Report on the investigation of

the grounding of

CFL Performer

Haisborough Sand

North Sea

12 May 2008

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

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AIS	-	Automatic Identification System
AMETIAP	-	Association of Maritime Educational and Training Institutions Asia-Pacific Regions
BSH	-	Bundesamt Für Seeschifffahrt Und Hydrographie
CEC	-	Certificate of Equivalent Competency
CFL	-	Canada Feeder Lines
CIRM	-	Comité International Radio- Maritime (The International Association for Marine Electronics Companies)
DOC	-	Document of Compliance
DPA	-	Designated person ashore
ECDIS	-	Electronic Chart Display Information System
ENC	-	Electronic Navigational Chart
ETA	-	Estimated Time of Arrival
EU	-	European Union
EUT	-	Equipment Under Test
GPS	-	Global Positioning System
GT	-	Gross tonnage
HSC	-	High Speed Craft
IAMI	-	International Association of Maritime Institutions
ICS	-	International Chamber of Shipping
IEC	-	International Electrotechnical Commission
IMO	-	International Maritime Organization
ISM Code	-	International Management Code for the Safe Operation of Ships and for Pollution Prevention
kts	-	knots
kW	-	kilowatt

m	-	metre
MCA	-	Maritime and Coastguard Agency
MT	-	Metric Tonne
NAABSA	-	Not Always Afloat But Safely Aground
nm	-	nautical miles
OOW	-	Officer of the watch
PSC	-	Port State Control
RPM	-	Revolutions per minute
SENC	-	System Electronic Navigational Chart
SMS	-	Safety Management System
SOLAS	-	International Convention for the Safety of Life at Sea
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping Incorporating the 1995 Amendments
TSS	-	Traffic Separation Scheme
UPS	-	Uninterrupted power supply
UTC	-	Universal Co-ordinated Time
VDR	-	Voyage Data Recorder

Times: All times used in this report are UTC +2 unless otherwise stated

SYNOPSIS

At 1619 on 12 May 2008, the Netherlands registered dry cargo ship, *CFL Performer,* ran aground on Haisborough Sand off the east coast of England. The vessel was refloated 15 minutes later and continued on passage to Grimsby, River Humber, where she arrived the following morning. There were no injuries or damage to the vessel, and there was no pollution.

The grounding occurred when *CFL Performer* was on passage from Paramaribo, Suriname. The ship was carrying 6020 MT of bauxite, and grounded 29 minutes after the OOW had adjusted course to follow the passage plan shown on the vessel's Electronic Chart Display Information System (ECDIS). The planned route took the vessel across Haisborough Sand, where the charted depth of water was considerably less than the vessel's draught. It is clear that this route was not adequately checked for navigational hazards either when planned or when being monitored.

ECDIS was the primary means of navigation, but none of the vessel's bridge watchkeeping officers had been trained in its use. Consequently, many of the system's features which could have prevented this accident were not utilised. Similar factors have been contributory to a number of recent groundings in UK waters. Although the use of ECDIS as the primary means of navigation is set to increase markedly during the next 10 years, specific competences in its operation have not yet been included in the STCW Code.

A recommendation has been made to the Maritime and Coastguard Agency (MCA) to support a proposal under consideration by the International Maritime Organization (IMO) for the inclusion of ECDIS competences within the STCW Code, and to press for the training required to meet such competences to be fit for purpose and assessed by examination and performance. Further recommendations have been made to the International Chamber of Shipping (ICS), the International Association of Marine Institutes (IAMI), the Association of Marine Educational and Training Institutes Asia-Pacific Regions (AMETIAP) and the International Association for Marine Electronics Companies (CIRM) aimed at improving the quality and effectiveness of both generic and equipment specific training in ECDIS. A recommendation has also been made to the International Chamber of Shipping to promote the need to preserve recorded information, including ECDIS information, following an accident. A further recommendation has been made to CFL Shipmanagement B.V. which seeks to ensure procedures are incorporated into its safety management system on the use of ECDIS.

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CFL Performer

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *CFL PERFORMER* AND ACCIDENT

Vessel details

Registered owner	:	Canada Feeder Lines B.V.
Technical manager	:	Vertom Scheepvaart- & Handelmaatschappij B.V.
Port of registry	:	Groningen
Flag	:	Netherlands
Type	:	General cargo
Built	:	2007 Holland
Classification society	:	Lloyd's Register
Construction	:	Steel
Length overall	:	118.4m
Gross tonnage	:	4106
Engine power and/or type	:	Wartsila 6426A2, 2040kW at 221 RPM
Propulsion	:	Single screw controllable pitch propeller
Service speed	:	12 knots
Other relevant information	:	The vessel's charter party contained a NAABSA clause Maximum Summer draught 6.09m

Accident details

Time and date	:	1619 on 12 May 2008
Location of incident	:	52º 54.123' N, 001º 43.695' E
Persons on board	:	8
Injuries/fatalities	:	None
Damage	:	None

1.2 NARRATIVE

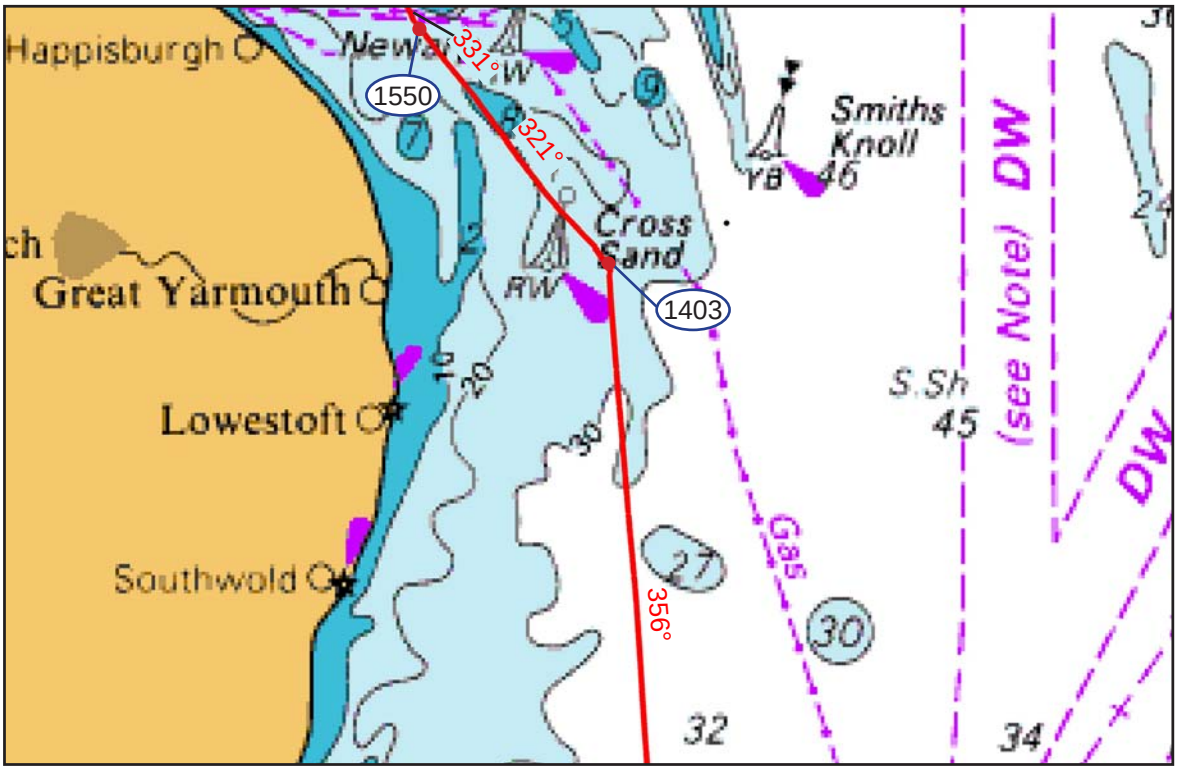
1.2.1 The grounding

On 26 April 2008, *CFL Performer* sailed from Paramaribo, Suriname bound for Grimsby, UK, carrying 6020 MT of Bauxite. Her estimated time of arrival (ETA) at the entrance to the River Humber was midnight on 12 May.

The vessel transited the Dover Strait Traffic Separation Scheme (TSS) on the evening of 11 May, and during the 1200-1600 watch the following day, the second officer was the officer of the watch (OOW). The vessel's position was monitored in relation to the voyage plan using the vessel's Electronic Chart Display Information System (ECDIS)[1]. To follow the plan, the vessel's course was adjusted at 1403 from 356º to 321º and again at 1550 to 331º **(Figure 1)**. The vessel was in autopilot and her speed over the ground was about 9.5 knots.

AIS data courtesy of the MCA

Figure 1



Vessel's track recorded by AIS

[1] Electronic chart display and information system (ECDIS) means a navigation information system which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/19 and V/27 of the 1974 SOLAS Convention, as amended, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information. (IMO Resolution MSC 232 (82))

The weather was fine; visibility was 6nm, the sea was calm and the wind was north-easterly between force 2 and 3. The tidal stream was south-easterly at 1 knot, and the predicted height of tide was about 2.5m (based on Cromer, England). Both of the vessel's radars were operating with the displays set at the 6 miles and 12 miles range scales. During the watch, the second officer prepared files for security and safety management audits which had been arranged to take place during the vessel's stay in Grimsby. He also completed the passage plan from the pilot embarkation point to the anticipated berth.

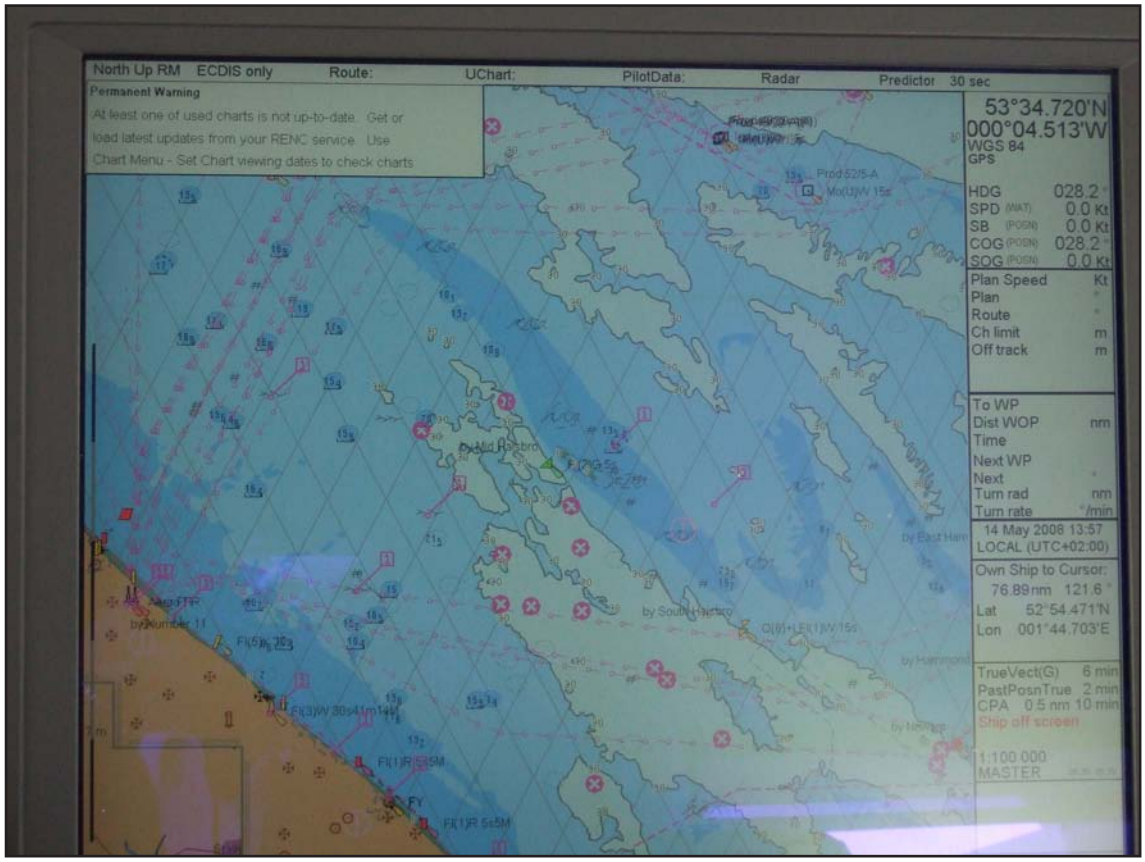
At 1615 the second officer contacted the chief officer, who had not arrived on the bridge at 1600 as expected. Shortly afterwards, the master, who was in his cabin, felt a change in the vessel's vibrations. He called the second officer and instructed him to check the depth of water. The second officer looked at the ECDIS display and reported to the master that there was no cause for concern. The depth sounder was not switched on.

The vibrations increased and the vessel began to slow down. At 1617 the vessel speed was 6.9 knots, and by 1619 it had reduced to 1.1 knots. The second officer realised that something was wrong and put the propeller pitch to zero. He then changed the ECDIS display to a 1:50000 scale and saw that the charted water depth was less than the vessel's draught **(Figures 2 and 3)**. He realised that the vessel was aground on the Haisborough Sand[2]. This was confirmed when the depth sounder was switched on.

The reduction in the vessel's speed was detected by Yarmouth coastguard using the Automatic Identification System (AIS) **(Figure 4)**. At 1634, the coastguard station called *CFL Performer* on VHF radio to establish if the vessel was aground and needed assistance. The master, who had quickly made his way to the bridge with the chief officer, informed the coastguard that the vessel was aground but did not require assistance. He then put the propeller pitch to full astern, and the vessel refloated without difficulty. The chief officer checked the soundings of the double bottom tanks and the chief engineer checked the temperatures of main and auxiliary machinery; no problems were found.

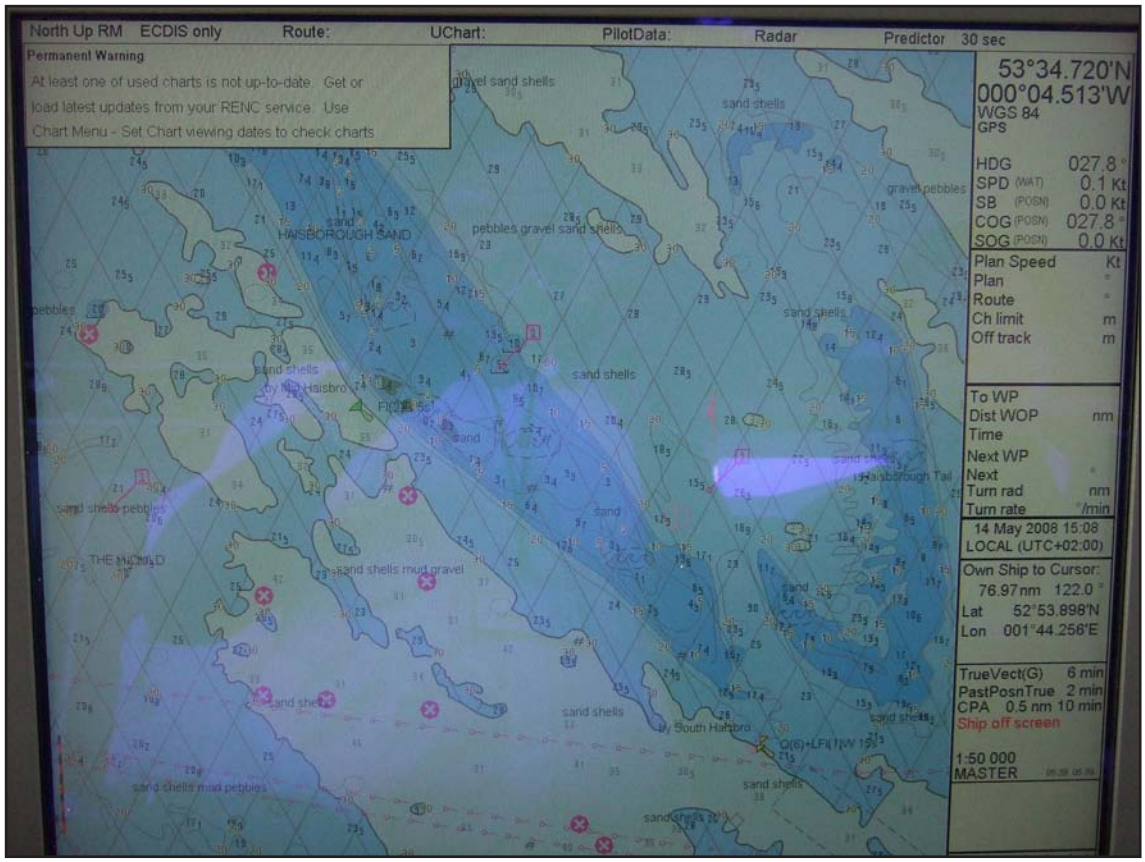
[2] Admiralty sailing Directions (NP54) states: (Haisborough Sand)… *is 10 miles long and 1 mile wide lying parallel to the Norfolk coast. It is marked to the NW by N Haisbro' Light-buoy (N cardinal), to the SE by S Haisbro' Light-buoy (S Cardinal) and to the west by Mid Haisbro' Light-buoy (starboard hand). The shoal has three drying patches (1995) close NE, E and ESE of the Mid Haisbro' Light-buoy. Except at slack water their positions are indicated by tidal eddies and even a slight sea or moderate swell breaks on the shallower parts of the shoal. There are a number of foul patches on the S part of the shoal. There are strong eddies on and around the bank, especially to the NW.*

Figure 2



ECDIS display at 1:100000 scale

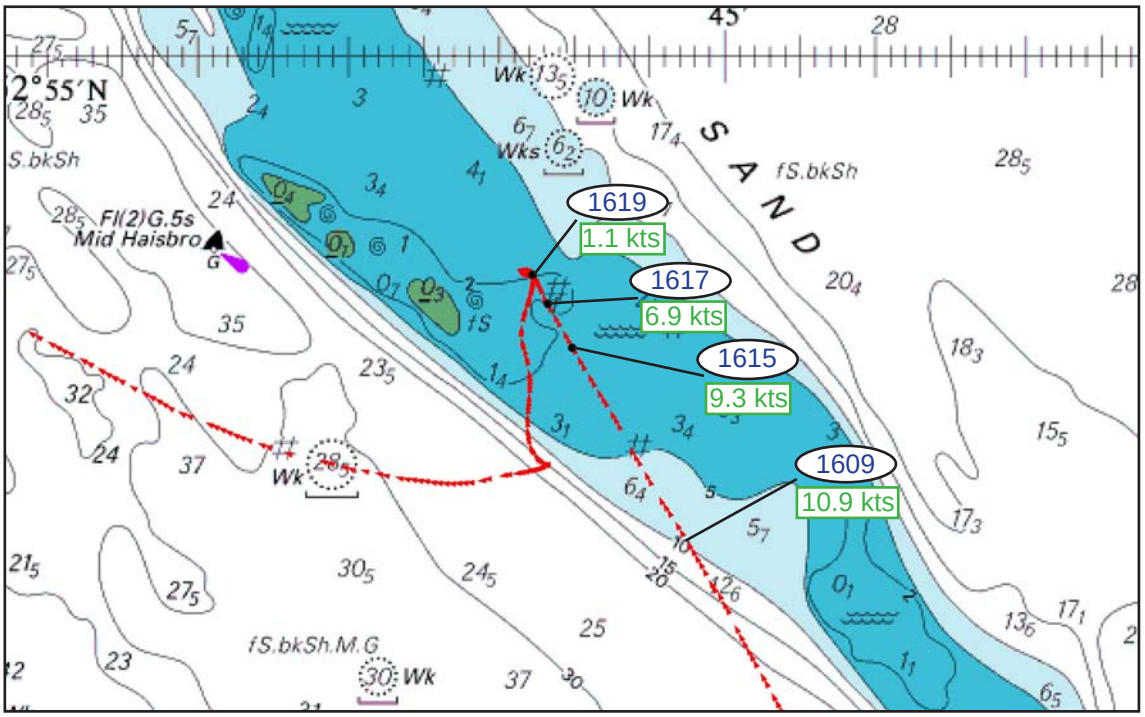
Figure 3



ECDIS display at 1:50000 scale

AIS data courtesy of the MCA

Figure 4



Vessel's AIS track over Haisborough Sand

1.3 ACTION IN GRIMSBY

1.3.1 The vessel

CFL Performer berthed at Grimsby at 0052 on 13 May. The master informed Lloyd's Register, the vessel's classification society, of the grounding at midday, and the vessel's designated person ashore (DPA) at 1445. No action was taken to save the information recorded on the vessel's voyage data recorder (VDR).

1.3.2 Port State Control

The Maritime and Coastguard Agency (MCA) carried out a Port State Control (PSC) inspection on board *CFL Performer* and detained the vessel for the following deficiencies:

- The routing of the vessel with a draught of 5.9m across Haisborough Sand where the charted depth was less than 2m.
- The ship's navigating officers not being trained in the use of ECDIS.
- Not reporting the incident to the vessel's DPA for 23 hours.
- The chart support certificate had expired.
- A Netherlands Certificate of Equivalent Competency (CEC) for the second officer was not made available for inspection.
- A cadet was being used as a rating watchkeeper (lookout) without rating watchkeeper certification.

1.3.3 Additional International Safety Management (ISM) audit[3]

Following the vessel's detention, the Netherlands administration instructed Lloyd's Register to conduct an 'additional' ISM audit on board the vessel. The audit identified two major non conformities: the first related to the failure of the master to report the grounding to the DPA for 23 hours, and the second to the navigating officers' lack of familiarity with, and incorrect use of, the ECDIS system on board.

1.4 CREW

The crew comprised the master, chief officer, second officer, chief engineer, two deck ratings, a cook and a deck cadet. All the officers held appropriate STCW certificates of competency obtained from their respective countries of origin, and CECs for working on a Netherlands registered vessel. None of the crew had previously been employed by Canada Feeder Lines (CFL).

The master had been at sea for 22 years, and held a deep sea captain's certificate issued by the Ukrainian administration. He had been employed as a master since February 2007 and had served on two other ships in this rank. He joined *CFL Performer* in February 2008, and kept the 8-12 bridge watches.

The chief officer held a Ukrainian licence and had 6 years' experience at sea. He joined *CFL Performer* as second officer in March 2008 and was promoted to chief officer on 25 April 2008. The chief officer kept the 4-8 bridge watches.

The second officer's certificate of competency was issued by the Philippines administration in January 2002. He first went to sea in 1979 and had been a second officer for 16 years. He joined *CFL Performer* on 24 April 2008, and kept the 12-4 bridge watches.

1.5 AMENDMENT TO THE VOYAGE PLAN

The voyage from Paramaribo to Grimsby was planned on the ECDIS by the chief officer before he was promoted. The plan was named *Paramaribo-Grimsby* and an extract is at **Figure 5**.

At about 2100 on 11 May 2008, the master called the chief officer to the bridge and instructed him to amend the passage plan to enable *CFL Performer* to arrive at the Humber pilot station 1 hour sooner than her existing Estimated Time of Arrival (ETA). This was to ensure that the vessel did not miss the high water which would have delayed her berthing. Accordingly, the chief officer created a new passage plan in the ECDIS using the scale of 1:100,000. The master assisted in the selection of the revised waypoints, and the chief officer visually

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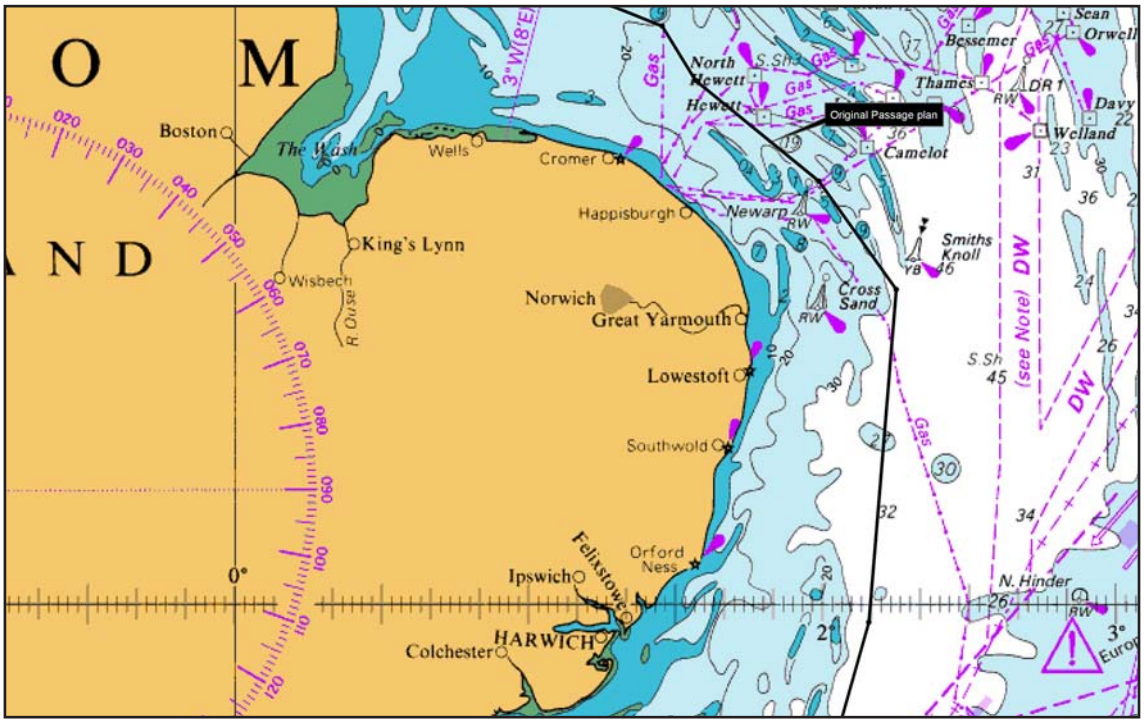
[3] An additional ISM audit may be carried out for the purpose of confirming DOC or SMC validity if major nonconformities have been disclosed, significant changes have been introduced to Company's SMS or when the lead auditor finds that the number of nonconformities disclosed in the Company's/ship system during the last audit proves that such audit is necessary. Additional audits may also be considered necessary when technical deficiencies and/or nonconformities are discovered during onboard inspections and surveys.

checked each leg of the new plan to ensure they were clear of hazards. In doing so, he noticed that the vessel would leave a green conical buoy to port in the vicinity of Haisborough Sand, but did not investigate further. The new voyage plan took about 5 minutes to complete, and was in use when the second officer took over the bridge watch at 1200 on 11 May 2008.

Figure 5



Extract of the original passage plan

1.6 ECDIS - FURUNO FEA-2107

1.6.1 Installation

The ECDIS on board *CFL Performer* was a Furuno FEA-2107 which was installed and commissioned by Radio Holland[4] on 18 November 2007. Two systems were fitted, with one system designated as the master unit and the second as the standby or slave unit. Radar, Global Position System (GPS), AIS, gyro and speed log were connected through a local area network and each ECDIS had its own Uninterrupted Power Supply (UPS). To facilitate a seamless transition between systems in the event of a system failure, settings and changes to one system were simultaneously duplicated in the other. As two ECDIS systems were fitted, and used official Electronic Navigational Charts

[4] Radio Holland (Rotterdam) is a service agent of FURUNO which specialises in the supply, installation, integration and service of maritime electronics.

(ENC)[5], paper charts were not required to be carried. The vessel was provided with an ECDIS operations manual, which was over 600 pages in length. Extracts of the manual are shown at **Annex A**.

1.6.2 Operation

The FEA 2107 chiefly operates in two modes: planning and monitoring. Changes to an existing passage plan input in the system can only be carried out by accessing the plan concerned and ticking a box titled *Enable changes*. The system does not allow the alteration of a plan when it is in the monitoring mode. Although it is possible to monitor one plan and edit another on the same screen, it was the usual practice on board *CFL Performer* to plan on the slave system display and to monitor the route in use on the main system display.

The system can display ENCs at different scales, with the degree of detail displayed increasing or reducing in line with the scale selected. The FEA-2107 indicates when chart information on a larger scale than the one in use is available, or when the scale selected is larger than the optimum scale available.

1.6.3 Contours and depths

A number of settings related to the charted depth are applied on the ECDIS: the safety contour, the safety depth and the shallow and deep contours. The safety contour provides a visible boundary between "safe" and "unsafe" water with respect to depth, and is highlighted on the display to enable easy identification. It is selected by the navigator to reflect a ship's draught, adjusted for the required under keel clearance and for the height of tide, if required. As depth contours on an ENC are normally only drawn at 5m intervals, the system automatically uses the deeper contour when the selected safety contour depth lies between contours.

The safety depth applies to spot soundings, the depth of which is insufficient for a vessel to safely pass over. Spot soundings less than the safety depth are displayed in bold type to provide a more accurate representation of a vessel's 'no-go' line than the safety contour **(Figure 6)**.

The shallow and deep contours are utilised when the multi-colour depth display is selected. The deep contour is normally set at twice a vessel's draught to indicate when squat is likely to be experienced. The area between the 0m contour and the shallow contour is coloured dark blue, the area between the shallow and safety contour is coloured light blue, and the area between the safety contour and the deep contour is coloured grey. This allows the gradient of the seabed to be graphically displayed. All of the area between the 0m contour and the safety contour is also hatched **(Figures 2, 3 and 6)**.

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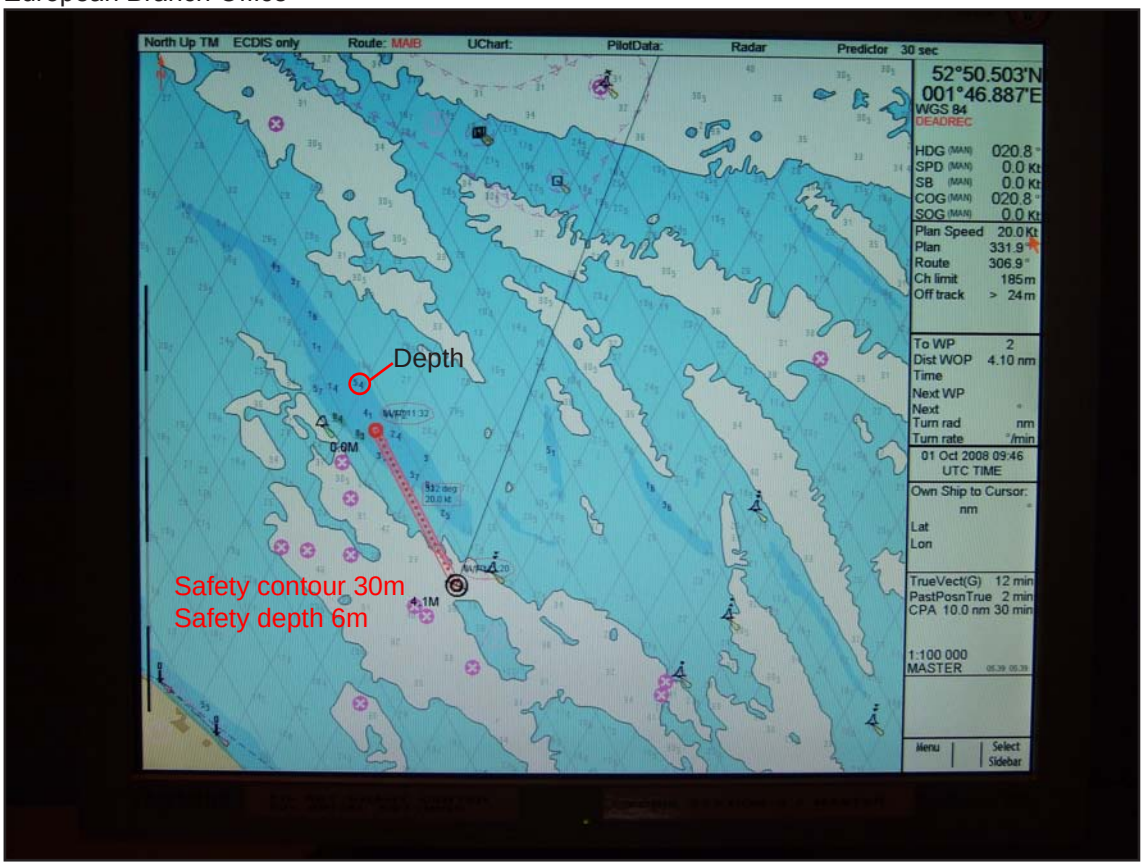
[5] An ENC database stores chart information within an ECDIS in the form of geographic objects represented as unique vectors. A System Electronic Navigational Chart (SENC) is a database resulting from the transformation of an ENC by ECDIS for use by the mariner.

ECDIS data courtesy of Furuno
European Branch Office

Figure 6



Screen shot of ECDIS display showing depth and contour settings
(taken at the Furuno European Branch Office)

1.6.4 Route planning

When route planning, the ECDIS calculates chart alarms using user defined off track or channel limits for the route selected. Danger areas within the channel limits are shaded red if the safety contour or selected danger areas are crossed **(Figure 6)**. The default setting for the channel limit is 185m either side of a planned track, and the default setting for the safety contour alarm is 30m. Once a plan has been completed, it can be verified using the system's 'check page', which helps the user to identify legs of a plan where the safety contour has been crossed and where defined danger areas are located. A plan does not have to be free of warnings or alarms to allow it to be saved and monitored.

1.6.5 Route monitoring

Route monitoring is divided into two categories: monitored route, and predicted movement. In the first category, an audible alarm activates to warn the user when a vessel moves outside the channel limits and when nearing a waypoint. In the second, an audible alarm sounds when a ship is going to cross the safety contour set on the display, which can differ from the safety contour alarm setting used when planning. To enable this alarm, a watch vector (time and angle) must be defined by the user **(Annex A)**. If a watch vector is not defined, the

safety contour alarm will not activate. When an un-checked plan is monitored, the name of the plan at the top of the ECDIS screen is displayed in red, as are the areas within the channel limits where the safety contour is crossed **(Figure 6)**.

1.6.6 Security

Fixed vessel parameters were entered into the system at installation. A floppy disc provided by the manufacturer was needed to access and change these parameters. However, a Windows™ interface was accessible via an external keyboard which did not require the user to provide security discs or passwords, and through which system files could be accessed.

1.7 EQUIPMENT FAMILIARITY

In November 2007, Radio Holland conducted ECDIS training on board *CFL Performer* for the master, chief officer and second officer who were in post at the time. The training occurred before the vessel entered service, and was specific to the Furuno ECDIS. The training consisted of two sessions, each lasting between 4 and 5 hours. No training in the use of ECDIS was provided for officers who subsequently joined the vessel.

Of the officers on board at the time of the grounding, neither the chief officer nor the second officer was trained in the operation of ECDIS, but both had used such equipment on previous ships. The master had no previous experience or training on ECDIS or any other form of electronic navigation system. None of the officers were aware of the significance of the safety contour, the safety depth, and the shallow and deep contours, and did not know how to establish a watch vector ahead of the vessel, or its significance. They also did not know how to use the 'check page' **(Annex A)** to ensure that all course lines and associated channel limits were clear of navigational dangers.

At the time of the grounding, the vessel's owner was in the process of obtaining feedback from its ships' officers regarding their experience with ECDIS, with a view to identifying future training needs.

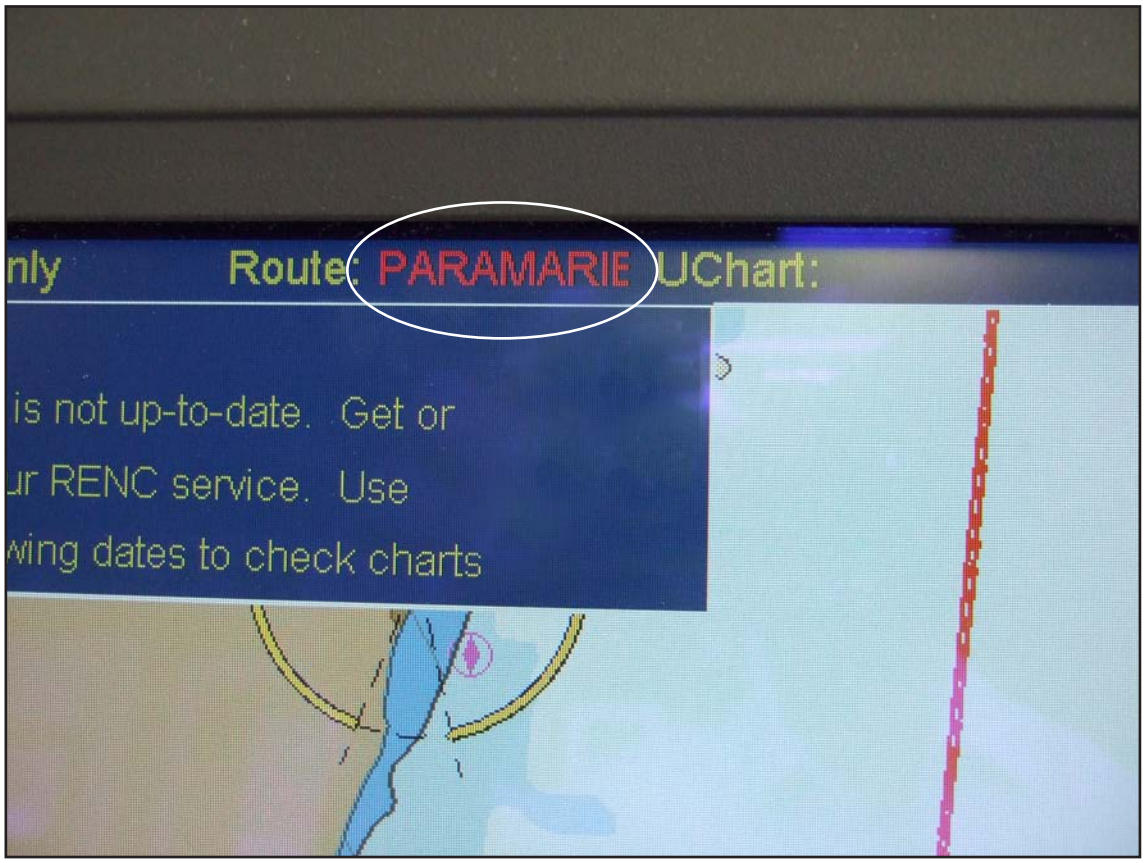
1.8 ECDIS DATA

1.8.1 Examination

Immediately following the grounding, the MAIB conducted a detailed examination of the vessel's ECDIS. The key findings were:

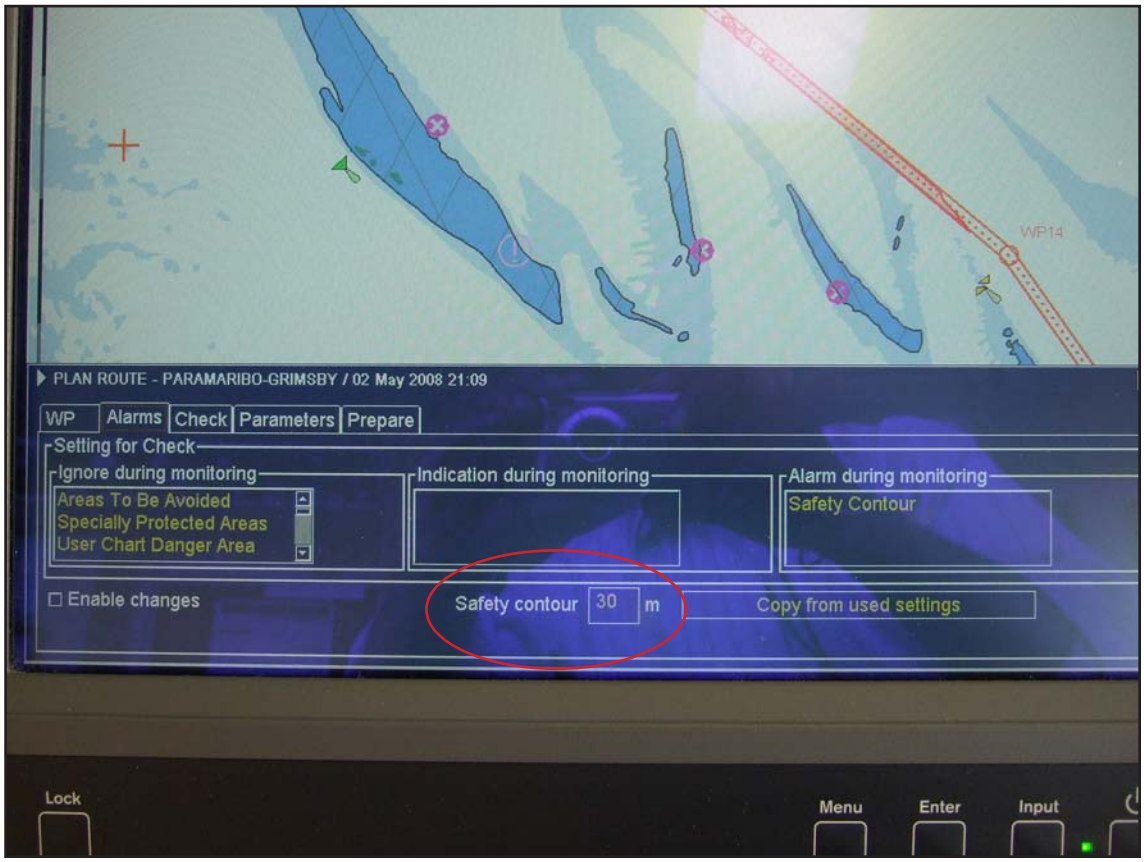
- The voyage plan in use at the time of the grounding had been deleted.
- The original passage plan from Paramaribo to Grimsby was saved as a file called "*Paramaribo-Grimsby*". The plan was created on 14 April and was last modified on 2 May. The title of the plan and the tracks were coloured red on the display **(Figure 7)**.
- The safety contour used on the original passage plan was 30m **(Figure 8)**.

Figure 7



Screen shot showing title of original plan

Figure 8



Screen shot showing safety contour set in original plan

- The waypoint approach alarm activated immediately prior to the vessel's course alterations at 1403 and 1550 on 12 May 2008 **(Figures 1 and 9)**.
- The safety contour alarm did not activate at any time during the voyage **(Figure 9)**.
- The voyage log file did not record the name of the passage plan in use, but contained sufficient information to reconstruct the vessel's track.
- The chart usage file was deleted.
- All of the charts required for the vessel's passage to Grimsby were official ENCs.

Figure 9

Screen shot showing alarm log

The ECDIS was also examined on 29 June 2008. On this occasion, the voyage log was found to have been reset. This deleted the information recorded during the vessel's voyage to Grimsby.

1.8.2 Display at the time of the grounding

The scale selected was 1:100,000, which was the scale in use when the second officer relieved the master at 1200. The name of the plan and the intended track were displayed in red, and the channel limit was set to 185m. No watch

vector was set. Display settings for the safety, shallow and deep contours or the safety depth were not recorded, but the safety contour selected was reported to be 30m.

1.9 SAFETY MANAGEMENT

1.9.1 Vessel management

CFL Performer was the second of a series of nine new sister ships administered by CFL on behalf of their owners. Established in 2007, the company employed two staff and contracted responsibility for the vessels' technical and safety management to Vertom Scheepvaart & Handelmaatschappij B.V., a well established ship manager which held an ISM Document of Compliance (DOC) and provided a Designated Person Ashore (DPA) for CFL's vessels. The responsibility for the implementation of the vessels' safety management system was, in turn, subcontracted to Q- shipping. CFL engaged the services of Global Crew Management B.V. to provide the crew for its vessels. At the time of the publication of this report, CFL administered five vessels in service, with a further eight on order.

1.9.2 Onboard procedures

An interim ISM audit was conducted by Lloyd's Register on behalf of the Netherlands administration before *CFL Performer* entered service on 19 November 2007. Under the heading of *Chart Corrections & Nautical Publications*, the audit report noted the vessel's exemption from carrying paper charts. The SMS on board *CFL Performer* did not contain any reference to ECDIS or any instructions regarding the use of the VDR.

Shortly before the grounding, CFL issued a questionnaire to its fleet of three ships in service to gain feedback on the use of ECDIS. There was no written policy regarding the length of handover between officers leaving and joining CFL vessels.

1.10 ECDIS REQUIREMENTS

1.10.1 Carriage

Carriage of ECDIS will be mandatory on High Speed Craft (HSC) built after 2008, and existing HSC are to be retrofitted by 2010. Proposed amendments to SOLAS, Chapter V Safety of Navigation, Regulation 19 *Carriage requirements for shipborne navigational systems and equipment* require the mandatory carriage of ECDIS on new passenger vessels of 500GT and above, and new tankers and cargo ships of 3000GT and above starting 2012 and proceeding in phases over the following 2 years. The proposal also requires existing ships to be retrofitted with ECDIS by 2018.

1.10.2 Training

Although Table A II/1 of the STCW95 Convention states that *ECDIS systems are considered to be included under the term "charts"*, there is no mandatory international requirement for navigating officers to undertake specific ECDIS training, and the requirements of individual national administrations differ in this respect. The UK administration includes ECDIS in its syllabus for all deck officers, and also requires navigating officers to receive both generic and equipment-specific training when serving on vessels fitted with ECDIS. However, most other European Union (EU) administrations, including the Netherlands, rely on the general requirements placed upon ship owners and managers by the ISM Code to ensure all personnel are familiar with the equipment they are expected to use. The Code states:

> *The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarization with their duties*

Guidelines have been issued to surveyors conducting PSC inspections under the Paris Memorandum of Understanding, which includes:

> *Are the master and deck watchkeeping officers able to produce appropriate documentation that generic and type specific ECDIS familiarisation has been undertaken?*

In September 2008, an ad hoc intersessional working group of the IMO Sub-Committee on Standards of Training and Watchkeeping (STW) considered a proposal submitted by Australia to include additional competences related to the knowledge and use of ECDIS in tables A-II/1, A-II/2, A-II/3 and section B-II/1 of the STCW Code. The proposed amendments include the demonstration of competence by the examination and assessment of evidence from approved training ship experience, approved ECDIS simulator training, and approved in-service experience. The proposal was supported by the United Kingdom, and will be further considered at the next meeting of the STW sub-committee scheduled for February 2009.

The framework of an ECDIS course, titled "Model Training Course on the Operational Use of ECDIS" (Model Course 1.27) was published by the International Maritime Organization (IMO) in 2000, and provides detailed guidance on content, the facilities required, basic entry level qualifications, certification, and simulator exercises. Many ECDIS training courses based on the IMO model course are run by maritime training colleges and other educational organisations around the world. The course is designed for 40 hours of instruction (1 week), and successful completion is dependent on attendance. Although tests and evaluations are suggested, there is no requirement for attendees to pass an examination.

1.10.3 Performance standards

The performance specification for ECDIS was originally detailed in 1995 in IMO Resolution A.817(19) and was amended by:

- Resolution MSC.64(67) - *Adoption of New and Amended Performance Standards- Annex 5*, which was adopted on 4 December 1996;
- Resolution MSC.86(70) – *Adoption of New and Amended Performance Standards for Navigational Equipment, Annex 4*, which was adopted on 8 December 1998; and
- Resolution MSC.232(82) – *Adoption of the Revised Performance Standards for Electronic Chart Display and Information System (ECDIS)*, which was adopted on 5 December 2006.

The ECDIS performance standard does not stipulate specific requirements for the system interface or terminology, and many of the available approved ECDIS' differ in terms of their user menus, hardware interfaces and nomenclatures.

The requirements of the performance standard include:

4.10.5.3 *ECDIS shall give an alarm if the ship, within a specified time set by the mariner, is going to cross the safety contour.*

10.6.3 *It should not be possible to manipulate or change the recorded information*

1.10.4 Conformance with IMO performance standard

The type approval for the FURUNO ECDIS was carried out by Bundesamt Für Seeschifffahrt Und Hydrographie (BSH) in Germany. The type approval process ensures that the IMO performance standards are met by testing against the International Electrotechnical Commission (IEC) standard 61174.

1.11 VOYAGE PLANNING REQUIREMENTS

SOLAS V regulation 34 requires the masters of all vessels which proceed to sea to ensure that the intended voyage has been planned using the appropriate nautical charts and publications, and to ensure the guidelines issued by IMO in Annex 25 to Resolution A.893(21) are followed. Additional guidance is also provided in SOLAS V Annex 24, which should be used in conjunction with the IMO guidelines. The principles of voyage planning include:

- Intended tracks and course alteration points, along with areas of danger, should be marked on the navigational charts, taking into account the margins of allowable error and minimum under-keel clearance.
- Everyone who is concerned with the vessel should be comprehensively briefed.

- The vessel's position is closely and continuously monitored, and is cross-checked using different methods; reliance on a single method of position fixing should be avoided.
- The decisions of individuals are cross-checked so that errors can be detected.

1.12 SIMILAR ACCIDENTS

The MAIB is aware of a number of accidents in recent years in which the use or misuse of ECDIS or ECS has been identified as a contributing factor. In August 2004, a cross channel ferry grounded after the helm was put the wrong way as the vessel approached a port entrance. This mistake was not noticed by the bridge team and, although an ECDIS was in use, no warning was given to indicate that the vessel was approaching shallow water because the watch vector or predicted movement warning area had not been correctly enabled.

In 2006, a ro-ro ferry ran aground after the safety contour in her ECDIS was set at 30m. This caused the chart display to be shaded blue, which severely impeded the bridge team's ability to see that the vessel was outside the navigable channel.

In January 2008, a ro-ro passenger ferry hit a submerged wreck near Dover and severely damaged her propellers. Although the vessel's primary means of navigation was paper charts, her deck officers relied on the vessel's ECS, despite not having been trained in its use. The wreck was not shown on the ECS display due to the settings applied to the system at the time.

Contributory factors to the grounding of a container ship in UK waters early in 2008 included the lack of training in the use of the vessel's electronic chart system. This resulted in the use of inappropriate settings with regard to depth contours, and chart and depth alarms.

SECTION 2 - ANALYSIS

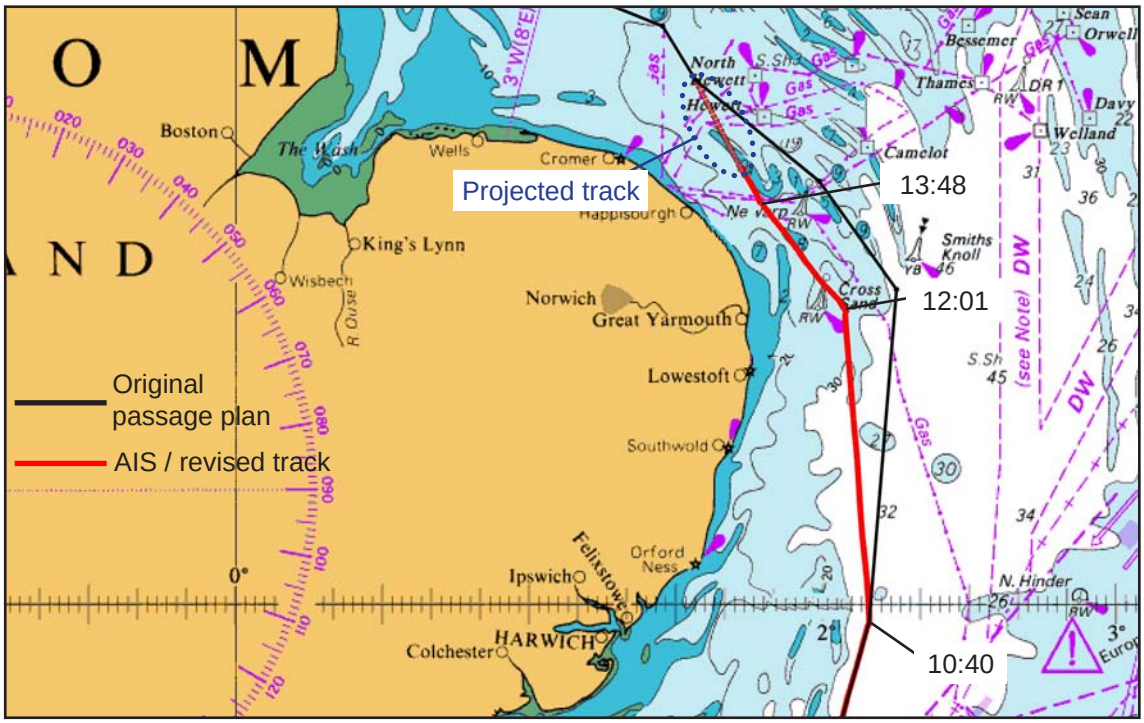
2.1 AIM

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 PASSAGE PLAN

The passage plan in use when *CFL Performer* grounded could not be retrieved from the ECDIS. However, as the activation of the waypoint approach alarms **(Figure 9)** corresponds to the vessel's positions transmitted by AIS **(Figure 1)**, the vessel's AIS track is considered to be representative of the intended passage. The alteration of course to 331º at about 1550, which took the vessel across Haisborough Sand towards the vessel's original planned track **(Figure 10)**, was therefore made to follow the planned route shown on the ECDIS display. In view of the fact that the depth of water over the majority of Haisborough Sand was significantly less than 5m, it was inevitable that *CFL Performer*, which had a draught of about 6m, would run aground.

Figure 10



Vessel's original and revised planned routes

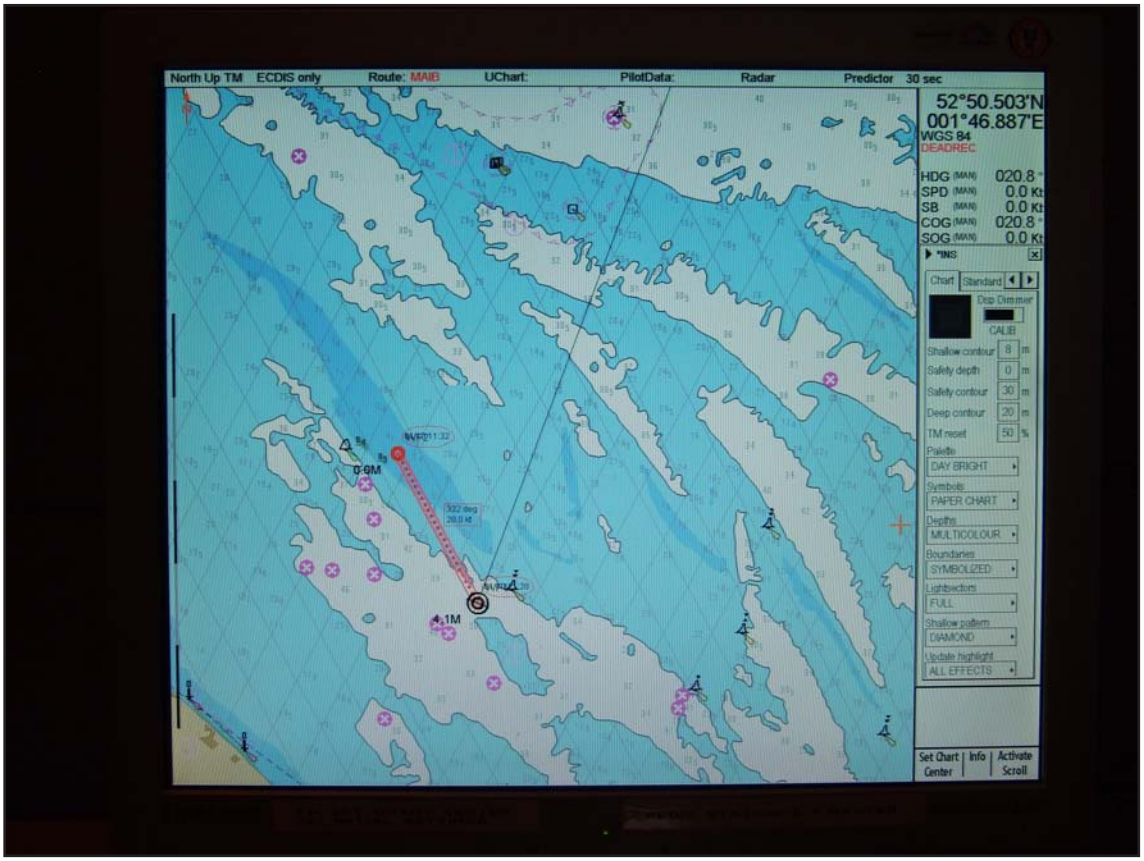
The route was planned and executed on the vessel's ECDIS, which had numerous in-built safeguards intended to prevent an accident of this nature. However, it is evident that on this occasion these safeguards were not utilised, and system warnings were not acted upon, either when the route was planned or when it was monitored. In particular:

- The system's check page was not used to check each leg of the route for navigational hazards.
- The plan was executed despite its title remaining red, indicating that the intended route crossed the safety contour set or other defined dangers.
- The safety contour alarm did not sound as the vessel approached the shallow because a watch vector had not been set.

It is also highly likely that the configuration of the display was not optimised to make the presence of the shallows over Haisborough Sand readily apparent. At a scale of 1:100000 and with a safety contour of 30m selected **(Figure 2)**, the shallows over the bank are much harder to identify than when viewed at a scale of 1:50000 **(Figure 3)**. Furthermore, the identification of the depths over Haisborough Sand would have also been highly dependent on the safety depth selected **(Figures 6 and 11)**. However, although the configuration of the display

ECDIS data courtesy of Furuno
European Branch Office

Figure 11



Screen shot showing display with 0 metres safety depth set
(taken at the Furuno European Branch Office)

would have affected the officers' ability to see the shallows, the drying patches in the vicinity of the Mid Haisbro' buoy would have been visible regardless of the settings applied. As these were not seen when the route was planned, and as the vessel's intended track would have passed over dark blue shading and the diamond hatched markings, which are similar to the conventions used for marking shallows and 'no-go' areas on paper charts, it is evident that the planner's visual check was only cursory. It is also evident that the amended route was not cross-checked by the master.

2.3 USE OF ECDIS

2.3.1 Training and familiarity

Route planning and monitoring are critical to the safe operation of every vessel, and it is essential that requirements of SOLAS V are met, regardless of whether ECDIS or paper charts are used. However, the differences between the two media are considerable. This has been recognised by the International Chamber of Shipping (ICS) in its Bridge Procedures Guide, which states:

> *Navigation with ECDIS is fundamentally different from navigating with paper charts. As a consequence, the safe use of ECDIS requires the mariner to be appropriately trained and appropriate bridge procedures to be established*

While the information shown on a paper chart is fixed, the electronic data within ECDIS can be displayed and used in a variety of ways, which requires both careful consideration and manipulation. This can be daunting and confusing to untrained users. On this occasion, although the vessel's deck officers were trained in, and had experience in the use of paper charts, none had been trained in the use of ECDIS. Consequently, they were ignorant of many of the system requirements and features, and operated the system in a very basic and inherently dangerous manner.

The use of ECDIS has steadily increased in recent years, and it is disturbing that the number of accidents resulting from the incorrect use of ECDIS and ECS through poor system knowledge has also risen (Paragraph 1.12). ECDIS will soon replace paper charts as the primary planning and monitoring media on board most vessels, but the system can only realise its potential benefits to maritime safety if all mariners who are expected to use the equipment at sea are properly trained. Therefore, the need for mandatory training in ECDIS is compelling. Given the sophistication of the systems, and their differences in terms of user menus, hardware interfaces and terminology, this can only be achieved through both generic and equipment specific training. Reliance on the requirements of flag states, knowledge of paper charts, on the job training and self-tuition are not realistic or sensible options for such a vital piece of navigational equipment.

Consequently, the proposed inclusion of specific ECDIS competences within the STCW Code is a very positive step, which merits strong support and early adoption by IMO.

2.3.2 IMO model course

Generic training in the use of ECDIS is already available through the IMO model course and, in view of the system's proliferation over the next 10 years, it would appear compelling that all bridge watchkeeping officers of vessels on which ECDIS is the primary navigation system, complete this course. It is also reasonable for the successful completion of the course to be determined by practical assessment and examination, not just by attendance. However, although the structure and syllabus of the course provides a benchmark for training establishments, it is 8 years since the course was developed, and a review of its content may be beneficial to take into account the experience gained in the use of the system over that period, the lessons learned from this and similar accidents, and to ensure the course still meets the requirements of the maritime industry.

2.3.3 Equipment-specific training

The chief and second officers on board *CFL Performer* had used an ECDIS on previous ships. However, the factors listed in Paragraph 2.2 indicate that neither had an acceptable working knowledge of the operation of the Furuno FEA-2107. Although ECDIS' must meet the specific performance standards set by the IMO, manufacturers inevitably vary aspects of equipment operation in order to remain commercially competitive. This has led to differences between systems in terms of menus, terminology and equipment interface. Such differences can be marked and, although operations manuals are provided, these are not always easily understood. A mariner's proficiency in the use of a particular system is therefore undoubtedly best served by the provision of equipment-specific training, regardless of any previous training and experience.

2.4 ROUTE MONITORING

During the afternoon of 12 May, the OOW relied on ECDIS alarms to warn when the vessel was approaching an alteration of course or was more than 185m off the intended track. In effect, the monitoring of the vessel's progress was undertaken by the ECDIS, while the OOW spent much of his watch preparing for forthcoming audits and passage planning.

The second officer presumed that the vessel would be safe providing she remained within the channel. Consequently, he paid little attention to where the vessel was heading, and did not: investigate the significance of the South Haisbro' cardinal mark and the Mid Haisbro' starboard conical buoy, which the vessel passed at a distance of about 1 mile; check the new course before altering at 1550; see the eddies or disturbed water which, given the height of tide, were probably visible directly ahead of the vessel before she grounded,

or; ensure that the echo sounder was switched on, particularly when the master raised concern regarding the depth of water. Such actions are fundamental to the duties of an OOW, and would have undoubtedly helped to identify the shallows ahead of the vessel in sufficient time for successful avoiding action to be taken.

ECDIS provides a potentially invaluable asset to passage planning. However, there is a danger that many bridge watchkeepers will increasingly trust what is displayed without question. As this case demonstrates, such trust can be misplaced. The need for bridge watchkeepers to remain vigilant and continuously monitor a vessel's position in relation to navigational hazards remains valid, regardless of the electronic aids available.

2.5 WATCH VECTOR

It is disturbing that, although the safety contour was set at 30m, its associated alarm did not activate because a watch vector, which defines the predicted movement of a vessel, had not been set. The setting of a watch vector is therefore an extremely important feature without which many of the chart alarms cannot operate. The use, or misuse of a watch vector in this, and other accidents highlighted in Paragraph 1.12, indicates that the significance of this function requires emphasising to all ECDIS users.

2.6 SAFETY MANAGEMENT

Positive attitudes to safety and the development of a healthy safety culture need time to develop, and can only occur when there is a commitment to safety at the highest level, supported by robust procedures documented in operations or management manuals. In this case, CFL was a relatively new and expanding company with a fleet of new and well-equipped ships. The company had been proactive in arranging for the officers on board *CFL Performer* to be trained in the use of the Furuno FEA-2107 before the vessel entered service, and was in the process of obtaining feedback on the use of ECDIS on board its vessels when the accident occurred. However, a number of issues related to the safety management of the vessel, for which Vertom was responsible, indicate that the implications of the use of ECDIS had not been assessed and that onboard procedures were not robust. These issues included:

- Following the initial onboard ECDIS training, no further training was arranged. Consequently, officers who subsequently joined the vessel were not familiar with the ECDIS and were reliant on their limited previous experience.

- The complexity of the operation of ECDIS with regard to the number of user settings required, was not recognised, and no procedures for the use of the equipment were included in the vessel's safety management system. Instructions for the operation of the VDR were also omitted.

- The master did not consider the grounding to be sufficiently serious to immediately inform the DPA or save the VDR data. While there was no apparent damage to the vessel or the marine environment, the accident raised a number of safety issues of which the DPA should undoubtedly have been made aware.
- Electronic records pertinent to the accident were deleted from the ECDIS.
- No consideration had been given to the duration of the handover required for crew joining the vessel.

In order to develop, a safety management system must be modified and updated as lessons are learned from accidents, hazardous incidents and other operational situations. It is therefore important that, unlike in this instance, clear guidance for the reporting of such occurrences and the preservation of evidence, including electronic data from VDRs, ECDIS' and other systems, is provided to ships' crews.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES

3.1.1 Safety issues directly contributing to the accident which have resulted in recommendations

1. The route plan took the vessel across Haisborough Sand, and in-built safeguards in the vessel's ECDIS which are intended to prevent accidents of this nature were not utilised and system warnings were not acted upon. [2.2]

2. The planner's check of the route plan was only cursory and was not cross-checked by the master. [2.2]

3. The deck officers had not been trained in the use of ECDIS, and no procedures on the system's use were included in the vessel's SMS. They were therefore ignorant of many of the system requirements and features and operated the system in a very basic and inherently dangerous manner. [2.3.1, 2.6]

4. Over the next 10 years, ECDIS will replace paper charts as the primary planning and monitoring media on board most vessels. Therefore the need for the inclusion of specific ECDIS competences within the STCW Code and for mandatory training in its use is compelling. [2.3.1]

5. A review of the content of the IMO ECDIS course would be beneficial in order to take into account the experience gained in the use of the system, the lessons learned from this and other accidents, and to ensure the course continues to meet the requirements of the maritime industry. [2.3.2]

6. Differences between ECDIS' in terms of menus, terminology and equipment interface can be marked, and proficiency in the use of a particular system is best served by the provision of equipment specific training. [2.3.3]

3.1.2 Other safety issues identified during the investigation also leading to recommendations

1. To enable lessons to be learned from accidents, hazardous incidents and other operational situations, it is important that clear guidance for the reporting of such occurrences and the preservation of evidence, including electronic data from VDRs, ECDIS' and other systems, is provided to ships' crews. [2.6]

3.1.3 Safety issues identified during the investigation which have not resulted in recommendations but have been addressed

1. The OOW placed an undue reliance on the ECDIS, and it is possible that the grounding could have been avoided had he remained vigilant and continuously monitored the vessel's position in relation to navigational hazards. [2.4]

2. The setting of a watch vector on the ECDIS, without which many of the chart alarms cannot operate, is an extremely important feature which merits emphasis. [2.5]

SECTION 4 - ACTION TAKEN

4.1 VERTOM SCHEEPVAART & HANDELMAATSCHAPPIJ B.V.

Vertom, the vessel's safety manager, has:

- Issued a fleet circular highlighting the circumstances and causes of this accident **(Annex B)**.
- Implemented a policy requiring all navigating officers on board its vessels to complete generic training in the use of ECDIS and to be familiar with the ECDIS fitted **(Annex C)**.
- Revised its instructions to masters regarding its requirements for informing the DPA during or following an onboard emergency.
- Stated an intention to practise its emergency response procedures with its vessels more frequently.

4.2 CFL SHIPMANAGEMENT B.V.

CFL Shipmanagement B.V. has:

- Increased its number of employees and obtained its own DOC. It has assumed responsibility for the safety management of its fifth vessel to enter service, and intends to take responsibility for the remaining four as soon as possible.
- Implemented a policy which requires all deck officers joining its vessels to have completed training in the use of ECDIS, and has taken steps to ensure they are familiar with the systems fitted on board its vessels.
- Issued a circular to its fleet highlighting the circumstances of this accident, and of the need to: report accidents and incidents; be trained in the use of ECDIS; and to navigate using all available means **(Annex D)**.
- Produced its own ISM Manual, which includes requirements for the reporting of accidents and incidents and the saving of VDR data.
- Audited its crew management company.

4.3 FURUNO (EUROPEAN BRANCH OFFICE)

Furuno (European Branch Office) has:

Undertaken to adopt in its next generation of ECDIS software, a number of revisions resulting from this investigation. These include the addition of the names of passage plans in the voyage log file, and the improvements to the security of recorded data.

SECTION 5 - RECOMMENDATIONS

The Maritime and Coastguard Agency is recommended to:

2008/186 Continue to strongly support the expeditious adoption of current proposals for the formal inclusion of an ECDIS competence and its mandatory assessment in the STCW Code and, in doing so, to press for an urgent review of the IMO model course syllabus for ECDIS training to ensure it remains fit for purpose, and that successful completion of the course is determined by examination and practical assessment.

International Chamber of Shipping is recommended to:

2008/187 Through its member organisations, remind ship owners:

- Of their obligation to ensure that all bridge watchkeeping officers are familiar with the navigational systems in use and to encourage the use of both generic and specific system training courses to help meet this obligation.
- Of the need for ships' crews to preserve all recorded information, including VDR, ECDIS and other electronic data, following an accident or incident.

The International Association of Maritime Institutions, the Association of Maritime Educational and Training Institutions Asia-Pacific Regions, and the **Comité International Radio- Maritime** are recommended to:

2008/188 Encourage their members who provide training in ECDIS to align it as closely as possible with the IMO model course, and to determine the successful completion of such training through practical assessment and examination.

Vertom Scheepvaart & Handelmaatschappij B.V. and CFL Shipmanagement B.V. are recommended to:

2008/189 Ensure that procedures on the use of ECDIS are included in their vessels' safety management systems.

Marine Accident Investigation Branch
December 2008