precisely fix the vessel's position, by radar range, visual bearing, or GPS was limited given the scale of BA chart 1978. As a consequence, his ability to detect the vessel dragging in a reasonable time frame was substantially decreased.

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[7] Admiralty Manual of Seamanship

The large range of tide on a gently sloping coastline had the effect of reducing radar position fixing accuracy due to the constantly changing coastal water line. This also meant that the practice of marking prominent points on the radar display, using lower range scales to gain an early indication of dragging, was also impracticable. It is possible that the distance of nearby buoys could have been monitored by radar, but the effectiveness of this was also questionable given that the buoys were not displayed on the bridge chart.

This is a particularly good case where the use of the GPS 'anchor drag' alarm would have provided the bridge watchkeeper with an early indication of dragging. Although such a feature was fitted, its use had not been considered.

2. Even when it became apparent to the bridge watchkeeper that the vessel was aground, the master was not informed. That the mate, who was the watchkeeper at the time, preferred to believe that this was a standard occurrence at Wild Road, shows a disregard for his responsibilities as a watchkeeping officer.

   Furthermore, had the ship been unfortunate enough to suffer structural damage, the delay in notifying the master or anyone else on board meant that proper consideration and actions could not be immediately carried out to minimise the potential consequences. The company ISM procedure for grounding / stranding was not implemented until much later the same day and still, contrary to that procedure, the master failed to report the incident to a national or local authority.

2.5 PILOTAGE

Mostyn Docks Limited's 2001 risk assessment of commercial traffic and ferry operations in the South Hoyle Channel identified the need for compulsory pilotage, or equivalent PEC status, in the Mostyn Outer Channel. This requirement was reinforced by Trinity House, and Mostyn Docks Limited's draft HRO circulated to the EA in February 2002 sought the powers to achieve this. The requirement for compulsory pilotage was re-affirmed in the 2003 risk assessment.

The October 2004 risk assessment, which occurred after the ferry operation had ceased, however, did not cover marine activity in the Mostyn Outer Channel. Around this time, the Mostyn harbourmaster notified the UKHO that the pilot boarding symbol near the North Rhyl buoy should be removed and the advice in the Admiralty Sailing Directions amended accordingly.

The result was a dedicated pilotage service commencing from the Dee buoy, on the edge of Mostyn Docks Limited's CHA area, although the harbourmaster was willing to provide a pilotage service from the South Hoyle Channel, weather conditions permitting, on request.

The Mostyn harbourmaster considered it unsafe that *Thunder*'s master had: begun navigating in the Mostyn Outer Channel 1 hour before sunset; proceeded without an appropriate chart; not sought local advice or made use of the channel approach directional light; and proceeded to anchor in an area normally only used by vessels waiting to berth on the same tide. These points had been covered in his risk assessments prior to 2004.

The 1987 Pilotage Act recognises the need to secure the safety of vessels navigating in the approaches to a harbour, as well as those navigating within its limits. By reducing the pilotage service available in this area, the harbourmaster removed one of the key risk control measures identified in his earlier risk assessments.

Until such time as provision is made for compulsory Pilotage of the Mostyn Outer Channel, Mostyn Docks Limited should reinstate the recommended Pilotage service from the North Rhyl Buoy.

2.6 PORT PASSAGE PLAN

2.6.1 Anchorages

Although 'deep draught' vessels are not defined in the Port of Mostyn passage plan, such vessels are advised, if necessary, to anchor in the vicinity of the North Rhyl buoy. For safety reasons, the initial intention of *Thunder*'s master was to anchor in this area. Given:

- the present and likely future offshore wind farm traffic using the port
- the dangers of shoal water to the east
- that vessels up to 6500t deadweight can operate from the port
- the infrastructure is in place to support a scheduled ferry service

Mostyn Docks Limited, as CHA, should examine as part of its routine risk assessment review, the need for a defined '*Mostyn deep water anchorage'.* The boundaries of the deep water anchorage should be displayed on the appropriate BA charts, with corresponding advice to mariners provided in Sailing Directions.

The Wild Road recommended anchorage lies adjacent to the Mostyn CHA limits. In compliance with the Port of Mostyn's SMS, the anchorage was regularly surveyed to confirm the available depth of water. Notwithstanding the regular survey, the anchorage was acknowledged by the Mostyn harbourmaster to be unsuitable for vessels, such as *Thunder*, other than for short periods while awaiting a tide to berth. Specifically, given the depth of water in the Wild Road anchorage, there was insufficient sea room for a vessel to swing safely at all states of tide unless it compromised on the amount of anchor cable it deployed. The port passage plan and the Sailing Directions should be amended to provide more comprehensive advice to mariners on the suitability and use of this anchorage.

2.6.2 Movement and reporting

The Port of Mostyn's risk assessment determined that a VTS information service[8] was adequate for the frequency of shipping movements that the port handled. Awareness of vessel movements within the CHA area relied upon individual vessels reporting their own presence on VHF radio channel 14, and an assumption that other vessels in the vicinity had received the broadcast.

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[8] Defined by the IMO, as a service to ensure that essential information becomes available in time for on-board navigational decision making.

The outer channel approach to Mostyn is outside the present CHA limits, but nevertheless is an extended part of the port approach and is, in parts, extremely narrow. The width is determined by the dredging campaign undertaken by Mostyn Docks Limited, but for vessels of any size it can be considered, in parts, to only support one-way traffic at a time.

In 2001, Trinity House expressed concern about the narrowness of the channel and stated that Mostyn Docks Limited should achieve CHA status for the area before being given local direction of the channel and its buoys. The ability to control vessel movements in the channel, given the constraints, is a significant safety measure and one which should be considered as part of the routine risk review of the Outer Channel.

To effect movement control, an effective reporting system is required. Had a vessel reporting system been in place, it would have ensured that *Thunder*'s master was able to communicate with the port, and receive instructions and advice on what was an unfamiliar area. Also, it would have provided an opportunity for the port to update the master on the intentions for berthing the vessel. This would have allowed the master to better consider his options for anchoring and would, probably, have prevented this accident from occurring. Furthermore, a formal reporting and monitoring process would have allowed the Mostyn harbourmaster, when questioned by the coastguard about a reported grounding, to have been fully aware of the vessel's location. If necessary, other vessels operating in the area could have been made aware of *Thunder*'s presence in the Mostyn Outer Channel by routine navigation broadcast.

2.6.3 Under keel clearance

It is good practice for a port passage plan to specify a minimum under keel clearance (UKC) to be applied by vessels navigating in its area, taking into account bottom type, rate of silting / frequency of surveying, and the likely consequences of grounding. Further, navigation in the Mostyn Outer Channel and whole of the Dee Estuary, requires a precise assessment of the available depth of water available throughout the passage. The port passage plan should define the minimum UKC that is considered acceptable when navigating in the approaches to and within the CHA area.

2.7 SAFETY MANAGEMENT

2.7.1 Commercial agent

The agent was employed by Mostyn Maritime Services, an integral part of the Port of Mostyn's organisation, and reported directly to the managing director and owner of the company, who was also the owner of Mostyn Docks Limited. The agent had no previous maritime background.

Although the agent was clear about his position within the company, he was not clear about his job responsibilities, and was concerned that there were no terms of reference covering his duties as the commercial agent. Had the agent been fully apprised of his responsibilities and level of authority, he might have better understood the potential consequences of forwarding the navigational information to *Thunder*'s master, and chosen instead to make suitable arrangements for supply of BA chart 1953, as requested.

From receipt of the charter fixing note on 8 August, the standard of communications between the key parties should have been higher and more consistent. Had it been so, more decisive action might have been taken when it became apparent to the port that the appropriate chart was not held on board *Thunder*. Further, the discrepancies in the agent's and master's recollections of the mobile telephone calls made between them shows the dangers associated with non-receipted methods of communication.

The agent is uniquely placed to have early communication with visiting vessels. However, he should not be passing navigational safety information to vessels without the prior approval of the harbourmaster. To avoid such confusion in the future, the agent's responsibilities for communicating with the harbourmaster and visiting vessels should be clearly defined within Mostyn Maritime Services' operating procedures.

2.7.2 Emergency response organisation

A comprehensive emergency response plan is incorporated within the Port of Mostyn SMS. The plan is based upon reacting early to the accident and determining whether immediate action and resources are required.

However, on 10 August, the telephone call received from the coastguard failed to prompt the harbourmaster to thoroughly investigate the report of a grounded vessel. Had he determined with certainty the circumstances surrounding the vessel's presence, then the emergency response could have been generated much earlier, and an additional high water period would have been available for refloating the vessel.

Later in the evening, once the emergency response plan had been implemented, consideration was given to the provision of towing and counter-pollution assets, however no arrangements were put in place by the port. Considering the potential for the vessel to become neaped, arrangements could have been made for a suitable towing asset to be standing by in the vicinity of *Thunder*. This would have provided reassurance to both harbour authorities and the vessel's owner that towage assistance was readily available should the master be unable to manoeuvre his vessel clear.

The main focus of the emergency response plan was refloating the vessel at the next high water. Considering that the master was tired, unfamiliar with his surroundings, and without an appropriate navigational chart, he needed and deserved all the assistance it was possible to provide. Notwithstanding the shipping movements programmed for later that day, an opportunity was missed during the evening low water period for a pilot to board *Thunder* from the beach. This would have provided time for the master and pilot to formulate a plan, and the pilot to become familiar with the vessel and ready to assist the master to manoeuvre clear once the vessel refloated.

When a pilot did board, a further opportunity was missed to pilot the vessel clear of the Mostyn Outer Channel and into a safe anchorage, probably in the vicinity of the North Rhyl buoy. Instead, the vessel re-anchored at Wild Road and continued to drag anchor overnight.

Fortuitously, *Thunder* did refloat and, despite dragging again, did not ground a third time. However, more robust emergency arrangements could certainly have been made, and these would have been appropriate given the prevailing conditions.

2.7.3 Deputy harbourmaster

The SMS defines and refers to the many duties and responsibilities of the harbourmaster. The CHA pilotage area is large, the surveying and hydrography commitments are substantial, and his activities are subject to frequent review as part of the MOA audit procedures agreed with, and undertaken by, the Dee Conservancy harbourmaster.

The SMS makes frequent references to the duties and responsibilities of the deputy harbourmaster, a position that has remained vacant since 2004. The vacancy was noted in the covering letter of the 2005 Mostyn SMS audit, and also in the 24 August 2005 minutes of the Dee Conservancy annual review of the Mostyn SMS applicable to marine operations in the MOA, which noted that the harbourmaster anticipated an appointment would be forthcoming.

Recruiting a suitably qualified person to fill the post of deputy harbourmaster in the port would allow the harbourmaster to properly fulfil his obligations within the SMS, focus on port management and, in particular, the development of robust procedures for the safety of navigation. Importantly, in this case, it might have allowed the harbourmaster to take a more strategic view of events, thoroughly monitor developments with *Thunder* and respond in an appropriate manner.

2.8 PMSC

Having received PMSC accreditation from the DfT, the Port of Mostyn has committed to complying with the principles of the Code; a key requirement of which is an audit process that proactively searches for weaknesses and failings within the port's SMS.

Since accreditation, annual audits have been carried out by the Port of Mostyn designated person, the finance manager. The 2005 audit covered 20 activities against the requirement of the SMS. All activities were summarised as being satisfactory, with the exception of the pilot boat logbook which was assessed as unsatisfactory and received an audit deficiency. The absence of a deputy harbourmaster was recorded on the auditor's covering letter to the duty holder. Given the findings of this investigation, it appears probable that the audit did not explore in sufficient depth the more limited scope of the October 2004 risk review, and therefore the duty holder was presented with an incomplete and inaccurate picture of the effectiveness of the port's SMS.

The PMSC recommends that periodic external audit and verification is carried out. Although the Port of Mostyn's SMS undergoes a progressive annual review conducted by the Dee Conservancy harbourmaster (see Section 2.9), this is limited in its scope and it does not fulfil the requirement of an external audit. An independent external audit has yet to be conducted at Mostyn, but such a process would be able to examine the SMS in detail and provide the duty holder with confidence that the SMS is robust, effective and meeting the current and future needs of the port.

Another, main principle, of the PMSC, is that a port's SMS should be informed by and based upon formal risk assessments. In the Port of Mostyn, formal risk assessments were conducted as new business ventures were realised; specifically, in this case, the P&O Ferries operation. However, with the cessation of that business, subsequent risk reviews failed to recognise that the same risks were still faced by other commercial

vessels navigating the Mostyn Outer Channel. By overlooking the risks of the Mostyn Outer Channel, the port neglected to implement adequate control measures to ensure that the risk was reduced to '*as low as reasonably practicable*'.

In its risk assessment reviews and auditing process, the Port of Mostyn was attempting to adhere to PMSC principles. However, without an independent external review of its SMS, the port was, in effect, marking its own homework to its own, internal, standards. The Port of Mostyn should introduce external auditing of the SMS at the earliest possible opportunity and, in light of the port's growth aspirations, it is recommended that the MCA also conducts a PMSC verification audit of the port.

2.9 HARBOUR AUTHORITIES INTERACTION

2.9.1 Present situation

Having an SHA situated within the limits of another SHA is not unique. The PMSC requires such authorities to collaborate, as necessary, on all aspects of the Code.

Some co-operation between the Dee Conservancy and Mostyn Docks Limited has been achieved. The ports' respective SMSs allow the SHA of the Dee Conservancy to review the SMS of the CHA, Mostyn Docks Limited, and inspect operations being conducted in the MOA. The purpose of the agreement was for the Dee Conservancy harbourmaster to satisfy himself that marine operations being conducted in the area met the standards of the PMSC.

In the 5 years since the agreement's inception, the Dee Conservancy harbourmaster has conducted regular SMS reviews and joint inspections of activities. The inspection process was a key driver for the harbourmaster who was responsible to the EA for an area which holds several conservation designations. The minutes of the reviews reflect the Dee Conservancy harbourmaster's concerns over safety issues identified; the time taken by, and the variable nature of, Mostyn Docks Limited's response; and highlighted his views about the importance and the effectiveness of the inspection process.

Conversely, the Mostyn harbourmaster, while recognising the importance of the process, found the inspections time consuming and diverting given the wide scope of his other duties and responsibilities in respect of the day to day running of a small commercial port.

In principle, the jointly agreed procedures provided a comprehensive and effective management tool following the principles of the PMSC. In practice, the process of implementing and monitoring the procedures served to highlight the different priorities of the two organisations.

2.9.2 Outer Channel

Originally, provision of Pilotage and aids to navigation within the whole of the Dee Estuary and its seaward approaches were the responsibility of Trinity House. The switch of responsibility from Trinity House to the Welsh Water Authority (the predecessor to the EA) following the introduction of the Pilotage Act 1987 made sense given the Port of Mostyn's capacity at that time. When the port was re-developed in the late 1990s, and became capable of accepting much larger traffic, the navigation hazards of the Mostyn Outer Channel to this traffic were recognised by both the port and Trinity House. Trinity House consequently recommended that Mostyn Docks Limited make an HRO application to take on ownership[9] of the Mostyn Outer Channel.

With the commencement of a regular ferry operation imminent, 'temporary' work-around measures, using the Coast Protection Act 1949, were adopted to allow Mostyn Docks Limited to enhance the navigation marks in the channel.

The cessation of the ferry service from Mostyn in early 2004, had the effect of removing focus on the safety of the Mostyn Outer Channel. The port's 2004 review of risk assessment for marine operations did not include navigation in the Outer Channel and the Mostyn harbourmaster elected to remove the pilotage symbol from the vicinity of the North Rhyl buoy. The pilotage symbol was subsequently removed from Edition 6 of BA chart 1953, and the Sailing Directions amended to remove reference to that pilot boarding point.

It is acknowledged that when the ferry operation ceased in 2004, the likelihood of a grounding incident had reduced. Nonetheless, the port continued to accept large commercial vessels which were equally susceptible to the hazards of the Mostyn Outer Channel. The HRO process identified by Trinity House and referred to in the Coast Protection Act 1949 consent, effectively had stalled, but this had not triggered a review of the 'entire situation' **(Annex K)**. As a result, the Coast Protection Act - section 34 consent remained in place and became, by default, the means by which the Port of Mostyn operated, and continues to operate the Mostyn Outer Channel. The situation is unsatisfactory, and furthermore the issues regarding the provision of a Pilotage service from the North Rhyl Buoy remain unresolved.

2.9.3 Harbour revision orders

At the time of *Thunder*'s grounding, Mostyn Docks Limited had submitted an HRO which included an application to become the SHA for the whole Mostyn approach channel, including the Mostyn Outer Channel. In counterpoint, the EA had submitted an HRO applying to update its powers and duties in its current SHA area, and assume powers to levy passenger, ships and goods dues. The two HROs conflicted over SHA jurisdiction of the Mostyn approach channel inside the current Dee Conservancy area. A public inquiry has been held as part of the procedure for determining the issues raised by the HRO applications.

It is clear from this investigation by MAIB that the status of the Mostyn Outer Channel must be resolved.

Thereafter, the responsible authority needs to arrange for:

- A thorough and independent risk assessment of the Outer Channel to be conducted. The assessment should include:
    - Compulsory pilotage requirements.
    - VTS requirements.
    - Identification of suitable anchorages.
    - Hydrographic surveying and maintenance dredging requirements.
- Immediate implementation of the control measures identified through the independent risk assessment.

[9] Trinity House's letter 30 May 2001 - provision 1 - extending their harbour limits and giving them powers, among other things, to establish aids to navigation, control vessel movements, and wreck marking/removal responsibilities.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

1. The action of navigating the Mostyn Outer Channel without an appropriate chart was contrary to good navigation and seamanship practice, was dangerous, and ultimately could have resulted in far greater consequences for the vessel and crew. [2.3.3]

2. The master showed a fundamental misunderstanding of the principles of anchoring. Given the weather, tide, depth of water, and the proximity of navigational danger, the scope of cable deployed was insufficient to hold the vessel securely in position. [2.4.2]

3. Until such time as provision is made for compulsory pilotage of the Mostyn Outer Channel, Mostyn Docks Limited should reinstate the recommended pilotage service from the North Rhyl buoy. [2.5]

4. The port passage plan and the Sailing Directions should be amended to provide more comprehensive advice to mariners on the suitability and use of the Wild Road anchorage, and the availability of alternative arrangements for deep draught vessels. [2.6.1]

5. The status of the Mostyn Outer Channel must be resolved. [2.9.3]

3.2 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

6. The master was unaware of an amendment to the Sailing Directions which advised that the Mostyn pilot boarded vessels at the Dee buoy. [2.3.2]

7. Although a GPS anchor drag alarm was fitted, its use was not an option that had been considered. [2.4.3]

8. The mate did not call the master when it became apparent that the vessel had grounded. [2.4.3]

9. The master failed to report the grounding to either a national or local authority. [2.4.3]

10. Had a vessel reporting system been in place, it would have ensured that *Thunder*'s master was able to communicate with the port and receive instructions and advice. [2.6.2]

11. The port passage plan should define the minimum UKC that is considered acceptable when navigating in the approaches to and within the CHA area. [2.6.3]

12. Had the harbourmaster determined with certainty the circumstances surrounding the vessel's presence in the Wild Road anchorage, then the emergency response could have been generated much earlier, and an additional high water period would have been available to assist refloating the vessel. [2.7.2]

13. An independent external audit has yet to be conducted at Mostyn, but such a process would be able to examine the SMS in detail and provide the duty holder with confidence that the SMS is robust, effective and meeting the current and future needs of the port. [2.8] Specifically:

    i. The agent's duties, responsibilities, and authority should be clearly defined within Mostyn Maritime Services' operating procedures. [2.7.1]

    ii. Recruiting a suitably qualified person for the role of deputy harbourmaster in the port would allow the harbourmaster to fulfil his obligations within the SMS. [2.7.3]

3.3 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

14. The company's SMS did not provide the master with a procedure to follow in the event of a change of orders while on passage, or a process to obtain the necessary nautical publications should they be required. [2.3.1]

15. The master did not inform the owner's marine superintendent who was ultimately responsible for ensuring that vessels were fully equipped with all necessary nautical publications. [2.3.1]

16. The master believed that the waypoint information had been sent, or authorised, by a senior professional with a maritime background. This was the single most important factor which, at the last moment, caused him to change the arrival plan. [2.3.3]

17. The scale of chart in use did not provide early enough warning to the watchkeeper when the anchor started to drag. [2.4.1]

SECTION 4 - ACTION TAKEN

4.1 REEDEREI ERWIN STRAHLMANN

Subsequent to the grounding on 10 August 2006, the vessel's owners have issued an amendment to their SMS procedures. The passage planning procedure now instructs that:

- If the agent is not able to provide the charts required, then the company Nautical Inspector is to be informed immediately.
- In the case where charts are not available due to change of orders, the Nautical Inspector is to be contacted immediately. The Nautical Inspector will make appropriate arrangements.
- The port agent is not to be contacted for advice regarding waypoints. The company and master are ultimately responsible for the safety of the ship.

4.2 THE PORT OF MOSTYN

The duty holder and owner of the Port of Mostyn issued a memorandum to the agent and harbourmaster that:

- Masters of vessels intending to anchor should do so at the North Rhyl buoy.
- Vessels to listen on VHF radio channels 14 & 16 for instructions.
- If a master requests further navigational information, he should be referred to the harbourmaster.

SECTION 5 - RECOMMENDATIONS

Reederei Erwin Strahlmann is recommended to:

2007/141 Revise its SMS to ensure that masters:

- Are aware of their obligation to report an accident in accordance with national and local regulations.
- Follow and understand the instructions for keeping a safe navigational watch at anchor, provided in STCW.
- Understand the fundamental principles of anchoring.

The Port of Mostyn Ltd is recommended to:

Take action to achieve the following:

2007/142
- Reinstate the recommended pilotage service from the North Rhyl buoy, and ensure that all applicable charts and hydrographic publications are amended accordingly.
- Amend its port passage plan to provide comprehensive guidance for masters of vessels using the channel and anchoring in the approaches to Mostyn.
- Review its emergency response procedures for marine accidents, ensuring that the necessary actions for each emergency are identified, and that port and harbour personnel are trained and familiar with the requirements.

The MCA is recommended to:

2007/143 Conduct a PMSC verification check on the Port of Mostyn. As a minimum, the check should encompass the safety of navigation of vessels arriving and departing the port, the port passage plan, and emergency response procedures for marine accidents.

The Secretary of State for Transport is recommended to:

2007/144 In considering his decisions on the Harbour Revision Orders submitted by the Environment Agency and Mostyn Docks Limited, take into account the need to clarify the status of the Mostyn Outer Channel, such that the responsible authority has the necessary powers to ensure the safety of navigation in the channel.

Marine Accident Investigation Branch
June 2007