INTERNATIONAL MARITIME ORGANIZATION
4 ALBERT EMBANKMENT
LONDON SE1 7SR

Telephone: 020 7735 7611
Fax: 020 7587 3210
Telex: 23588 IMOLDN G

IMO

E

Ref. T1/1.04

MSC/Circ.995
11 June 2001

ADVICE ON THE DANGERS OF FLOODING OF FORWARD COMPARTMENTS

1 The Maritime Safety Committee, at its seventy-fourth session (30 May to 8 June 2001), considered the recommendations of the Re-opened Formal Investigation into the loss of the motor vessel **Derbyshire,** carried out by the United Kingdom, in particular that masters of bulk carriers should be made fully aware of the possible dangerous consequences of water entry into forward spaces and consequent reduction of freeboard, and approved the Advice on the dangers of flooding of forward compartments, set out in the annex.

2 Member Governments are invited to bring the annexed Advice to the attention of all those involved in the operation of bulk carriers and other similar types of ships flying their flags, in particular of all owners, operators and masters of such ships.

***

ANNEX

ADVICE ON THE DANGERS OF FLOODING OF FORWARD COMPARTMENTS

The capesize Oil Bulk Ore Carrier **mv Derbyshire** sank off Okinawa in Typhoon ORCHID in September 1980 with the loss of 44 lives. The cause of her sinking remained a mystery until 1994 when, using modern deep-sea underwater techniques an expedition located the wreck. This preliminary expedition led to a detailed survey of the wreck in 1997 which revealed aspects of the sinking that showed - after subsequent research using testing tank models – that the initial cause of sinking was progressive flooding of forward spaces.

The **Derbyshire** initially suffered damage to the air pipes serving the fore peak tank and the forward bosun's store. The damage was attributed to the impact of heavy seas on air pipes and, possibly, the displacement of the starboard windlass, which then caused further damage.

The research that was commissioned subsequent to the findings at the wreck site showed that large volumes of water can be taken in through damaged air pipes of the size and type typically fitted to bulk carriers and tankers to serve forward tanks. Flooding rates in excess of 400 cubic metres per hour through a single 300 mm air pipe were found to be possible in relatively heavy but by no means extreme seas.

Flooding of the fore peak and the forward ballast tank through air pipes caused the ship to trim by the head and reduce the effective bow height. Statistical analysis of tank test results indicated that, although there was a low probability of the ship meeting a hatch-breaking wave in her intact condition, a reduction in bow height of as little as 1.1m could lead to a 70% probability of encountering a hatch-breaking wave (depending on speed, etc). The hatch covers of Nos.1 and 2 cargo holds subsequently failed allowing rapid flooding of those spaces. The ship was then in a condition beyond its survival capability.

The evidence considered by the investigation indicated that these events took place rapidly. There was no evidence that any attempt to abandon ship had been possible. The events took place almost certainly at night and it was concluded that in such circumstances the ship's crew would have been unlikely to have detected the impending disastrous circumstances until the ship was already doomed.

Masters - particularly those who sail on large ships where the bridge is remote from the forward spaces - need to be especially vigilant that the weathertight integrity of their ship is fully maintained. After initial battening down, regular checks should be made to detect any reduction in the integrity of the closing arrangements. In particular:

- Spaces that are entered on routine basis should be subject to a careful check after their use to ensure that watertight integrity is fully restored.

- Rope and other hatches should have their fixing arrangements checked to compensate for any slackening of toggles or other fixing devices.

- Bilges and tanks should be regularly sounded and any ingress of water investigated.

- Where bilge alarms are fitted, they should be regularly tested.

- Pumping arrangements in forward spaces should be regularly checked for operational effectiveness.

Owners of ships without bilge alarms in remote forward spaces should consider fitting such devices with audible and visual indication on the bridge.

Masters should consider early evasive action in the event that severe weather systems approach the region in which the ship is navigating. Due regard should be had to the handling characteristics of the ship and any limitations of control that may lead to the ship being dangerously exposed to the forces of such extreme weather.

Masters should keep owners or managers advised when weather conditions deteriorate necessitating evasive action. Such advice should include position, course and speed and should be given more frequently in proportion to the severity of the weather and the limitations imposed on the ship's progress.

_____