INSPECTOR'S REPORT

ON THE CAPSIZE OF THE

fv *SALLY JANE SM74*

ON 27 JULY 1998

Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1994

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes 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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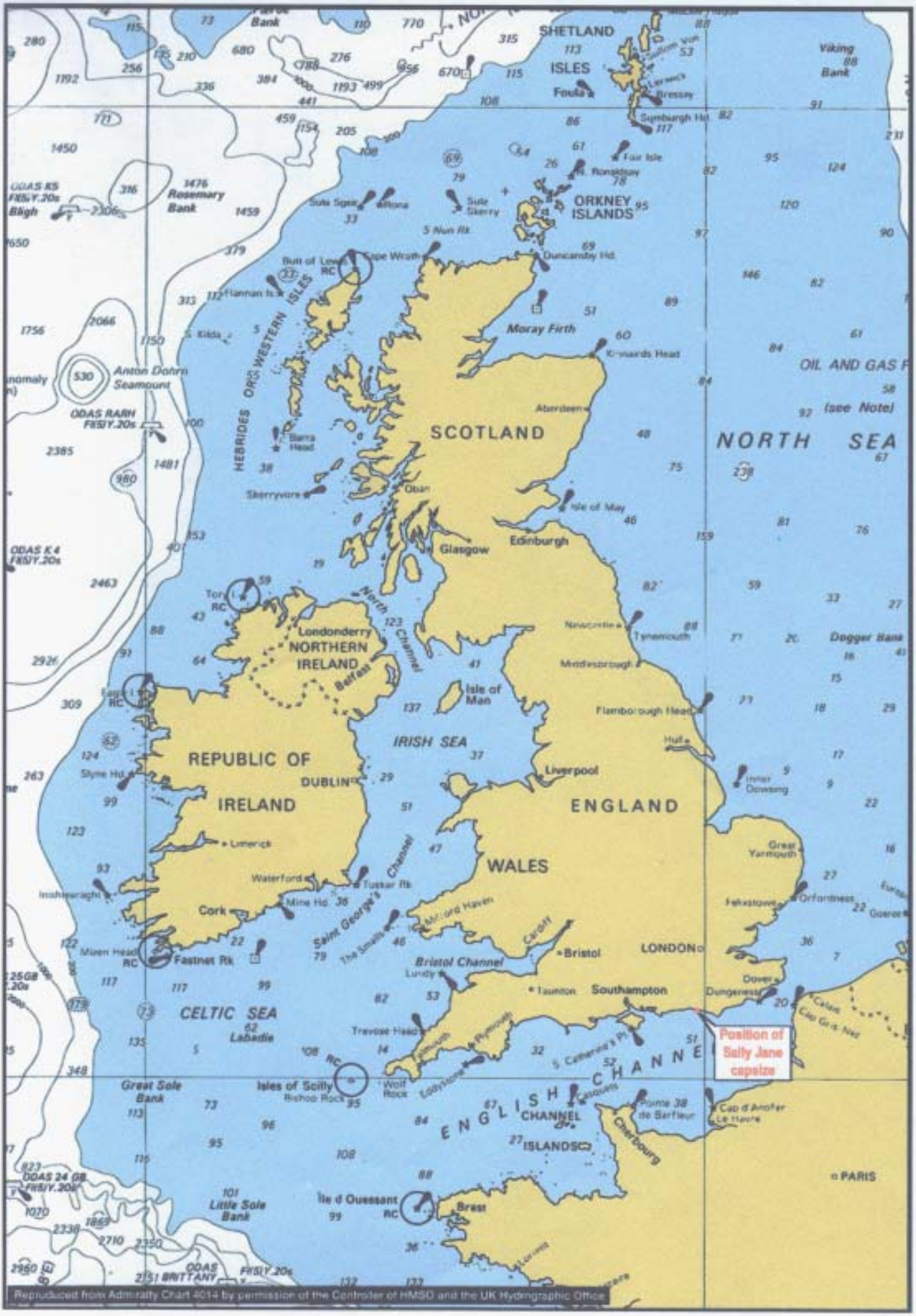
GLOSSARY OF ABBREVIATIONS

MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
UTC	Universal Co-ordinated Time



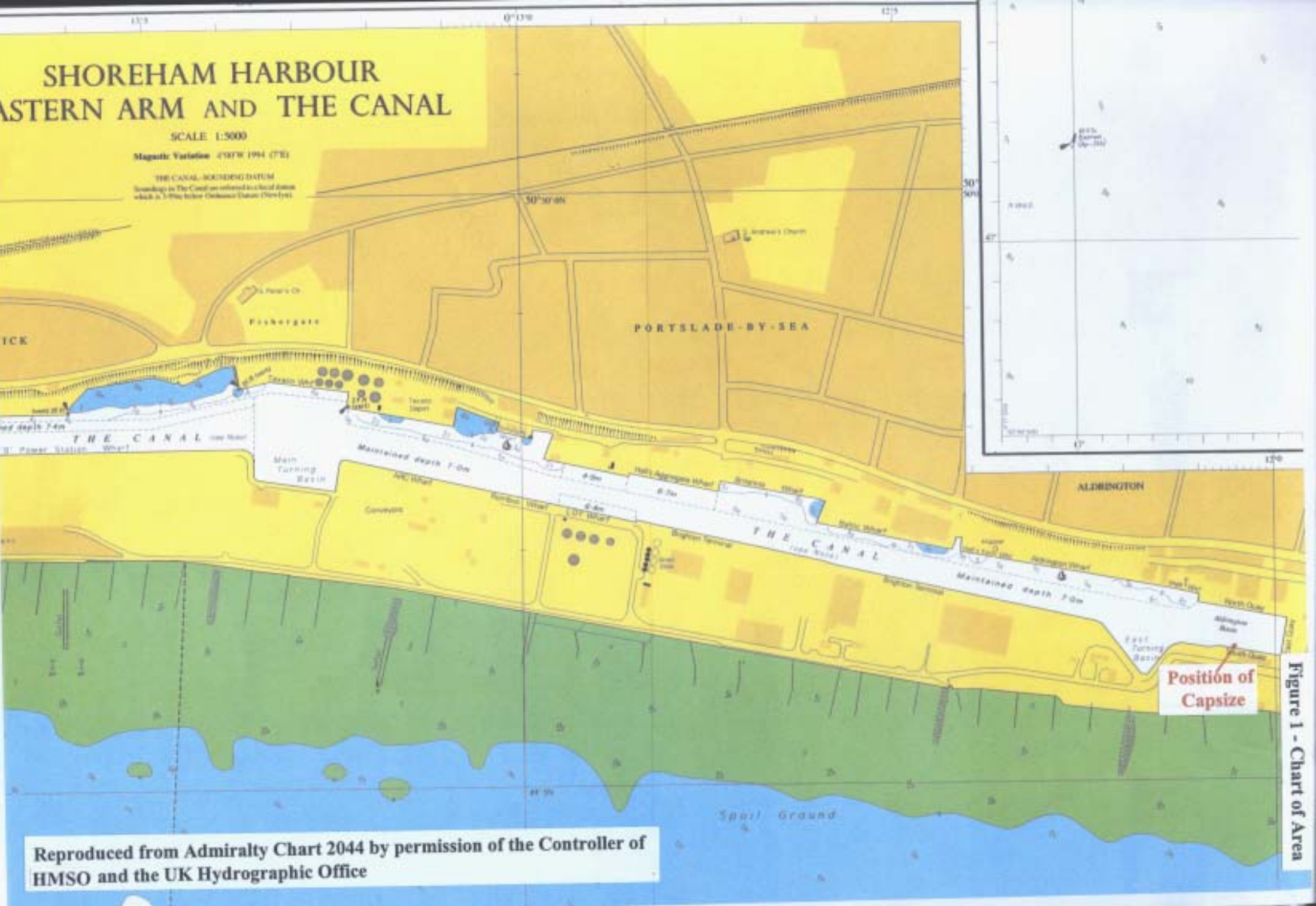


Figure 1 - Chart of Area

SYNOPSIS

The accident was reported to the Marine Accident Investigation Branch in the late afternoon of 27 July 1998. The investigation began the following day and an Inspector attended the scene. The completion of this investigation was regrettably delayed because of the number of Inspector's Inquiries and the associated heavy workload undertaken in the second half of 1998 and the first quarter of 1999.

Sally Jane, a twin beam trawler of 11m registered length, capsized at about 1300 on 27 July 1998 while alongside in the Aldrington Basin of Shoreham harbour. At the time the crew were repairing both sets of fishing gear which had been hauled up to the derrick heads. The crew of three abandoned the vessel when they saw it was going to capsize. Weather conditions were good and were not a factor in the accident. No one was injured.

The vessel capsized because it had inadequate transverse stability for the operation in hand. There was insufficient data on the condition of the vessel before she capsized, to determine why the stability was deficient.

The stability of the vessel had never been assessed for the operation being carried out, and despite similar operations having been undertaken without mishap for the previous eight years, the margin of safety was an unknown which was finally and unwittingly exceeded.

The vessel was salvaged and completely refurbished. The owner appointed a naval architect to assess the stability of the vessel. A trim and stability book was produced which showed compliance with the recommendations of the MCA for transverse stability. While the owner is commended for taking these precautions, the trim and stability book does not show the condition for the vessel in port repairing gear, which is the condition relevant to this accident.

Two recommendations have been made. One is addressed to the owner, to include in the trim and stability book the condition with the trawl gear aloft for repair. The second is to the Maritime and Coastguard Agency (MCA) on the stability of twin beam trawlers.

VESSEL AND INCIDENT PARTICULARS

Vessel

Name	:	*Sally Jane*
Port of Registry	:	Shoreham
Type	:	Fishing vessel (twin beam trawler/stern trawler)
Crew	:	3
Fishing number	:	SM74
Registered length	:	11.07m
Overall length	:	13.60m
Breadth mld	:	4.86m
Depth amidships mld	:	2.10m
Construction	:	Steel, multi-chine
Built	:	In 1990 at Newbury Engineering Ltd, Newhaven
Registered owners	:	Leach Fishing Enterprises, Portslade, Brighton
Position of accident	:	South quay, Aldrington Basin, Shoreham harbour
Time and date	:	1300 on 27 July 1998
Casualties	:	None

Sally Jane - alongside
in the Aldrington Basin

SECTION 1 - FACTUAL INFORMATION

All times are UTC+1.

1.1 NARRATIVE

Sally Jane was alongside, starboard side to the south quay in Aldrington Basin, Shoreham Harbour. She had just completed a brief shake-down trip (first trip) following a three week refit and was low on fuel, fresh water and ice. Her catch had been landed and the crew were preparing her for the next trip.

As part of the preparations the twin beam fishing gear was examined and repaired. Both sets of gear, each weighing 1.8 tonne with a 4.5m long beam, were lifted off the deck and hauled to the heads of the derrick, which were about 8.5m above the deck. The bridle chains attached to the beams had been shortened so that the chain mats were fully extended (**Figure 2**).

At some point the vessel rolled very slowly to port and the starboard derrick swung around its gooseneck. The roll continued until the mooring ropes came tight. Thinking the vessel was about to capsize, the crew abandoned her immediately. One reboarded her to run a rope from the mast to the quayside so that a fork-lift truck could be used to pull her back upright. At about 1300, and before the fork-lift truck could be connected to the rope, the mooring ropes parted and *Sally Jane* capsized, completely inverting.

She was salvaged the next day.

1.2 WEATHER CONDITIONS

Winds were light, south-westerly force 2 to 3 and the protected waters of Aldrington Basin were calm.

1.3 THE VESSEL

Sally Jane was similar to a number of steel fishing vessels less than 12m in length, produced by Newbury Engineering. She had been operated without incident for about eight years. The transverse stability of the vessel had not been assessed by a naval architect.

She was equipped to operate as both a stern trawler and twin beam trawler but did not carry both sets of gear at the same time. When she capsized she was rigged for twin beam trawling and the net drum for the stern trawl was empty.

Figure 2

Trawl gear hauled aloft for repair

The wheelhouse was forward (**Figure 3**) with access through a wooden door on the starboard side. Forward of the wheelhouse was the accommodation.

The aft watertight bulkhead of the fish hold was amidships and the fish hold ran forward underneath the wheelhouse. Aft of the fish hold was the engine room.

The refit involved no structural changes nor changes to the fishing gear. It was mainly an opportunity for general maintenance, tidy up and painting. A quantity of surplus gear, which had built-up onboard the vessel over the years, was also removed. Some electronic equipment in the wheelhouse was renewed.

1.4 THE CREW

The skipper was 30 years old and had operated *Sally Jane* for about three years. In all he had about five or six years experience as a skipper and had been a fisherman since leaving school at the age of 16.

Both deckhands were in their mid-twenties and experienced fishermen.

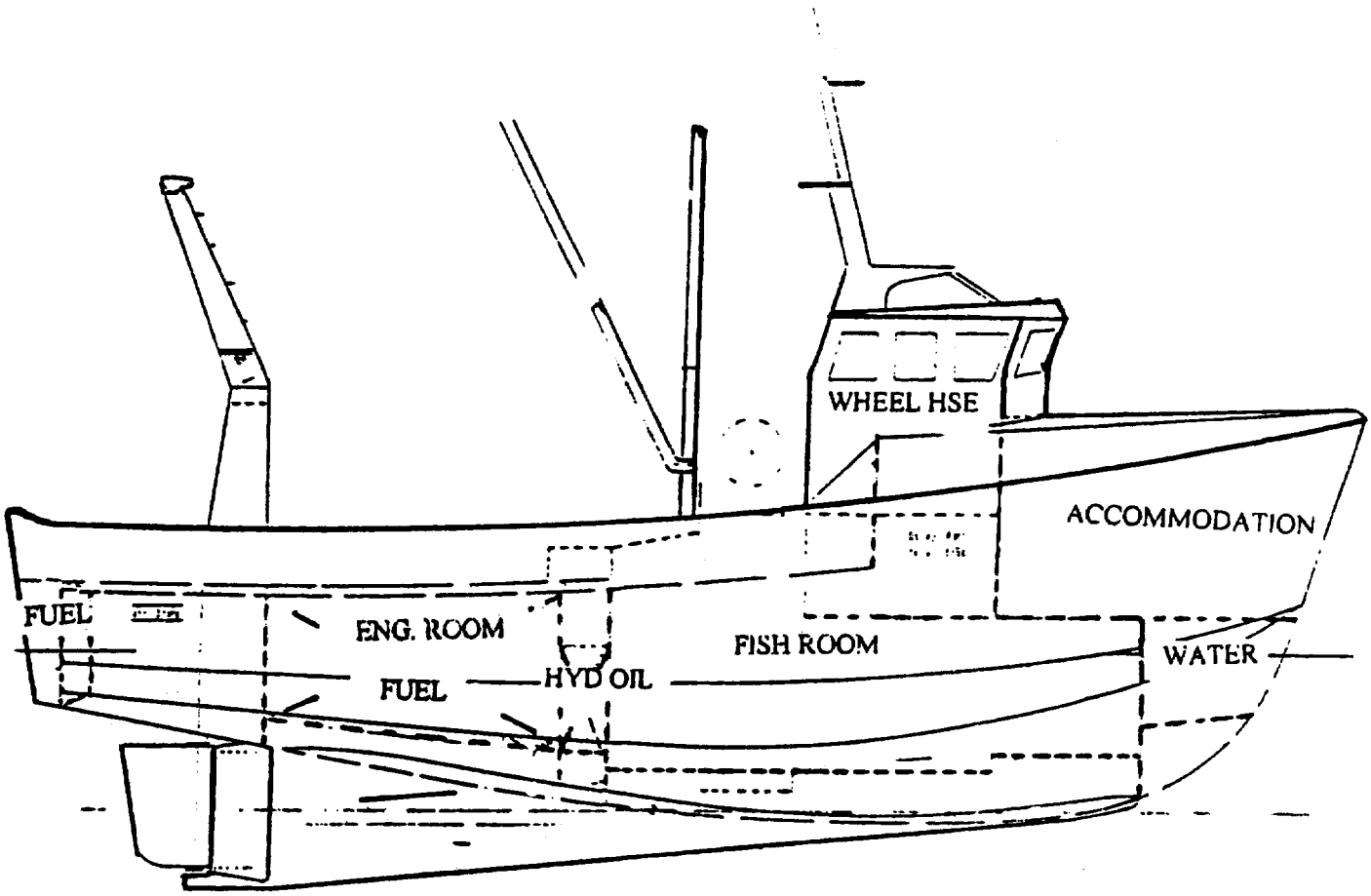
1.5 SUBSEQUENT ACTIONS BY THE OWNER

Following her salvage, *Sally Jane* was gutted and completely refurbished.

Before she returned to service, the owner engaged a naval architect to examine her stability. The vessel was inclined on 10 September 1998, and a full stability book was produced.

The instructions on working the vessel, contained in the stability book, reduced the quantity of fuel carried in the aft tank by half, limited ice to 1.75 tonne and the number of fish boxes to 100. With these restrictions, the vessel met the stability criteria recommended by MCA (**Annex 1**).

The owner has also instructed the skipper that fuel and water tanks must be full before attempting to haul the trawl gear to the derrick heads for repair.



Layout of *Sally Jane*

SECTION 2 - ANALYSIS

2.1 THE CAPSIZE

The vessel had operated without incident for eight years and during this time the crew hauled both trawl beams to the derrick heads hundreds of times without mishap. This strongly indicated that the capsize was a result of changed circumstances; either the stability of the vessel had changed as a result of the refit, or there was an imbalance between the derrick loads while the crew worked on the suspended trawl gear. No other possibility has been identified, and there was insufficient data on the condition of the vessel before she capsized to determine which was the underlying cause of the accident.

The vessel capsized because she had inadequate transverse stability for the operation in hand, although on previous occasions this clearly had not been the case. The stability of the vessel had never been assessed for the operation being carried out and, despite the operation having been undertaken without mishap for eight years, the margin of safety was an unknown which was finally and unwittingly exceeded.

2.2 THE TRIM AND STABILITY BOOK

As a fishing vessel of less than 12m registered length, *Sally Jane* was not required to comply with any regulations for a minimum standard of stability. It is to the owner's credit, following the accident, that he appointed a naval architect to assess the stability of the vessel for compliance with the recommended standard, and had a trim and stability book produced.

The trim and stability book for the refurbished vessel shows compliance with the recommendations of the MCA for transverse stability. These standards cover seagoing conditions only; that is, for the vessel in transit to and from the fishing grounds. Fishing operations are not covered, nor is the hauling of trawl gear to the derrick heads. Consequently, while the trim and stability book demonstrates compliance with the recognised stability standards, it is of limited practical value to the skipper in operating his vessel safely and, significantly, provides no guidance on the avoidance of a similar accident.

The capsize of *Sally Jane* was not an isolated incident. A number of less than 12m registered length twin beam trawlers have capsized during routine gear handling operations. *Helen Claire* capsized in Whitby Harbour in 1995 while the crew were repairing the gear and, like *Sally Jane*, the gear was hanging from the derrick heads. *Doris B*, *Thomas William* and *Equinox* were all lost during fishing operations and it is believed that *Lady Sylvia* and *Provider* were lost under similar circumstances. In all, ten fishermen have lost their lives in small beam trawler capsizes during the last eight years. In many cases the capsize could probably have been avoided if the stability of the vessel had been assessed by a naval architect and if the vessel had been operated within the limits of her known stability.

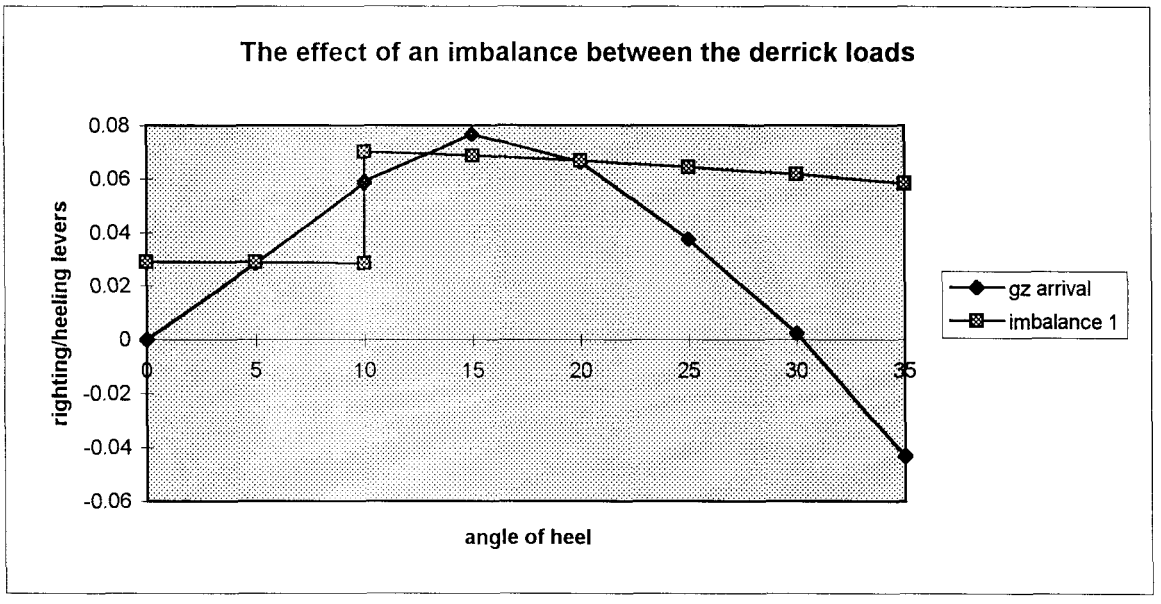
The MCA is consulting the fishing industry on the content and implementation of a *Code of Safety for Fishing Vessels of Under 12 metre Registered Length*. The *Code* will be based on modern risk assessment techniques. There is a need to ensure that compliance with the *Code* for twin beam trawlers is dependent on a thorough assessment of the risk of capsize, not only in seagoing conditions but also when the fishing gear is being worked.

2.3 THE VESSEL'S CURRENT STABILITY

Hauling both trawl beams to the derrick heads is the established position in which gear is repaired in port. Consequently, a twin beam trawler must have adequate transverse stability for this operation to be carried out. An examination of the vessel's stability, based upon the data in the trim and stability book, indicates that this is now the case if both sets of gear and derricks are kept in balance about the centre-line (**Figure 4**).

It is of the utmost importance that the effect on transverse stability of modifications which result in a shift, addition or removal of heavy items is assessed by a naval architect. In addition, on beam trawlers, the effects of any change to the weight of the trawl gear or the lengths of the derricks should similarly be assessed.

Stability with both sets of trawl gear aloft



Notes :

1 The curve "imbalance 1" represents the limiting heeling lever from the derricks. It is assumed that both derricks are initially 10 degrees off the vertical. One derrick is then lowered slightly so that the derrick head moves outboard. This causes the vessel to roll in the direction of the derrick movement and as the roll passes 10 degrees the other derrick falls in towards the centre-line, causing a step change in the heeling lever curve.

2 It is assumed that the second derrick is restrained by a wire **from** falling in past the vertical, that is it can only **fall 10** degrees towards the centre-line before **it** is stopped.

3 The curve shown corresponds to an outboard movement of the first derrick head of **2.3** metres, which is equivalent to a 16 degree rotation of the derrick from its original position. Any greater movement could capsize the vessel.

4 No account has been taken of the slight lowering in vertical centre of gravity which would accompany the rotation of the first derrick.

5 The vessel's loading condition is arrival port, less catch, but full of fuel and water, and no ice. Displacement 63.17 tonne and VCG 2.254m above base.

SECTION 3 - CONCLUSIONS

3.1 FINDINGS

The capsize

1. *Sally Jane* capsized while the crew repaired the fishing gear which had been hauled to the heads of the derricks. [1.1]

2. The weather was good and was not a factor in the accident. [1.2, 2.1]

3. The vessel had just returned from her first trip following a three week refit and was light on fuel, water and ice. [1.1]

4. There was insufficient data on the condition of the vessel before she capsized to determine the underlying cause, but it was probably either a reduction in the vessel's stability due to the refit or an imbalance between the derrick loads. [2.1]

Stability of beam trawlers

5. The fishing vessel safety regulations do not require a stability assessment for vessels of less than 12m registered length and consequently no assessment was made before the accident. [1.3, 2.2]

6. A stability assessment was carried out after the vessel had been salvaged and completely refurbished. It showed that *Sally Jane* met in full the stability criteria recommended by the MCA. [2.2]

7. A trim and stability book presenting eight seagoing conditions has been produced for the vessel. It does not show the condition for the vessel in port repairing gear. [2.2]

3.2 CAUSES

Immediate cause

The cause of the capsize was inadequate transverse stability; no external factors were involved. [2.1]

Contributory factors

The stability of the vessel had never been assessed for the operation which was being carried out, and despite similar operations having been undertaken without mishap for the previous eight years, the margin of safety was an unknown which was finally and unwittingly exceeded. [2.1]

SECTION 4 - RECOMMENDATIONS

The owner of *Sally Jane* SM74, Mr P Leach, is recommended to :

1. Engage a naval architect to produce a condition for the trim and stability book to cover the operation of repairing gear in port, clearly setting out the required loading of the vessel and including limitations on the movement of the derricks. The skipper should be instructed in the use of the information by the naval architect. [3.1.7]

   Note:

   On 17 September 1999 the MAIB received written confirmation from the owner's naval architect that this recommendation had been carried out.

The Maritime and Coastguard Agency is recommended to :

2. Ensure that twin beam trawlers' compliance with the new requirements for fishing vessels of under 12m registered length (currently being developed) is dependent on a thorough assessment of the risk of capsize, not only in seagoing conditions but also when the fishing gear is being worked. [2.2, 3.1.5]

GLOSSARY OF TERMINOLOGY

Gooseneck	A connection between mast and derrick boom which allows rotation in the horizontal and vertical planes.
Twin beam fishing	A mode of bottom trawl fishing, where a net is set from both sides of the vessel and where the mouth of each net is attached along its lower edge to a steel beam.
Bridle chains	Chains attaching the trawl beams to a pulley block carrying the towing warp.

ANNEX 1

STABILITY OF SMALL VESSELS ENGAGED IN COMMERCIAL FISHING - ADVICE TO DESIGNERS, BUILDERS, OWNERS AND SKIPPERS

THE DEPARTMENT
OF TRANSPORT

"Spring Place",
105 Commercial Road
Southampton
SO1 0ZD

Tel 0703 329100
GTN
DDI

Your Ref:

Our Ref: MS 07/08/0694

Date 21 June 1993

Dear Sir

STABILITY OF SMALL VESSELS ENGAGED IN COMMERCIAL FISHING - ADVICE TO DESIGNERS, BUILDERS, OWNERS AND SKIPPERS

We wish to draw the attention of designers, builders and operators of small fishing vessels to the effect that fishing operations such as hauling nets, relocating crab/lobster pots etc. can have on stability and, therefore, the safety of their vessels.

This is illustrated by the case of a 9.75 metre fishing vessel which, on only her third voyage, sank with loss of life. The sea was calm, there was no wind and the visibility was good. The vessel was beam trawling alone and hauling her nets, when she suddenly capsized. A subsequent inclining test confirmed that the vessel would capsize when lifting the heavy cod ends even with 3 tonnes of ballast on board. In fact less than one tonne was carried.

Fishing vessels of 12 metres or over must comply with the Fishing Vessels (Safety Provisions) Rules 1975. Rules 15 and 16 set out the freeboard and stability requirements that include values of dynamic stability, righting lever and metacentric height that are increased by 20% for beam trawlers. There are no such requirements for vessels under 12m and clearly something has to be done to improve their safety.

Officials are in discussion with the Fishing Industry Safety Group (FISG) with this in mind. That group has been advised that the Department has plans to develop a code for smaller fishing vessels with the cooperation of the fishermen. Until this is completed it is strongly recommended that, where doubts exist, vessels are inclined and the loading conditions checked with the following criteria to ensure adequate margins of stability:-

Criterion		Non-Beamers	Beamers
Initial GM	(m)	0.35	0.42
A_{30}	(m-radians)	0.055	0.066
A_{40}	(m-radians)	0.090	0.108
A_{30-40}	(m-radians)	0.030	0.036
$GZ_{(\theta \geq 30)}$	(m)	0.20	0.24
$\theta_{GZ\ max}$	(deg)	25.0	25.0

It is clearly essential that stability should be assessed by a person having the appropriate professional experience and knowledge - particularly when substantial alterations have been made to the structure, fishing gear or ballast - having regard to the intended type of fishing and service.

Yours faithfully

R H Smith
Chief Surveyor (Fishing Vessels)
Department of Transport

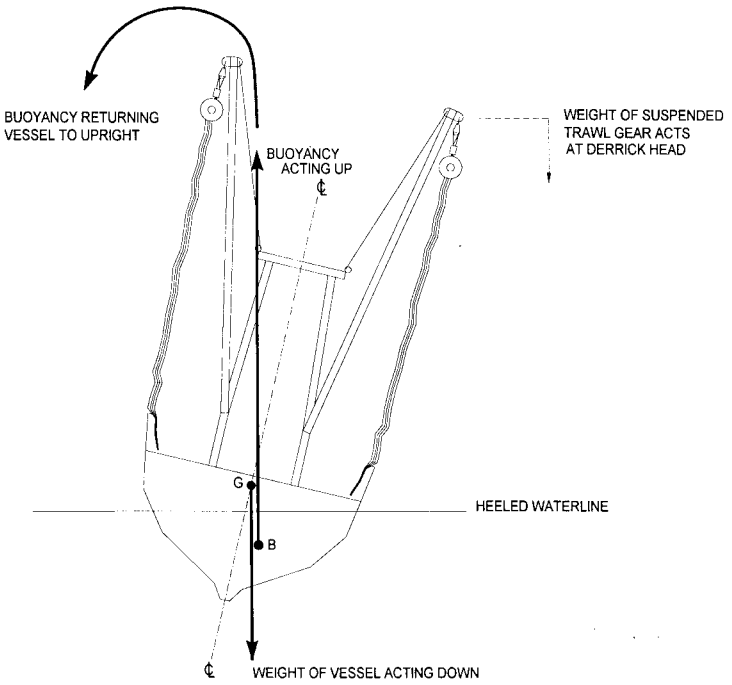
ANNEX 2

THE TWO POSSIBLE CAUSES FOR THE CAPSIZE

ANNEX 2

THE TWO POSSIBLE CAUSES FOR THE CAPSIZE.

NO CAPSIZE - VESSEL IN HER ORIGINAL SAFE CONDITION

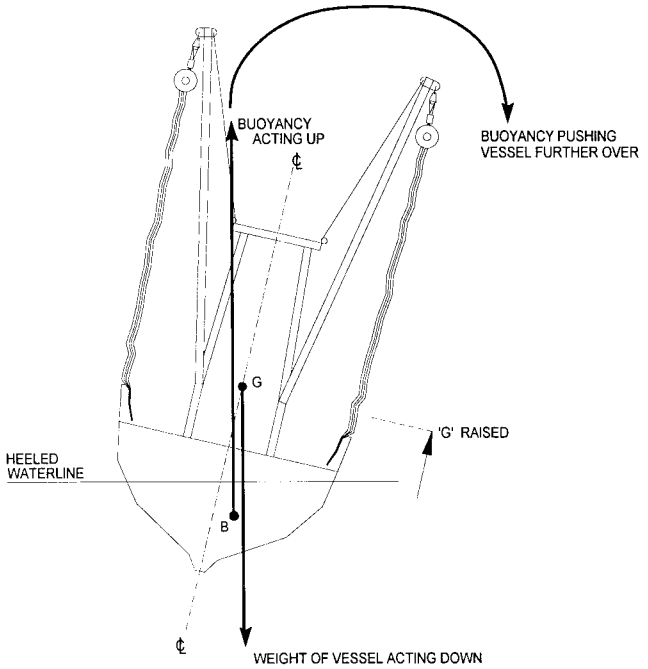


THE VESSEL HAD OPERATED SAFELY FOR 8 YEARS, SHE CAPSIZED BECAUSE SOMETHING HAD CHANGED

EITHER

'G' WAS HIGHER AFTER THE REFIT

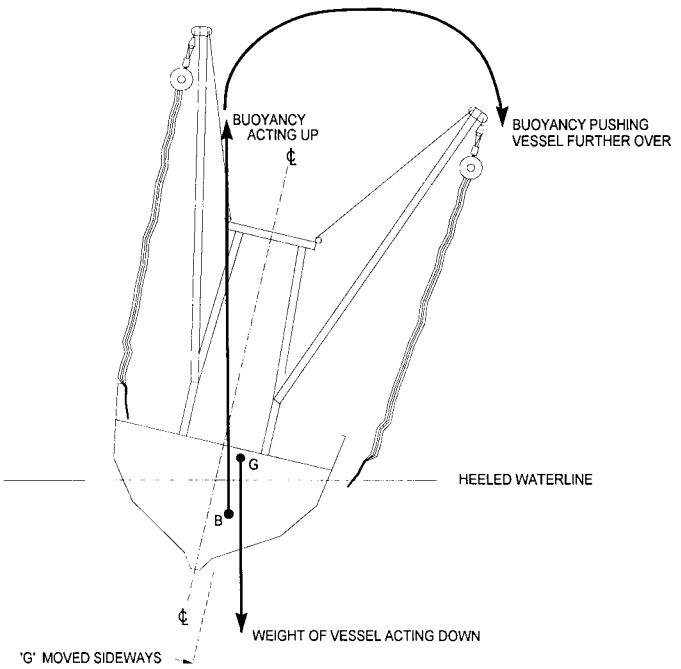
CAPSIZE



OR

THE DERRICK LOADS WERE OUT OF BALANCE

CAPSIZE



KEY :

G - POSITION OF VESSEL'S CENTRE OF GRAVITY
B - POSITION OF IMMERSED HULL'S CENTRE OF BUOYANCY

NOTE :

A VESSEL IS UNSTABLE IF THE LINE OF ACTION OF THE VESSEL'S WEIGHT (ACTING DOWN) IS OUTBOARD OF THE LINE OF ACTION OF THE BUOYANCY FORCE (ACTING UP).