Marine Accident Investigation Branch (MAIB) - Safety Digest 2/1995

Contents

1. OBSTRUCTION AT TIDAL BERTH CAUSES POLLUTION

Narrative

A 60 metre coastal tanker arrived at a tidal berth to load 1176tonnes of light crude oil. Loading was completed in the afternoonand it was then necessary to wait for the next tide and sufficientwater for the tanker to sail. Low water occurred in the earlyevening, during which time the vessel took the ground.

Shortly before midnight, about an hour before high water, thecrew turned out to prepare for sailing. It was then noticed therewas crude oil on the water surface around the vessel. A reportwas made to the harbour authority and the Department of TransportMarine Pollution Control Unit was notified. While the source ofthe leak was being investigated, the crew deployed the buoyantmooring ropes as an emergency containment measure. Oil booms wereplaced downstream of the berth to prevent pollution of other partsof the harbour. At about 0100 hours it was established that theoil had leaked from No 4 starboard cargo tank. The shore hosewas connected and discharge of No 4 tank was commenced. This wascompleted at about 0400 hours.

The tank was opened up and water was seen to be leaking in toit, evidently through a hole in the bottom. The remainder of thecargo was transferred ashore, this being completed by about 1000hours. After gas freeing No 4 starboard tank, an internal inspectionof it revealed a rounded and cracked indentation in the bottomplating. The ship was moved to a nearby slip for repairs.

Observations

1. Fortunately the pollution was not serious. It was calculatedthat less than two tonnes of the cargo was lost and it was allsuccessfully contained in the vicinity of the berth. Much of itwas recovered by skimming equipment.
2. A search was made off the berth during the following low water.A large lump of concrete about one metre square with a lengthof steel rail protruding from it was found. This was without doubtthe cause of the holing and consequent pollution.
3. The berth had been in use for the loading of crude oil cargoesfor only six months prior to the incident, although 37 loadingshad taken place during that time. Prior to the first loading theberth had been cleared of debris and cleaned up.
4. Following the incident the entire berth and swing basin wasdredged, but no further debris was found. The berth operator alsoset up a procedure of routine visual inspections of the berthat low water spring tides and amended the loading procedures toensure that, whenever it is practical to do so, vessels take thebottom in the light condition only.

Comment

1. There are many tidal berths in United Kingdom ports and itis common for coastal vessels of all types to take the groundat low water. However, extremely careful consideration needs tobe given before allowing a loaded vessel to take the ground. Excessivestresses will be exerted on the hull if the ground is irregularor fouled and a dangerous loss of stability can occur in certaincircumstances.
2. All operators of tidal berths should have a system for checkingthat as far as possible the berth is clear of debris, and followthat system regularly.
3. So far as coastal tankers are concerned, in particular thosecarrying dangerous and polluting cargoes, the cargo operationsshould be carefully planned so that the vessel lies on the bottomfor the

minimum amount of time. Should it be necessary to commenceloading before the vessel grounds, the amount of cargo so loadedshould be the minimum quantity as dictated by operational needs.It should be loaded into all the cargo tanks in order to minimiselocal stresses when the vessel takes the bottom.

2. INCORRECT SETTING OF GENERATOR RUNNING SEQUENCE CAUSESPOWER FAILURE

Narrative

The engineers of a large Ro-Ro vessel had been performing routinemaintenance on No 3 of the vessel's three main generators. Nos1 and 2 generators were running. On completion of the work No3 generator was started and put on the board; No 2 was then takenoff load and shut down. Several minutes later No 3 generator startedto shed its load and shut down, so placing an excessive load onNo 1 generator which then tripped on overload.

The vessel remained without main electrical power for about onehour. This time was spent investigating possible causes of fuelstarvation, however none was found. Power was restored after aboutan hour and the vessel safely reached port a few hours later.

The emergency generator functioned properly.

Observations

1. The main generators were arranged to start automatically andsequentially as load demands changed, a multi position switchfor each generator being used to select whether it should be thefirst, second or third machine in the sequence.
2. In shutting down No 2 generator the engineer inadvertentlyturned the selector switches for both Nos 2 and 3 generators sothat they were both the third machine in the sequence.
3. Although No 2 generator was stopped, and therefore could properlybe the third machine, No 3 was running with only one other generatorrunning. The control logic of the sequential loading system recognisedthat No 3 generator was one of two on load and yet had been instructed,via the selector, to be the third on load. The control systemthus commenced to shut down No 3 generator, so leading to an overloadof No 1 and complete black out.

Comment

1. This incident demonstrates the great care that needs to betaken when selecting the automatic start and stop sequences ofvital machinery such as main generators.
2. Clear and unambiguous instructions, placed adjacent to selectorswitches, are always of assistance with these operations. Withsome installations these can be in the form of a 'matrix' showingswitch positions for desired sequences.

3. INADEQUATE PASSAGE PLANNING LEADS TO LOSS OF A TOW

Narrative

A pontoon of 15 metres length had been employed for several decadesas an unpowered vehicle ferry on a narrow river crossing. Thehull was subdivided and of riveted steel construction but witha wooden main deck. For vehicle access purposes there was a largehinged ramp at each end of this deck.

In order to employ the vessel at another location, preparationswere made to tow it to another port several miles along the coast.Suitable arrangements were made to satisfy mandatory requirementsfor this operation, including the issue of a Load Line ExemptionCertificate which specified limiting weather conditions, and atug was hired to perform the tow. The pontoon was to be unmannedduring the tow. Two hours after the tow commenced it was observedthat one of the pontoon's ramps had partially broken from itssecuring arrangements. The weather at this time was good and thetow was returned to its port of departure in order to undergoa temporary repair.

Once these repairs had been completed towing started again andproceeded without incident for several hours. However, shortlyafter clearing a headland, which had been offering shelter, thepontoon started to pitch and roll significantly. The deteriorationin conditions, probably coupled with rather too high a towingspeed due to the tug Skipper's wish to compensate for the timelost earlier in the operations, caused seas to break over thepontoon's main deck.

After several hours of these conditions the pontoon capsized andeventually sank.

Observations

The lack of any previous seagoing service on the part of thispontoon made the assessment of its ability to withstand sea-inducedmotions rather difficult. Even the moderate motions produced duringthe first tow, when weather conditions were good, were sufficientto generate dynamic loads on one of the ramps which caused itto break free from its securing arrangements.

Comment

1. This incident reinforces the importance of careful preparationfor a tow, and the responsibility of the person in charge to assessall dangers. Satisfying the minimum conditions set out in a LoadLine Exemption Certificate may not guarantee a successful conclusionto an operation; prudent seamanship remains a fundamental requirement.
2. Advice on planning, preparing and performing a tow, togetherwith emergency advice, is contained in Merchant Shipping NoticeNo M.1406 "Safety of Towed Ships and Other Floating Objects".

4. PREMATURE RELEASE OF LIFERAFT LIFTING HOOK

Narrative

An exercise involving the preparation of a davit-launched liferaftwas conducted on board a passenger/Ro-Ro cargo ferry while thevessel was berthed alongside in port. On completion of the preparationprocedure, the Bosun entered the liferaft which was suspendedover the side, in order to insert three deflation plugs in readinessto lift the liferaft back on board. Still in the liferaft, hewas instructed by the Second Officer, who was in charge of theexercise, to indicate the hook cocking wire.

The prevailing force 5 wind conditions caused the liferaft tomove and to unbalance the Bosun, who then grabbed the liferaftsuspension ropes with both hands for support. In doing so he inadvertentlypulled both the hook cocking wire and the remote brake releasewire which caused the hook actuating mechanism to operate andthe winch brake to lock in the OPEN position.

The winch lowered the liferaft until the load was taken fullyon the bowsing lines and caused the hook to automatically release.Fortunately, the Bosun was able to scramble back on board thevessel without injury.

Observations

1. The liferaft davit lowering mechanism was so arranged thatit could be actuated by one person on the ship's deck or, alternatively,by one person from within the liferaft.
2. Actuation of the lowering mechanism from within the liferaftwas achieved by means of a remote brake release wire which, whenpulled, effectively locked the winch brake in the OPEN position.It was intended that the remote release wire should only be usedwhen launching the last of a number of assigned liferafts.
3. The liferaft hook could be released either manually or automatically.Operation of the actuating mechanism, which allowed the liferaftto be released automatically when the hook was relieved of itsload, was achieved by means of pulling a hook cocking wire fromwithin the liferaft.
4. Although the position of the hook cocking wire rendered itunlikely to be pulled inadvertently by personnel boarding theliferaft, the remote brake release wire was positioned in closeproximity to the liferaft entrance.

Comment

1. The incident was caused by the inadvertent operation of boththe hook actuating mechanism and the winch brake locking arrangementwhen the Bosun attempted to support himself using the liferaftsuspension ropes.
2. A major contributory factor was that the Bosun became unbalancedat a time when he was reaching upwards in order to indicate thehook cocking wire.
3. The close proximity of the remote brake release wire to theliferaft entrance rendered the winch brake liable to inadvertentrelease by personnel boarding the liferaft or by the remote releasewire becoming fouled by the liferaft suspension ropes during theinflation process.
4. The management company concerned has since taken action toprevent a recurrence by installing a short length of line forthe purpose of keeping the remote brake release wire clear ofthe liferaft entrance until required.

5. SHIFT OF CARGO ON RO-RO VESSEL DURING BAD WEATHER CONDITIONS

Narrative

A Ro-Ro cargo vessel had loaded a total of 37 trailers and onearticulated vehicle. A weather forecast predicted winds of force6 - 7, occasionally 8. In anticipation of a rough passage, unitswere selected as being suitable for the voyage and none containedhazardous goods. Each unit stowed on the lower vehicle deck wassecured using 8 chains; those on the upper deck had 10 chains.

The vessel left port at 0815 hours and by 1300 hours the windhad increased to force 9 giving very rough seas and heavy swell.Course was adjusted to keep rolling to a minimum and cargo lashingswere inspected regularly. At 1550 hours course was altered forthe final leg of the voyage. During this turn the vessel experienceda series of exceptionally violent rolls. As a result two trailersfell onto their sides when the lashings failed and cargo shiftsoccurred in four other trailers. The affected units were stowedon both the upper and lower decks.

The vessel suffered no significant heel and safely made port at1830 hours.

Observations

1. The lashings employed for securing these cargo units wereequal to, or in excess of, the recommendations contained in the"Code of Practice for Roll-on/Roll-off Ships - Stowage andSecuring of Vehicles".
2. The majority of the affected units suffered from shift oftheir cargo. This is indicative of inadequate arrangements forsecuring cargo to the trailer.

Comment

1. This incident again highlights the difficulty of performingan accurate assessment of the efficacy of securing arrangementsof cargoes in trailers.
2. It should be recognised that problems only occurred when weatherconditions were significantly worse than predicted and whilstthe vessel was altering course.

6. CORROSION CAUSES FLOODING TO A STANDBY SAFETY VESSEL

Narrative

A standby safety vessel with a crew of 12, was on duty in theNorth Sea. The wind condition was force 7 and the sea swell 6/7metres. Whilst on his rounds the Chief Engineer noticed that therewas more water than normal in the bilge system. The cause wastraced back to a leak from the starboard machinery cooling seachest into internal tanks. It was decided to leave attemptingany repair until the morning when the weather was due to moderate.At 0730 hours and before repair had commenced, there was a rapidincrease in the flow rate. One ship's party tried to stem theflow while the other put the salvage pump into action: this wasin addition to the ship's bilge pumping system. This action wassuccessful.

At 1300 hours the vessel received permission to break off herduties and proceeded to Lerwick. During this 15 hour voyage shereported her progress to HM Coastguard every two hours and shemade port safely.

Observations

1. The vessel was 14 years old and of steel construction.
2. She had been dry docked for survey ten months before the accident,when no significant defects to the steel hull had been found.
3. The port and starboard keel coolers were removed and it wasfound that about 50% of the nylon insulators were missing fromthe studs securing the bronze tube plate to the steel mountingplate on both coolers.
4. The absence of these insulators had allowed very high galvanicaction to take place causing extremely heavy corrosion of thesea chest.
5. The plating within the cooler recess area on the sister vesselis to be inspected.

Comment

1. This incident illustrates the benefits of officers' rounds,and having a portable/salvage pump on board and in working order.
2. The Merchant Shipping Notice No M.1361 on "The Dangersof Flooding" provides useful advice.
3. All inlets and recesses should be thoroughly examined duringthe five years periodical hull survey. The cooler should be removedand plating within the recess examined and if in doubt an ultrasonictest on the plating should be carried out. It goes without sayingthat on replacing the cooler all the insulators should be correctlyrefitted.

7. LOSS OF CREW MEMBER OVERBOARD

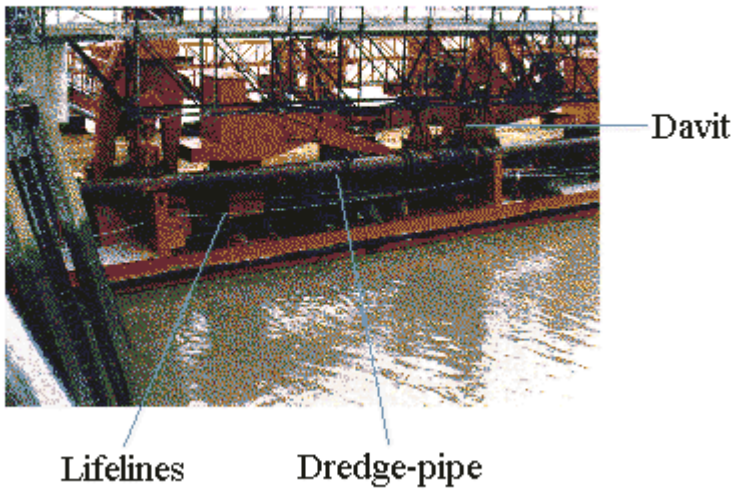
Narrative

A dredger, with a full cargo of sand, having weighed anchor atabout 0945 hours was on passage up river making for her dischargingberth. The weather was overcast, force 5, fresh breeze with amoderate swell. At approximately 0920 hours, the Fourth Engineerand the Assistant Engineer discussed details of repair work tobe carried out on the aftermost hopper spillway on the starboardside of the vessel. Subsequently, the Assistant Engineer wentaft to the steering gear compartment to collect some steel barand to assemble the tools necessary to complete the work. Amongstthe tools was an electric welding set. The Fourth Engineer passedthe Assistant Engineer on the catwalk at about 0940 hours wherehe was fitting the lead for the electric welding set into thesupply socket.

At about 1215 hours it became apparent that the Assistant Engineerwas missing. The vessel was immediately searched and all workingspaces and accommodation areas were inspected. The welding equipmentand a steel bar were found on the starboard deck aft of the spillwaybut there was no trace of the Assistant Engineer. The vessel wasby this time in the process of manoeuvring alongside the berthand once secure the Master immediately informed the Thames NavigationService and the Coastguard. A thorough search of the river wascarried out starting at 1254 hours and continuing until 1508 hours,but no sign of the missing man was found.

Observations

1. The area in which the repair work was to be carried out wason the main deck just forward of the accommodation on the starboardside. To reach this point it was necessary to climb down ontothe well deck, move forward to No 3 dredge pipe davit, pass outboardof this and then forward again underneath the dredge pipe to thework area. Lifelines were normally fitted between the aft sideof the dredge pipe davit and the accommodation, and between theforward side of the davit and the aft side of the next davit forward.The dredge pipe davits were about 460 mm wide and to go forwardit was necessary to go outboard of the lifelines using grab points.
2. The equipment to be used during the repair was found on theaft side of No 3 dredge pipe davit. No scuff marks were foundon either the deck or hull in the vicinity of the davit althougha light covering of sand debris was present. At the time of theincident, lifelines in three sections should have been fittedbetween the aft and middle davits, some 1500 mm inboard. On inspection,the centre section was missing with the other two very slack.Additionally, access to the repair point required the engineerto either crawl under or climb over the fixed dredge pipe.
3. When in the loaded condition, the vessel's freeboard in wayof the davits was very small with the result that in any kindof seaway, waves were likely to come inboard. Two safety harnesseswere carried on board the vessel but neither were in use on theday of the incident.



Comment

1. Taking into account the evidence found, there seems no doubtthat the Assistant Engineer was lost overboard whilst negotiatinghis way forward to his place of work. Access was difficult withlimited space. Lifelines were in place although slack and theadvice contained within the "Code of Safe Working Practicesfor Merchant Seamen" Chapter 15 regarding safety when workingoutboard was not heeded.
2. Subsequent to this incident, the company has issued instructionsthat when emergency work is required on the open deck whilst atsea, two men will work together and both will wear life-jacketsand safety harnesses.

8. ESCAPE OF FREON 22 GAS

Narrative

A passenger vessel was in dry dock for her annual overhaul andmaintenance period. She had been in dry dock for approximatelyfive days with the air conditioning system shut down. The systemconsisted of four self-contained chiller units operating on refrigerantFREON 22. At the time of the incident, due to high ambient temperatures,the system gas pressure was in the order of 10 bar.

During the early evening, a shipyard safety officer noticed that"frosting" had occurred on a connection between theevaporator and a filter dryer. This was brought to the attentionof an engineer cadet who was in the vicinity. The cadet triedto tighten the connection but, in the attempt, caused the pipeto shear releasing freon gas into the compartment. The alarm wasraised and the compartment evacuated. Two senior engineers quicklydonned self contained breathing apparatus sets, entered the compartmentand confirmed that nobody was inside. Both then re-entered thecompartment, one making a further confirmatory search whilst theother re-made the pipe connection.

A test of the atmosphere within the air conditioning machinerycompartment and shaft tunnel below revealed traces of the freongas. Entry to these spaces was therefore prohibited and the areaventilated overnight. Sampling next morning confirmed that bothareas were clear and that safe access was possible.

Observations

The failure occurred at a "flared" compression connectionbetween a 12 mm OD copper pipe and a filter/dryer. This connectionwould have been prone to stressing and work hardening each timethe filter assembly was renewed. The risks of soft metal pipefittings failing whilst attempting to prevent leaks by furthertightening is well known. "Flared" connections are particularlyat risk due to the thinning of the metal during the flaring process.

Comment

1. Approximately 200 kg of FREON 22 escaped from the system.Due to the gas's density it gravitated to the lower compartments(shaft tunnels) and resulted in significant concentrations ofthe gas collecting in these areas. The toxicity of FREON 22 isrelatively low but because it is heavier than air, it will seekthe lower levels, displacing air in the process. It is this processof displacement that can lead to the danger of asphyxiation ininadequately or unventilated areas.
2. The dangers of working with refrigerants are clearly identifiedin the "Code of Safe Working Practices for Merchant Seamen"- Chapter 20, Section 20.4 and Chapter 22, Section 10.

9. THE VITAL IMPORTANCE OF KEEPING AWAKE WHEN ON A BRIDGEWATCH

It is disappointing that many accidents are continuing to happenbecause the watchkeeper had fallen asleep. Four recent cases arebriefly described in this summary.

Case 1

A small fishing vessel with a crew of two hit rocks after thewatchkeeper had fallen asleep. She was not fitted with any watertightbulkheads and the pump was unable to cope with the flooding. Shequickly sank. Fortunately the crew had time to take to their liferaftand they were later rescued by an RNLI lifeboat.

Case 2

The crew of an 18 metre stern trawler worked all day on fishingoperations and then had a meal at about midnight before headingfor port. The Skipper, who had been up for at least 24 hours,took over the watch at about 0200 hours and he fell asleep soonafterwards. The vessel ran ashore. She refloated but flooded andquickly sank. Fortunately the crew were able to abandon in timeand were rescued from their liferaft.

Case 3

A 21 metre trawler left port in the early hours, bound towardsfishing grounds. About two hours later the watchkeeper, who wasthe Skipper, fell asleep. While he was asleep the vessel turnedback towards the coast and fetched up on the shore. Fortunatelynone of the crew was injured, they were able to transmit a Maydayand were later rescued. The vessel became a total loss and therewas pollution from her fuel tanks.

Case 4

A 19 metre wooden trawler left port at about midnight for fishinggrounds, in good weather and visibility. About two hours latershe ran ashore. It is again fortunate that there were no injuries,the flooding was confined to the forward compartment and the vesselwas successfully refloated. The fisherman who was on watch hadfallen asleep, probably because he had not had any adequate restwithin the previous 24 hours and there was no watch alarm in thewheelhouse.

Comment

1. Two of the cases described above happened because the watchkeeperhad not had adequate rest before taking the watch, but a watchkeepermay tend to fall asleep at any time when he is seated in a comfortablewatchkeeper's chair - whether he is fatigued or not. It is theSkipper's responsibility to ensure that anyone taking over a bridgewatch has been adequately rested and it is the watchkeeper's ownresponsibility to ensure that he keeps awake.
2. Merchant Shipping Notice No M.1190 contains useful adviceon bridge manning, watchkeeping and the command of fishing vessels.It was issued because of the number of collisions and groundingsinvolving fishing vessels that have taken place and unfortunatelycontinue to do so. Skippers and watchkeepers of fishing vesselsshould take heed of the advice contained in this notice.

10. LOSS OF A 54 YEAR OLD WOODEN FISHING VESSEL

Narrative

A 1940 built, wooden, 18.5 metre gill netter was operated witha crew of four. Towards the end of the first full day of fishingall the crew were on deck recovering nets. Darkness had set in,hence deck lights were in use, but the weather was good with thevessel beam on to a swell and rolling slightly.

Suddenly the engine stopped, then the lights dimmed and went out.An immediate inspection of the engine room found water almostto the top of the engine; and clearly still rising rapidly. Attemptswere made to pump out the engine room using hand pumps but theseproved unsuccessful. A Mayday was broadcast on Channel 16 usingthe vessel's main VHF set but no response was received.

The vessel started to list and the situation was clearly deterioratingrapidly. The crew then started to launch the liferaft, however,difficulty was experienced freeing the liferaft's container fromits securing straps. These straps were eventually cut and theliferaft successfully launched. Once all the crew were safelyin the liferaft a further Mayday call was broadcast on a portableVHF set. This message was received and acknowledged by HM Coastguardand another fishing vessel. Further, an accurate position forthe sinking vessel was obtained from the EPIRB which had floatedfree as the vessel sank. All the crew were safely recovered bythe second fishing vessel within an hour of their evacuation.

Observations

1. The vessel had been slipped for a hull survey about 6 monthsbefore this incident.
2. No inspection of the engine room had been made for a substantialperiod before the flooding was found.
3. The high level bilge alarm did not function to give earlywarning of the flooding.

Comment

1. No cause for the sinking has been established. However, dueto the rate at which flooding occurred, the most likely causeis considered to be failure of the wooden hull in way of the engineroom.
2. Advice is offered in Merchant Shipping Notice No M.1327 onthe dangers of flooding.

11. GALLEY FIRE WHILST ALONGSIDE

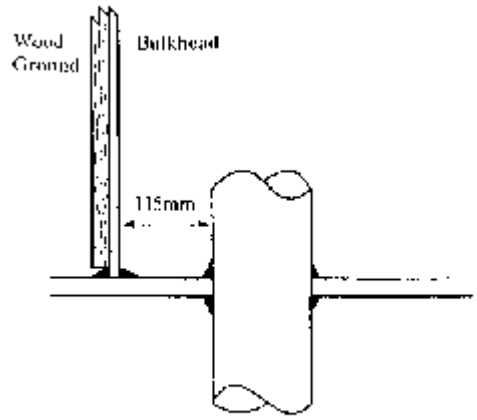
Narrative

A 22 metre fishing vessel was steaming home at full speed whenabout seven miles from port, the main engine exhaust temperaturesuddenly rose to about 700°C and the engine slowed down.No problem was identified and the vessel continued home at reducedrevolutions. Once alongside discharge started but shortly afterwardssmoke was seen to come from the galley area. When this was investigatedthe galley burst into flames and the vessel was evacuated.

The local fire brigade arrived and spent one and a half hoursputting out the fire. There were no injuries to persons but thegalley, wheelhouse and wheelhouse equipment were severely damaged.

Observations

1. On investigation, the fire was found to have started behindthe galley bulkhead amongst the bulkhead groundings. The causeof the fire was the excessive heat generated by high exhaust temperaturesbeing transmitted directly from the engine exhaust pipe to thesteel structure via welds. A heat barrier had not been fittedbetween the exhaust pipe and the support structure. The steelbulkhead onto which the wooden grounds had been secured was about115 mm from the exhaust pipe.
2. The cause of the high exhaust temperatures was probably dueto a restriction round the propeller or propeller shaft. Sucha restriction, possibly from fishing gear or a rope, would havecaused overloading of the engine and exhaust temperature rises.



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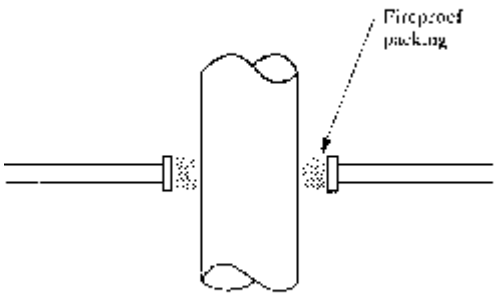

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Comment

The fixing of any exhaust pipe support direct to steel structureswithout any heat barrier is a very poor and potentially dangerouspractice. Heat transfer will take place and if there is wood adjacent,ignition could eventually follow. Good constructional practicecalls for the fitting of a heat barrier between an exhaust pipeand its support. This barrier should consist of fireproof packingwhich is not liable to movement because of vibration or expansion.

12. HEAVY WEATHER FLOODING AND DAMAGE TO FISHING VESSEL

Narrative

A 22 metre side trawler ceased fishing operations and hove toin the North Sea after receiving a weather forecast for north-easterlyforce 8 - 9 winds. The wind subsequently increased to east-north-eastforce 11. The Skipper considered that it would be unsafe to runbefore the wind towards a port of refuge and, instead, decidedto ride out the storm.

The vessel was being steered by auto-pilot at reduced speed whichprevented her from pounding and from taking seas on board. However,the prevailing conditions caused the vessel to pitch heavily andto yaw.

During the night, the vessel was struck by a wave on the portbow, which caused her to list heavily to starboard. Seas brokeacross the main deck and the fishing gear was washed over thestarboard side. The crew were able to recover the fishing gearon board and, having assessed that the vessel had sustained heavyweather damage, the Skipper set a course for land. HM Coastguardwas advised of the situation and the vessel was subsequently escortedto a port of refuge.

Observations

1. The wheelhouse electronic equipment was extensively damageddue to water ingress through an open window on the starboard side.Damage was also sustained to the hull, deck fittings and engineroom equipment.
2. The vessel was able to proceed under her own power althoughher fuel oil tanks were later found to be contaminated with seawater.
3. The forward cabin had not taken any water and any ingressto the engine room was effectively removed by the continual operationof the main engine-driven bilge pump and an automatically operatedelectrical submersible pump. Any ingress of water to the fishhold was effectively removed by the operation of an hydraulically-poweredbilge pump.
4. The main engine-driven alternator and battery charger, locatedat the forward end of the engine room, became inoperative dueto floodwater draining from the wheelhouse by way of the electriccableways. The auxiliary engine was subsequently started and wasable to charge the batteries by means of its own associated charger.

Comment

1. The Skipper's actions in monitoring the prevailing and forecastweather conditions and in ceasing fishing operations and heaving-toin good time were in accordance with established recommended practices
2. However, as the weather conditions worsened, the Skipper failedto ensure that all openings into the vessel were closed. Appropriateadvice is provided in the "Recommended Code of Safety forFishermen", which is published by the Department of Transport.
3. The bilge pumping arrangement was effective in removing anyresultant ingress of water to the vessel.

13. RAPID CAPSIZE AND SINKING OF A FISHING VESSEL WITH LOSSOF LIFE

Narrative

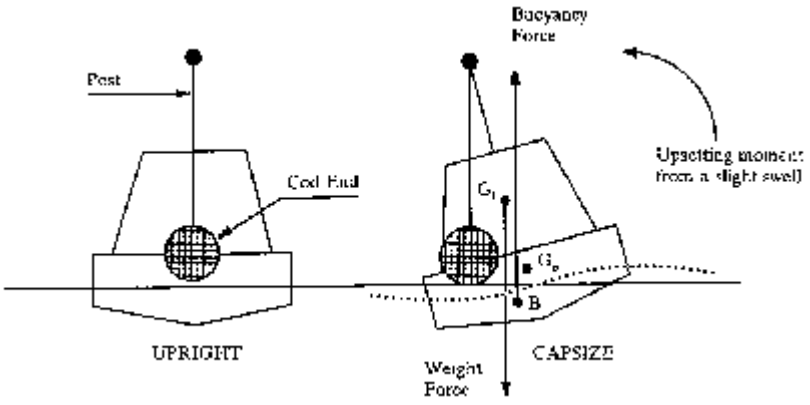
A two year old 8.10 metre steel hulled stern trawler had beentrawling for about three and a half hours. The weather was finewith good visibility, a slight swell and a gentle breeze.

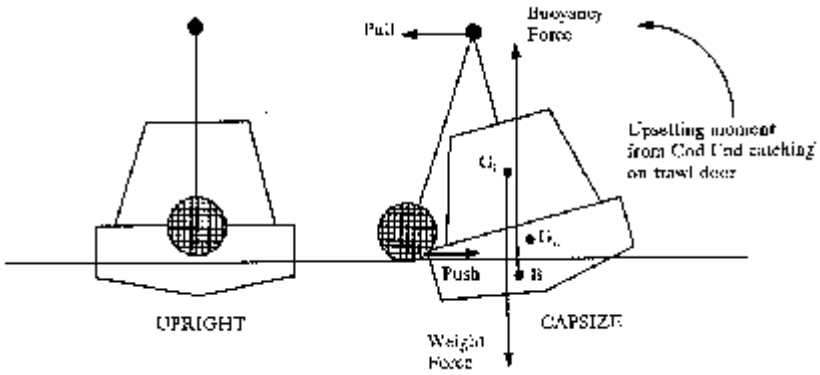
During the second tow the Skipper noted that his vessel was slowingdown which indicated that the net might be filling with sand anddebris. They began to haul in the net. The winch was strugglingbut the cod end was eventually hauled up as far as possible. Thetwo hauling lines, leading through blocks at the top of the post(see Figure 1), were then tied off and the deckhand went aft totry and pull the cod end over the stern. While he was strugglingwith the cod end he heard the Skipper shout. He looked forwardand saw that the vessel was heeled well over to port; the bulwarkrail was under the water and the water level about a quarter ofthe way across the hatch cover. He rushed forward to let go ofthe hauling lines to release the cod end to allow the vessel torecover. He managed to free one and the Skipper joined him tohelp free the other but the vessel suddenly rolled over and bothmen were thrown into the water.

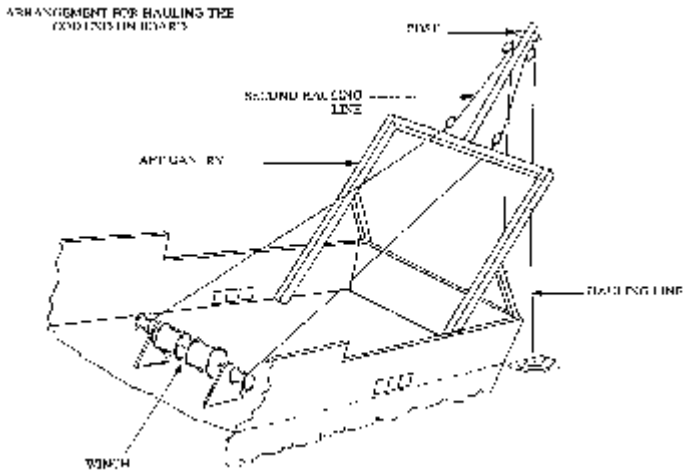
The capsize was observed by the Skipper of another fishing vessel.He recovered the two men from the water, but the Skipper was unconscious.Despite continued attempts at resuscitation the casualty was pronounceddead on arrival at hospital.

Observations

1. As this vessel was under 12 metres in length there was nostatutory requirement for its stability to be established. Stabilitycharacteristics had never been determined.
2. The primary factor leading to the capsize and loss of thisvessel is almost certainly that the weight of the cod end, whenlifted clear of the water, and suspended from the top of the poston the stern gantry, (some 3.4 metres above the deck), raisedthe effective centre of gravity to such an extent that the vessel'stransverse stability was reduced to near zero.
3. With her stability reduced to near zero a small upsettingmoment such as a roll in the slight swell would have been sufficientto cause the vessel to capsize. Alternatively the cod end couldhave caught on the port side trawl door and acted like a weighton the gunwale of the vessel (see Figure 2).
4. Neither crewman was wearing any form of buoyancy aid. TheSkipper was a non-swimmer.







Comment

1. This accident could have been avoided if the vessel's stabilitycharacteristics had been assessed by a suitably qualified personand advice been given on any operational limitations required.
2. The Department of Transport publishes advice to fishermenregarding the stability of small fishing vessels and on the dangersof suspended loads.
3. Attention is drawn to Merchant Shipping Notice No M.989 "TheSafety of Small Fishing Vessels" and the Department of Transportsafety leaflet "Fishing is a Dangerous Business. Make itYour Business to Make it Safer".
4. Fishermen who understand the dangers of recovering a cod endheavy with sand will not attempt to lift it clear of the water.Instead they will tow it at speed behind the vessel for some timeto wash the sand out of it and reduce its weight before attemptingto lift it above the water surface.

14. LOSS OF A WOODEN FISHING VESSEL

Narrative

A 16 metre wooden fishing vessel was being operated by the Owner/Skipperand a crew of four. While on passage floodwater was noticed inthe engine room but no bilge alarm had been heard. Initial attemptswere made by the Skipper to arrest the flooding. None of the crew,other than the Skipper, was sufficiently familiar with the engineroom systems to offer worthwhile assistance. These attempts provedunsuccessful and HM Coastguard was requested to assist.

A rescue helicopter and a lifeboat were on the scene very quicklyand evacuated the Skipper and crew. The vessel sank shortly afterthe evacuation.

Observations

1. The following paragraph summarises two characteristics ofthis incident: The flooding had reached an extremely serious levelby the time it was discovered. The high level bilge alarm hadnot been tested for many months and failed to function. Unfortunatelythis type of problem applies to a large number of cases wherefishing vessels flood and subsequently sink.
2. The Owner/Skipper took great pride in maintaining an efficientengine room, performing all routine tasks himself. This practicehad an undesirable consequence of preventing the crew from gainingany worthwhile working knowledge of the machinery; in particularthe bilge pumping system. A substantial and unreasonable workloadwas thus placed on the Skipper during this accident.

Comment

1. The value of the advice contained in Merchant Shipping NoticeNo M.1327 is again reinforced by this accident.
2. High level bilge alarms can provide useful early warning offlooding. However, to be of any value THEY MUST WORK!

15. FLOODING AND FOUNDERING OF WOODEN FISHING VESSELS - OFFICIALCONCERN AT NUMBER OF INCIDENTS

The Marine Accident Investigation Branch (MAIB) of the Departmentof Transport has noted with concern the rising number of accidentsto wooden fishing vessels where flooding and foundering have takenplace. Wooden fishing vessels account for almost 44% of the totalfishing vessel fleet on the United Kingdom register.

During the five year period 1 January 1990 to 31 December 1994,43 serious flooding incidents were investigated by MAIB inspectors.Of these reported cases 26 subsequently sank, often with a lossof life.

Most of the remaining 17 vessels were saved by the use of emergencypumps put on board by RNLI lifeboats or airlifted on board byHM Coastguard or MOD search and rescue helicopters. These survivingvessels were inspected to determine the cause of the floodingand in 11 instances it was found that the flooding had been dueto the loss of caulking. This represents 65% of those vesselswhich survived and 25% of the flooding incidents as a whole. Assome of the vessels which were lost may also have sunk due tothis cause it is likely that there will be an increased percentageas far as the total number of incidents are concerned.

Other causes of flooding discovered on the remainder of the survivingvessels were as follows:

- One leaking stern gland;
- Two instances of collision with unseen underwater objects;
- Three instances involving piping systems.

These latter causes deserve special mention. They were namely:

1. Back flow of water from deck wash sea suction into the engineroom bilge line by way of a valve which had been prevented fromclosing properly due to blockage by debris;
2. A burst pipe in the engine room;
3. Back flooding via the bilge system.

In some of the cases in which the 26 vessels were lost, the MAIBinspectors were able to establish the cause of flooding from statementsgiven by survivors. However, 11 or 42% of the vessels lost, sankwithout the cause of flooding being established.

Where the causes of flooding were established, these were foundto be:

- Vessel swamped (1);
- Damage to hull structure/failure of hull structure (6);
- Pipework failure (4);
- Loss of caulking (2);
- Failure of wet exhaust system (1);
- Failure to close a seacock during maintenance on the enginecooling water system (1).

The vessels which sank were, in many cases, lost unnecessarilydue to one or more of the following factors:

- Failure of the vessel's bilge pumps;
- Blocked strums on bilge suctions;

- Failure to operate valves correctly;
- Sea valves unable to be closed properly;
- Failure of high level bilge alarm to alert crew of danger;
- Non-watertight bulkheads allowing progressive flooding fromone compartment to others.

The MAIB considers that Owners and operators of wooden fishingvessels can do much themselves, to reduce the risk of loss oftheir craft due to flooding by taking the following precautions:

- Ensure the hull is well maintained; in particular paying carefulattention to the hull fastenings and caulking of seams, not onlywhen the vessel is slipped for survey but whenever the opportunityarises, such as when the vessel is lying at a dry berth;
- Familiarise themselves with the various piping systems, theirvalves, and connections to the hull, machinery etc. All valvesshould be regularly operated to see that they open and close correctly,and be examined to check for secure fitting and freedom from corrosion;
- In the case of the bilge system, the suction strums shouldregularly be checked to see that they are free from obstructionand the various compartments, in particular the fish hold shouldbe kept free of all debris, especially polythene bags;
- Propeller shaft stern glands, rudder stock, and wet exhaustsystems should regularly be checked for watertightness;
- Bilge pumps, their prime movers and/or drive belts shouldbe carefully maintained and regularly checked for correct operation;
- High level bilge alarms should be regularly checked; ie atleast daily;
- Bulkheads should be made watertight as far as is practicableon existing vessels. All penetrations for pipes and cables shouldbe fitted with watertight glands or otherwise sealed;
- It is strongly recommended that a portable diesel driven salvagepump of suitable output and fitted with an adequate length ofsuction hose should be carried, and stowed in a readily accessibleposition.

Finally, fishermen should make themselves familiar with the followingpublications which can be obtained free of charge from the MarineSafety Agency's local Marine Offices:

- Merchant Shipping Notice No M.989 - "The Safety of SmallFishing Vessels";
- Merchant Shipping Notice No M.1327 - "Losses of FishingVessels through Flooding";
- "Fishermen and Safety - A Guide to Safe Working Practicesfor Fishermen";
- "Fishing is a Dangerous Business - Make it Your Businessto Make it Safer", a safety leaflet, also in self-adhesiveposter form.

16. HYDRAULIC OIL LEAK CAUSES EXPLOSION ON FISHING VESSEL

Narrative

A 13 metre wooden stern trawler left harbour at 1130 hours. Itwas the intention of the two men on board to make one trawl beforereturning in the early evening. The weather was good with clearvisibility and a fresh, force 4 - 5, north-easterly wind.

At 1500 hours they began the process of recovering the trawl.The Skipper slowed the engine and engaged the engine driven hydraulicpump by means of the "Morse" control from the wheelhouse.The crewman commenced recovering the trawl using the hydraulicallydriven trawl winch which was situated forward on the shelter deck.After about 6 metres of wire had been hauled the winch was stoppedto allow the Skipper to unhook the towing strops.

Having unhooked the strops the Skipper instructed the crewmanto continue heaving but the winch would not operate. The crewmanput the control lever to veer. The winch responded, however onreturning the lever to the haul position the winch still wouldnot operate. The Skipper walked aft towards the wheelhouse withthe intention of disengaging the hydraulic pump. He was just aboutto step up into the open door of the wheelhouse when an explosionoccurred and he was engulfed in a ball of flame. The shelter deckrapidly filled with acrid smoke. Both men were able to reach theopen after deck but the Skipper had sustained serious burns tohis hands, lower arms and head. The explosion caused a fire tostart in the engine room which rapidly spread to encompass thewheelhouse and shelter.

The two men were rescued and taken into harbour by a fishing vessel,the crew of which had seen the fire. Another vessel and an RNLIlifeboat also proceeded to the aid of the fishing vessel. Usingtheir own hoses and pumps they managed to put the fire out. Theseverely burned vessel was towed into harbour.

Observations

1. The vessel was well maintained and equipped.
2. There were no signs, other than the fault with the winch,that would have warned of an imminent fire or explosion.
3. The hydraulic pump served three winches: the trawl winch,a net drum winch and a line hauler. Flexible pipework was usedbetween the pump, situated in the engine room, and the deck mountedwinches.
4. A detailed examination of the vessel and, in particular, ofthe engine room pipework indicated that the explosion probablyhappened when a fine mist of hydraulic oil was ignited by contactwith a hot surface. The hydraulic oil leak probably occurred wherea flexible pipe had chafed against a steel deckhead stiffener.The engine exhaust manifold, which was close to this pipe, couldhave been the source of ignition.
5. The crewman had undergone training in basic first aid andhis prompt action in treating the Skipper's burns by cooling themwith water considerably reduced their eventual severity.

Comment

Merchant Shipping Notice No M.1456 provides advice on the preventionof fuel, lubricating and hydraulic oil fires in the machineryspaces of merchant ships and fishing vessels. Where possible hydraulicsystems should not be placed in engine rooms. In cases where itis unavoidable the

systems should be well designed to limit therisks, be well maintained and frequently inspected for faults.

17. THE LOSS OF A FISHING VESSEL AND THE STOWAGE OF LIFERAFTS

Narrative

A 16 metre wooden fishing vessel was being operated by a crewof five. Several hours after leaving its home port, and whilston passage to its chosen fishing grounds, floodwater was noticedin the engine room. Initial attempts to arrest the flooding wereunsuccessful and HM Coastguard was requested to assist.

A rescue helicopter and an RNLI lifeboat were on the scene veryquickly. Most of the crew were immediately evacuated by the lifeboatbut the Skipper remained on his vessel until just before it sank,when he too was taken off by the lifeboat.

The vessel sank in deep water and it was clear to those who remainedon the scene that its liferaft did not float free.

Observations

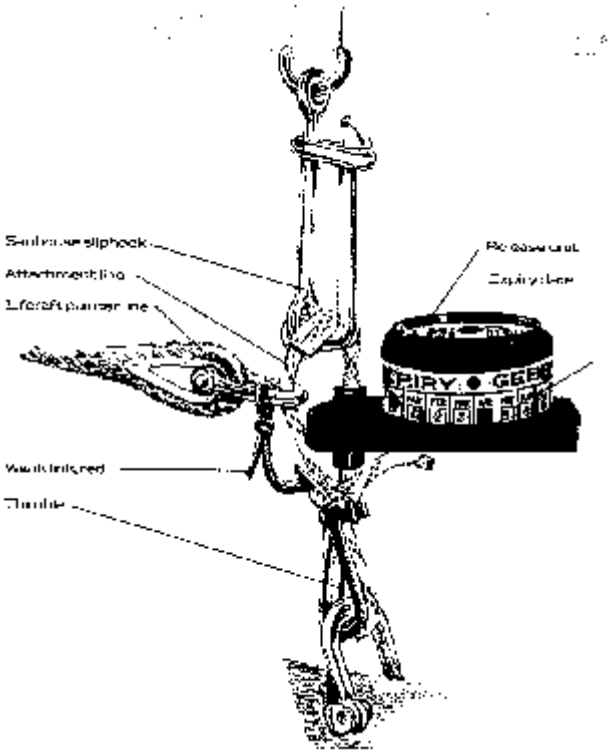
The vessel's EPIRB and inflatable liferaft had been fitted withnew hydrostatic release units several months previously. Shortlyafterwards the liferaft was repacked and reinstalled on the vessel.During this operation the free end of the liferaft's painter wassecured to a handrail adjacent to the liferaft's cradle.

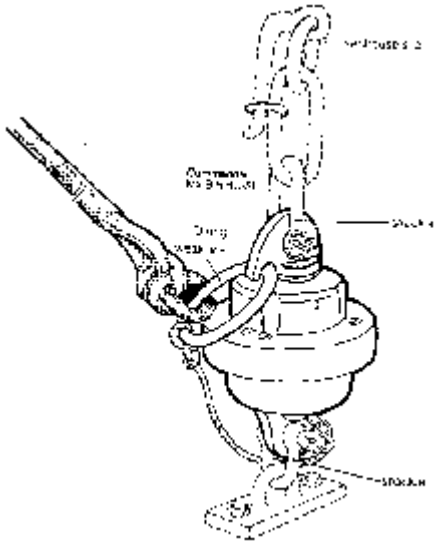
Comment

The crew of this vessel were very fortunate that search and rescueunits were on the scene very quickly, giving them no need to relyon their own liferaft.

It is clear that incorrect re-installation was the most probablecause of the liferaft's failure to float free. This was an errorof a type which is worryingly common. At the time of the relevantmandatory survey a vessel's life-saving equipment will be closelyinspected. However, liferafts, and probably their hydrostaticrelease units, are likely to require overhaul or renewal beforethe next survey is performed. It is generally after these servicingperiods that the errors of incorrect installation are likely tobe made. It is thus vitally important that Masters, Skippers andOwners ensure that liferafts are correctly installed so that theequipment will operate as the manufacturer intended.

Two commonly encountered hydrostatic release units are shown inFigures 1, 2 and 3. These arrangements show a weak link to whichthe liferaft's painter should be attached. It must be rememberedthat these weak links are carefully designed components, whichare intended to break under a load which is sufficient to causethe liferaft to inflate, yet not so large as to cause damage tothe liferaft or prevent it floating to the surface.





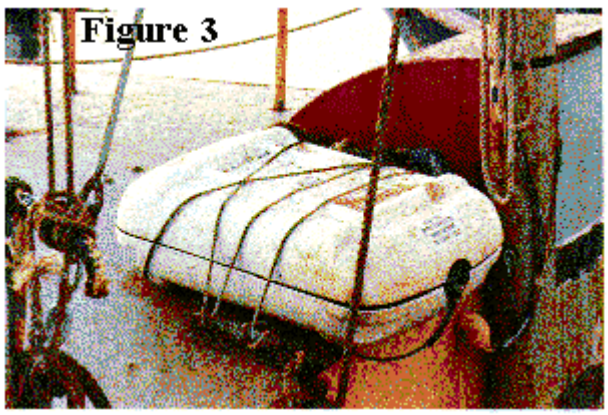
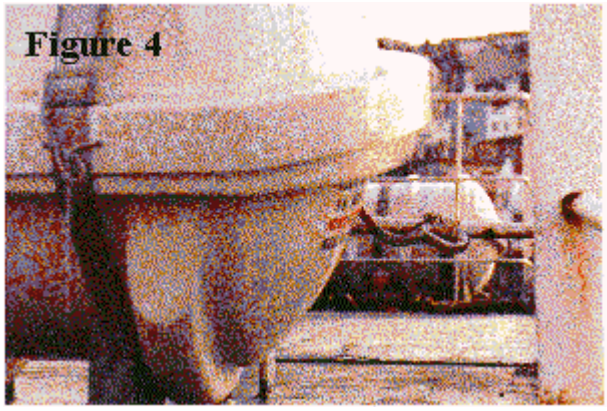
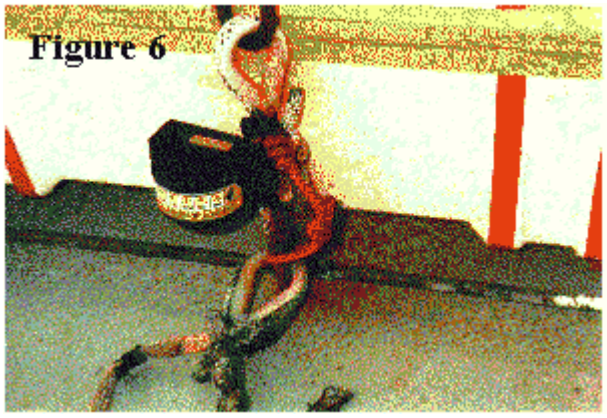


Figure 3

Advice on the stowage of liferafts is contained in Merchant ShippingNotice No M.1400.

An independent sighting of 23 inflatable liferaft containers,on various types of small vessels, revealed that only two containerswere correctly installed. Some of the more common errors of installationare shown in Figures 4, 5 and 6.





18. ANOTHER WOODEN FISHING VESSEL LOST THROUGH FLOODING

Narrative

A single-decked wooden fishing vessel of 24 metres registeredlength was engaged in pair trawling. The trawl gear snagged andboth vessels turned into the weather and commenced hauling inan attempt to clear the obstruction. During the hauling operation,a flexible rubber section of hydraulic pipe ruptured in the wheelhouse.The hydraulic oil supply was isolated in the engine room and thesection of pipe was then replaced, a job which took about 20 minutes.Towards the end of the repair, the engine room bilge alarm soundedbriefly.

Upon completion of the repair the engineer returned to the engineroom in order to restore the hydraulic oil supply and discoveredthat the engine room was flooding. Both of the electrically poweredbilge pumps on board were started and the Skipper requested additionalpumps by radio. However, the prevailing adverse weather conditionsprevented additional pumps from being safely transferred to thevessel by sea or by air. The bilge pumps on board were unableto cope with the rate of flooding. The crew abandoned the vesselinto inflatable liferafts and were air-lifted to safety by helicopter.The vessel was taken into tow but sank before reaching port.

Observations

1. The vessel was 17 years old and had not been formally surveyedfor 3 years.
2. The wind was force 5 - 6, which caused the vessel to rollheavily.
3. The consequent surge of floodwater in the bilge caused theengine room plates, which were not secured in position, to moveand so render the seacocks inaccessible.
4. The ability of the bilge pumps to stem the rate of floodingbecame impaired as the bilge suction strainers became choked withsmall pieces of debris which had been allowed to accumulate inthe engine room bilge.
5. A maximum rate of bilge pumping was not achieved because thesea suction valves were not completely shut and no use was madeof the manual pumps provided on board the vessel.

Comment

1. The source of flooding was not positively identified althoughit was probably caused by the failure of the stern tube glandor the hull, a seacock or an associated pipe in way of the engineroom bilge.
2. Appropriate advice aimed at preventing danger to life andlosses of fishing vessels through flooding is provided in MerchantShipping Notice No M.1327 and the "Recommended Code of Safetyfor Fishermen". It is apparent that such advice was not fullyheeded.
3. A lack of clear deck space, combined with the motion of thevessel in the prevailing adverse weather conditions, preventedadditional pumps from being lowered to the vessel by helicopter.In this regard, it would be prudent for vessels of similar ageand construction to carry a portable diesel pump for emergencyuse.

19. LOSS OF A FISHING VESSEL WITH LOSS OF LIFE

Narrative

A 14.7 metre steel fishing vessel was operating as a beam trawler,with a crew of three. Whilst fishing in darkness, in a heavy swellwith wind force 4 - 5, flooding was discovered in the engine roomand the fish hold. The crew started bilge pumping operations.

Once the flood level had been reduced in the engine room it becamepossible to operate the hydraulic power winch to recover the fishingbeams from the sea bed. When both beams were recovered it wasrealised that they had become fouled by a static monofilamentnet (gill net). At this stage the engine was in neutral. Afterattempts were made to cut the gill netting from both beams, thevessel started to manoeuvre. However, the starboard cod end wasthought to be seen going into the propeller, so the engine wasagain put into neutral. The procedure adopted to disentangle thecod end from the propeller was to lower the starboard beam onlyand put the propeller in reverse. Shortly after commencing tolower the beam, the vessel heeled to port. A wave came over theport side and before the water cleared from the deck a secondwave came over the bulwark top. The vessel continued heeling untilshe was lying on her side.

The Skipper managed to inflate the liferaft and the other twocrew members found their way to the outside of the starboard hullforward. One of the crewmen and the Skipper managed to swim tothe liferaft, but the second crewman was lost in the darkness.

A flare was set off from the liferaft and the vessel's EPIRB operatedautomatically, resulting in a full scale search and rescue operationbeing initiated which led to rescue of the two men in the liferaft.

Observations

1. The vessel had approved stability for operation as a sterntrawler only. She should not have been used for single or twinbeam trawling or for scallop dredging.
2. The freeboard was well below that laid down for a fishingvessel of her size.
3. It was not possible to determine with certainty the causeof the flooding, but possible causes were; corrosion of the seawater system and/or failure of the propeller shaft gland. Additionalflooding could have been due to the failure of the ice scuttles.With the low freeboard the aft deck would have been awash in mostseaways, and if these flush deck scuttles leaked, sea water couldhave entered the ice store and melted the ice which may have increasedthe flooding effect.
4. Divers reported that her propeller and rudder were fouledby gill netting. This would have made manoeuvring difficult.

Comment

The cause of the capsize was the combined effects of the asymmetricmoment exerted on the port side of the vessel when the starboardbeam was lowered, and waves breaking on to the port side of theafter deck. With the vessel's derricks and beams raised she wasprobably in the worst operating condition with regard to stability.Flooding of the engine room and fish hold would have further reducedstability.