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EMERGENCY EVACUATION STEERING COMMITTEE

WORK GROUP ON LIFEBOAT SURVIVAL AND RESCUE

APRIL-NOVEMBER, 1990

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APPENDICES

1. MANAGEMENT SUMMARY

The DEn/Industry Emergency Evacuation Work Group identified the need to examine problems encountered by personnel who may find themselves in Totally Enclosed Motor Propelled Survival Craft (TEMPSC) following an emergency evacuation from an offshore installation.

The issues included the equipment and design of TEMPSC as well as methods of recovery of personnel from the craft. It seemed appropriate to extend the discussions to include the rescue of personnel who may find themselves in the water, either as a result of escaping from a stricken installation, or from an inadvertent 'man overboard' situation.

It was recognised that most people placed in a TEMPSC evacuation scenario will not only be in a state of shock and apprehension as a result of the evacuation trauma, but in a short space of time will succumb to the effects of sea sickness. Sea sickness is recognised as debilitating and although generally not life-threatening the syndrome reduces the ability for self-help amongst survivors. The TEMPSC canopy tends to exacerbate conditions conducive to sea sickness and the report recommends that certain practical steps can be taken to assist in the management of sea sickness, and to provide some means in reducing the stresses which are likely to bring on this motion sickness.

Those involved in the rescue of personnel from TEMPSC can be assisted by the addition or in some cases improvement of equipment available within the craft. The provision of a flashing light on the canopy will assist in finding or monitoring the craft during the hours of darkness, for example, and a purpose-designed towing line may provide a better and safer option to the master of a rescue vessel over existing arrangements.

The work group took the view that the ability to communicate between those inside TEMPSC and would-be rescuers is a significant advantage, and to this end a suitable marine VHF multi-channel radio is desirable. It is known that some operators presently install such equipment in TEMPSC.

Several aspects of procedural operations are addressed, with the overall confirmation that the preferred method of recovering personnel from TEMPSC is by the use of fast rescue craft (FRC) deployed from a rescue vessel. Similarly, the deployment of FRC is still the most effective method of retrieving personnel from the sea, either from the single 'Man Overboard' situation in or in a major-incident with the possibility of several personnel having escaped from the installation direct to the sea.

2. TERMS OF REFERENCE

2.1. CONSIDER EQUIPMENT AND DESIGN IMPROVEMENTS TO TOTALLY ENCLOSED MOTOR PROPELLED SURVIVAL CRAFT (TEMPSC) IN ORDER TO ENHANCE SURVIVABILITY IN AN EMERGENCY EVACUATION

It is recognised that possible equipment enhancements or additions may be suggested which could be suitable for retro-fitting into existing craft, whilst more radical innovations affecting basic design of TEMPSC would of necessity only be possible in the long-term. Any findings or conclusions by the Working Group would be reflected in either of these two categories.

2.2. MARINE RESCUE OF PERSONNEL FROM TEMPSC

The working Group will address problems of rescuing personnel from TEMPSC, by methods other than by helicopter winching of survivors from the craft. (Developments in helicopter winching have been made by earlier work carried out by the Emergency Evacuation Work Group)

This recognises that TEMPSC should provide the optimum practical facilities and options for recovery of personnel from typical North Sea conditions.

2.3. RESCUE OF PERSONS IN THE WATER

Both single 'man overboard' incidents and multi-personnel incidents are discussed.

2.4. LIMITATION

The work group will limit its deliberations to the period between a survival craft or person entering the sea until the survivors are in a safe haven; ie, a ship, helicopter, ashore, etc. For the purposes of the work group, TEMPSC is being recognised as a transportation medium from which survivors still require to be recovered.

3. SUMMARY OF RECOMMENDATIONS

Recommendations relating to equipment

3.1. Marine VHF radio sets should be provided in TEMPSC, suitably rated for the harsh environmental atmosphere. This would encourage the development of more reliable 'weatherproof' VHF sets. (5.2.3) & (5.4.6)

3.2. A quick flashing white light is required on the canopy of TEMPSC. The light should be self-contained, ie, with its own power source, and controlled from inside the boat by an on-off switch. (5.2.6)

3.3. Effective internal lighting within the TEMPSC should be a requirement. (This is required under IMO regulations.) (5.2.6)

3.4. Effective means for replenishing lost body fluids, and thus reducing dehydration, are required. Suitable water containers should be provided for each seating position. (5.2.8)

Recommendations relating to design of TEMPSC

3.5. Noise insulation should be installed around the engine box. (5.2.3)

3.6. Suitable arrangements are required to allow for towing TEMPSC. The tow point is required at an optimum location on the stem of the vessel, with the towing spring permanently attached in such a manner that the eye at the end of the spring is readily accessible from another vessel by means of a boat hook. An internally operated 'quick release' device is required for the tow rope. (5.2.4)

3.7. Arrangements are required which allow the sea anchor to be deployed from within the craft without putting personnel at risk from falling overboard. It is necessary that the sea anchor and cable can be detached from inside the boat. (5.2.5)

3.8. Arrangements are required to prevent engine and exhaust fumes escaping within the TEMPSC, including a requirement that the exhaust system should he installed clear of the bilges. (5.2.1)

3.9. Electric start arrangements for the engine should be encouraged wherever possible. (5.2.10)

3.10. When stowed on the installation's davits, the interior of TEMPSC should be maintained in a warm and dry condition to reduce the adverse effects of condensation. (5.2.11)

3.11. The cox'n's seat should be such that he is comfortable and well-supported, and that he has good all-round horizontal visibility and from his position be able to see the falls' wires. He should readily be able to see inside the boat. The boat's consul and controls should be ergonomically designed. The compass should be mounted directly in front of the cox'n, and not too far below his horizontal field of vision. (5.2.6) & (5.2.7)

3.12. A secure body harness and some form of head protection is required at every passenger place. (5.2.8)

3.13. Suitable handholds should be provided within the craft to aid personnel movement. (5.2.9)

3.14. Future design of TEMPSC should be encouraged to incorporate an open protected cockpit with hatches into the interior. (5.2.9)

3.15. A central gully should be incorporated into the bottom of the boat leading to a sump which can be pumped out. A washrail rail system should be provided with two flexible hoses to enable the washing down of the boat or fouled clothing. This facility would require suitable pumping arrangements, (5.2.8)

3.16. A system of improving the ventilation of the boat is required. A 'Dorade box' would assist in satisfying this requirement. (5.2.1)

Recommendations relating to operational policy

3.17. Further work is required to identify a realistic policy, with respect to wearing immersion suits in TEMPSC and to provide suitable design features within the TEMPSC to reduce the stress to the wearer. (5.2.2)

3.18. When personnel are recovered from the water, every effort should be made to prevent them having to walk or climb, and they should be moved or transported in a horizontal position until it is apparent they have recovered body heat. (5.4.4) & (5.4.5)

3.19. FRC crew refresher training should be developed at suitable training establishments, and FRC crews required to attend such courses on a periodic basis. (5.5.3)

3.20. In the case of a vessel registered as a standby vessel, where it periodically assumes an alternative role - eg, supply vessel - the frequency of on-board FRC crew training should be maintained regardless of whether the vessel is acting as a standby vessel or not. (5.5.3)

3.21. Special equipment or devices installed on standby vessels to assist in the recovery of personnel from the water should in themselves not pose a hazard to people in the water. (5.5.1)

3.22. The preferred method of rescuing survivors from TEMPSC is by FRC, 'shuttling' to the rescue vessel. (5.3.1)

3.23. In weather which is so bad there exists a real danger of injury to personnel in rescuing survivors from TEMPSC, it is prudent for the rescue vessel to consider 'standing by' in order to allow the weather to abate, or to allow time for a support or other vessel to offer a lee to the TEMPSC. (5.3.1)

4. CONDUCT OF WORK GROUP

It was recognised by the Emergency Evacuation Steering Committee that both the Standby Ship Owners' Association (BSSOA) and the British Offshore Support Vessels' Association (BOSVA) could make a valuable contribution to discussions based on the Work Group's terms of reference, and both these organisations accepted an invitation to participate fully in the working group. The British Rig Owners' Association (BROA) were represented on the working Group, as were the Department of Energy (PED 8) and the Marine Technology Support Unit (MaTSU). The UKOOA Marine Committee and the UKOOA Safety Committee were represented through membership of the Emergency Evacuation Steering Group, a representative being co-opted to the Work Group.

The Working Group heard a presentation from Hamish McDonald of Maritime Rescue International (Stonehaven) on development work carried out by his organisation with particular respect to Fast Rescue Craft (FRC), and Chris McCleave of Design Research Centre, Brunel University, described a study of innovative lifeboat (TEMPSC) design.

The group recognised that work relating to lifeboat survival and rescue has already been carried out, and particular study was made of a document entitled 'Study of Enhanced Offshore Rescue Facilities' prepared by Global Marine for UKOOA, dated February 1990.

Five meetings were held between April and November, 1990, the venue alternating between London and Aberdeen, and a list of attendees is included in the Appendix.

5. DISCUSSION AND OBSERVATIONS

5.1. DESIGN OF CONVENTIONAL TEMPSC

All conventional TEMPSC protect the occupants from fire and gas and the environment by nature of the canopy, designed to be water-cooled. The canopy in itself, however, presents some particular problems, ie

The build-up of heat and other atmospheric problems within the vessel.

The lack of visual reference which accelerates the problems of motion sickness.

Amplifies engine noise levels within the vessel. These are debilitating and stressful, and cause significant communication problems.

Virtual unavailability of any outside deck space, which make all activities on or outside the canopy hazardous.

Can make it difficult for the cox'n to see where he is, or where he is going.

Make movement inside the boat hazardous, with a significant risk of head injuries.

Whilst the question of improvements or alterations in the overall design of the TEMPSC canopy would be considered by the group, it was appreciated that any significant deviations from the accepted practice would only be possible for longer-term assessment, involving an about-turn of philosophy with the authorities.

It is also widely recognised that if a TEMPSC is loaded to its rated capacity the conditions within the boat could conservatively be described as 'crammed', exacerbating many of the problems associated with evacuation of offshore installations by TEMPSC.

5.2. TEMPSC: AREAS OF POTENTIAL IMPROVEMENT

The group identified the following areas in which improvements to the existing arrangements could be made, both in equipment carried on board TEMPSC, and in aspects of its design.

5.2.1. Ventilation

Problems associated with ambient temperature within the vessel caused by the engine and body heat; build-up of fumes - engine and exhaust; stench of sea sickness; build-up of $C0_2$.

The generation of fumes from hot surfaces associated with the engine have been demonstrated on a number of occasions, and has been formally recognised by the issue of a DEn Safety Notice (2.90 issued March 1990). TEMPSC engines should now be run for prolonged periods in order to bake off volatile contaminants from hot surfaces i.e. paint, and the generation of associated fumes. The Safety Notice calls attention to the maintenance/inspection required of TEMPSC exhaust systems.

Department of Energy sponsored trials measured a CO_2 level of up to 4% in a closed-down TEMPSC laden to 75% capacity. The effects of CO_2 is to induce nausea and breathing difficulties. Both these symptoms promote fluid loss and dehydration.

Similar trials measured an ambient temperature 33°C after the engine had run for a period of time, again with the boat closed down. The volunteers inside the boat were seen to be in some distress towards the end of the trial. It should be noted that the metabolic heat generated from a full complement of 50 persons would be in the order of 5kW.

The best operating procedure in evacuation circumstances may be to motor the TEMPSC clear of the installation or other obstructions, deploy the sea anchor, shut down the engine, and await rescue. This procedure would alleviate some of the problems which contribute to a hot and foul atmosphere within the TEMPSC.

5.2.2. Survival Suits

It is known that the wearing of survival suits, especially in the enclosed atmosphere of TEMPSC (see 'Ventilation' (above)) causes heat stress to the personnel involved. The Ocean Odyssey incident highlighted the heat stress caused by wearing insulated suits in a closed-down TEMPSC. It is clear that an immersion suit is desirable at the time of transfer out from the TEMPSC, where there is some risk of falling into the sea. However, it is also clear that an immersion suit which adds to the already stressful environment within the craft should be avoided.

It is recognised that this is a significant consideration. Further work is required to identify a realistic policy for the wearing of immersion suits in TEMPSC and to provide suitable design features within the TEMPSC to reduce the stress to the wearer.

5.2.3. Communication

The ability to communicate in an emergency situation is of high priority with respect to effecting rescue from within the TEMPSC. Communication with the 'outside world' has a significant effect on the morale of survivors.

Radio Communications Radio Communications could be critical for survivors within the boat; ie, instructions from rescue agencies; information from the cox'n to rescue agencies regarding health or injuries of survivors, morale, etc. Present offshore legislation requires either a radio operating on 2182 kHz, or VHF channel 16. We consider this to be insufficient, and TEMPSC should be equipped with a marine multi-channel VHF set. There is already some experience of VHF sets designed for aggressive environment but it has been found that so-called weatherproof VHF sets are not impervious to prolonged exposure to a damp atmosphere.

Reliability of radio communication would seem to be an important issue, and the point is particularly relevant when discussing fast rescue craft (5.4.3)

Noise Levels within TEMPSC Experience has also shown that verbal communications within the boat are especially difficult due to the engine noise level. This adversely affects the orderly control of those within the craft.

Noise insulation around the engine box is highly recommended.

5.2.4. Towage Arrangements

The master of a rescue vessel should have the option of taking a TEMPSC in tow. This would be made easier if the TEMPSC was fitted with suitable towing attachments.

The work group recognised that the falls hook does not provide satisfactory towing arrangements. Earlier work demonstrated that towing from the falls hook induces an overturning moment to the craft. (Recovery of Personnel From Survival Craft, Institute of Offshore Engineering, Heriot Watt University, February 1988)

Suitable arrangements are therefore required to allow for towing of TEMPSC. A tow point is required at an optimum location on the stem of the vessel.

The towing spring should be permanently attached to this point in such a manner that the eye at the end of the spring is readily accessible from another vessel by means of a boat hook. An internally operated 'quick release' device is required to release the tow rope. (3.5)

5.2.5. Sea Anchor

Earlier experience in working with TEMPSC on related work highlighted difficulties associated with the deployment of the sea anchor. It is generally not possible to deploy the sea anchor without prejudicing the 'closed-down' security of TEMPSC or placing those involved in deploying the sea anchor in a degree of peril.

Arrangements are therefore required which allow the sea anchor to be deployed from within the craft without putting personnel at risk from falling overboard. It is necessary that the sea anchor and cable can be released from within the boat.

5.2.6. Visibility

Several aspects of visibility were discussed by the Work Group.

Cox'n's Visibility It is considered essential that the cox'n is afforded all-round visibility from the steering position within the boat, with the boat in the 'closed-down' situation, and as a minimum, the cox'n should be afforded 360° horizontal visibility from his steering position, readily be able to see the sea around him, and again, from his helm position, be able to observe his fellow survivors.

Internal Lighting In the closed-down situation, very little light gets into TEMPSC. A translucent panel in the canopy would significantly improve the amount of light available within the craft, and consideration should be given to encouraging this facility. It is noted SOLAS regulations state:- Chapter III, Regulation 44, 2.7, 'windows or translucent panels on both sides which admit sufficient daylight....with the hatches closed to make artificial daylight unnecessary.'

During major refurbishment of existing TEMPSC consideration should be given to install suitable translucent panels.

During the hours of darkness, internal illumination of the craft is desirable.

Within the lifesaving appliance legislation for offshore installations, there is a requirement for artificial lighting within TEMPSC.

It would appear that this requirement can be satisfied by having an electric torch available to the cox'n. It is noted that under IMO legislation, (Chapter III, Regulation 41, 7.11.) 'a lamp or source of light shall be fitted inside the lifeboat....' would seem to discount a torch being admissible for this purpose.

The work group considered the standard of illumination should be sufficient for example, to allow ready location and use of first-aid equipment etc. Fixed illumination in addition to a torch should be provided.

Visibility at Night According to the report into the capsize and sinking of the Rowan an Gorilla I in the North Atlantic the TEMPSC with its survivors was unable to be seen by the rescue tug after it became dark, and visual contact was possible by a circling rescue aircraft dropping illumination flares.

An exterior navigation light is not presently required by offshore legislation, and it was unanimously considered by the work group that a self-contained white high-intensity flashing light mounted on the canopy of TEMPSC would greatly improve SAR at night, as required under SOLAS Regulation 41, 7.10.

5.2.7. Boat's Compass

It is reported that the boat's 'approved' compass is occasionally installed at a location between the cox'n's knees or between his feet; is difficult to read and respond to, and is liable to erratic deviation.

The usefulness of a compass in TEMPSC was discussed, with the group reiterating its requirement, if only having the capability to maintain a general course at the request of a rescuing vessel. The cox'n will gain minimal assistance from the compass in manoeuvring away from a stricken installation.

5.2.8. Seasickness

It is inevitable that some personnel will succumb to motion sickness when in a small closed-down craft in any form of a sea-way. In the rig abandonments associated with the Alexander Keilland, Vinland, Ocean Odyssey and Rowan Gorilla I, seasickness occurred in 75% or more of TEMPSC occupants.

It is acknowledged that sea sickness is not in itself life threatening, but is detrimental to a person's physical and psychological condition, and reduces his ability to co-operate and self-help during recovery. The group recognise that the UKOOA Medical Advisory Committee have done work in this area regarding drugs to combat the syndrome, but the group would wish to explore aspects of boat design or equipment which could assist in regressing the symptoms.

It is necessary to

a) provide some facilities to cater for the control of vomit, odours, etc. It would be advantageous to have some method of washing down the interior of the boat, soiled clothing or equipment, with the soil allowed to run down a central gully in the bilges in order that it can be pumped out. A washrail rail with a couple of flexible hoses would satisfy this fairly basic duty, supplied by a hand pumping arrangement.

b) provide some means of reducing the stresses which are liable to promote sea-sickness, as discussed earlier in this report - ie, temperature control, foul odours, carbon dioxide build-up. The discussion contained within 5.2.1 (Ventilation) of this report has bearing on these points.

c) recognise that when people succumb to sea sickness they tend to go limp. There is therefore significant risk of injury unless the personnel are well secured together with some form of head protection.

Dehydration It should be recognised that dehydration presents a serious potential health hazard to TEMPSC occupants. It is brought about by excessive fluid loss due to overheating or seasickness.

There is a need for an effective method of rehydration ie, the means whereby TEMPSC occupants can make up this fluid loss. Whilst it is recognised that drinking water is carried on TEMPSC, (offshore legislation calls for of 1 litre per occupant, IMO SOLAS requirements is 3 litres), it is necessary that this water is readily available to each occupant of TEMPSC. In the North Sea, it is improbable that survivors from any incident will be more that a few hours in TEMPSC before being recovered - a completely different scenario to survivors from a ship lost on the high seas, with a possible requirement to rigidly control the distribution of drinking water.

For offshore requirements, therefore, drinking water or rehydration fluid should be packaged and stowed such that it is adjacent to the occupants. The design of the container should consider the problems likely to be experienced by personnel in a tightly-packed situation, secured by a seatbelt, and in a highly unstable situation.

The stowage and packaging of drinking water requires consideration and updating.

5.2.9. Ergonomic Lay-out

It is recognised that the layout of the inside of TEMPSC is such that personnel are prone to banging their heads or falling about. The seatbelt is of economical design, with the regulation specifying 'suitable seatbelts with simply operated quick release buckles'. In effect, the seatbelts are in the form of lap belts, offering no support to the trunk or shoulders. The lap belt was recognised as being inadequate to meet the needs of a survivor and a full waist and shoulder harness together with a padded head support was recommended.

The boats are usually bereft of hand-holds, and it may be that a re-arrangement of the seating arrangements would be beneficial. Boats which are installed pointing outwards from the installation (Cullen recommendation 79) would seem to be suitable for stern entry. It is possible that such arrangements would favour a more orderly method of loading a TEMPSC and provide the possibility of an open cockpit.

Other benefits of outward-facing boats with stern entry could be associated with the better ability to offer protection to personnel at the embarkation point.

The Working Group discussed seating arrangements and were in favour of fore and aft benches where it is easier to move around more quickly to render assistance to fellow survivors.

Athwartship benches at best present an obstacle course of some proportions, and this arrangement is further complicated by survivors sitting and being strapped in on lower athwartship benches making movement extremely difficult for anyone.

5.2.10. Engine Start

It was recognised by the group that existing hydraulic start devices have limitations. Primary concerns are associated with the time required for subsequent start attempts should the engine not start at the initial attempt.

The provision of engine electric starter with conventional batteries is considered a ready solution for starting TEMPSC engines. Provision for trickle charge with suitable disconnect coupling is required. (3.10)

5.2.11. Condensation

It was recognised by the group that the build-up of condensation within TEMPSC can cause significant problems. They include

- possibility of icing on floors and seats, etc.

- corrosion, especially with relevance to electrics, radio, etc.

- poor starting performance of engine.

These problems could be largely overcome by ensuring the atmosphere within TEMPSC is maintained warm and dry. This could be achieved by techniques presently available. (eg, 'black' heater)

5.3 RESCUE OF PERSONNEL FROM TEMPSC

5.3.1 Bad Weather Considerations

Discussion

The group were of the opinion that the preferred method currently available for retrieving personnel from a TEMPSC was by Fast Rescue Craft (FRC), and transferring survivors in a 'shuttle' mode back to the rescue vessel. The option of laying the standby or rescue vessel alongside a TEMPSC and transferring personnel directly on board is less favoured, with the risk of severe damage to TEMPSC or injury to the survivors.

In a 'for real' evacuation incident, the question of timing with respect to the retrieval of personnel from TEMPSC in inclement weather is periodically raised in discussion. The decision on whether to proceed with the transfer attempt will be based on personal opinion of the skipper of the rescue vessel, and rarely substantiated by any direct experience of this potentially hazardous operation.

Broad guidelines are therefore offered

If the weather is so bad that there exists a real danger of injury to the survivors or to the rescuers whilst attempting a transfer, it is prudent for the rescue vessel to consider 'standing by' the TEMPSC in order for the weather to abate, or to allow time for a large support vessel to offer a lee to the TEMPSC. Recent work carried out by the Emergency Evacuation Steering Group in the Beryl Field and with the co-operation of Mobil, clearly demonstrated the positive effects a powerful and manoeuvrable vessel can have in quietening a confused sea.

If the TEMPSC is seen to be in difficulties due to damage, or it is known there are personnel who have suffered severe injuries and in urgent need of medical attention, the skipper of the rescue vessel may be faced with a 'force majeure' situation, and will probably proceed with an attempted transfer - possibly against his better judgement - and in the knowledge that in doing so may cause a degree of injury to the survivors.

5.3.2. Lifting TEMPSC by Crane

The question of the survivors being rescued by lifting the TEMPSC on to an installation or suitable large vessel (diving support vessel, for example) by crane was considered. Such operations had been carried out successfully on unmanned ballasted TEMPSC off the east coast of Canada during bad weather PROD trials.

Some observations are made with respect to this method of TEMPSC recovery.

i) TEMPSC would have to be provided with a single lifting point above the canopy and of suitable strength to withstand a significant snatch load (weight of fully-laden TEMPSC, typically, 8.5 tones). Such a lifting point would probably incorporate a large 'A' frame structure attached to strengthened securing points on the craft's hull.

ii) There are few support vessels with cranes of sufficient capability to lift a weight of this magnitude. The commitment to have TEMPSC adapted with the lifting frame would have to be balanced against the likelihood of a suitable crane vessel being available.

iii) The risk analysis of a TEMPSC being lifted in this manner and full of survivors has not (to our knowledge) been addressed. Such an analysis should be undertaken.

The above points require consideration before the crane-rescue option can be recommended for use in the North

For the purposes of the report, this topic is not pursued.

5.4. RESCUE OF PERSONNEL FROM THE WATER

5.4.1. Use of FRC

The use of FRC is considered be the best method of rescuing personnel from the water, and it is likely that the FRC will have been launched from a standby vessel.

5.4.2 FRC Equipment

A FRC should not be cluttered with 'possible' survival or rescue devices, eg stretchers. The group took the view that any injuries to personnel in the water are secondary in importance to the primary aim of removing that person from the water. The principal consideration with respect to performance of the FRC should revolve around the speed of recovering personnel from the sea, and this should not be compromised by carrying 'nice to have' equipment. Injuries cannot be realistically be attended to on a FRC.

Equipment such as buoyancy devices should not normally be stowed on the FRC, but in the event of an incident involving many people in the water it may be prudent to consider distributing - by FRC - buoyancy devices normally stowed on the standby vessel before commencing individual resuces.

5.4.3 Transfer from FRC to Standby Vessel

Assuming the FRC has successfully retrieved survivors from the water, a significant risk - particularly in bad weather - will be associated with transferring the survivors from the FRC to the standby vessel. The access port into a standby vessel's side has a freeboard of up to 1.75 metres, but this may prove to be outwith the capability of an exhausted survivor, possibly weak with motion sickness and stiff with cold. In such circumstances, therefore, it will probably be prudent to recover the FRC, with crew and survivors on board, to the deck of the standby vessel.

5.4.4 Circulatory Stress Phenomena

There is a potentially hazardous complication to which a rescued person may be exposed if he is required to climb a vertical scrambling net in circumstances described above.

A person suffers severe circulatory stress if he is severely chilled and attempts movement in an upright attitude - ie, walking.

The phenomena is now well recognised and is thought to be associated with the loss of the hydrostatic support a person's circulatory system receives whilst in the water. That support is removed when the person is taken out of the water, and if that person walks - or even stands - his blood pressure will drop and cardiac arrest may occur.

The complication would be largely negated if he is lifted in the FRC directly to the deck of the rescue vessel, and thereafter transferred to a place of recovery by means of a stretcher.

A similar risk has been identified if a person is retrieved from the sea by a rescue helicopter using a conventional 'horse's collar' lifting sling, again inducing a circulatory problem by reason of the cold blood in his legs. This has been addressed by some rescue agencies with the provision of double straps to keep the survivor horizontal during the lift.

5.4.5. Severe Seasickness

It has been shown that a person who is suffering from severe seasickness will be unlikely to be able to climb vertical scrambling nets or ladders by reason of physical weakness and general disorientation.

This further supports the procedure whereby the FRC - with its survivors - is lifted directly to the deck of the survival vessel.

5.4.6. FRC Radio

It is necessary that multi-channel VHF marine radios are carried on board FRC's, and is recommended that the equipment includes a headset of earphones and mike. Although so-called 'weatherproof' sets are available, it is reported that these radios suffer from the effects of long-term dampness and exposure to a hostile atmosphere.

The work group recognise there is a need for further development in the field weather/ waterproof radios.

5.5. EQUIPMENT ON STANDBY VESSELS

The working group studied the Department of Transport 4th Draft 'Code of Practice of the Suitably of Standby Vessels', and recognised that enhancements in manning scales and equipment would have a significant knock-on effect to the industry.

There were, however, some topics which the were worthy of specific mention.

5.5.1. Scrambling Nets

Conventional scrambling nets are of limited effectiveness due to the degree of strength required by a survivor to climb these nets.

A method of recovering personnel using a net is required which does not require exertion on behalf of the survivor. A number of devices have been developed or proposed, and these will all have a degree of effectiveness. There are certain potential disadvantages associated with some such equipment and they should, therefore, be understood.

It should be ensured that a system which uses a net incorporating a lifting mechanism for recovering personnel from the water does not tend to roll the survivor up against the side of the vessel. Any boom designed to support a recovery net must not compromise the safety of personnel in the water; ie consideration must be given to the possible hazard of a boom projecting out from the side of a vessel in such a manner that when the vessel is rolling in heavy seas the end of the boom is periodically immersed in the water. This situation would pose a significant hazard to a person being recovered by the net method.

It was felt a boom in the fore-and-aft direction used to support a net would not pose the same threat to a person in the water, provided the net recovery arrangements allow the rescued survivor to be lifted clear of the ship's side.

5.5.2. Rescue Baskets

Whilst the work group recognise the desirability of having rescue baskets as part of the standby vessel's rescue equipment, it is our view that mechanical means should be provided for the recovery of the basket back on board the vessel.

5.5.3. Training for FRC Crews

The effectiveness of the FRC rescue capability is vitally dependent on the competence of the cox'n and crew of the FRC, and this competence is only developed through training and familiarity with the equipment.

It is noted that Recommendation 96 of Cullen's report into the Piper Alpha Disaster states:

> 'The cox'n and crew of fast rescue craft should receive special training for their duties, along with regular refreshers.'

The requirement for 'on board' training is recognised in the Department of Transport Code but it is felt that formal refresher training at an approved training establishment should be addressed. FRC crews have a basic course in boat handling and rescue techniques, but it is considered that refresher training is essential to maintain a uniformity of standards, provide a practical forum for the update of equipment and procedures, and to provide a means of assessing the proficiency of the crews.

These refresher courses should be specifically tailored to recognise that the crews already have basic knowledge in FRC, and the syllabus should not simply mirror the basic course.

It was further recognised that some vessels have other roles; ie, they may be supply vessels or anchor handlers for extended periods of time. In these roles there may not be the opportunity - or inclination - for regular on-board FRC training. When such a vessel assumes the duties of a standby vessel, the effectiveness of its rescue capability may be compromised by lack of on-board training of its FRC crew.

It is therefore recommended that any vessel which is certified as a standby vessel should have as a condition of that certificate the requirement for (say) weekly on-board FRC training practice, regardless of whether the vessel is assuming the role of a standby vessel or not.

APPENDIX I

LIFEBOAT SURVIVAL AND RESCUE WORK GROUP

LIST OF PARTICIPANTS

WS Ballingall	BP Exploration, Chairman
DH Robertson	MaTSU, Secretary
MG Lunt	PED 8, DEn
A Rose	BROA
E Robertson	Conoco
AK Shannon	Suffolk Marine
JJS Daniel	SSOA
AP Bartholomew	Houlder Offshore Engineering
Patrick Lynch	North Star
H Davis	Maersk
W Dick	Maersk
J Balls	Colne Shipping

APPENDIX II

PRESENTATION TO WORK GROUP BY MARITIME RESCUE INTERNATIONAL

Hamish McDonald of Maritime Rescue International gave a presentation with respect to an 'Offshore Maritime Project II'. The thrust of the presentation was that all possible development of the conventional semi-rigid fast rescue craft (FRC) had been explored, and that a new concept in fast rescue boats was required. This concept would be a derivative of a military intercept/assault craft with which MRI had been closely involved.

MRI were invited to undertake an assessment of the fast rescue craft presently in common use in the North Sea. Specifically, they were asked to examine FRC launch and recovery procedures, shortcomings in capability or performance, and consider available equipment with respect to expectations.

The report on their assessment has not (as yet) been received.

PRESENTATION TO WORK GROUP BY BRUNEL UNIVERSITY

Dr Peter Robertson of Design Research Centre, Brunel University, introduced a presentation by Chris McCleave which highlighted studies and findings of work carried out in connection with a design feasibility study jointly undertaken by the Royal College of Art Industrial Design Department and RGIT Survival Centre Technology Research Unit.

The proposal, in essence, was to undertake performance evaluation trials of a scale model TEMPSC designed as a result of the above studies. A 'standard' design TEMPSC, on the same (fifth) scale would be used for comparison purposes.

Brunel have now withdrawn this proposal due to the lack of a suitable test facility.