

The duff and offal chute's inner covers

Closed or Open?

During the proceedings of the Gaul RFI in 2004, the court accepted the Attorney General's proposition that the crew had neglected to secure the inner covers for both the duff and the offal chute waste openings. They also concluded that this had been a causal factor in the vessel's loss.

Unfortunately, if we look for the evidence that is supposed to support this damning outcome we come to realize that there isn't really any firm evidence at all. Of course there is the fact that the inner covers to both chutes were found open on the seabed and also the fact that a piece of wire detritus appeared to be entangled around one of the chute lids, but apart from these observations from the wreck site there is nothing really tangible to support the court's findings.

If, on the other hand, we take another look at the evidence from the seabed, we can see that this points in a quite different direction, to the possibility that the inner covers had actually been closed and secured by the crew, prior to the vessel's loss.

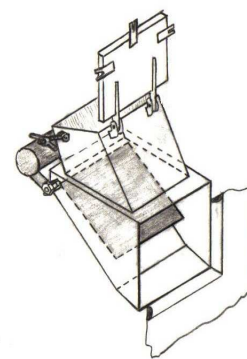
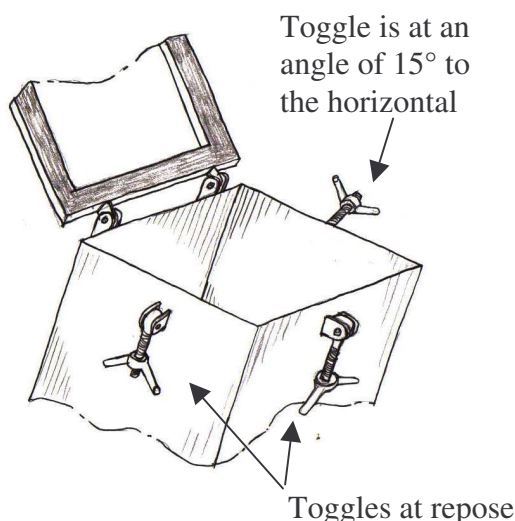
The following images and sketches show the condition of the duff and offal chute inner covers 'as found', at the time of the underwater surveys:

1. The duff chute's inner cover 'as found' in 2002:



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Image from inside the factory space on the wreck - looking outboard - duff chute cover



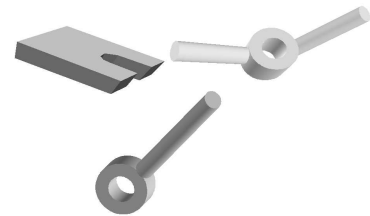
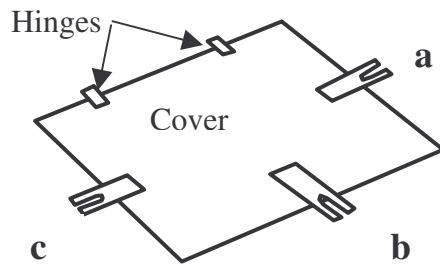
Diagrammatic sketch of the duff chute and its inner cover - looking inboard

A number of simple observations can be made regarding the duff chute's inner cover and its securing arrangements:

- It is open
- It appears undamaged
- Two of the securing toggles are in their normal position of repose, the third toggle is at an angle of 15 ° to the horizontal (this is unusual and indicates possible damage to the toggle pin)
- The forked lug, which mates with the third toggle, seems to be damaged (the tines appear to be spread and bent)

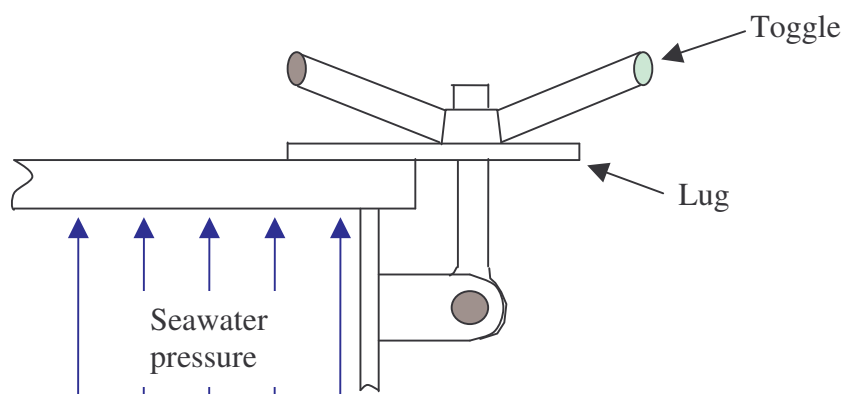
Analysis

The visual evidence would suggest that prior to the loss of the vessel, the duff chute inner cover may have been secured by one of its toggles (in way of lug 'a'):

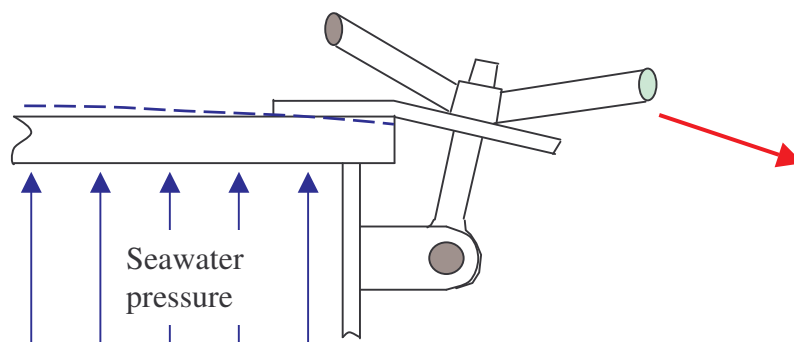


Toggle assembly

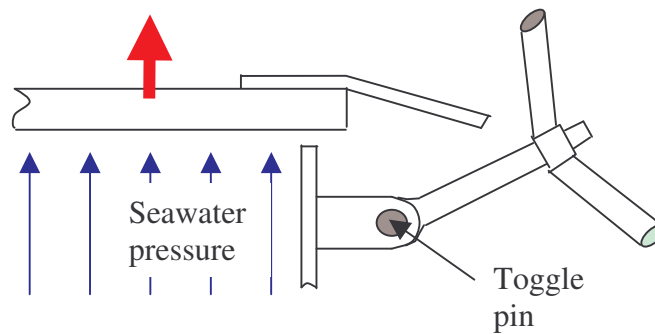
If we then consider a sectional view through the lid in way of the forked lug and toggle 'a':



If the seawater pressure exceeds the strength of the lug then the forked lug's tines will bend and open and the toggle will rotate:



Further sea loading will cause the butterfly toggle to slip down and out of the forked tines and the hatch lid will open:



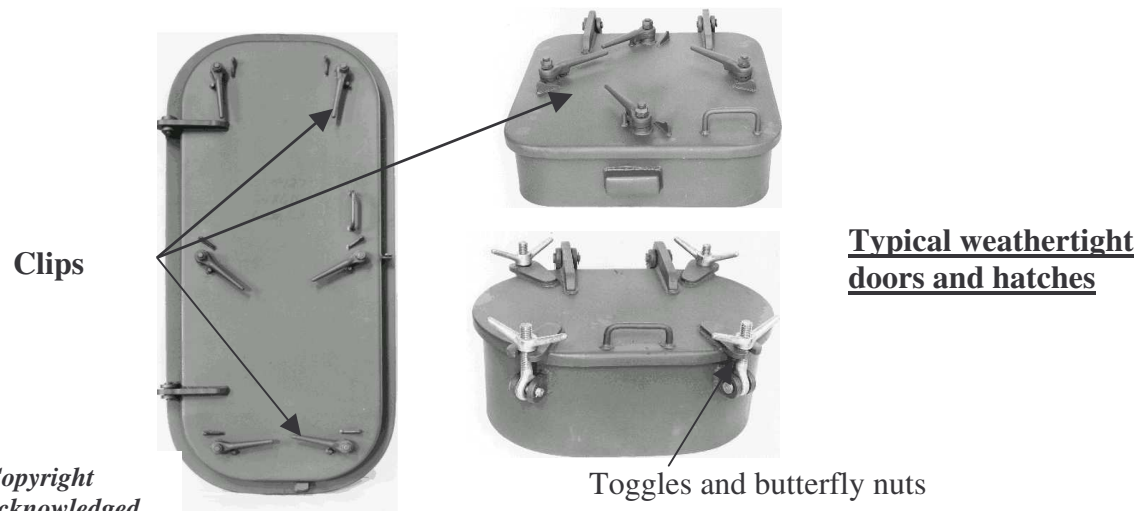
If the toggle pin or its support, suffers any minor damage during this process, the toggle will tend to remain where it is rather than dropping into its position of repose.

Conclusion: The damage to the tines on the forked lug and the final position of the toggle (as observed in the underwater image) is consistent with the failure mechanism that has been described above. The evidence from the underwater image thus indicates that the duff chute inner cover may have initially been secured in the closed position by one of its toggles and that this toggle then failed allowing the cover to burst open due to seawater pressure (*The non-return flap in the lower part of the chute was open at the time of the loss and as a consequence of this fact, the forces of the sea were able to act directly upon the inner cover*).

Comment

The fact that the duff chute inner cover may have been secured by one toggle only instead of all three does not indicate crew error. It is normal, in the daily operation of a ship, for the weathertight doors and hatches to be opened and closed in this fashion (using one clip or toggle only) Even in heavy weather, regardless of whether one or six clips have been used, the door or hatch cover will exercise its full strength against external sea loads and will remain closed.

However on the Gaul, the inner covers, *contrary to the norm for weathertight closures*, opened inwards and, in this respect, it was only the toggles and hinges that withstood the forces of the sea. The crew could not be expected to realise that there was this significant strength difference between the inner covers on the duff and offal chutes and that of the other weathertight hatches and fittings they would use in the normal course of their work.



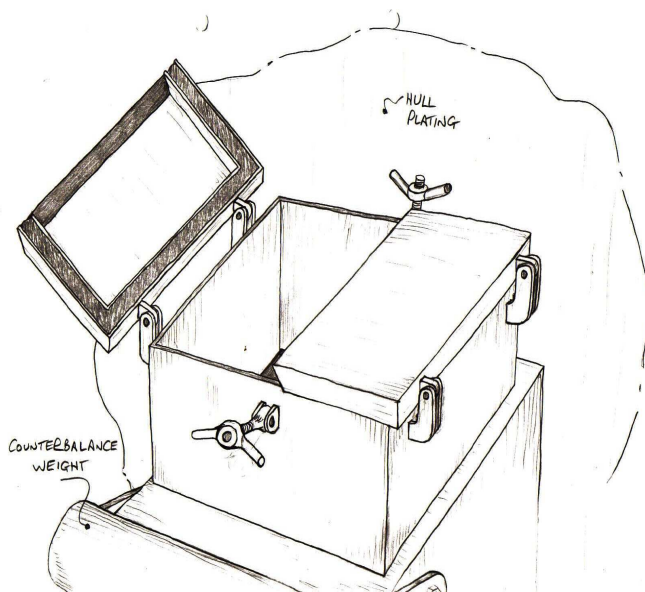
2. The offal chute's inner covers 'as found' in 2002:



Image Crown Copyright

Toggle bolts

Image from inside the wreck - looking outboard towards the offal chute hopper and one of the hinged inner covers



Diagrammatic sketch of the offal chute 'as found' - looking outboard

A number of simple observations can be made regarding the offal chutes inner covers and their securing arrangements:

- One of the lids is open
- The other lid is closed but unsecured
- They appear undamaged
- The strongback bar, which is essential for securing the two lids, is missing
- The two securing toggles are not in their normal position of repose (this is unusual and indicates possible damage to the toggle pins) see also the sketch on page 6

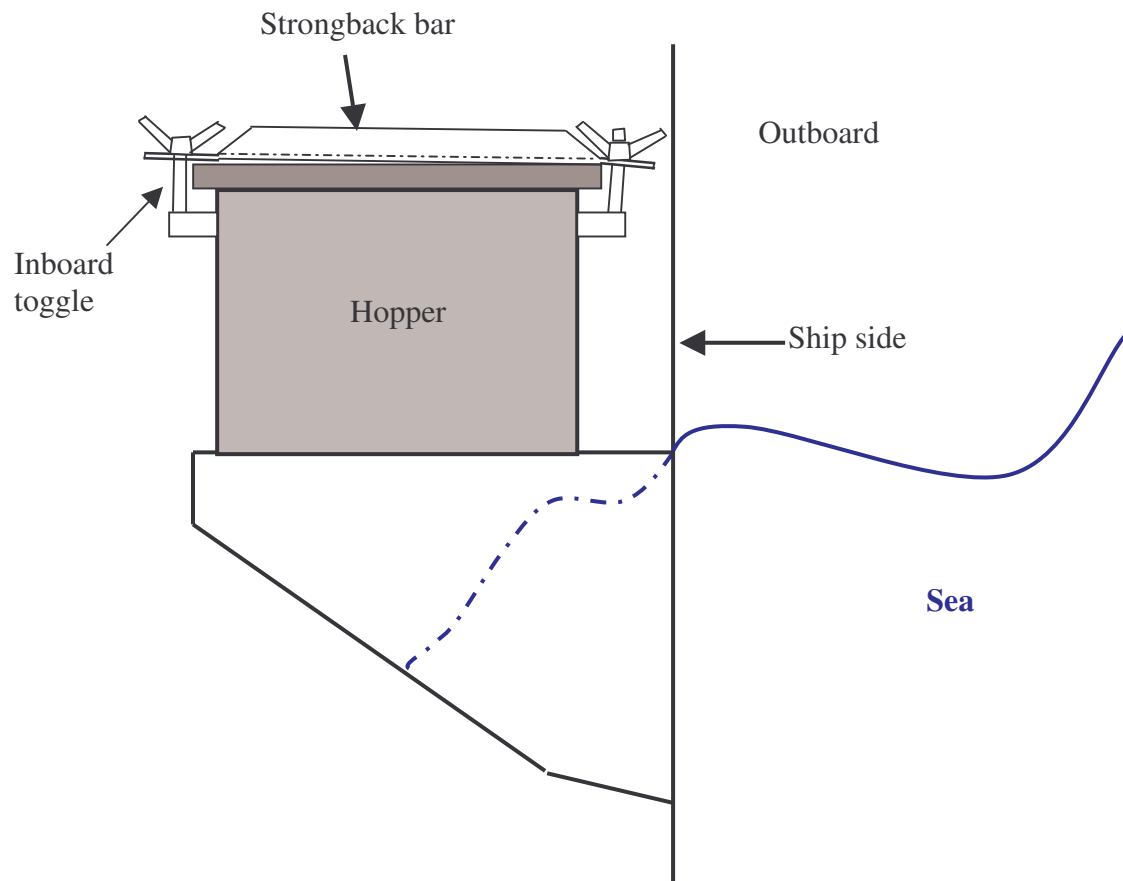
Offal chute inner lids closing arrangements

The two half covers were not provided with forked lugs, instead they were secured closed by means of a strongback bar, this was laid across the two half lids and kept in place by means of the two toggle nuts.

Analysis

The visual evidence suggests that prior to the loss of the vessel, the covers were secured closed by the strongback bar and the two toggles, it also suggests that the innermost toggle was not screwed down fully so as to bring the strongback bar hard up against the inner covers.

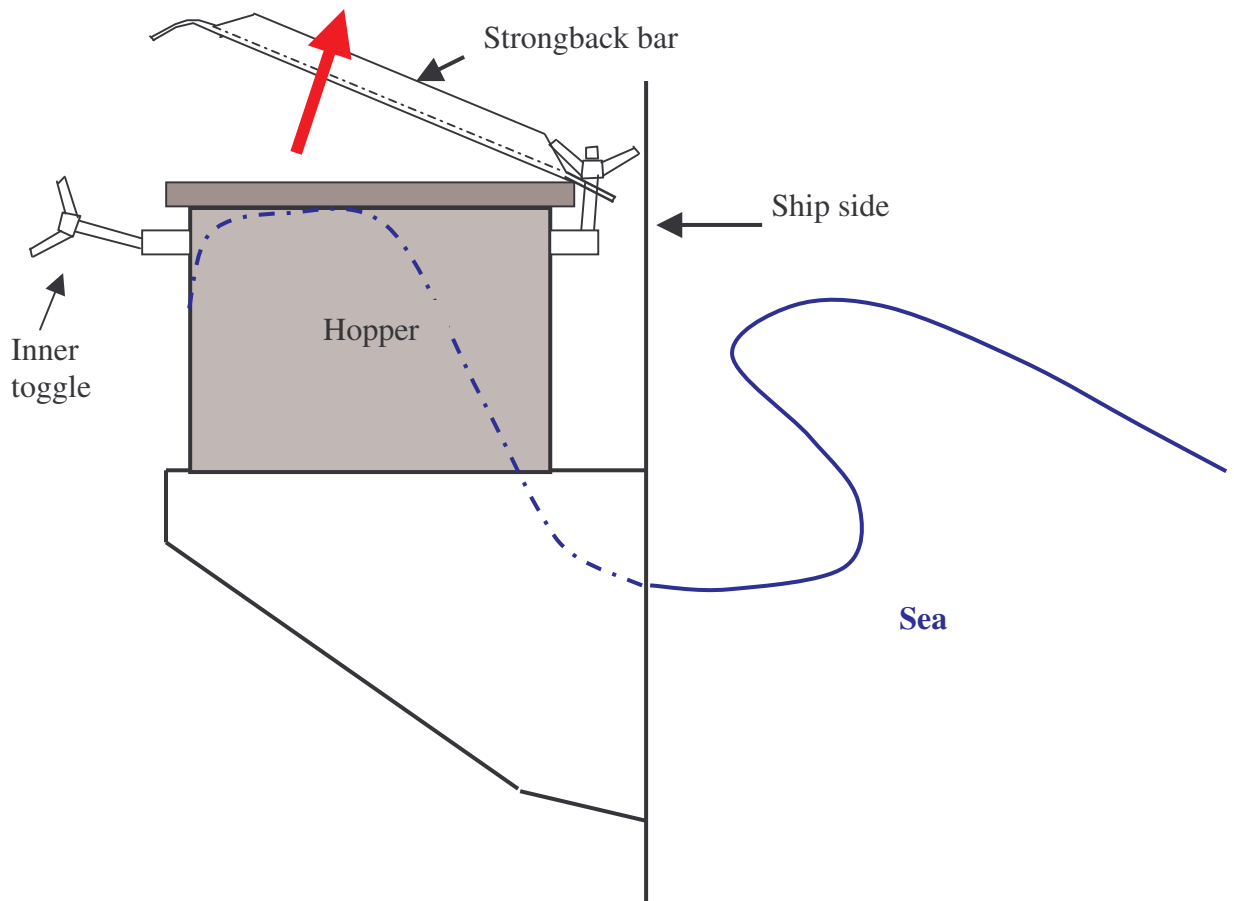
This is shown in the sectional view through the offal chute hopper below:



In the sketch above the outboard toggle is engaged fully within the forked tines of the strongback bar while the inboard toggle is not fully engaged, this is illustrated in the sketch below.



If the forces of the sea overload the toggles and strongback bar, they will fail at their weakest point. In the arrangement that is shown above, the forked tines of the strongback bar in way of the inboard toggle are the weakest point of the cover securing arrangement. The inner toggle would thus fail first, in the manner shown previously on pages 2 and 3. Thereafter the strongback bar would be 'catapulted' away from the inner covers and swept away from the chute by floodwater.



Conclusion

The final positions of the two toggles (as observed in the underwater image) and the fact that the strongback bar was neither attached to the toggles nor found nearby, is consistent with the failure mechanism that has been detailed above.

The evidence from the underwater image thus indicates that the offal chute inner covers may initially have been secured in the closed position by the strongback bar and toggles and that this closing arrangement subsequently failed, allowing the cover to burst open due to external seawater pressure.

Discussion

The two scenarios that have been outlined above describe two realistic failure mechanisms for the inner covers that are consistent with the known facts.

So why was this possibility not examined by the court during the course of the 2004 RFI?

One inevitable inference would be that scenarios such as those discussed in this paper, **were deliberately not examined**, because they would have diverted attention and undermined the court's predetermined and preferred outcome ie *that the vessel was lost as a result of crew error*.

Most of the parties to the Gaul RFI, especially those charged with its conduct, had had prior involvement in the Derbyshire's Formal Investigations. They would have therefore been well aware of the importance of the factual evidence obtained from the

underwater surveys and also of the significance that the ‘**toggles**’ could assume when it came to considering matters of crew negligence.

Extracts from the Report of the Re-opened Formal Investigation into the loss of the **MV Derbyshire**:

“1.24.....the disturbing aspect of this [Assessors]Report was that the main reason for entry of seawater into the bosun’s store in the first place was found to be the failure of the crew to secure the lid to the hatch on the foredeck.

1.25 This conclusion clearly involved the imputation of serious negligence against the officers and crew”

“7.35.....The toggles assumed considerable importance by reason of the conclusion arrived at by the Assessors in their Report that the lid had not been properly secured.”

Side remarks

The word ‘**toggle**’ is mentioned in the evidence heard during the Derbyshire Re-opened Formal Investigation a total number of **715 times**

The word ‘**toggle**’ is mentioned in the evidence heard during the Gaul Re-opened Formal Investigation (in relation to the inner covers of the duff and offal chutes), **once** only.