Report on the investigation of

the collision between

# mv *Sand Heron* and fv *Celtit*

NE Traffic Lane, Dover TSS

30 July 2001

Marine Accident Investigation Branch
First Floor
Carlton House
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Southampton
United Kingdom
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**Extract from**

**The Merchant Shipping**

**(Accident Reporting and Investigation)**

**Regulations 1999**

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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## GLOSSARY OF ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| ARPA | - | Automatic Radar Plotting Aid |
| ATA | - | Automatic Tracking Aid |
| BEA Mer | - | Bureau des Enquetes-Accidents Mer |
| CNIS | - | Channel Navigation Information Service |
| Collision Regulations | - | The International Regulations for Preventing Collisions at Sea, 1972, as amended. |
| DGPS | - | Differential Global Position System (Satellite Navigation Instrument) |
| h | - | Hour – unit of time |
| knots | - | Nautical miles per hour |
| kW | - | kiloWatt - unit of power |
| m | - | metre - unit of length |
| min | - | minute – unit of time |
| MRCC | | Maritime Rescue Co-ordination Centre |
| PEC | - | Pilotage Exemption Certificate |
| Point (of the compass) | - | Measurement of angle equivalent to 11¼° |
| T | - | True (direction) |
| TSS | - | Traffic Separation Scheme |
| UTC | - | Universal Co-ordinated Time |
| VHF | - | Very High Frequency (Radio) |

## SYNOPSIS

(All times are UTC +1, all courses/bearings are true)

At 1524, on 30 July 2001, the French fishing vessel *Celtit* collided with the UK aggregates dredger *Sand Heron* in the north-east traffic lane of the Dover TSS. *Celtit* was not fishing and had been the give-way vessel under the Collision Regulations.

The MAIB was notified of the collision at 1715 and an MAIB inspector, Nick Beer, began an investigation immediately.

*Celtit* had been crossing the traffic lane on a southerly heading making 9 knots. *Sand Heron* was steering 050°, along the course of the traffic lane and making a speed of 11.7 knots. She had been slowly overhauling two vessels close ahead of her. The headings and speeds of both *Celtit* and *Sand Heron* had been steady for 10 to 12 minutes before the collision.

The second officer was on watch on *Sand Heron*. He was aware that *Celtit* was approaching on a collision course. His experience had taught him to expect fishing vessels to wait until the last minute before altering course. He continued to monitor the situation, but did nothing at that stage to attract the attention of *Celtit*'s watchkeeper.

The skipper was on watch on *Celtit*. He had seen *Sand Heron* but did not think there was a risk of collision. **(Chart extract 1)**

No action was taken on either vessel until it was too late.

The accident has been investigated by both the UK MAIB and the French BEA Mer. The BEA Mer conducted interviews with the crew of *Celtit,* and the MAIB interviewed those involved on *Sand Heron*. There has been good co-operation between the two investigating authorities.

The investigation determined that the collision occurred because neither vessel correctly applied the Collision Regulations. *Celtit* was the give-way vessel, but she did not give way. *Sand Heron* had an option to act when it became apparent that *Celtit* was not taking appropriate action.

This is the latest in a series of accidents involving French fishing vessels contravening the Collision Regulations in the Dover TSS. As a result of this accident, BEA Mer has made several recommendations aimed at heightening the awareness of fishing skippers and watchkeepers to the requirements and the dangers involved.

*Sand Heron'*s owner is recommended to ensure that the second officer understands all the lessons to be learned from this accident.

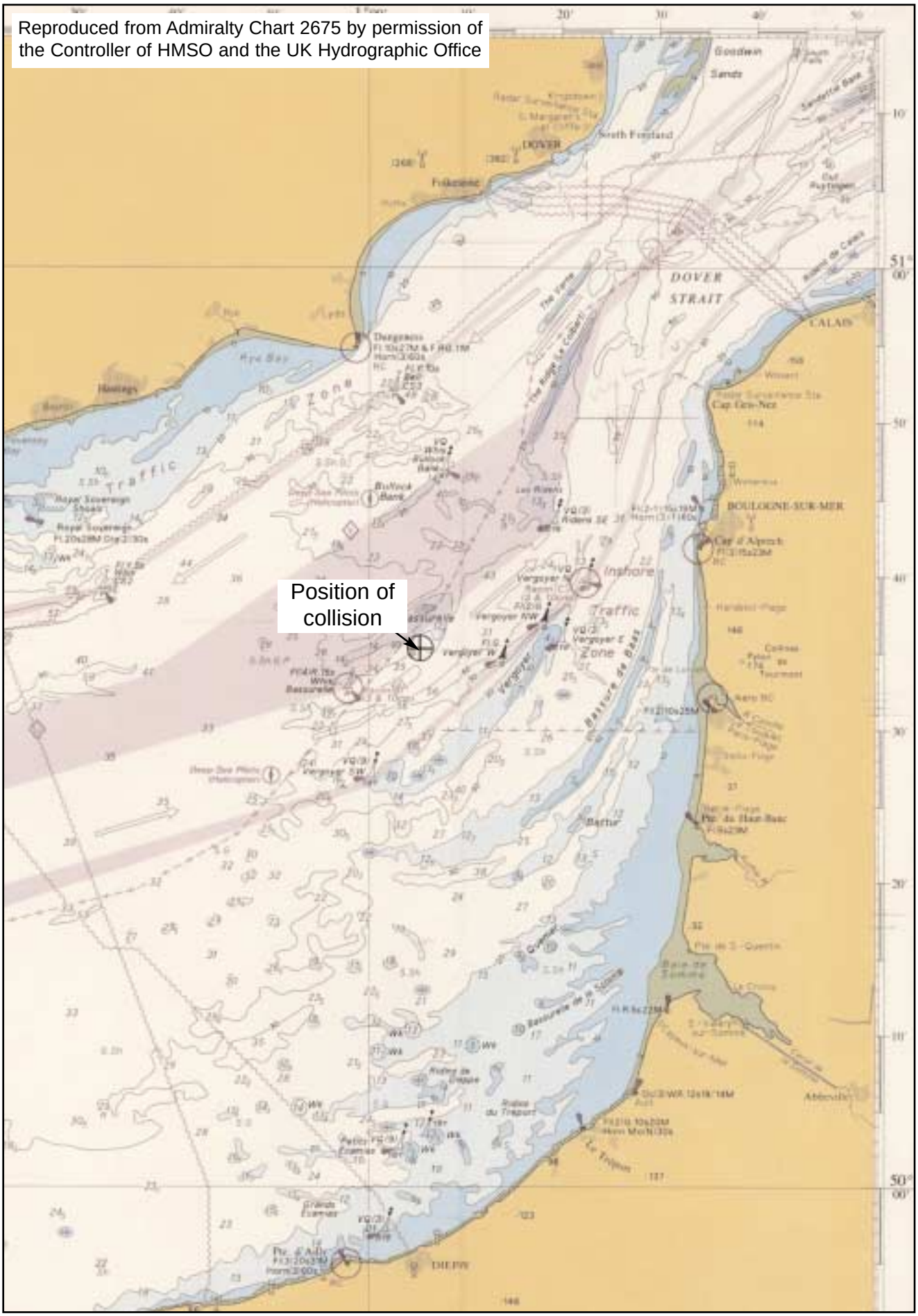



Chart extract showing position of collision

# SECTION 1 - FACTUAL INFORMATION

## 1.1 PARTICULARS OF *SAND HERON, CELTIT* AND ACCIDENT

| **Vessel details** | | ***Sand Heron*** |
|---|---|---|
| Registered owner | : | South Coast Shipping |
| Manager | : | South Coast Shipping |
| Port of registry | : | Southampton |
| Flag | : | UK |
| Type | : | Aggregates dredger |
| Built | : | 1990, The Netherlands |
| Classification society | : | Lloyd's Register of Shipping |
| Construction | : | Steel |
| Length overall | : | 99m |
| Gross tonnage | : | 3,751 |
| Engine power and type | : | Mirlees K8 Major MkIII, 3824kW |
| Speed | : | 11.7 knots |
| Other relevant information | : | ingle variable pitch propeller, Schilling rudder |

| **Vessel details** | | ***Celtit*** |
|---|---|---|
| Registered owner | : | "Celtit", 10042, Rue Robert Duverdrey, 76510 Saint Nicholas, Aliermo, France |
| Port of registry | : | Dieppe |
| Flag | : | France |
| Type | : | Fishing vessel |
| Built | : | 1975, Montoir de Bretagne, France |
| Construction | : | Steel |
| Length overall | : | 16.5m |
| Gross tonnage | : | 29.69 |
| Engine power | : | 281kW |
| Speed | : | 9 knots |

**Accident details**

| | | |
|---|---|---|
| Time and date | : | 1524 (UTC+1) 30 July 2001 |
| Location of incident | : | 50 35.4N 001 05.4E North-east traffic lane of Dover TSS |
| Persons on board | : | *Sand Heron* - 9,<br>*Celtit* - 4 |
| Injuries/fatalities | : | None |
| Damage | : | *Sand Heron* - superficial bulwark damage<br>*Celtit* – damaged bow |

## 1.2 BACKGROUND

*Sand Heron* is one of eight similar aggregate dredgers operated by South Coast Shipping. Each voyage she is directed to load a cargo from one of several dredging grounds in the southern North Sea or English Channel. The cargo is then delivered to one of several specialist discharging berths in north European ports. The loading area and discharge port is decided in advance, according to demand for a cargo. Loading and discharge each take between 4 to 6 hours.

*Celtit* was purchased by her present owner, the skipper and another member of his family, in 1999. She works along the Colbart and Bullock Banks during the summer months. She generally makes one 5-day voyage each week from her home port of Dieppe.

## 1.3 NARRATIVE

(All times are UTC+1, all courses/bearings are true)

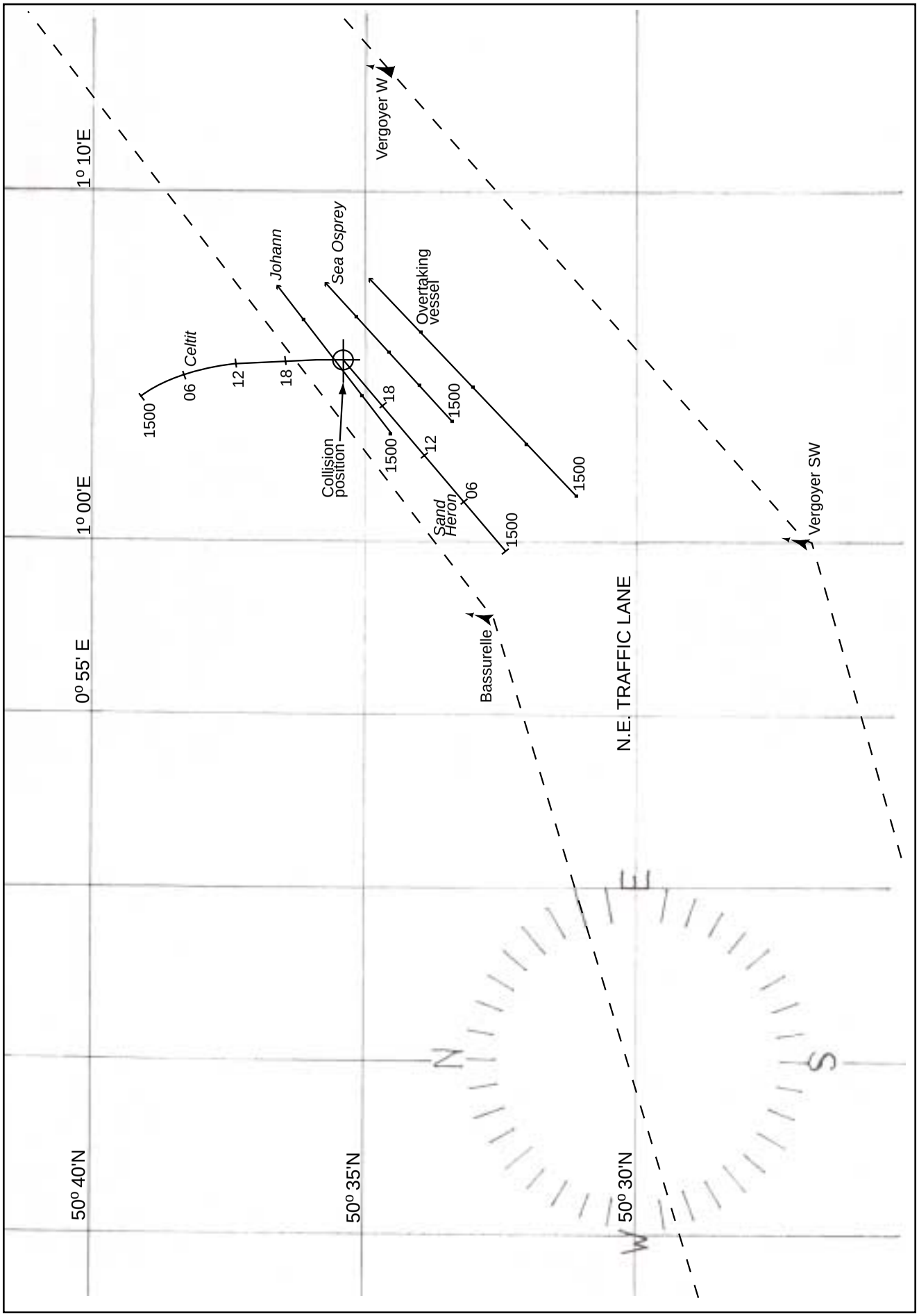
*Sand Heron* had been loading aggregates on the Owers Bank between 0448 and 0926 on 30 July 2001. She left the dredging ground at 0936 for a passage to Rochester on the River Medway.

Between 1255 and 1400 a fire and boat drill exercise was held on board. The second officer, who usually kept the 1200 to 1800 watch, was involved with the exercise, while the chief officer kept the bridge watch. Between 1400 and 1450 the master took over the watch, while the second officer stowed away the breathing apparatus and other fire-fighting gear.

The second officer resumed his bridge watch at 1450. The vessel altered course to 050° when 1.5 miles south of Bassurelle light buoy at 1451. When the master handed the watch to the second officer he indicated *Sand Heron*'s position and told him of several other vessels in the vicinity including a vessel which was about 4 points (45°) on the port bow. Visibility was good; it was sunny with a south-westerly breeze of force 1 to 2 and a slight sea **(see Figure 1 track plot)**.

*Celtit* had completed fishing and was on passage to her home port of Dieppe. At 1500, she was steering south-easterly, but over the next 12 minutes she was brought around gradually to a southerly heading. The skipper was alone on her bridge.

There were two other vessels about 3 miles ahead of *Sand Heron* in the north-east traffic lane; *Sea Osprey*, a cargo vessel which was about 2 points on *Sand Heron*'s starboard bow, was overtaking another cargo vessel, *Johann*, which was fine on *Sand Heron*'s port bow. *Sand Heron* had been overtaking both these vessels. There was also another vessel which was slowly overtaking *Sand Heron* about 1.5 miles to starboard of her.




Track plot of *Celtit* and *Sand Heron* collision

After *Sand Heron*'s master had left the bridge, the second officer acquired the radar target of the vessel which had been 4 points on the port bow. He was using the Kelvin Hughes Nucleus 5000 radar which, although not an ARPA radar, has an electronic plotting facility. The relative vector subsequently displayed on the radar, showed the second officer that this vessel was a potential collision threat.

As the two vessels closed, the second officer continued to monitor the situation. At about 1515, he noted that the other vessel was a fishing vessel which was at about 2 miles range and on a collision course. He could see no fishing signals and he was expecting the fishing vessel to giveway in accordance with the Collision Regulations.

The skipper of *Celtit* was aware of *Sand Heron*, but did not think that the two vessels were at risk of collision.

At about 1523, when *Celtit* was about 0.25 mile away, and 4 points on the port bow, the second officer decided that he himself would have to make an alteration to avoid a collision. He put the helm to starboard using the autopilot, and then switched on the second steering motor and put the steering controls to manual before increasing the starboard helm to 40°. At this time *Sea Osprey* was about 4 points on *Sand Heron*'s starboard bow at 1.5 miles range and the vessel which was overtaking *Sand Heron* was just forward of her starboard beam at 1.5 miles range.

At about the same time, *Celtit*'s skipper noticed *Sand Heron* very close at hand and, realising that a collision was imminent, put his engine to full astern.

The second officer sounded short and rapid blasts on *Sand Heron*'s whistle. He estimated that *Celtit* was close on his port side and about 0.1 mile range at this time. He noted that there were three people on the fishing vessel's deck, and that no fishing gear was being towed.

The second officer estimated that *Sand Heron*'s heading had changed by between 20° and 40° to starboard, before he heard the impact as *Celtit* collided with *Sand Heron*'s port quarter. The time was 1524.

The master had been alerted by the blowing of the ship's whistle, and had arrived on the bridge at about the time of the impact. *Sand Heron*'s engine was stopped, and the vessel was manoeuvred towards *Celtit* to offer assistance if necessary. Radio contact between the two vessels was established, and it was learned that *Celtit* had a badly damaged bow, but was not in need of assistance **(see photograph 1)**.

*Sand Heron* then continued her passage to Rochester, with the permission of Dover Coastguard. She arrived to anchor off the River Medway at 2340. Subsequent inspection revealed that *Sand Heron* had suffered only superficial damage to her port bulwark **(see photograph 2)**.

*Celtit*, in accordance with instructions from Cross Griz-Nez MRCC, was escorted to Dieppe by the Affaires Maritime launch *Origan*. She arrived at 2130.

Photograph 1

*Celtit* soon after the collision

## 1.4 ENVIRONMENTAL CONDITIONS

The wind was south-westerly force 1 to 2, there was a slight sea and clear skies. Visibility was at least 4 miles in slight haze. The sun's azimuth was about 230° and its altitude 48°.

## 1.5 MANNING AND WATCHKEEPING ON *SAND HERON*

The crew of *Sand Heron* comprised:

master, chief officer, second officer, chief engineer, second engineer, three seamen and one engine room rating.

Photograph 2

Damage to *Sand Heron*

The second officer was 57 years old. He was British and had first gone to sea as a yacht skipper in 1974, but had worked aboard aggregates dredgers since 1976. He had obtained a Class 3 (Deck) certificate of competency in 1982 and a command endorsement in 1986. He had been promoted to master in 1987 and had served as master until 1994 when, through redundancy, he returned to the rank of chief officer. Redundancy again caused his demotion, this time to second officer, in 2000.

The chief and second officers worked a watchkeeping routine of 6 on/6 off on *Sand Heron*. Generally, this regular routine was operated whether the ship was at sea or in port. However, adjustments were occasionally necessary owing to the requirements of PEC duties. At the time of the accident, the chief officer was the only person on board with a valid PEC for the Medway and Thames. When the chief officer had been required to perform PEC duties, the second

officer's watch might be extended, or made shorter, to ensure that both watchkeepers were properly rested. Occasionally, the master would do a watch, or part of a watch, to help out.

In the days preceding the accident, the second officer had worked the following hours:

| | | | | |
|---|---|---|---|---|
| 26 July | 0420 – 0800 | 1800 – 1950 | Total | 5h 30min |
| 27 July | 0445 – 0800 | 1800 – 2000 | Total | 5h 15min |
| 28 July | 0830 – 1035 | 1735 – 1940 | Total | 4h 10min |
| 29 July | 0310 –0600 | 1145 – 1800 | Total | 9h 05min |
| 30 July | 0035 – 0600 | 1200 – (1524) | Total | 8h49min |

The seamen watchkeepers worked an 8 hours on/ 8 hours off watchkeeping routine. During daylight hours the watchkeeper on duty generally performed maintenance tasks around the vessel. He carried a portable VHF set in case he was needed on the bridge. At the time of the accident, the second officer was alone in the wheelhouse.

The master was 44 years old. He was British and held a Class 2/1 certificate of competency with a Limited European command endorsement. The master had left the bridge about half-an-hour before the collision. He was alerted to the situation on hearing the ship's whistle.

The vessel was manned in accordance with her minimum safe manning certificate.

Both crew and officers worked a routine of 3 weeks on duty, followed by 3 weeks leave.

### 1.6 MANNING AND WATCHKEEPING ON *CELTIT*

The crew of *Celtit* comprised a skipper and three fishermen.

The skipper was 34 years of age. He had 10 years experience at sea, and he had held a certificate of competence since 1992. He had been in charge of *Celtit* since the vessel's purchase in 1999 and had been skipper of other boats before that.

One of the fishermen was qualified with a naval engineer's certificate and he acted as engineer and occasionally skipper.

Generally, the skipper kept the bridge watch on the passage to and from the fishing grounds. He took rest between shooting and hauling nets during the fishing operation. At the time of the accident *Celtit* had been at sea for 5 days, and the skipper was on watch alone.

## 1.7 BRIDGE LAYOUT AND NAVIGATIONAL EQUIPMENT ON *SAND HERON*

*Sand Heron* was equipped with two radars, a Kelvin Hughes Nucleus 2 5000 ATA which was situated forward on the port side of the bridge adjacent to the bridge front window. The second radar, a Kelvin Hughes HR 3061, was sited more centrally on the port side, immediately outboard of the main central control console **(see photograph 3)**. She had a Sperry gyro compass, a Robertson autopilot and a Sailor Compact VHF radio. Her Microplot 7 electronic chart system had inputs from one of the two DGPS navigators. Paper charts were carried and Admiralty chart 2451 (Newhaven to Dover) was in use at the time of the collision. There are three locations where whistle controls are sited, one on the central console and one on each bridge wing. An Aldis light was rigged ready for use on the port side of the bridge.

The vessel was fitted with a Doppler log which was not operational at the time of the accident. The Nucleus radar relied on a speed input to calculate the courses and speeds of acquired targets. The Doppler log was interfaced with the radar, but manual speed input was also possible. It is uncertain whether a manual speed had been set on the radar on 30 July. The second officer assessed risk of collision by reference to the relative vectors produced by the radar which were not reliant on speed input.

Photograph 3

Bridge layout of *Sand Heron*

## 1.8 CNIS PLOT OF THE COLLISION

The tracks of all those vessels in the vicinity of the collision were recorded by the CNIS at Dover **(see Figure 1)**. It can be seen from the plot that at 1500 *Celtit* was shaping to cross the north-east traffic lane on a south-easterly course, at about right angles to the flow of traffic, which was in accordance with the Collision Regulations. At this time, she had a relative bearing of about 3 points on *Sand Heron*'s port bow at a range of 7.3 miles. Had the two vessels maintained their course and speed, *Celtit* would have passed clear ahead of *Sand Heron*. However, for an unexplained reason, possibly as avoiding action for the collision situation that existed with *Johann* and *Sea Osprey*, or simply to head for her home port of Dieppe, *Celtit* gradually altered her heading to starboard until, at about 1512, she was making good a course of about 175°. At that time, *Sand Heron* was bearing about 205°(T) from *Celtit* at a range of about 4 miles, and they were on a collision course.

*Sand Heron* maintained a steady course of about 050° until the moments immediately before the collision.

The CNIS radar was unable to record *Celtit*'s track in the 4 minutes preceding the collision. However, the collision position indicates that she must have maintained a course just to the east of south from her last known position at 1520.

Immediately before the collision, *Celtit* had been making 9 knots and *Sand Heron* 11.7 knots.

## 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, if any, with the aim of preventing similar accidents occurring again.

### 2.2 FATIGUE

The MAIB has studied the work/sleep pattern of *Sand Heron*'s second officer, and it is concluded that he would not have been suffering from fatigue at the time of the accident.

C*eltit* had been at sea for 5 days before the accident, during which time the skipper had only taken snatches of rest at times to suit the fishing cycle. It is considered highly likely that, in the middle of the afternoon on a calm and bright sunny day, while alone on the bridge, the skipper's performance was adversely affected by fatigue.

### 2.3 ALCOHOL AND OTHER DRUGS

There is no evidence to suggest that alcohol or drugs played any part in this accident.

### 2.4 THE COLLISION

*Celtit* was not fishing at the time of the accident; she was on passage and crossing *Sand Heron*'s track from *Sand Heron*'s port side. *Celtit* was clearly the give-way vessel under Rule 15 of the Collision Regulations **(see Annex)**. Under these circumstances, it was her duty to take "early and substantial action to keep well clear" of *Sand Heron* under Rule 16 **(see Annex)**. She did not do so. The only action she took was to move her engine full astern in the moments preceding the collision.

*Sand Heron*, for her part, had a duty to maintain her course and speed until such time that she thought that *Celtit* was not taking appropriate action in compliance with the Collision Regulations. At that time she had an option under Rule 17 a (ii) **(see Annex)** to take action to avoid a collision. She did not do so. Her last minute alteration of course to starboard was made far too late, possibly even exacerbating the collision by moving her stern towards *Celtit.*

*Celtit*'s skipper considered that his vessel was going to pass clear astern of *Sand Heron*, and that it was *Sand Heron*'s last-minute broad alteration of course which ultimately caused the collision. However, his full astern engine movement was made before he appreciated that *Sand Heron* was altering course to starboard. This indicates that he had very serious concerns at that stage.

There is no evidence to suggest that *Celtit* made any sound signals. *Celtit* had been on a collision course with *Sand Heron* for about 10 to 12 minutes before the collision. She should have reduced speed or altered course much earlier, so as to let *Sand Heron* know her intentions.

In mitigation, bright sunlight was annoying *Celtit*'s skipper. The skies were clear. However, in the crucial 10 to 12 minutes before the accident, as the two vessels were approaching each other on collision courses, the sun's azimuth was about 233°, 2.5 to 3 points further round to starboard than the bearing of *Sand Heron* from *Celtit*. The sun's altitude at this time was about 48°. The sun should not have posed a serious problem to *Celtit* under these circumstances, although the general brightness and glare warranted special attention to lookout, and may have affected the clarity of the radar picture on the bridge of *Celtit.*

*Sand Heron*'s second officer had been monitoring *Celtit*'s progress throughout the build-up to the collision, and yet he did nothing about it until *Celtit* was at about a range of a quarter of a mile. It is likely that this late reaction was due to his past experience of fishing vessels not altering course until the last minute. He was relying on *Celtit* to alter course, and yet did not use the prescribed signals to alert the give-way vessel (five or more short and rapid blasts of the whistle accompanied by similar flashes using the signalling light) until he had taken action himself to avoid the collision, and the range between the two vessels was about 100m. This reaction was far too late. The second officer should have alerted *Celtit* as soon as he thought she had not taken timely action to avoid the collision. Additionally, *Sand Heron* should have exercised her option under Rule 2 and Rule 17 a(ii) **(see Annex)** to take avoiding action when *Celtit* continued to show no signs of altering course or speed. At this time an alteration of course to starboard by *Sand Heron* would have had the desired effect.

*Celtit* had been crossing the north-east traffic lane on a southerly heading in apparent contravention of Rule 10 (c) **(see Annex)** of the Collision Regulations, which states that vessels crossing traffic lanes must do so on a heading as near as practicable to right angles to the general direction of traffic flow. However, it is possible that she had altered from her intended track of about 150° temporarily to avoid collisions with two other vessels which were making passages in the traffic lane ahead of *Sand Heron*. This would serve to mitigate the apparent contravention of Rule 10 (c). However, it is equally possible that the skipper had intended to make a southerly course directly towards Dieppe.

## 2.5 LOOKOUT

*Sand Heron*'s second officer appreciated that *Celtit* was on a collision course, but assumed that she would take action at the last minute but in time to avoid a collision. This was an assumption based on scanty information. He had no reason to assume this, apart from experience with other fishing vessels on other occasions in other circumstances. It is concluded that he was probably maintaining a proper lookout, but that he showed poor judgment.

The watchkeeper on *Celtit*, on the other hand, did not fully appreciate that risk of collision existed. The track plot recorded by CNIS clearly shows the two vessels on a collision course for the 10 to 12 minutes before the accident. *Celtit*'s watchkeeper was not, therefore, maintaining a proper lookout.

## SECTION 3 - CONCLUSIONS

### 3.1 FINDINGS

1. *Celtit* was on a heading of about 175° crossing the traffic lane at an oblique angle in contravention of the Collision Regulations. [1.3,2.4]

2. *Celtit* was the give-way vessel under the Collision Regulations.[2.4]

3. On *Celtit* the bright sunshine might have affected the skipper's ability to see the radar, but should not have posed too great a problem in the direction of *Sand Heron* in the minutes leading up to the collision. [2.4]

4. The watchkeeper on *Sand Heron* appreciated that risk of collision existed with *Celtit*, but left it far too late before taking avoiding action. In this he showed poor judgment. [2.4, 2.5]

5. The watchkeeper on *Sand Heron* did not try to warn *Celtit* that she was not taking appropriate action until the collision was imminent. [2.4]

6. The watchkeeper on *Celtit* was not keeping a proper lookout. He did not fully appreciate the risk of collision. [2.5]

7. *Celtit*'s watchkeeper took no action to avoid the collision until it was imminent. [2.4]

8. Neither alcohol nor drugs were contributory factors. [2.2,2.3]

### 3.2 CAUSES

#### 3.2.1 Fundamental cause

The collision occurred because neither vessel correctly applied the Collision Regulations. *Celtit* was the give-way vessel, but she did not give way. *Sand Heron* had an option to act when it became apparent that *Celtit* was not taking appropriate action. She did not. [2.4]

#### 3.2.2 Underlying causes

- Poor lookout on *Celtit*, in that risk of collision was not properly established. [2.5]

- *Celtit*'s skipper was alone in the wheelhouse and, having been fishing for 5 days, he was affected by fatigue. [2.2]

- The bright sunlight was annoying the skipper and it may have affected the clarity of the radar picture on *Celtit*. [2.4]

- The assumption, by *Sand Heron*'s watchkeeper, that *Celtit* would alter course at the last minute, which caused him to delay his own action to avoid the collision, until it was too late. [2.5]

## SECTION 4 - ACTIONS ARISING FROM THE ACCIDENT

Following a number of recent collisions between French fishing vessels and commercial vessels, all of which have involved contravention of the Collision Regulations, the BEA Mer has made several recommendations which are aimed at:

1. Reissuing warnings to skippers about the risks of inadequate navigation in the area of the traffic separation scheme (TSS).

2. Publicising a list of those fishing vessels which have been found to contravene the regulations governing traffic in the TSS.

3. Training of fishing skippers, and officers in charge of a navigational watch, in awareness of the navigational regulations, in particular Rule 10 of the Collision Regulations.

4. Advising fishing vessel skippers to, in areas of high traffic density: double the bridge watch; reduce the time interval of bridge watch alarms if fitted; and activate radar proximity alarms if fitted.

## SECTION 5 - RECOMMENDATIONS

**South Coast Shipping** is recommended to:

1. Discuss the circumstances of this accident with the second officer, to ensure that he is fully aware of his contribution and what action he should have taken to avoid the collision.

**Marine Accident Investigation Branch**
**April 2002**

# ANNEX EXTRACTS FROM THE COLLISION REGULATIONS

## Rule 2

*Responsibility*

(a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

(b) In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessels involved, which may make a departure from these Rules necessary to avoid immediate danger.

## Rule 10

*Traffic separation schemes*

(a) This Rule applies to traffic separation schemes adopted by the Organization and does not relieve any vessel of her obligation under any other Rule.

(b) A vessel using a traffic separation scheme shall:

(i) proceed in the appropriate traffic lane in the general direction of traffic flow for that lane;

(ii) so far as practicable keep clear of a traffic separation line or separation zone;

(iii) normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from either side shall do so at as small an angle to the general direction of traffic flow as practicable.

(c) A vessel shall, so far as practicable, avoid crossing traffic lanes but if obliged to do so shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow.

## Rule 15

*Crossing situation*

When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

## Rule 16

*Action by give-way vessel*

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

## Rule 17

*Action by stand-on vessel*

(a) (i) Where one of two vessels is to keep out of the way the other shall keep her course and speed.

(ii) The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.

(b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.

(c) A power-driven vessel which takes action in a crossing situation in accordance with sub-paragraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.

(d) This Rule does not relieve the give-way vessel of her obligation to keep out of the way.