

CHIEF & ASSISTANT CHIEF FIRE OFFICERS  
ASSOCIATION  
(SOUTH WEST REGION)

OPERATIONS WORKING PARTY  
~WATER SAFETY GROUP ~

**‘SAFE’  
WORKING ON  
OR  
NEAR WATER**

DRAFT RESEARCH REPORT  
10<sup>th</sup> January 2001

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# APPENDICES

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## FOREWORD

The guidance contained within this document, if followed, will ensure that a systematic process is undertaken in determining the approach to dealing with 'water related incidents' (WRI's). There are advantages, disadvantages, limitations and new developments that are on-going. It is not intended that the guidance remains static. This CACFOA South West Regional approach and framework document was instigated via CACFOA (SW) Operations Working Party ~ Water Safety Group'.

The 'Water Safety Group' (WSG) will continue to meet as dictated by CACFOA (SW) Operations Working Party to consider:

- Current research and development programmes and provide input where appropriate.
- Research findings.
- Reports and experience reported through the Network.

When an amendment or addition is considered it will be implemented and the relevant pages amended including the date reference in the footer. Amendments will be circulated, subject to consultation within CACFOA (SW) Operations Working Party.

## TERMS OF REFERENCE

At a meeting of Chief Fire Officers in the South West on 19<sup>th</sup> December 2000 it was agreed that we attempt to work together on determining standard 'water safety' equipment needs and specifications for the South West.

The sole terms of reference were stated as 'to agree equipment needs for water associated operations and the specification for the same'. However, the WSG felt that to deal with this item in isolation left unanswered questions on key aspects of water safety, therefore the additional terms of reference have been included by the group:

- Carry out a full risk assessment of incidents involving water related incidents (WRI)
- Research the use of appropriate equipment for WRI's in other UK Fire Services and abroad.
- Taking into account any national implications identified via CACFOA, DETR, etc.
- Collate the resulting research material to formulate short and long term options for the SW.
- Make recommendations on equipment and training.
- Provide costings.
- Produce a generic Operational Policy Document that meets the need of South West Fire Service's.

## ACKNOWLEDGEMENTS

- CACFOA South West Chief Officers Group
- CACFOA South West Operations Working Party
- Avon Fire Brigade
- Cornwall County Fire Brigade
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- Somerset Fire Brigade
- Wiltshire Fire Brigade
- Greater Manchester County Fire Service
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# 1. INTRODUCTION

In recent years, South West Fire Service's have responded to numerous incidents involving people or animals in difficulty on or in water, mud and ice. The rescues have been affected by improvisation of fire fighting equipment or commandeering whatever other equipment is available.

Experience has shown that nationally, Fire Service fatalities and injuries resulting from the exposure to WRI's have occurred directly or indirectly as a result of: -

- Inadequate understanding of the hazards and risk.
- The lack of training.
- Limited suitable operational equipment.
- Limited availability of suitable PPE to support and protect operational personnel when operating within this hostile and dangerous environment.

The Fire Service does not have a statutory duty to respond and apply resources to incidents of this type. However, the Fire Service are the prime rescue service across a wide diversity of hazardous situations that the public may be exposed to.

Many of our activities do involve working in, on or near water. This may be during training or when attending operational incidents e.g. 'working from open water' - which can have it's own inherent risks!

It is recognised by the Service nationally that there is a strong public expectation for the Fire Service to attend incidents with the purpose of saving life or rendering humanitarian services... and historically that is what we have done.

*Current climate conditions are known to be changing and the potential for increased exposure to water related incidents will increase. This has been clearly identified both nationally and internationally. Therefore we must be prepared to deal with this type of incident on a more frequent basis in the future.*

## 2. SOUTH WEST POLICY STATEMENT

The Fire Service attends a number of incidents each year where personnel are potentially at risk from injury or loss of life due to working in close proximity to water.

Operational personnel must be aware of the dangers presented at such incidents and ensure that the safety of all concerned in these activities is maintained through pre-planning together with operational dynamic risk assessment.

Although the primary water risk within the Region stems from coastal and estuarial waters, a number of other risk areas exist such as:

- Offshore.
- Fast and/or deep running rivers.
- Spate conditions e.g. Flooding.
- Reservoirs.
- Ponds and lakes.
- Quarries.
- Mine shafts.
- Local flooding.
- Slurry pits.
- Canals

These risk areas in turn can be sub-divided into categories of tasks and for each exposing the firefighter to some degree of hazard. Although these are numerous they mainly fall under the following headings:

- Working alongside water.
- Working on/being transported on water.
- Pumping from open water.
- Water rescues.
- Mud/sand rescues.
- Ice rescues.

Other areas of activity, such as line rescue operations, confined space, sewer and slurry pit rescues, will also subject firefighters to similar hazards, but due to the nature of such risks additional control measures will be required to protect the individual from contamination, infection or asphyxiation.

**The Fire Service recognises the public's expectations and accepts the moral responsibility of providing a predetermined and designated call for assistance. Therefore we will provide an appropriate level of response to all distress calls received in these criteria where the public are at risk.**

### 3. EXECUTIVE SUMMARY

This document provides guidance to Chief Fire Officers for the safe and effective approach in dealing with inland water related incidents (WRI's)

The guidance sets out a compliance framework providing systematic and logical processes to follow. Dealing with WRI's is by nature a hazardous activity where it is unlikely that total safety can ever be guaranteed.

Following this guide will, however, enable a position of compliance to be achieved.

The document provides a guide through the key risk control measures necessary to ensure the safe delivery of training. This includes risk assessment and competence of staff and use of operational equipment.

Guidance is provided on the provision, use and management of operational equipment including PPE.

Analysis of previous incidents in the South West Region indicate that there is a need to train and equip the firefighters appropriately in safe working at WRI's so as to ensure their own personal safety, and meet the expectations of the public.

The outcomes shown in this report in terms of costings are, not surprisingly high, and may need to be tailored to suit any available funding but it is essential to allocate sufficient resources to provide the best level of equipment and training possible

In broad terms, the costings primarily consider:

- Equipment
- Training

CACFOA South West (Operations Working Party) should act to continue development in this area, as a joint initiative can lead to a reduction in procurement costings.

Additional savings may be found by joint Best Value initiatives through shared resources from other agencies such as MCA, RNLI, EA and the RSPCA.

Further guidance may be available to Brigades in the near future via the Home Office and 'DETR.



## 4. HAZARDS ASSOCIATED WITH WRI'S

- 4.1 'WRI's' are in themselves a generic term and can comprise of incidents involving- 'still' and /or 'fast flowing 'water, e.g., ponds, quarries, lakes, beaches and estuarial waters, weirs and areas of mud and slurry. There are other variables that can be added to those basic water types such as remote locations, steep banking, cliffs and restricted access.

Climatic extremes further add to the complexity of these incidents and can significantly change the required approach, for example, extreme cold resulting in water courses forming ice and presenting a new set of hazards to crews.

The physical arena confronting the initial crews is then exacerbated by the nature of the emergency and what is involved. Some examples might be; submerged cars, boats, aircraft, people or animals requiring rescue or environmental protection issues.

It follows that crews will also face situations where by necessity they will have to work from or very near 'open' water.

- 4.2 Throughout all the possible scenarios that may be encountered runs the fundamental element of time. The urgency of the situation will dictate the response selected by the Incident Commander based on the following key elements: -

- Dynamic Risk Assessment
- The 'safe person' concept
- A generic approach to water related incidents.

These three elements are supported by the Incident Command System, and together will form the basis of the Incident Commanders tactical decision making.

In order to work safely alongside water and to enter water for rescue purposes with the minimum of risk to themselves, it is essential that personnel appreciate the hazards that water presents.

*(It is worth considering that, according to statistics from the USA, 10 percent of people drowned each year are professional rescuers!)*

- 4.3 Firefighters spend a proportion of their duties involved in activities working near water. Normally, this involves pumping from ponds, lakes and rivers, but on occasions they will be called upon to rescue persons and animals from water, sometimes in hazardous, time-critical situations.

It is essential therefore, that personnel appreciate the hazards associated with WRI's. These may be briefly summarised as: -

- Current, flow, undertow, eddies, whirlpools, weirs, stoppers.
- Weight, temperature.
- Depth.
- Water clarity.
- Pollution/Contamination/Biological risks.
- Mud, Silt, Roots, Weeds and Rocks.
- Entrapment, debris/trees, fencing, cars, shopping trolleys - strainers.
- Panic of casualty.
- Riverbank quayside conditions (slips, trips, and falls).

- Surface vessel movements and water borne debris.
- Impacts from casualties and animals.
- Sprains and strains caused by pulling and lifting from unnatural positions.
- Drowning/fatigue.
- Danger from action of bystanders.
- Equipment falling in.
- Electrical hazards - overhead power lines, etc.
- Inadequate lighting.

**4.4** The Operational Procedures Section of this document outlines the actions to be taken by crews to minimise the risk posed as a consequence of the above hazards. However, special consideration should be given to the following: -

#### 4.4.1 Current/Flow

There are two types of current generated as water flows along a river: - helical flow and laminar flow.

- Helical Flow is the flow, which causes the banks of the river to be undercut. The hazard provided by this current is that an object in moving water will tend to be swept away from the bank into the centre of the river.
- Laminar Flow does not provide a particular hazard in itself, but it is worth noting that it causes water near to the surface to move more quickly than water near the riverbed.

Furthermore, at a bend in the river, water on the outside of the curve will travel faster than that on the inside.

#### 4.4.2 Fast Flowing Rivers:

In any fast flowing water stream, various currents and eddies will be formed by obstructions in or under the water, thus changing the direction and speed of the flow. These eddies can have adverse effects on a rescuer and must be considered in the dynamic risk assessment. Remember that waves on the sea tend to move and the water stays still but in a river the waves remains in one place and the water moves. Therefore, eddies and currents can often be detected by the presence of such static waves.

#### 4.4.3 Weirs/Stoppers

The hazards presented by these currents to a person or object in the water is that they will be drawn upstream towards the face of the weir by the tow back then forced under the surface, to be flushed out further downstream. In many cases the person or object is again caught by the tow back and circulated in a similar manner, rapidly becoming disorientated.

#### 4.4.4 Weight of Water

The weight of water exerted against an object is directly related to the speed of the flow. A flow of 1m per second exerts a force of almost 8kgs on a person's legs (in depth of approximately 1 metre). If the flow doubles to 2m per second the force quadruples to 32kgs.

**N.B. Double the water speed = quadruple the weight.**

Thus standing in fast flowing water is extremely difficult.

#### 4.4.5 Strainers

The main hazard associated with a strainer is that a person or object may be drawn against it and trapped by the weight of water passing through it.

#### 4.4.6 Entrapment

A similar hazard to strainers exists where fast moving water flows against a solid object such as a bridge pillar. Although most objects will tend to be flushed around the obstacle, a swimmer or boat that hits side on can be pinned against it with considerable force.

Rocks or other debris below the water surface may cause entrapment hazards to personnel wading in the water. This is particularly hazardous in flowing water where the weight of water may also cause a loss of balance.

**4.5** The local environment could have a profound effect on the situation and the following hazards should be considered in the operational risk assessment: -

- Fast flowing rivers and changes in water flow due to tidal conditions, heavy rain, and flash flooding may increase the risk. Conditions could change quickly and dramatically due to these effects.
- In tidal situations, local tide times and heights should be ascertained either locally or through Fire Control at the earliest opportunity.
- Particularly in quarries and around the coastline the bottom may shelve away very quickly, changing the depth of water from a few millimetres to 30 metres or more.
- Underwater obstructions and hazards may be unseen and personnel must take the utmost care when moving through water. It is best to adopt a shuffle as when wearing BA and some form of additional support such as a ceiling hook may be of use.
- Darkness will significantly increase the risk to rescuers and additional lighting should be provided. Rescuers should carry a lit torch or light stick to enable the shore crew to see them. High visibility jackets may also be worn under lifejackets to increase visibility.

**4.6** All open water is potentially hazardous and the risk to the firefighter may be increased by the presence of contaminants. The sources of such contamination are numerous, but stem mainly from the following: -

- Outflows from slurry pits and sewage/water treatment plants.
- Run-off from agricultural and industrial sites.
- Leaking fuel from submerged vehicles.
- Blue green algae (usually in summer months).
- Water borne diseases.

## **5. HEALTH AND SAFETY**

### **5.1 Risk assessments**

See Appendix D.

### **5.2 Basic safety rules:**

There are a number of Health and Safety rules, which have been taken into account and form the basis of the recommendations for the provision of equipment, PPE and training, in the recommendations section.

The basic safety rules when attending WRI's are as follows:

- Dynamic Risk Assessment (DRA) and Crew safety is always the priority.
- Always wear a buoyancy aid / Lifejacket.
- Always wear appropriate headgear.
- Always deploy 'spotters'.
- Always deploy safety crews.
- Always keep it simple; water rescue should never be complicated.
- Always use the correct equipment.
- Never wade above the knees.
- Never put your feet down if swept away.
- When working in, on or near the water use only approved safety lines and harnesses.
- Never rely on the casualty to help in his/her own rescue.
- Always be pro-active - identify risks and where possible remove or reduce.

### **5.3 Contamination**

Biological contamination should be prevented wherever possible by taking the following actions: -

- Only enter the water if absolutely necessary.
- Wear immersion/dry suits.
- Personnel with open wounds should not enter the water.
- After the incident and before eating, drinking, or smoking, personnel should wash their hands using soap and water or detergent. Antiseptic wipes where available should also be used once hands have been washed.
- Cuts and grazes should be cleaned and covered.

The foregoing shows that any water can provide hazards to firefighters. These can all be avoided by avoiding contact with the water in the first place.

## 6. STANDARD OPERATIONAL PROCEDURES

### 6.1 Introduction:

The Fire Service will rely on Incident Commanders (IC's) applying the generic procedures encompassed within this report. The Incident Command System will support these generic procedures in line with the principles of dynamic risk assessment and the safe person concept.

Additionally, current, relevant and high quality information will be communicated to all operational personnel to provide them with the information enabling them to assess risks as far as is reasonably practicable.

Each situation involving the above activities will present its own difficulties and problems, therefore this document cannot be prescriptive. However, its contents should be viewed as the absolute minimum and IC's will determine the course of action according to the individual circumstances of the situation. *Nevertheless, the following items must be used as a framework of minimum safety.*

- In all instances the health, safety and welfare of Fire Service personnel is of paramount importance.
- IC's must ensure that all elements of the Incident Command System are followed.
- A risk assessment is to be undertaken prior to setting priorities and allocating tasks.
- Where the rescue of animals is involved, undue risk to human life should not be taken.
- Risk must be proportional to benefit at all times.

### 6.2 Attendance:

The emergency response provided by the Fire Service to water related incidents is essentially modular and can be illustrated as two progressive levels.

**Level 1** All WRI's that require an initial attendance of either a Supervisory Officer and/or crew with knowledge, basic training, limited PPE, safe working practices and procedures covered in this document.

**Level 2** Persons Reported - Level 1 supported by attendance of crews with enhanced training and equipment.

Water rescues may require a larger attendance than other Emergency Special Service Calls (SSC's), to provide both resources for the rescue and to provide a greater degree of safety to personnel.

**NB. IC's should consider the involvement of other services such as:**

- The Coastguard
- RNLI
- Police Underwater Search Unit
- Ambulance/Paramedics
- Royal Society for the Prevention of Cruelty to Animals (RSPCA)
- Environment Agency (EA)
- Emergency Planning Departments

However, it should be advised that an anticipated early emergency response may not be forthcoming and the relevant mobilising centre needs to advise the IC as a matter of urgency of any delays anticipated.

Drivers of all Fire Service vehicles must continually assess their ability to proceed to incidents taking into account information obtained relevant to local environmental conditions.

### **6.3 Helicopter operations**

The use of a search and rescue helicopter may reduce the risk to firefighters or remove the risk all together. Request for helicopter assistance will be channelled via Fire Control or Police officer on scene.

However, they carry their own inherent difficulties and the greatest care must be taken to protect rescuers, casualties and the public if a helicopter is to be used.

The following points should therefore be taken into account when requesting helicopter assistance:

#### **6.3.1 Communications**

Unless the Coastguard are in attendance it is unlikely that radio contact with the aircraft is possible. However, there is provision to speak to the Police helicopter and other air support using Brigade UHF hand held radio on channel 6, 69 or 70. The additional facility of VHF marine wave band hand held radios, used by licenced operators on channel 16, will give direct communication to search and rescue helicopter.

#### **6.3.2 Rota down-wash.**

Survey the area for loose materials and structures i.e. loose roof sheeting, sand, grit, etc. Also small items of equipment and PPE must be secured with particular attention paid to fire helmet.

#### **6.3.3 Approaching The Aircraft**

Never approach the aircraft when it is on the ground unless directed to do so by the aircrew, then follow their instructions precisely and try to remain in sight of the pilot when approaching. Do not approach from the rear, or side.

## 6.4 Actions on Arrival

The Dynamic Risk Assessment (DRA) process must be carried out on arrival.

The IC at a WRI may be faced with many difficult decisions and the greatest difficulty may be in stopping ill conceived and reckless rescue attempts being made (where a rescuer may become a victim).

Firm control must be exercised to ensure that unauthorised personnel do not venture into the water.

Any witnesses should be interviewed to ascertain what has happened, how many people are involved, where the casualty was last seen, etc.

Then a logical plan of action, taking into account all possible hazards, must be devised and initiated as quickly as possible, with the safety of personnel as the overriding factor.

**'When a person has disappeared below the surface of the water little can be achieved without specialist equipment or personnel. A clear distinction must be drawn as to when a rescue attempt becomes a body recovery'.**

## 6.5 Key Operational Considerations

This procedure is dependent on applying a prioritised approach to water rescues, Talk, Reach, Throw, Row are the preferred options, with entry to water as a very last resort.

Any attempt to rescue people or animals from waterways or associated hazards without the aid of specialist PPE and ancillary equipment should be carried out from the safety of firm ground (bank) or a structure (bridge or jetty).

Also:

- Only the minimum number of personnel should be used to undertake the task.
- Weather conditions and the duration of the incident may increase the requirement to rotate crews.
- At night, lighting of the scene is a priority.
- Always deploy upstream spotters above the location of the rescue operations, ideally on both sides of the river.
- Consider alternative measures to cater for a sudden change of situation i.e. prepare a secondary plan of action.

- Talk** It is important that contact is made with the casualty as quickly as possible. Keep talking to them, explain what you are going to do, what you want them to do and keep encouraging them.
- Reach** Either with your hand, or equipment from the appliance - e.g. ceiling hook, chimney rods, inflated fire hose then pull the casualty to firm ground. By lying down, you can increase the distance reached and also prevent yourself being pulled in.
- Throw** Use a purpose designed throw line and/or BA Guide Line. Throw one end out to the casualty. Do not weight the bag or the thrown end as it may injure the casualty.
- Row** If a boat is available then care must be taken to ensure that it does not capsize during the rescue. If it is powered, approach the casualty bow on and as soon as the contact is made switch off if safe to do so. It may then be better to row the boat to shore towing the casualty rather than try to pull the casualty aboard.

Remember never to stand up in a small boat and be aware of underwater obstructions particularly if using an inflatable boat.

- Go** *Only if all these fail, as a very last resort should suitably trained personnel enter the water to attempt to facilitate a rescue.*

*Where the Incident Commander is faced with a rescue situation (after considering all other courses of action) it is determined that the only possible approach is to commit personnel to the water to carry out a swimming rescue, the following control measures must be in place.*

**For 'still' water:**

- A Line Safety Officer should be appointed to control each rescue swimmers floating line.
- All personnel must be fully briefed regarding the rescue procedure and the role of each individual.
- Effective communications must be established between the IC the rescue swimmer and all safety personnel.

**For 'fast flowing' water:**

- The risks associated specifically with swimming rescues from flowing water are extremely high. Only personnel who have received enhanced training and are provided with the appropriate WRI PPE should attempt to perform this type of rescue.
- If personnel wade in rivers they should take care not to trap their feet in rocks or other debris, which may cause them to lose their balance, fall and be prevented from standing due to the force of the water flowing over them.  
As a general rule, never wade in water, which is above knee high.
- Anyone entering the water should be dressed in the appropriate PPE



- Firefighters provided with a life jacket and suitable communications should be deployed as spotters upstream to warn of any surface debris heading towards the rescue scene. The spotters must maintain regular communication with the IC. Their position should be such as to allow adequate time for rescuers to get clear of the rescue scene before the hazard arrives.
- Downstream, a boom of inflated fire hose (or similar), the boat, or personnel with throwing lines, should be positioned as a safety measure for any rescuer who may accidentally enter the water and be carried along with the flow. (When using throwing lines, the number of safety personnel should reflect the number of casualties and rescuers in the danger area, but in any case must be a minimum of two).

In situations where it has been determined that a swimming rescue will be attempted, buoyancy aids such as inflated fire hose or composite BA cylinder, etc., must be used to attempt to stabilise the casualty.

**A floating line and harness must be attached to the rescue swimmer.**

Raising a hand directly above the head is a recognised method for a rescue swimmer to indicate they are in difficulty and/or need removing from the water. All personnel must understand this signal and the action to take should it be given.

Entry into the water must be done slowly to minimise cold-water shock and reduce the chance of injury. The person entering the water should have a means of gauging the depth, e.g. ceiling hook.

**N.B. RAPID IMMERSION IN COLD WATER CAN COMPROMISE GOOD SWIMMERS ALMOST IMMEDIATELY.**

## **6.6 Safety of Personnel:**

This is paramount and IC's must ensure that:

- They do not enter the water unless absolutely necessary.
- Lifejackets and/or suitable buoyancy aids are worn by all firefighters working on or near the water, i.e., the "Risk Zone" (which, extends 3 metre horizontally from the water).
- Use appropriate PPE whenever possible to prevent cold shock, hypothermia, and contamination (even in summer water temperature can debilitate rescuers within a relatively short time).
- A Safety Officer is appointed as soon as practicably possible.
- The IC gives consideration to any personnel in or near the water using a safety line.
- All non-essential personnel must stay out of the risk area.
- Panic of a Casualty: - A drowning person when physically contacted by an in-water rescuer may attempt to climb on top of the rescuer; overcoming the rescuers buoyancy and submerging them both.

- Physical contact with a struggling casualty should be avoided whenever possible. Offer a buoyancy aid, line, etc. Tow casualty to safety.

**Fire fighting PPE affords mechanical and limited thermal protection and is slightly positively buoyant in water (mainly due to the air both inside the fabric/material and air pockets trapped between the material and wearer). Water entering fire boots will equalise and will not have a detrimental sinking effect.**

## 6.7 Water Emergency

In the event of Fire Service personnel accidentally falling into water and finding themselves in difficulty a standard message has been formulated to provide immediate assistance at the incident. Similar to the BA and fireground emergencies the message can be sent by anyone from the incident by contacting Fire Service Control and stating "Water Emergency". On receipt of the message Fire Service Control will mobilise the following:

- Level 2 attendance.
- Search & Rescue (SAR) Helicopter.
- Duty Officer.
- Ambulance.
- Accident Investigation Officer.

This new procedure is designed to be in line with existing messages and procedures. It provides a short, simple method of obtaining urgent assistance when firefighters are in difficulty.

## 6.8 Breathing Apparatus (BA) for Sub Surface Rescue.

**Fire Service BA must not be used under water.** Personnel are not trained and the equipment is not designed for such use. It may be considered necessary to fit a BA face mask (with air supply) to a casualty trapped below the surface of the water to afford extra time to rescuers. However, firefighters must be able to achieve this without wearing BA themselves.

**All activities of this type must be strictly controlled.**

## 6.9 Lines:

Approved rescue lines and harnesses should be employed whenever possible and always in fast flowing rivers.

Where the IC commits a crew member as the rescuer, the line should be attached to a detachable rescue harness and not to the lifejacket. Safety lines must be attended at all times by a Line Safety Team (LST) and not attached to a shore side anchor point.

The LST will be supervised by the Line Safety Officer (LSO), whose responsibilities are:

- The Rescue swimmer safety:
- Be positioned to have overall control of the rescue swimmers line.
- To maintain visual and verbal contact with the rescue swimmer.
- Before the rescue swimmer enters the water ensure sufficient personnel are available to retrieve the rescue swimmer.
- Initiate emergency action if necessary.

The only task allocated to the LSO (whilst the rescue swimmer is in the water) will be to ensure safety of the swimmer and control of the safety line.

Although it is not essential for the LSO to have direct contact with the safety line they must be in sole control of any personnel holding it.

Verbal and visual contact must be maintained at all times between the LSO and the rescue swimmer. If either of these break down at any point during the rescue attempt, the LSO must initiate emergency action by withdrawing the rescue swimmer (if necessary by physically removing).

Members of the LST should position themselves upstream of the rescuer on one of the riverbanks. If the rescuer then loses his or her footing the current will swing the rescuer to the riverbank and relative safety.

Under no circumstances should the LST work in parallel to the current as this could cause the rescuer to be held into the current and be drowned in the flow.

Water will flow deeper and faster on the outside of a bend and slower and shallower on the inside of the bend. This can be used to the advantage of the rescuer in getting near to the casualty but by remaining in shallow water.

#### **6.10 Risk Zone:**

Most accidents result in drowning after a casualty slips, trips, or falls from the bank from within 3 metres horizontally from the water's edge, ie., the 'risk zone'. To reduce the risk and provide a safer working area, all personnel required to work within the risk zone must be dressed in the minimum standard of Personal Protective Equipment consisting of:

- Full Firefighting Kit
- Life Jacket
- For 'lone' workers, e.g., pump operators who are working within the 'risk zone' a 'Restricting Line' should be provided (this should be anchored and restricted to a length that prevents falling into water).

**N.B. The fire helmet should be removed unless there is a possibility of falling debris, in which case the chin strap should be unfastened (this is to prevent a neck injury in the event of accidental immersion).**

A safe route should be identified and marked from the nearest access point to the scene of operations (Traffic tape may be used to indicate this route).

Any significant hazard that may cause injury i.e. trip hazards, should be clearly marked and identified to all personnel working in the vicinity.

#### **6.11 Contact with the casualty**

It is important to make contact with the casualty as quickly as possible. Keep talking to them, explain what you are going to do, what you want them to do and keep encouraging them.

*Where possible it should be the aim of the rescuer to stay dry and not enter the water. Therefore, the talk, reach, throw principals already described should be adhered to.*

Be aware of the local environment (See Section 4).

Never let the casualty make direct physical contact with you.

If the casualty cannot use their arms, turn them on to their back and allow the shore team to tow you back using your safety line.

Offer the casualty a suitable flotation device and allow them to hold on to it as a buoyancy aid.

If the casualty is not conscious the airway must be maintained and where a neck injury is suspected then the head, neck and back must be supported throughout the rescue.

Resuscitation should be commenced as soon as practically possible.

## 6.12 **Standard Operational Procedures - Summary**

- Start dynamic risk assessment on receipt of call.
- Use preplanning information/local knowledge.
- Consider equipment requirements.
- Consider personnel requirements.
- Consider access/egress.
- Gather information.
- Review dynamic assessment.
- Formulate plan.
- Initiate plan.
- Establish risk.
- Consider specialist assistance.
- Prepare secondary plan of action.
- Post incident consideration

## 7. SUB SURFACE RESCUES/RECOVERY

The risks associated with sub surface rescue attempts are considered to be excessive. It is not possible to reduce this risk to tolerable levels for firefighters. Because of this firefighters **MUST NOT** attempt sub surface rescues. However, there are certain situations, which may be considered as sub surface but because of their type, or location adequate control measures can be put into place to reduce the risk to within tolerable levels. Examples of this would be:

- **A person is in difficulty on the bottom of a deep swimming pool because hair or a finger is trapped in a grate.**  
Although rescue personnel may have to "duck dive" below the surface of the water to effect the rescue, safety crews can control the safety of the rescuer. The rescuer can be seen from the side of the water. The water environment is also considered to have few uncontrollable hazards and therefore this type of activity would be considered to be acceptable.
- **In open water where a casualty is in difficulty below the surface of the water.**  
If the rescuer is able to stand upright in the water with the water at no more than shoulder level and is only required to place the head and shoulders beneath the surface of the water to attempt rescue, this will also be regarded as an acceptable practice. Simply by standing upright at any time in the water, the rescuer is again in a tolerable risk situation.
- **Where a rescuer is in open water attempting to recover a casualty who has just gone beneath the surface of the water.**  
If the casualty is located touching part of the rescuers body, with rescuers head above water, an attempt can be made to recover the casualty provided the rescuer is able to do so without submerging totally below the surface of the water and the activity is rigidly controlled.
- **Where a vehicle has entered the water and submerged below the surface with occupants known to be trapped inside.**  
If firefighters are able to work from a horizontal surface of the vehicle (i.e. roof, bonnet or boot) to affect the rescue without totally submerging below the surface of the water this would be regarded as an acceptable practice provided correct levels of PPE and rigid control measures are in force.

**NB:** Sub surface rescues in open water **MUST ONLY** be attempted when firefighters actually witness the casualty disappearing below the surface of the water. This activity must only be continued up to a maximum period of 10 minutes after the casualty is known to have disappeared below the surface.

## 8. ICE RESCUES

- 8.1** Incidents involving persons falling through ice are rare, however, research indicates that where persons do fall through ice, then the risk of loss of life is extremely high. Additionally, the risk to the would-be rescuer is equally high, if they are not properly trained or equipped.

Total cold-water immersion, or part immersion will, after an extremely short period of time, (about 4 minutes) render the victim into an almost helpless state. They will probably only have sufficient strength and co-ordination to cling to the broken, floating ice.

The problems and dangers faced by attending fire crews are:

- These incidents occur usually in the more remote areas and often provide difficult access to the rescuer.
- The Level 1 attendance will have limited equipment available to assist them to affect a safe rescue.
- Walking on the ice might easily result in the rescuer requiring to be rescued should the ice continue to break.
- People who have fallen through ice tend to be surrounded by broken ice that prevents the rescuer approaching directly up to them

## **8.2 Procedures for ice rescues**

All ice rescues will automatically receive a Level 2 response, the inflatable rescue path (IRP) should be considered as the primary tool for this type of incident. Both ambulance and police controls shall be informed.

The principles of Talk, Reach, Throw, Row and Go apply, urgent consideration must be given to the use of throw lines and inflated hose to assist in stabilising the casualty.

The IC of the first attending appliance shall confirm with control the most suitable access route for supporting rescue vehicles.

The casualty may not be able to affect their own rescue; therefore, a Level 2 trained firefighter will have to make their way out to the casualty utilising the IRP.

The rescuer should ideally be a lighter member of the crew they shall always be a swimmer and confident in water. A safety line shall be attached to the rescuer.

## 9. MUD/SAND/CLAY RESCUES

9.1 People or animals may find themselves trapped in or on these unstable surfaces either when the surface is so soft that they simply sink to a point where movement becomes impossible, or they break through a layer of a relatively firm surface into a soft solution.

**IN ANY EVENT, THE SURFACE PRESENTED TO A RESCUE TEAM WILL BE BOTH SOFT AND TREACHEROUS.**

- Time spent on reconnaissance is never wasted. Consider the most effective route to the casualty. The route the casualty took might not be the best route for access and recovery. Poor conditions or difficult terrain may require additional personnel or equipment.
- All rescue activities should be controlled and coordinated by the IC from a safe working area on firm ground. A minimum number of personnel required to complete the task should be committed to the immediate area around the casualty. Access to a casualty may be difficult due to the soft surface of the mud, making walking impossible, the only effective method is to spread the weight as widely as possible across the surface.
- IRP's, ladders, inflated fire hose, salvage sheets and boarding may all be useful tools for providing a safe working platform around the casualty. The boat may also be of value if the mud is adjacent to water.
- Initial activities should be directed to stabilisation of the casualty using lines and safe preparation for extrication. A safety line should be attached to all personnel working in mud. Each line should be under the control of an individual LSO.
- A BA set should be provided for the benefit of the casualty and account needs to be taken of any local tidal conditions.
- The area should be well lit. Artificial lighting must be provided to illuminate access routes and work areas where natural light is poor.
- An equipment recovery area should be set up on safe ground as part of the incident control area. Items of equipment should be immediately returned to the recovery area after use.

### 9.2 Rescue

There are only two principal rescue methods available - water injection or digging out.

#### 9.2.1 Water Injection

An IRP should be laid out on the surface adjacent to the casualty to provide a stable working platform for the rescuers.

- A safety line and/or suitable strops should be passed around the casualty (under the arms where possible) to give support and prevent further sinking.
- A mud lance is placed down the sides of the casualty and around the body in a circular motion, this loosens the clinging mud/sand and breaks the suction effect.
- As the lance is being used, other members, working from the IRP, should attempt to pull the casualty clear to firm ground.

### 9.2.2 Digging Out

“Digging” is self-explanatory. However, considerable care should be exercised when working close to the casualty. It is likely that the casualty will be partially numbed by the mud and may not feel any contact with the spade. Serious injury may be caused that would not become apparent until the condition of the casualty abruptly worsens, or they are evacuated and cleaned up.

### 9.3 Animal Rescues

Determine the condition of the animal and urgency of action, ie., need for a vet or RSPCA.

The majority of incidents will involve farm animals, i.e., the release of a cow that has fallen into a slurry pit or a horse that has stumbled into a river. This type of rescue is potentially hazardous and the IC on arrival at the scene must put strict control measures in place.

It must be considered that in many instances animals manage to get to safety unaided after falling into water. Provided that the lives of firefighters are not unduly risked, attempts should always be made to rescue animals.



## 10. VEHICLES IN THE WATER

This information is designed to assist the Incident Commander to make an informed judgement on the appropriate actions to take and control measures which may be necessary at incidents where vehicles are positioned in, on or near water.

It is not a definitive guide.

It may also be necessary to use additional skills and techniques to deal with the incident, such as those related to Road Traffic Accidents on a roadway.

Incidents involving vehicles submerged in water may vary quite dramatically because of: -

- The type of vehicle - Car, LGV, Articulated, Laden/Unladen.
- The type of water hazard - Still, Flowing, Temperature, Depth, Flood condition.

### 10.1 Vehicle Behaviour

Initially, (even with all windows open) the average car will float for at least 45 seconds. The electrical system (lights, wipers, radio and power window) will usually still work even when a vehicle is full of water.

- Once a vehicle is full of water a number of factors will determine what happens next, such as, the nature of the riverbed, the surface current, weight and distribution of passenger or load.
- In flowing water if the vehicle is side on to the current on a solid riverbed a roll is almost inevitable. Even in slow currents a vehicle will be rolled a considerable distance if unimpeded.
- On a soft bottom, (mud, sand or small rocks) if the vehicle lands on its wheels, each tyre will create an eddy, scooping mud, sand, etc. out, so that the vehicle will settle onto its chassis.
- If a vehicle comes to rest more or less straight in line with the current, water pressure will sink the upstream end of the vehicle deeper than the downstream end.
- An eddy will be created on the downstream side of the vehicle providing rescue crews with a calm area of water to work from. However, strict control must be exercised over crews working in this area, as there is the potential for the vehicle to roll in the direction of rescuers.
- Anchoring a line to each side of it may reduce the risk of the vehicle rolling.
- If the vehicle is wedged against an obstacle the area of eddy is usually a safer area for crews to work from. Consideration should be given to the fact that the object/condition causing the vehicle to be wedged may move or change, thus allowing the vehicle to move whilst rescue operations are in progress.

## 10.2 **Associated Hazards**

- Slippery vehicle surface.
- Sudden uncontrollable movement of the vehicle.
- Entrapment of rescuers inside vehicle.
- Snags, sharp edges.
- Once the body panels of a vehicle are wet, they may be extremely slippery to personnel attempting to stand or place equipment on.
- Even in still water, movement of the vehicle load (passengers, etc.) or access onto the vehicle by rescuers may cause the vehicle to move.
- In flowing water use of a window punch or axe to break glass, enabling access, can cause drastic decompression. Do not use such tools to break a downstream window as this may cause a loss of internal pressure resulting in all the glass breaking and the possibility of occupants and rescuers being flushed downstream.

Where the vehicle is totally submerged below the surface of the water but rescue personnel are able to stand either on the vehicle or equipment bridged between the bank and the vehicle, this will not be regarded as sub surface activities.

Extreme care must be taken by anyone entering a submerged or partially submerged vehicle as the weight of water or vehicle fittings may cause entrapment inside the vehicle.

The vehicle may have sustained impact damage prior to, or as a result of, entry into the water. Glass or damage to body panels may have created numerous sharp hazards.

## 10.3 **Rescue Considerations**

Effective and continuous communications will play an essential part in the success of the actions taken. Firefighters must be fully briefed on the tasks they are to perform, including the aims and any control measure, which will be in place. Casualties need to be reassured and instructed on what to do to assist with any rescue attempt, in addition to being advised of the activities being undertaken by firefighters to rescue them.

When the vehicle is close enough to the bank side, it may be possible to wade through the water or to bridge ladders or use the Inflatable Rescue Path (IRP) to gain access to, or onto it.

If the occupants of the vehicle have managed to self-rescue and position themselves on top of the vehicle it may be possible to use rescue boards, inflated fire hose, throwing lines or a bridged ladder to stabilise or remove them.

Where the incident involves a vehicle submerged below the surface of the water and it is determined from a reliable source (Police or witness) that the vehicle has been in the water for a considerable time (in excess of 15 minutes), the Incident Commander should await the arrival of the specialist equipment to examine the vehicle and should not commit personnel prior to its arrival.

## 11. POST INCIDENT CONSIDERATIONS

### 11.1 Post Immersion Care:

Even in the most minor cases the casualty should not be allowed to walk out with the rescue team. Sudden release and attempts to stand may induce post rescue collapse with possible fatal results. For this reason the casualty should be evacuated on the stretcher in as near a horizontal position as possible.

The Institute of Naval Medicine, Portsmouth, has provided the following information.

Survival times of people on the surface of the water, maximum water temperature of 15°C (59°F) can be categorised as follows:

Effect	Maximum Time Period	Outcome
Cold Water Reflex	2-3 minutes	Drowning
Swimming Fatigue	2-15 minutes	Drowning
Hypothermia	15-30 minutes	Death

#### **N.B. Wearing a life jacket will not stop the above effects.**

Cold-water immersion cools the body 27 times faster than static dry air temperature; this is multiplied by a further factor of 10 when swimming.

In cold water a good, strong swimmer will quickly be reduced to a non-swimmer because of the effects of immersion hypothermia.

Summer inland water temperatures are known to average between 10° and 15°C.

All personnel who have been immersed in cold water should be taken to a warm environment as soon as possible.

Fire Service personnel should be removed from operational duties until they are thoroughly warmed, have dry clothing and their welfare has been suitably addressed.

Beware of hypothermia. Symptoms are shivering, slurred speech, lack of co-ordination and cold to the touch. If there is any doubt, seek medical attention. Remember, shivering ceases in the more advanced stages of hypothermia and so the lack of such shivering in isolation cannot be relied upon as to the welfare of the individual.

Non Fire Service personnel, who are either casualties or rescuers, should be advised to seek medical advice. Any person who has been revived or was near to drowning should be conveyed to hospital. Secondary drowning can take place up to 72 hours later.

### 11.2 Further considerations

- Decontamination of personnel/personal hygiene.
- Equipment retrieval.
- Equipment cleaning and testing on scene.
- Cleaning and testing of equipment at station.
- Remedial measures - reinstatement of fences, etc.

Personal hygiene is important where crews have been in contact with open water, mud or similar. All personnel must wash and shower as soon as is practically possible after the incident and all equipment should be cleaned, tested and serviced in accordance with the periodic maintenance schedule.

Critical Incident Defusing should be considered for personnel involved.

A de-brief of the incident should be undertaken to determine if there are any significant findings in relation to:

- Personal injury or trauma.
- Procedures.
- Equipment.
- Training.
- Inter Service liaison.
- Risk Assessment and safety systems.

### **11.3 Biological Contamination**

The diseases most likely to be encountered are Hepatitis A, Gastro-enteritis and Weil's disease caused by a variety of bacteria and virus.

#### **Weil's Disease**

This disease is carried in the urine of rats and other small rodents and is particularly prevalent in canals and rivers.

#### **What can you do to protect yourself?**

- Cover all cuts and broken skin with waterproof plasters before and during work.
- Wear protective clothing.
- Wash hands after handling any animal or any contaminated clothing or other materials and always wash before eating, drinking or smoking.
- Avoid contact with stagnant or slow moving water.
- Shower after becoming immersed in open water.
- Use footwear to avoid cutting feet.

#### **What are the symptoms?**

The first signs of Weils's Disease is a flu like illness within about 3-4 days of the infection. After 6-7 days a severe headache and conjunctivitis with the possibility of meningitis follows. At 8-10 days, kidney failure and the beginnings of jaundice will become obvious. If no treatment is given then severe kidney failure and the spreading of the organism to other major organs such as liver, pancreas and intestines can occur resulting in heart failure.

#### **What you must do**

If any of the symptoms develop - inform your General Practitioner of the symptoms and that you are at risk from Leptospirosis.

## 12. EQUIPMENT - REQUIREMENTS

### 12.1 Equipment

The following is the **minimum requirement** considered viable to maintain the safe person concept for firefighters dealing with WRI's

#### **Pumping Appliances – Level 1 Attendance**

- 4 x Life Jackets
- 4 x Thermal Under Suit
- 2 x Dry Suit
- 2 x Throw Lines
- 2 x Harnesses & Safety Lines
- Loud Hailer
- Hose Inflation Kit
- Snap Light

#### **Special Units – Level 2 Attendance**

- 5 x Buoyancy Aids
- 5 x Life Jackets
- 5 x Dry Suits
- 5 x Throw Lines
- 5 x Helmets
- 5 x Safety Knife
- 2 x Inflatable Rescue Paths (IRP's)
- Thermal Under Suit (Personal Issue)
- Stretcher (and/or rescue board)
- Mud Lance
- Rescue Pack
- Jason's Cradle
- Boat

### 12.2 Description

#### 12.2.1 Life Jacket

A life jacket is designed to ensure a wearer is kept buoyant and face up therefore maintaining an airway if unconscious. This is for crew safety and not for entering the water for rescue purposes.

#### 12.2.2 Buoyancy Aid

Designed to assist competent swimmers from a Level 2 trained crew in rescue situations. The aid gives the wearer maximum movement and comfort and should be fitted with a quick release mechanism. This does not turn the wearer onto the back if unconscious.

#### 12.2.3 Dry Suit

Dry suits provide environmental protection and improved thermal protection in conjunction with the thermal under suit.

#### 12.2.4 Thermal Under Suit

A one piece boiler suit, fleece lined for thermal protection against hypothermia.

#### 12.2.5 Throw Lines

A modern lightweight, conspicuous floating line provided as a safety/rescue facility.

#### 12.2.6 Loud Hailer

A portable voice amplification device for aiding communication in noisy conditions.

#### 12.2.7 Harnesses & Lines – Level 1

For the maintenance of physical contact and/or restricting lines for personnel.

#### 12.2.8 Rescue Pack – Level 2

An integrated system of lines, harnesses and associated equipment for various rescue techniques for WRI's.

#### 12.2.9 Hose Inflation Kit

Simple manufactured hose coupling adaptors providing the facility for inflating multiple lengths of delivery hose to be effective as a floatation aid or even a mini boom on water, ice, mud or sand.

#### 12.2.10 Snap Lights

A single use pencil sized, chemical fluorescent light for identifying personnel in dark conditions.

#### 12.2.11 Helmet

Suitable protective headwear for in and around water hazards where fire helmets are unsuitable.

#### 12.2.12 Boat

Boats must be provided to meet the needs of individual Brigades based on a risk assessment of the water hazards within that Brigade's area. Boats provide the most suitable safety measures for crews working in or near water.

#### 12.2.13 Inflatable Rescue Path (IRP)

Nationally accepted as the easiest and safest means of effecting rescues from ice, mud and sand. They also provide an excellent stable platform for working on inland water. They provide:-

- Rapid inflation, deployment and mobility.
- Rapid extension and 'link up'.
- Compatible with existing cylinders/regulators.
- Has anti slip net, inflation relief valves, grab lines, belay lines, link up connections and carrying valise.
- Folds down to 1m x 0.5m.

12.2.14 Mud Lance

Enables water at high pressure to be injected around the casualty trapped in impacted sand, mud, etc., thus disturbing the free surface and allowing the casualty to be released.

12.2.15 'Jason's Cradle'

A device for the horizontal lifting of a casualty from water onto a boat or an IRP.

12.2.16 Safety Knife

A floating knife provided for quick self-release in emergency situations.

12.2.17 Stretcher

Light weight construction, capable of supporting a casualty when on unstable services.

## 13. TRAINING - POLICY AND PLANNING

The training implications of introducing a water rescue capability are undoubtedly onerous. It is essential that every Wholetime and Retained firefighter receives training commensurate with activities expected of them on arrival at a water incident, and therefore different levels of training and subsequent expertise will be necessary.

There are now several dedicated water rescue training providers in the UK. Courses are tailored to suit the Fire Service's needs. They form the basis of training for many emergency services rescue teams. This leads to an internationally recognised certificate of competence.

The Rescue Techniques taught are very suitable and adaptable to still water, fast flowing water, flooding, mud and ice rescue. Whilst these courses are regarded as specialist they have a great deal in common with other rescue techniques that Fire Service personnel are trained in.

There are four areas of training appropriate and are identified as follows:

### 13.1 Safe Working Near Water

Designed for all uniformed personnel (Level 1 attendance) who may be called upon to respond to WRI's. Through a mixture of classroom and river based input the following topics are covered:

- Hazards, features and Dynamic Risk Assessment.
- Hydrology.
- PPE.
- Personal safety and rescue.
- Use of throw lines.
- Basic accident procedures.
- Adaptation of standard Fire Service equipment.
- Scene assessment and protection.
- Land Based Rescues.

This stage can be delivered on station consisting of theory and practical over two 2 hour sessions by suitably qualified watch based or Training Department instructors (Water Rescue Instructor).

### 13.2 Officer Training

Suitable training appropriate for the flexible duty officers or those with a supervisory role.

The topics will include:

- Safe working near water (Level 1 attendance) training.
- Incident assessment and command.



- Flood management.
- Appreciation of rescue techniques.

*(Personnel qualified to Water Rescue Instructor can deliver this training.)*

### **13.3 Enhanced Water Rescue Techniques**

Designed for specialist crews (Level 2 attendance) who may be called upon to perform rescues using specialist equipment.

Topics covered will include enhancement of:

- Hydrology.
- Hazard identification and risk assessment.
- Swimming in moving water.
- Basic boat handling skills.
- Contact and in-water rescues.
- Crossing techniques.
- Introduction to technical rescue equipment.
- Introduction to rope systems.
- Medical considerations.
- Scene management and incident command.

### **13.4 Instructor Training**

This course can be undertaken at one of the many registered centres around the UK who have the appropriately qualified staff.

It follows that a number of identified personnel would need to undertake the Water Rescue Instructor course as a starting point. They would then deliver the 'Safe Working Near Water (Level 1 attendance)' training to all stations on a rolling programme and 'Enhanced Water Training Techniques (Level 2 attendance)' to the specialist stations.

### **13.5 Training Costings (approximate - January 2001)**

An instructor course costs £2000 based on details provided by the Outreach Organisation, who are one of a number of training providers. Additional on costs will include in-house training and resources.

## 14. RECOMMENDATIONS

To ensure the Health Safety & Welfare of firefighters of those Brigades in the South West when dealing with Water Related Incidents (WRI's), and giving consideration to the safe person concept, the following recommendations are submitted for consideration:

### **Recommendation 1 - Attendance at WRI's**

The Fire Services in the South West should continue to respond to WRI's. This response should be based on the two level approach as detailed in this report.

- Level One:- First attending crews who have received basic safe working near water training.
- Level Two:- Supporting crews with enhanced training and specialist equipment.

### **Recommendation 2 - Existing Practices**

The practice of improvising existing Fire Service equipment for WRI's should be risk assessed and the hazards removed by the provision of appropriate and purpose designed equipment as detailed in this report.

### **Recommendation 3 - Operational Procedures**

The Fire Service in the South West must immediately implement the operational procedures identified in the report as the minimum standard required to safeguard personnel involved in WRI's. The concept of Talk, Reach, Throw, Row and Go must be the foundation of an operational approach to WRI's.

Any fundamental change of the operational procedures must be referred back to the CACFOA Operations Working Party for their consideration.

### **Recommendation 4 - Equipment and Appliances**

The issues surrounding the provision of equipment and appliances to deal with WRI's is a complex and costly one. The equipment identified within this report should be considered as the minimum standard required to safeguard personnel involved in WRI's.

In line with the two level approach the appropriate equipment and appliances must be sourced for both first attendance crews and supporting crews.

### **Recommendation 5 - Training**

All personnel who may be exposed to the hazards associated with WRI's must receive water safety awareness training commensurate with the information detailed in this report.

The Fire Services in the South West Region must implement the four areas of training identified in this report.

#### **Safe Working Near Water**

Designed for all uniformed personnel (Level 1 attendance) who may be called upon to respond to WRI's.

### **Officer Training**

Suitable training appropriate for flexible duty officers or those with a supervisory role.

### **Enhanced Water Rescue Techniques**

Designed for specialist crews (Level 2 attendance) who may be called upon to perform rescues using specialist equipment.

### **Instructor Training**

To deliver the 'Safe Working Near Water' (Level 1 attendance) training to all stations on a rolling programme and 'Enhanced Water Training Techniques' (Level 2 attendance) to the specialist stations.

This recommendation needs to be further developed by the CACFOA South West Personnel and Training Group.

### **Recommendation 6 - Health & Safety**

The Fire Services in the South West must have in place a procedure for post incident health monitoring for those personnel who have been involved in WRI's. Those procedures detailed within the CACFOA South West Region Hazmat Procedural Document should be considered.

### **Recommendation 7 – Liaison With Other Agencies**

CACFOA South West must be proactive in pre-planning and implementation of joint agency operational procedures for WRI's.

The recent South West regional approach in implementing the Incident Command System (ICS) identifies links with other agencies in an attempt to maintain the safety of non-fire service personnel at incidents. This inter agency approach should be continued for WRI's. For example, some of the other agencies would include the following:

- Search and Rescue organisations.
- Emergency Planning Departments.
- Other Emergency Services.
- Environment Agency, etc.

### **Recommendation 8 – Future Development**

A water safety strategy must not be developed in isolation within individual Brigades. In line with Best Value initiatives, it is recommended that CACFOA South West further develops a joint strategy for dealing with WRI's. The requirements of the following must dovetail into the common goals that are identified and associated within this report.

- Procurement.
- Specialist working groups.
- Rope Rescue.
- Training.
- Hazmat.
- Communications.
- Sharing of information.

Policy and procedure must be reviewed on a three yearly basis as identified in Appendix B.

## 15. SUMMARY

From the research undertaken it is clear that a surprisingly high proportion of UK Fire Services have been pro-active in enhancing their water rescue capabilities. Many now have some basic provision on front line appliances supported by specialist crews with a greater level of training and equipment, e.g., inflatable boats and rescue paths.

The recommendations contained within this report are by no means exhaustive and further joint research may need to be undertaken along with further analysis of the extent to which the CACFOA South West Region needs to extend the provisions detailed in this report. However, it does address the issues that will need to be immediately overcome.

## UK FIRE BRIGADE SURVEY

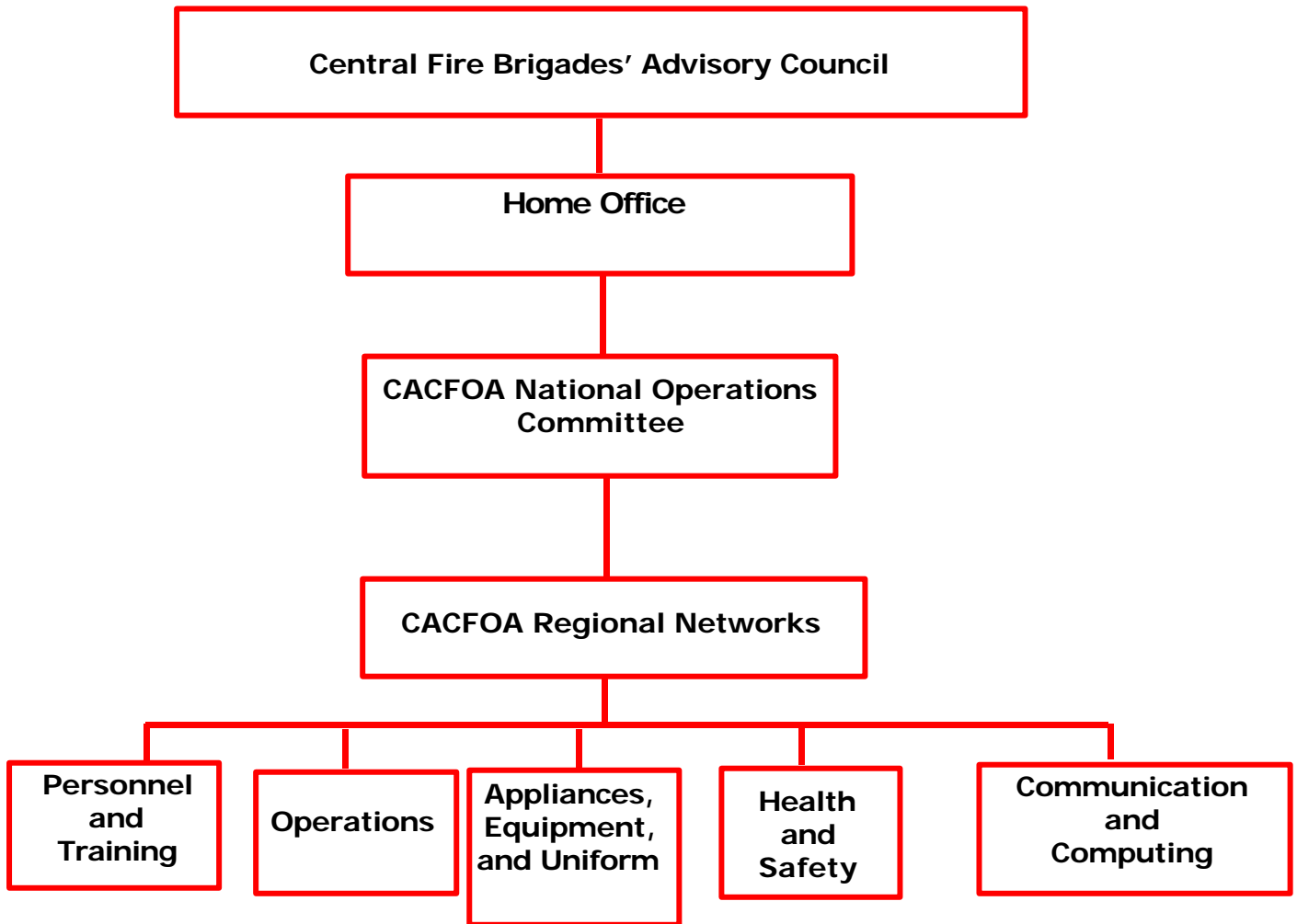
BRIGADE	BOATS			IRP's
	INFLATABLES	MOTORS	RIB	
AVON	2	✓		1
BEDFORDSHIRE	2	✓		1
BERKSHIRE			1	
BUCKINGHAMSHIRE			1	2
CAMBRIDGESHIRE	4	✓		2
CESHIRE	2			
CUMBRIA				1
CORNWALL	0	0	1	0
DEVON	0	0	0	5
DORSET	0	0	0	0
ESSEX	4	✓		10
GLOUCESTERSHIRE	1	✓	2	0
HAMPSHIRE				3
HEREFORD & WORCESTER	3	✓	1	
HERTFORDSHIRE	1	✓		2
KENT	2	✓		2
LANCASHIRE	1			1
LEICESTERSHIRE				3
GMCFS	2	✓		5
MERSEYSIDE	2	✓		6
NORFOLK	3	✓		
NORTHANTS				2
OXFORDSHIRE	1	✓		
SHROPSHIRE	1	✓		2
SOMERSET	1	✓	0	3
STAFFORDSHIRE	3			
SUFFOLK			2	
SURREY	1			
SUSSEX (EAST)				2
SUSSEX (WEST)			2	
TYNE & WEAR			1	
WARWICKSHIRE	1	✓		
WEST MIDLANDS	1	✓		1
WILTSHIRE	1*	✓*	0	3
YORKSHIRE (NORTH)			1	1
YORKSHIRE (WEST)				4
CLWYD				2
MID WALES	2	✓	1	
SOUTH WALES			1	3
STRATHCLYDE	6	✓		7

\* Cooper Avon Industrial Fire Brigade

## MAINTAINING CURRENCY OF THE DOCUMENT

This document will need to be reviewed on a three yearly basis and in the light of experience and development.

The following network arrangement can provide a pathway and forum to enable the experiences of WRI's to reach relevant groups and stimulate revisions to this guidance.



Where changes to this guidance document are deemed necessary the above structure will be used to bring recommendations to the attention of CACFOA (South West) Operations Committee. Where it is considered expedient an issue can be referred directly to the Chair of the committee

**EQUIPMENT COSTS (Current)**

These costs are based on information available at time of completion of this report.

<b>Pumping Appliance (Level 1)</b>	<b>Unit Cost £</b>	<b>No. Required</b>	<b>Total £</b>
Life Jacket	£50	4	£200
20m Throw Lines	£20	2	£40
Hose Inflation Kit	£150	1	£150
Dry Suits	£350	2	£700
Thermal Undergarment	£35	4	£140
Loud Hailer	£50	1	£50
Snap Light	-	12	£6
Harness	£100	2	£200
Lines (50m)	£60	2	£120
<b>Total</b>			<b>£1606</b>

<b>Special Units (Level 2)</b>	<b>Unit Cost £</b>	<b>No. Required</b>	<b>Total £</b>
5m Inflatable Rescue Path	£1250	2	£2500
Buoyancy Aid (c/w harness)	£80	5	£400
Life Jacket	£50	5	£250
Rescue Pack	£600	1	£600
Stretcher (or similar)	£200	1	£200
Dry Suit	£350	5	£1750
Thermal Undergarment	£35	Personal Issue	
20m Throw Line	£20	5	£100
Jason's Cradle	£450	1	£450
Mud Lance	£150	1	£150
Safety Knife	£10	5	£50
Helmet	£20	5	£100
Inflatable Boat	-	1	-
<b>Total</b>			<b>&gt;£6550</b>

## **RISK ASSESSMENTS**

**Addendum to follow with proposed South West Generic Risk Assessments**



## GLOSSARY

<b>Body Recovery:</b>	When a casualty is seen lying motionless on the surface of the water and no information is available as to the time of water entry or when a casualty has been submerged beneath the surface of the water for more than 15 minutes.						
<b>Buoyancy Aid:</b>	An item that increases buoyancy in water.						
	<table> <tr> <td>Buoyancy:-</td> <td>Floating ability</td> </tr> <tr> <td>Positive:-</td> <td>Will float on water</td> </tr> <tr> <td>Negative:-</td> <td>Will sink in water</td> </tr> </table>	Buoyancy:-	Floating ability	Positive:-	Will float on water	Negative:-	Will sink in water
Buoyancy:-	Floating ability						
Positive:-	Will float on water						
Negative:-	Will sink in water						
<b>Eddies:</b>	Water flowing in the opposite direction to the main flow, occurring alongside or behind objects.						
<b>Flooding:</b>	Where a river and/or drainage system is not able to cope with the excess of water causing urban or rural damage and threatening the lives of the public or animals.						
<b>Helical Flow:</b>	The current, which draws water away from the banks of the river with a circular motion.						
<b>IRP:</b>	Inflatable Rescue Path.						
<b>Laminar Flow:</b>	Found mainly in the centre of the river and is the motion by which water moves forward.						
<b>Life Jacket:</b>	Floatation device specifically designed to be worn by a person to add buoyancy and maintain the airway clear of the water.						
<b>Line Safety Officer</b>	Supervises Line Safety Team, reports directly to IC.						
<b>Line Safety Team:</b>	Dedicated team working directly to the Line Safety Officer.						
<b>Rescue:</b>	The process by which a person is removed from the water and brought to a place of safety.						
<b>Rescue Board:</b>	Purpose designed board with inherent buoyancy capable of supporting casualty and rescuer.						
<b>Risk Zone:</b>	Wherever possible this should extend to 3m horizontally from the water's edge.						
<b>Stopper:</b>	Where water flowing over an object causes a vertical reversal of flow, as with a weir.						

<b>Strainers:</b>	Any perforate object placed or trapped in flowing water such as a tree or metal grating which allows the water to flow through it, is referred to as a strainer.
<b>Sub surface:</b>	Below water surface.
<b>Tow Back:</b>	Water from downstream moves back against the flow towards the face of the weir.
<b>Water Emergency:</b>	A short simple method of obtaining urgent assistance when Fire Service personnel are in difficulty.
<b>Weirs:</b>	A pre-constructed dam across a river over which water falls to a lower level. As water passes over the edge of the weir, dropping from a high level to a lower one, it forces a space in the surface of the water at the base of the weir. Water from downstream moves back against the flow to fill this space.
<b>Whitewater:</b>	Churning water that contains up to 40-60% of air. Too thin to swim in, too thick to breath in.
<b>WRI's:</b>	Water Related Incidents

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## 1. **Executive Summary**

The purpose of this report is to examine water rescue equipment, training and subsequent costings and to formulate some recommendations and options for Cornwall County Fire Brigade.

Analysis of previous incidents in Cornwall County Fire Brigade indicate that there is a need to train and equip the fire fighters appropriately in water rescue so as to ensure their safety and meet the expectations of the public.

A brief summary of this incident analysis can be seen in Appendix 'C'

The outcomes in terms of costings and equipment are, not surprisingly high, and may need to be tailored to suit any available funding but it is essential to allocate sufficient resources to provide the best level of equipment and training possible.

In broad terms, the costings considers:

- Equipment
- Vehicles
- Training

CACFOA South West (Operations Committee) should act to continue development in this area, as a joint initiative this could lead to a reduction in costings. Additional savings may be found by joint Best Value initiatives through shared resources from other agencies such as MCA, EA and the RSPCA. Further guidance may be available to brigades in the near future via the Home Office and 'DETR.

The document is submitted as an initial report based around information kindly supplied by Devon Fire and Greater Manchester Rescue Service's. The resulting recommendations are 'broad brush' but do give an appreciation of what is required. I look forward to the outcomes and would welcome involvement in taking the project forward.

## 2. **Terms of Reference**

As part of the Operational Services Business Plan 2000 - 2005 and in response to recent national events. I have tasked the following:-

- Carry out a full risk assessment of incidents involving water, ice and unstable surfaces. ( *See Brigade current GRA's* )

- Identify major water risk areas within Cornwall and highlight station grounds with greatest levels of operational activity accordingly. (*Emergency Planning Department currently carrying out work here that may assist*)
- Research the use of water rescue equipment in other UK Fire Services and abroad. Taking into account any national implications identified via CACFOA, DETR etc.
- Collate the resulting research material to formulate short and long term options for Cornwall.
- Make recommendations on equipment and training.
- Provide costings.
- Submit strategy paper to SMT for consideration by September 2000.
- Produce a BIS Policy Document with appropriate risk assessments. (*Draft copy attached*).

### **3. Introduction**

3.1 Many of Cornwall County Fire Brigades activities involve working in, on or near water. This may be during training or when attending operational incidents. It is recognised by the Service nationally that there is a strong public expectation for the Fire Brigade to attend incidents with the purpose of saving life or rendering humanitarian services... and historically that is what we have done.

The Fire Service does not have any statutory duty to respond and apply resources to incidents of this type, where fire is not involved. However, no other emergency service is prepared or capable of providing the level of response expected by the public and the Fire Service is perceived as the prime rescue service across a wide diversity of hazardous situations.

3.2 In recent years, Cornwall County Fire Brigade has responded to numerous incidents involving people or animals in difficulty on or in water, mud and ice. (*See Appendix C*). The crews attending these incidents have had no formal training, no specialist equipment and use inappropriate PPE. The rescues have been effected by improvisation of fire fighting equipment or commandeering whatever other equipment is available.

This method is far from satisfactory, leaving the Brigade open to possible criticism, endangering crews and members of the public, however the extreme moral pressure that the initial Incident

Commander is subjected to will inevitably lead to him/her taking some 'offensive' action. It is therefore essential that a Water Rescue Strategy is developed to include appropriate training and equipment so that these types of rescue can be carried out in a safe, effective and professional manner.

Cornwall County Fire Brigade has for some time now concentrated some of its Training initiatives to issues involving marine incidents. This includes the teaching of sea survival training (to whole time personnel only) and the provision of suitable PPE to achieve both the operational and training outcomes. However the Brigade has failed to extend this initiative to that of 'General Water Safety' - where historically and statistically we are far more involved.

- 3.5 **Current climate conditions are known to be changing and the potential for increased exposure to water related incidents will increase. This has been clearly identified both nationally and internationally. Therefore we must be prepared to deal with this type of incident on a more frequent basis in the future.**

#### 4. **Water Related Incidents**

- 4.1 'Water Related Incidents' is in itself a generic term and can comprise fast flowing water, still ponds and quarries, lakes, beaches and estuarial waters, weirs and areas of mud and slurry. There are other variables that can be added to those basic water types such as remote locations, steep banking, cliffs and restricted access.

Climatic extremes further add to the complexity of these incidents and can significantly change the required approach, for example, extreme cold resulting in water courses forming ice and presenting a new set of hazards to crews.

The physical arena confronting the initial crews is then exacerbated by the nature of the emergency and what is involved. Some examples might be; submerged cars, boats, aircraft, people or animals requiring rescue or environmental protection issues.

4.2 It follows that crews will also face situations where by necessity they will have to work near water without intentionally entering it either at an incident or during training i.e. pumping from open water.

Throughout all the possible scenarios that may be encountered runs the fundamental element of time. The urgency of the situation will dictate the response selected by the Incident Commander based on the following key elements

- I. Dynamic Risk Assessment
- II. The 'safe person' concept
- III. A generic approach to water related incidents.

These three elements are supported by the Incident Command System, and together will form the basis of the Incident Commanders tactical decision making.

## 5. **Water Hazards**

In order to work safely alongside water and to enter water for rescue purposes with the minimum of risk to themselves, it is essential that personnel appreciate the hazards that water presents. It is worth considering that, according to statistics from the USA, 10 percent of people drowned each year are professional rescuers! (*The attached draft BIS provides details on water hazards*).

## 6. **Basic Safety Rules for Water Rescue**

There are a number of basic safety rules, which have been taken into account and form the basis of the recommendations for the provision of equipment, clothing and training, in the recommendations section.

The basic safety rules when working on, in or near water are as follows:

- Crew safety is always the priority.
- Always wear a buoyancy aid.
- Always wear appropriate footwear. (Fire boots are not considered suitable in most instances).
- Always wear appropriate headgear.
- Always wear adequate thermal protection,(fire kit is not considered 'adequate').

- Always deploy 'spotters' downstream.
- Always deploy safety crews and equipment downstream.
- Always keep it simple, water rescue should never be complicated.
- Always use the correct equipment.
- Never wade above the knees.
- Never put your feet down if swept away.
- Never tie a line around anyone in or on the water.
- Never rely on the casualty to help in his/her own rescue.
- Always be pro-active - identify risks and where possible remove or reduce.

The foregoing shows that any water can provide hazards to fire fighters. These can all be avoided by not entering the water in the first place. **Reach, throw, wade, row is still sound advice.**

## 7. Existing water safety equipment in Cornwall County Fire Brigade

7.1 Limited equipment is available as follows:-

Immersion suits / lifejackets...Falmouth / Rescue Tenders

Life Jackets...on 25 stations ( 33 at Falmouth)as 'wallgear', or inappropriately stowed.

Thigh waders...limited availability.

*(No consideration to other agencies equipment at this stage re 'OSRL' - (no policy in place) / 'Transco-Phoenix' / other agencies i.e. MCA / EA potential resources)*

Falmouth Fire Station holds a stock of PPE for the Offshore Response Group.

At present there is no water rescue equipment carried on any front line appliance.

The rescue tenders do carry a certain amount of specific water rescue equipment but this is restricted to lifejackets, immersion suits and thigh waders.

Each 'Area' is allocated with a stock of life jackets, the total number varies dependant on the size of the 'Area' and the risk of water related incidents occurring.*(requires re-assessment)*

7.2 In Cornwall County Fire Brigade, there are two basic type of marine life jacket in use.

(i) The 'Remploy Falcon' 275N



These life jackets are specifically designed for working in a hazardous environment and helicopter transit. They include a variety of mechanisms to ensure that they will inflate automatically on contact with water. In addition to complying with the above criteria, they have two separate inflatable chambers. In the event of the loss of buoyancy in any one chamber, the remaining one is capable of maintaining buoyancy. The jackets have the additional provision of a flame retardant silver outer covering for fire fighting purposes.

(ii) General purpose - 150N. 'Crewsaver'

Located at 25 stations (6per station) - a general purpose lifejacket.

Both types of life jackets do provide a good level of safety and conform to BS 3595 1981

'Approved Life Jackets' and SOLAS 1983 Approved. They are, however, not appropriate for entering the water to effect rescues, they are designed primarily to save the wearers life should he/she fall into water accidentally, they are not buoyancy aids.

However, due to the large number of these type of jackets already in Cornwall County Fire Brigade, it may be appropriate and cost effective to re-distribute the existing stock and add extra as necessary.

## **8. Equipment - Requirements**

### **8.1 Inflatable Boats**

Many Brigades from those surveyed for this project ( see *Appendix 'A'*) have already included an inflatable boat as part of their water rescue equipment. These are normally centrally or divisional based and form part of the inventory of a Rescue Tender or Specialist Water Rescue Vehicle. A majority of Brigades have chosen inflatables equipped with outboard motors for speed of response and manoeuvrability, however the need for such a facility in Cornwall County Fire Brigade would need to be assessed in relation to the size of water area the boat would be expected to respond to and the subsequent additional training and cost implications.

The existing boat currently located with 'OSRL' at Saltash could form part of the arrangements.

There are many types of inflatable boats available on the market with prices varying considerably, however there is one particular model that many Brigades have shown a

preference for. The 'Zodiac G380 Fire Brigade Inflatable Boat' has been designed and manufactured for the French Fire Service specifically for inland water rescue.

It is supplied in the UK by Nottingham Offshore Marine and is available from stock at a cost of £3000.00 each including inflation kit and VAT. An outboard motor would be an additional cost of approximately £800. ( e.g *Mariner 4 stroke 6hp*).

The main features of the Zodiac G380 are:

- Unique Zodiac H2P, fully inflatable for boat weight and reduced folded dimensions.
- Zodiac 'Futura' hull concept for performance associated to sea capability.
- Removable floor and small tubes for easy maintenance.
- Automatic inflation of speed tubes and keel.
- Dive cylinder inflation system with quick connection hoses, for fast deployment.
- Capacity for 5/6 persons.
- Folds down to 1.2m x 0.5m and fully valised.

Alternatively a small semi - rigid (for shallow water could be considered at reduced cost). The number and location of inflatable boats would need to be decided together with stowage and type of vehicle to be used to transport them to incidents. This will be considered later in this document.

## 8.2 **Inflatable Walkways 'Airtracks'**

The inflatable walkways have gained nationwide acceptance as the easiest and safest means of effecting rescues from ice, mud and other unstable surfaces. They also provide an excellent and stable platform for working on inland waterways. Of the thirty seven UK Brigades surveyed, twenty three are already using inflatable walkways to increase their water rescue capability. The sole supplier in the UK is MFC Survival Ltd and the walkways are available in a five metre or ten metre option at a cost of £1250.00 and £2500.00 each respectively.

The main features of the airtracks are:

- Rapid Inflation.
- Rapid deployment and mobility.
- Rapid extension and 'link-up'.

- Compatible with existing Cornwall County Fire Brigade cylinders/regulators.
- Each 'airtrack' is supplied complete with anti-slip net, inflation relief valves, grablines, belay lines, join-up connections and carrying valise.
- Folds down to 1m x 0.5m approximately.

The number, type and location of the airtracks is also an issue considered later in this document. The disadvantages of this system is primarily that of limitations in distance.

### 8.3 **Rescue lines/harnesses/throwing lines**

By removing our outdated 'lowering lines' and replacing with a modern lightweight conspicuous 'float / rescue line' c/w spliced karibinars and rescue harness etc, we can provide a much more improved 'purpose designed' rescue facility.

A minimum of one set per station, front line appliance, needs to be provided complete with a dedicated custom made 'throwing' line.

### 8.4 **Rescue Rockets**

The rocket is a non pyrotechnic rescue line delivered by firing a conspicuous plastic 'rocket' over considerable distances. Far more effective than a throwing line.

A compressed air operated floatation aid, it is charged from standard BA Cylinder 'Rocket' Launches up to 250' of line - and rescue sling. Available from 'Jasons' Cradle, cost at £1000.  
(video available)

### 8.5 **Rescue 'Sleds'**

Similar to a surfboard, those GRP units are robust, float, and will take the weight of three persons. they come with a viewing window to allow the rescuer to search beneath the surface, safety line, hand holds etc. Used by many rescue agencies in Scandinavia and North America, unlike the 'Mud Mats' there is no distance limitation on the 'Sleds' operational capabilities.

(Easily conveyed on the roof of an appliance). Cost approximately £1500 Per unit.

### 8.6 **Buoyancy Aids.**

Consider current disposition of lifejackets and replace or supplement with an approved buoyancy aid/vest.

#### 8.7 **Immersion Suits.**

The provision of suitable waterproof 'immersion' suits will provide environmental protection and in conjunction with the existing firefighting uniform - improved thermal protection. This then reduces the likelihood of biological and hypothermic 'contamination'. Prices from £250.

#### 8.8 **Mud Lances**

The mud lance enables high pressure water to be injected around a casualty trapped in impacted sand, mud etc. thus disturbing the free surface and allowing the casualty to be released.

#### 8.9 **Hose Adaptors.**

A simple hose adaptor (which can be constructed in house at a very low cost) provides the facility of 'inflating' 65mm hose to be effective for use as a floatation aid or even mini boom. The hose is inflated via the adaptor from a standard BA cylinder

### 9. **Training**

9.1 The training implications of introducing a water rescue capability are undoubtedly onerous. It is essential that every wholtime and retained fire fighter receives training commensurate with activities expected of them on arrival at a water incident, and therefore different levels of training and subsequent expertise will be necessary.

The Brigade MOG is currently reviewing all training initiatives for marine incidents.

The following will form the overall strategy for all marine related incidents:

Marine Safety - Pt 1 - General Water Safety Policy (BIS)

Marine Safety - Pt 2 - Ship Firefighting - vessels alongside (BIS)

Marine Safety - Pt 3 - Ship Firefighting - vessels offshore (BIS)

Marine Safety - Pt 4 - Standard operational procedure (SOP) - the use of helicopters for marine incidents.

To ensure effective delivery of all of the above the following training packages are available:-

- Ship construction
- Sea Survival Training
- Tactical Ship Firefighting
- Helicopter Operations
- General Water Safety (*under construction*)
- Case Histories

9.2 The main supplier of water rescue training in the UK is the National Whitewater Centre, Bala, North Wales. Operating under the umbrella of 'Rescue 3 International', they are an Adventure Activities Licensing Authority (AALA) and have provided training to the following UK Brigades to date:

- West Midlands
- Staffordshire
- Kent
- Nottingham
- GMC
- Lancashire
- Hampshire

Courses are tailored to suit client needs based around the Rescue 3 International UK Organisation Syllabuses. They form the basis for training for many emergency service rescue teams and lead to an internationally recognised certificate of competence.

9.3 The Rescue Techniques taught are very suitable and adaptable to still water, fast flowing water, flooding, mud and ice rescue. Whilst these courses are regarded as specialist they have a great deal in common with other rescue disciplines that Fire Service personnel are trained in.

There are two levels of training appropriate for Fire Service needs.

**a) First Responder**

Designed for all uniformed personnel who may be called upon to respond to water rescues.

Through a mixture of classroom and river based input the following topics are covered:

- Hydrology

- PPE
- Personal safety and rescue
- Use of throw lines
- Basic accident procedures
- Adaptation of standard fire service equipment
- Scene assessment and protection

This level can be delivered on station by suitably qualified watch based or training department instructors. To allow this to occur, instructors must have completed the course detailed in (b)\_

### **(b) Rescue Technician - Level 1**

This is a four day, competence based course designed to provide the necessary skills to undertake rescues in a swiftwater environment. It is an intensive course with a mixture of classroom and practical sessions and would cost approximately £300.00 per person.

Topics covered include:

- Hydrology.
- Hazard identification and risk assessment.
- Swimming in moving water.
- Basic boat handling skills.
- Contact and in-water rescues.
- Crossing techniques.
- Introduction to technical rescue equipment.
- Introduction to rope systems.
- Medical considerations.
- Scene management and incident command.

This course can be undertaken at the Whitewater Centre in North Wales or at one of the many registered administration centres around the UK with appropriately qualified staff.

It follows that a number of identified personnel would need to undertake the Rescue Technician Level 1 as a starting point. They would then deliver the First Responder training to all stations on a rolling programme.

### 9.3 **Officer Training**

Suitable training appropriate for the flexible duty officers or those with a supervisory role is in the process of being developed by the 'Rescue 3 ' instructors based on the experiences and requests of other Brigades undertaking their courses.

The syllabus has yet to be finalised but will probably include:

- First Responder level training.
- Incident assessment and command.
- Flood management.
- Appreciation of rescue techniques.

This is could also be delivered by personnel qualified to Rescue Technician Level 1 as previously described.

Recommendations on the extent of training delivery and approximate costings are contained later in this document.

## 10. **Outcomes**

In response to the information contained in this report and in order to enhance the water rescue capability of Cornwall County Fire Brigade.

The following recommendations are submitted for consideration.

### **Recommendation 1 - Existing Practices**

The practice of improving existing Fire Service equipment for water rescue should be risk assessed and dangerous practices stopped i.e. improvised boats, sub surface rescue wearing breathing apparatus etc. A 'Bulletin' should be published to reflect any outcomes.

### **Recommendation 2 - Basic Training**

All operational personnel to receive basic water awareness training to First Responder Level' or equivalent as below:

- Location : Individual stations including retained
- Duration : 2-3 hours
- Instruction : Watch based instructors (qualified to Rescue Technician Level 1)
- Costings : Minimal (instructors subsistence etc)

### **Recommendation 3 - Advanced Training**

All operational whole time Junior Officers at Falmouth and St Austell Fire Stations, (see also Rec. 6), and nominated Training Department Instructors receive training and subsequent qualification to Rescue Technician Level 1. These personnel would then be suitably qualified to cascade training to their respective watches etc.

- Location : National Whitewater Centre, North Wales, or other recognised Centre
- Duration : Four days
- Instructors : Rescue 3 International Staff
- Cost : £300 per student
- Students per Course : 10

As an alternative and more cost effective option, a selected core of staff from the identified stations become qualified as per Recommendation 3 and then undertake further training to raise their Technician qualification from Level 1 to Level 2 (instructor qualification). This would enable those individuals to instruct and qualify the remainder of their station personnel to Rescue Technician Level 1 standard. The advantage of this option is that it would give Cornwall County Fire Brigade its own batch of instructors and so keep all further training 'in house' with obvious financial benefits.

### **Recommendation 4 - Officer Training**



All officers conditioned to the flexible duty system undertake training to First Responder Level with additional modules covering incident assessment and command, flood management and rescue technique awareness

- Location : TBA
- Duration : 1 Day
- Instruction : Rescue 3 International staff or suitably qualified 'in house' instructors
- Number of Students : 30 Maximum

#### **Recommendation 5 - Buoyancy Aids**

Life jackets / buoyancy aids should be sourced, selected and issued to all pumping appliances (5 per appliance), together with:-

- 1 x 20m Throw bag line @ £17.50 each
- 5 x side impact 'sport' Helmets @ £20.00 each \*
- 5 x Rescue Knives (personal issue) @ £9.00 each
- 1 x 100m Floating rescue line and harness @ £100.00 each
- Hoseline inflation adaptor @ £10 each

\* The provision of approved Fire Brigade 'side impact' helmets would negate this item and give an ultimate cost saving.

#### **Recommendation 6 - Equipment**

Purchase for stations Falmouth and St Austell the following equipment and locate on the 'OSV' (see Rec.7).

- 2 x 5 metre MFC Inflatable Walkways @ £1250.00 each

- 1 x Zodiac GF 380 Inflatable Boat @ £3035.00
- 1 x 'Rocket' line @ £1000 each
- 2 x 100m Floating Lines @ £100.00 each
- 5 x Helmets @ £20.00 each
- Protective clothing for crews to operate safely in adverse conditions i.e. immersion suits @ £300.00 each.
- 1 x Mud lance @ £195.00

The above list is by no means exhaustive and will no doubt be subject to alterations. However, it does give a flavour of the sort of equipment and financial implications a specialist support facility would require

Consultation with other agencies e.g. MCA may indicate other priorities etc.

### **Recommendation 7 - Operational Support Vehicle's (OSV)**

The issues surrounding a vehicle for transporting the crew and equipment to incidents is a complex and of course, costly one.

There are two options to consider:-

#### **Option 1 -**

Provide OSV's similar in size to the current CSV 'Oscar 1, e.g. curtainside vehicle with tailgate lift, and replace the BASU's currently located at Falmouth and St Austell. Tests would need to be conducted to ensure that they have the capacity to accommodate the suggested equipment and issues surrounding crewing and mobilising would also need to be addressed. The vehicles are available to Cornwall County Fire Brigade at a cost of approximately £30,000 each and although this would increase the overall cost of the project quite substantially, it would ensure an effective water rescue response. The provision of the OSV's also address some of the issues raised by the Brigade 'HAZMAT' and Operations Intelligence Group. i.e. a dedicated vehicle to support Incident Command capable of delivering HAZMAT and some of the equipment currently carried on the BASU's (one of which is in need of replacement).

### Option 2 - Rescue Tenders

The two RT's currently carries a very basic water rescue provision as previously stated. With this in mind, an option would be to extend the line rescue provision together with the water rescue capability. The implications for developing this are considerable mainly with regard to equipment, training and maintaining competence especially in line rescue skills. However the overall additional equipment provision probably makes this option unrealistic.

### Recommendation 8 - Other Projects

The Water safety Strategy must not be developed in isolation. The requirements of the 'Line Rescue Group', 'HAZMAT' Group etc must dovetail into the common goals that are identified and associated within this document.

## **11. Conclusion**

The aim of this report is to provide the Senior Management Team with an overview of the national and local situation with regard to water rescue. Ultimately it is intended to secure agreement from the Senior Management Team to proceed and deliver a Water Rescue Strategy for Cornwall County Fire Brigade that meets current and future needs.

From the research undertaken it is clear that a surprisingly high proportion of UK Fire Services have been pro-active in enhancing their water rescue capabilities. Many now have some basic provision on all front line appliances supported by specialist crews with a greater level of training and equipment i.e. inflatable boats and walkways, and although we have been very pro active with regards ship fire fighting activities, we have failed to meet the need on general water safety

The recommendations contained within this document are by no means 'set in stone' and further research will need to be undertaken and more detailed analysis of the extent to which the brigade needs to extend its current provision. It does, however give an overview of the problems that will

need to be overcome. The equipment and training options are precisely that, options - and there may be more cost effective ways of achieving similar outcomes and this will also require further investigation.

On a personal note, the work I have undertaken in Marine Operations has shown me that there is equipment and 'tailor-made' training available within the UK now.

**Also, no other service is prepared or capable of providing the level of response expected by the public, and, as the Fire Service is perceived as the prime rescue service it is essential that it takes the lead in all inland rescue work.**

**Divisional Officer M J Kettle**

**August 2000**

**APPENDIX A**

BRIGADE	BOATS			INFLATABLE WALKWAYS
	INFLATABLES	MOTORS	RIGID	
AVON	2	✓		1
BEDFORDSHIRE	2	✓		1
BERKSHIRE			1	
BUCKINGHAMSHIRE			1	2
CAMBRIDGESHIRE	4	✓		2
CESHIRE	2			
CUMBRIA				1
ESSEX	4	✓		10
GLOUCESTERSHIRE	3	✓		
HASHIRE				3
HEREFORD & WORCESTER	3	✓	1	
HERTFORDSHIRE	1	✓		2
KENT	2	✓		2
LANCASHIRE	1			1
LEICESTERSHIRE				3
GMC	2	✓		5
MERSEYSIDE	2	✓		6
NORFOLK	3	✓		
NORTHAMPTONSHIRE				2
OXFORDSHIRE	1	✓		
SHROPSHIRE	1	✓		2
SOMERSET	1	✓		
STAFFORDSHIRE	3			
SUFFOLK			2	
SURREY	1			
SUSSEX (EAST)				2
SUSSEX (WEST)			2	
TYNE & WEAR			1	
WARWICKSHIRE	1	✓		
WEST MIDLANDS	1	✓		1
WILTSHIRE				1
YORKSHIRE (NORTH)			1	1
YORKSHIRE (WEST)				4
CLWYD				2
MID WALES	2	✓	1	
SOUTH WALES			1	3
STRATHCLYDE	6	✓		7

## WATER RESCUE EQUIPMENT- APPROXIMATE COSTINGS

PUMPING APPLIANCES	UNIT COST £	NUMBER REQUIRED	TOTAL COST £
BUOYANCY AID	60	5	300
HELMETS	20	5	100
RESCUE KNIVES	10	5	50
FLOATING LINE/ HARNESS	100	1	100
20M THROW BAG AND LINE	20	1	20
HOSE ADAPTORS	10	1	10
		TOTAL	580

Therefore to purchase and equip every pumping appliance in Cornwall County Fire Brigade with the above equipment.

$$£580 \times 48 = £27,840.00$$

This cost could be reduced dramatically by making use of existing life jackets and therefore only purchasing sufficient new jackets/ buoyancy aids to complete the strategy. Also the provision of the equipment to one pump per station i.e water tender will also dramatically reduce costings

WATER RESCUE VEHICLE	UNIT COST £	NUMBER REQUIRED	TOTAL COST £
5M MFC INFLATABLE WALKWAYS	1250	2	2500
ZODIAC GF380 INFLATABLE BOAT CW O/B	3800	1	3800
ROCKET LINE	1000	2	2000
FLOATING LINE (100M)	100	2	200
HELMETS	20	5	100
MUD LANCE	150	1	150
IMMERSION SUIT	300	5	1500
YAK GLOVES	20	4	80
ICE AXE	50	1	50
ICE KNIFE	20	1	20
		TOTAL	10,400

Therefore to equip each 'water rescue' vehicle would be:

$$£10,400 \times 2 = £20,800$$

Additional costs to purchase the appropriate vehicles to be designated as water rescue vehicles would need to be considered as stated in recommendation 7.

Training costs also need to be included in any final figures.

**STATISTICS FOR INCIDENTS OF 'WATER RELATED INCIDENTS'**

	<b>SPILLS AND LEAKS</b>	<b>WATER REMOVAL</b>	<b>Comparison with RTA's, CRE used</b>
Period 1/4/1997 to 31/3/1998	<b>95</b>	<b>103</b>	<b>93</b>
Period 1/4/1998 to 31/3/1999	<b>132</b>	<b>73</b>	<b>94</b>
Period 1/4/1999 to 31/3/2000	<b>140</b>	<b>152</b>	<b>81</b>
Period 1/4/2000 to 31/7/2000*	<b>40</b>	<b>47</b>	<b>53</b>

(\* four month period)