Annex A

Occupational Health and Safety Inspection Report
28 June 2007

Occupational Health and Safety (O.H.A.S.)

Safety Inspection Checklist - Deck / Engine / Accommodation (Please Delete As Appropriate)

1.	Safe Movement AFT MOORING STN 28 JUNE 07		Yes	No
	a)	Are means of access to the area under inspection in a safe condition, well lit and unobstructed?	X	
	b)	If any means of access is in a dangerous condition, is the danger suitably blocked off and warning notices displayed?		X
	c)	Is access through the area both for transit and working purposes clearly marked, well lit, and unobstructed and safe?	X	
	d)	Are fixtures and fittings over which seaman might trip or which project, suitably painted or marked?	X	
	e)	Is any gear which has to be stowed in the area suitably secured?	X	
	f)	Are all guard rails in place, secured and in good condition?	X	
	g)	If portable ladders are in use, are they properly secured and at a safe angle?	N/A	

2.	Environment		Yes	No
	h)	Are lighting levels adequate?	X	
	i)	Is the area clear of rubbish, combustible material, spilled oil, etc?	X	
	j)	Is the ventilation adequate?	N/A	
	k)	Are members of the crew adequately protected from exposure to noise where necessary?	X	
	l)	Are loose tools, stores and similar items lying around unnecessarily?		X

3.	Working Conditions		Yes	No
	m)	Is machinery adequately guarded where necessary?	X	
	n)	Are necessary safe operating instructions clearly displayed?	X	
	o)	Are necessary safety signs clearly displayed?	X	
	p)	Are "Permits to Work" used when required?	X	
	r)	Are crew working in the area wearing necessary protective clothing?	X	
	s)	Is protective clothing and equipment in good condition and being used correctly?	X	
	t)	Is there any evidence of defective plant or equipment?		X
	u)	Is the level of supervision adequate, particularly for inexperienced crew?	X	
	v)	What practical occupational safety improvements could be made?	NONE	

Remarks

4.	Other Items		Yes	No
	w)	Are all statutory and Company safety procedures being followed?	X	
	x)	Is the Safety advice in publications, such as the "Code of Safe Working Practices" for Merchant Seamen, M-Notices being followed where possible?	X	
	y)	Have the crew in the area any suggestions to make?		X
	z)	Have any faults identified in the previous inspections been rectified?	X	

Annex B

MAIB Safety Flyer

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

FLYER TO THE SHIPPING INDUSTRY

Fatal accident to a crew member during mooring operations

A passenger ferry was preparing to sail from her normal berth. Wind and tidal conditions were benign and the departure procedures followed the vessel's normal routine. In the process of letting go, the operator of the stern line winch inadvertently heaved in the line instead of paying out slack. The line parted with a loud crack and snapped back, striking the legs of the Officer in Charge (OIC). Both his legs were broken, with the left leg almost severed. A shore worker's shoulder and elbow were also dislocated by the recoil of the line. The OIC was evacuated to hospital, where his left leg had to be amputated. He remained in a critical condition and died 6 days later.

The OIC of the after mooring deck was obliged to stand in snap back zones near the fairleads during mooring operations, so that he could relay orders to line handlers ashore and keep visual contact with the crew operating the mooring winches.

The stern line was made up of a polypropylene length from the ship, which connected to a High Modulus Polyethylene (HMPE) line permanently secured ashore. The difference in elasticity of the two lines meant that the shorter, more elastic, polypropylene length was subject to material fatigue effects from the constant cycle of stretching and release. It was further degraded by exposure to ultraviolet (UV) radiation from sunlight. Subsequent tests revealed its breaking load to have reduced from 60, to some 35 tonnes.

Although the management company required mooring ropes to be inspected, the procedures were informal, with no records kept. There were no criteria for rope replacement or specification for new ropes.

The electric mooring winch used for the stern line had a stated nominal load of 12.7 tonnes, and it was not immediately clear how this could have parted the rope, even in its degraded state. However, tests showed that the winch was capable of pulling up to 37 tonnes for a short period on first starting. There were no indications, either on the winch markings or in the manufacturer's manual, that the starting load was so much greater than the running load, nor was there any reference to the Minimum Breaking Load (MBL) of the rope to be used on the winch.

In a more recent case examined by MAIB, a ferry broke its moorings in high winds and drifted free, subsequently contacting a nearby rig. Although, in this case, initiation of the mooring failure was the failure of a quayside bollard, the remaining moorings consisted of a mix of rope types with differing physical properties. On transfer of the load, the more elastic moorings initially stretched, leaving the "stiffer" ropes to take the major part of the load, and fail. The remaining moorings then parted as the excessive load was transferred to them. Again, this highlights the requirement to consider a mooring plan "as a whole", taking into account the physical properties of all components.

Safety Issues

- The risks in conducting mooring operations must be rigorously assessed and safe working practices developed. Every vessel should have a set of guidelines for achieving a safe mooring which can be modified to suit operational or environmental circumstances.
- Man-made fibre mooring ropes deteriorate in service and can have serious consequences if they part. Operators should develop a *Rope Management System* to provide a formal inspection routine of all mooring lines, and include as a minimum:
    - Assigning competent people, with adequate training and experience to assess the condition of ropes.
    - A process of permanently identifying each rope, describing its function, specification and linking it to its warranty certificate.
    - Keeping records of planned inspections of each rope, including: date of manufacture and putting into service; condition; exposure to sunlight (or other contaminants) and any unusual loads to which it has been subjected, etc.
    - Establishing objective criteria for rope replacement and a specification for new ropes.
    - A storage routine in which all ropes are protected from damage and kept away from potential contaminants.
- Assess mooring arrangements as a system; consider the suitability of each element and the compatibility of individual components, particularly ship and shore supplied lines.
- Ensure that the full capabilities of mooring winches are known and understood by all those involved in conducting and managing mooring operations, including the Minimum Breaking Load of ropes to be used.
- Detailed information and guidance on mooring operations and rope inspection is available in publications produced by the Maritime and Coastguard Agency (MCA), Oil Companies International Marine Forum (OCIMF), the Nautical Institute and the Cordage Institute.

Further details on the accident and the subsequent investigation can be found in the MAIB's investigation report, which is posted on its website: www.maib.gov.uk

Alternatively, a copy of the report will be sent on request, free of charge.

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