Northern Ireland
Fire & Rescue Service

STANDARD OPERATING PROCEDURE NO 4

Water Rescue

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VERSION CONTROL

Version No	Page No	Issued (Date)	Amendment	Initiated By	Reason for Change
1	All	24/05/05	Initial issue of Standard Operating Procedure (SOP) No 4A	Area Commander (AC) Kerr [Eastern Area Command (EAC)]	New SOP
1	All	24/05/05	Initial issue of SOP No 4B	AC Kerr (EAC)	New SOP
2	All	08/06/12	Various	Group Commander Synnott (Emergency Response)	Full review of SOPs Nos 4A and 4B – incorporated into SOP No 4

NORTHERN IRELAND FIRE & RESCUE SERVICE

STANDARD OPERATING PROCEDURE NO 4

Water Rescue

INTRODUCTION

This SOP has been developed by the Emergency Response (ER) Department and Specialist Rescue Team (SRT), in line with the current Northern Ireland Fire & Rescue Service (NIFRS) Corporate Plan and NIFRS' Annual Business Plan. This SOP should be read in conjunction with SOP No 4C (*Flooding Incidents*), in order to provide a comprehensive overview of the procedures to be adopted at all water related incidents that NIFRS resources are likely to attend.

SOP No 4A (*Water-Related Incidents – Water Awareness*) and SOP No 4B (*Operational Tactics for Water-Related Incidents*) have been amalgamated into one SOP to provide NIFRS personnel with clear safe systems of work to be adopted at incidents. This document will assist the Incident Commander (IC) in identifying significant hazards involved, implementing control measures and determining the relevant operational actions to be taken.

Currently NIFRS operates a Level 1 Response (all frontline appliances) and a Level 3 Response (SRT). This SOP shall detail procedures that all personnel trained to Level 1 Response must adhere to, and provide information on Level 3 capability in order to provide ICs with tactical advice to resolve incidents safely and effectively. **It is essential that all personnel only adopt procedures, utilise equipment or Personal Protective Equipment (PPE) in which they are fully trained and authorised to use.**

SOP No 4 has been produced in the following format:

SECTION A

Safety-Critical Information

All personnel ***must*** have complete knowledge and understanding of this section to ensure maximum safety at incidents. Section A is designed to reflect the content in the relevant section of the Operational Aide-Mémoire.

SECTION B

Provides more Detailed Information on the Topics Covered in Section A

Section B shall be NIFRS Training Note. Personnel ***should*** have a good knowledge of information contained within this section. This includes:

- Hydrology;
- Hazard Awareness;
- Control Measures;
- Pre-Planning;
- Water-related Incidents;
- Post Incident Considerations.

SECTION C

Background and Reference Material

This section includes information which personnel ***could*** use for reference material.

It provides details of relevant legislation and reference material used during SOP development.

1 – SECTION A

1.1 GENERAL

- All personnel shall adopt the following hierarchy when attending water rescue incidents:

  - self safety/rescue;
  - crew safety/rescue;
  - casualty safety/rescue.

- Consideration should also be given to the safety of bystanders, family members, and animal owners.

- All personnel shall only adopt operational procedures and utilise NIFRS equipment/PPE in which they are fully trained and authorised by NIFRS to use.

1.2 EN ROUTE

- Gather incident/hazard information from all available sources (Mobile Data Terminal, Regional Control Centre (RCC) and crew).

- The Officer-in-Charge (OiC) is to brief crews on incident type/initial actions.

- The OiC must inform crews to be vigilant for hazards when working near water, and to wear appropriate PPE (ie, life jackets when required).

- Confirm estimated time of arrival (ETA) for additional/specialist resources, eg, Ambulance, SRT.

- Upon approach, consider the best point of access to the scene whilst maintaining access for on-coming resources.

1.3 ON ARRIVAL

- Establish an initial Inner Cordon to prevent access to the scene and escalation of the incident.

- The OiC must retain effective command and control of the incident, even when faced with moral pressure and emotive situations.

- The OiC shall liaise directly with witnesses/other agencies to gather all relevant information.

- Determine location, number and condition of casualties.

- The IC must carry out a Dynamic Risk Assessment (DRA) to identify all significant hazards.

- All personnel must wear the correct level of PPE as determined by the IC.
- The IC shall determine if the current amount of resources present/ mobilised is sufficient to deal with the incident safely and effectively.
- The initial Tactical Plan is based on priority actions, managing risks and resources immediately available.
- The IC shall communicate the Tactical Plan to all NIFRS personnel/other agencies by ensuring a full and comprehensive brief.
- ICs must determine the requirement for a back-up plan to be developed; communicate and implement when necessary.
- Suitable control measures must be utilised, eg, Safety Officers, crews working in the minimum of pairs; use of life jackets; throwlines readily available; cordon control and effective communications.
- The IC shall declare the Tactical Mode in use to RCC (via informative).
- The IC must ensure close supervision of tasks that pose high risk to personnel.
- A higher level of risk = a higher level of control.
- Level 1 Incident Command System (ICS) should be instigated where time and resources permit.

1.4 OPERATIONAL CONSIDERATIONS

- The DRA and Tactical Plan should be updated/reviewed when operational circumstances dictate.
- Instigate and maintain contact with the casualty, where possible.
- Implement the Rescue Formula -

  1 talk;
  2 reach;
  3 throw.

- Always encourage a casualty to self-rescue or to go to a place of relative safety until rescue resources are in place.
- Personnel should be aware of the effects of cold water on casualties, and how that will affect their actions during the rescue phase.
- **Level 1 trained personnel shall not enter flowing water.**

- **Level 1 trained personnel may enter still water up to a depth of 6 inches, providing a life jacket and wading pole are in use.**

- **Only personnel dressed in full water rescue PPE shall operate in static/flowing water over 6 inches depth.**

- Consider use of working at height equipment around embankments.

- The IC shall consider preparation of the scene for SRT deployment, eg, lighting and location of access points for rescue sleds/boats.

- Ensure adequate lighting at the scene of operations.

- The IC must ensure that casualties are removed to a place of relative safety and receive adequate medical care.

- During night time operations, all personnel must wear high visibility jackets (under life jackets) and switch helmet torches on to improve personal visibility.

- ICs should commence an Incident Log to record key decisions, where time and resources permit.

- ICs should be aware of crew welfare during protracted incidents and ensure that suitable arrangements are in place.

1.5 POST-INCIDENT

- The appropriate level of decontamination should be utilised for personnel, PPE, equipment and vehicles.

- The IC must conduct an operational debrief and procedural review in line with SOP No 30 (*Debrief*).

- Where relevant, the IC should consider the on-going welfare of crews, eg, critical incident debrief.

1.6 OPERATIONAL HEALTH AND SAFETY MAXIM

All NIFRS personnel should remain cognisant of the Operational Health and Safety maxim:

"We may risk our lives a lot, in a highly calculated manner, to protect saveable lives.

We may risk our lives a little, in a highly calculated manner, to protect saveable property.

We will not risk our lives at all for lives or property that are already lost."

2 – SECTION B

2.1 HYDROLOGY

- Hydrology is the study of moving water. Understanding the various features, types, hazards and risks associated with hydrology, will provide the foundation for effective risk management and the development of techniques and safe systems of work.

- The nature of any body of water, whether "high energy", ie, fast moving river in spate conditions, or "low energy", ie, a wide area seemingly static body of flood water, is determined by 4 things - the amount of water; how fast it moves; the nature of its bed or sub-surface structure; and that of its banks or sides. All of these factors can vary from day-to-day, even hour-to-hour. Only by understanding how moving water behaves can we use it, and by doing so, avoid unnecessary or unacceptable risks.

2.1.1 MOVING WATER

- As the speed of a river's current increases, so does the power. As the speed is doubled, the force of the water against an object is quadrupled, greatly increasing the difficulty of a rescue or a river crossing.

- The current in a river will push on an object continuously, unlike an ocean wave, which breaks then ebbs. The current is relentless and unforgiving.

2.1.2 WATER FLOW (CURRENT)

There are 2 types of flow encountered in a river - ***laminar flow*** and ***helical flow***:

Laminar Flow

- The flow of water in the middle of a river is generally the fastest, with the speed decreasing towards the edges, as the water is affected by friction from the banks, the riverbed, or the air/wind on the surface. This 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, possibly creating undercut banks on the outside and shallows on the inside of bends.

Helical Flow

The helical flow is the flow of water between the banks and the main current. The hazard provided by this current is that an object in moving water will tend to be swept away from the bank towards the helical fence.

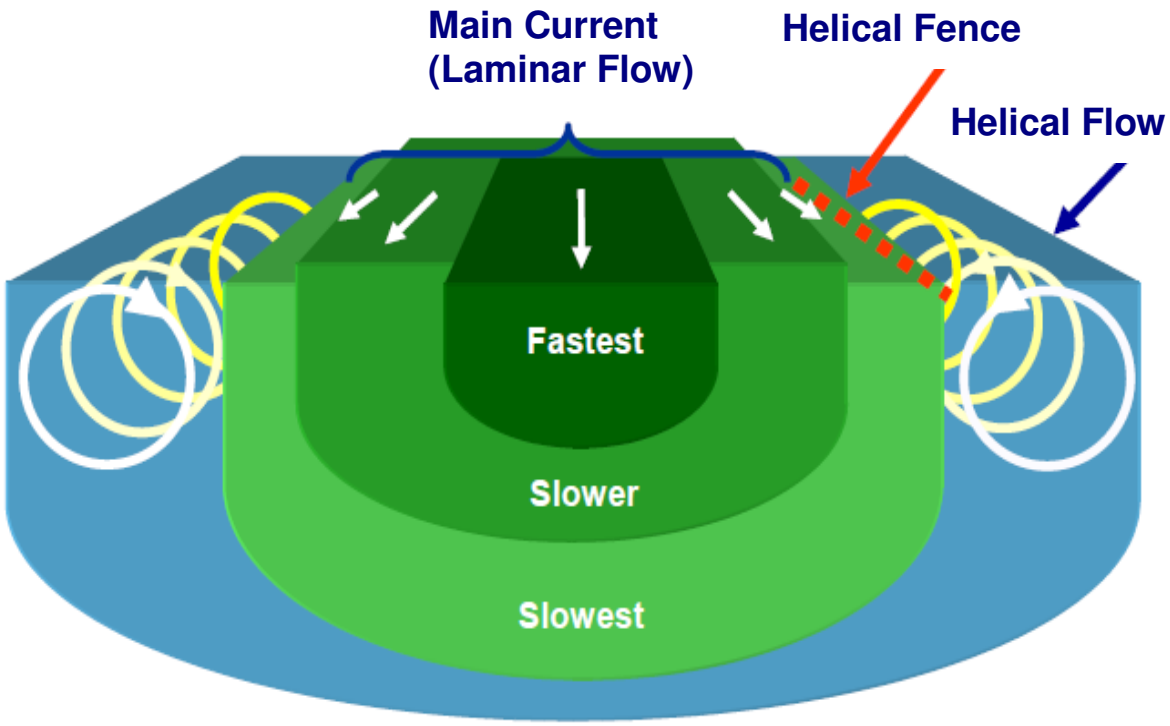

Diagram 1 – Current/Flow

Force of Water

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

Double the Water Speed = Quadruple the Force

Thus, standing in fast flowing water is extremely dangerous.

Tidal Conditions

Some rivers, inlets and estuaries are influenced by tides, often some distance from the coast. It is worth noting that the depth of water will sometimes change very rapidly. Ground that has dried out following a falling tide can be rapidly flooded when the tide turns and care must be taken to avoid being cut off or isolated from exit points.

The rate of flow can change from nil to rapid and the direction of the flow may reverse. These effects may occur over a very short time interval at least twice a day, and will vary from day-to-day.

2.2 HAZARD AWARENESS

2.2.1 NATURALLY OCCURING HAZARDS

Examples of naturally occurring hazards are:

- current, flow, undertow, eddies, whirlpools, weirs and stoppers;
- lighting levels at the scene;
- temperature;
- depth;
- mud, silt, roots, weeds and rocks.
- approach difficulties to and at the riverbank/quayside
- weight of water (double the water speed means quadruple the weight).

2.2.2 MAN-MADE HAZARDS

Examples of man-made hazards are:

- helicopter operations;
- strainers - fencing, debris, cars and trees;
- surface craft movement and debris movement;
- overhead power lines;
- pollution and contamination.

Holes/Stoppers

Often associated with weirs due to the features associated with both, however, stoppers can also be found where water passes over a vertical drop and re-circulates. This can be especially hazardous if the re-circulation is powerful enough to retain an object.

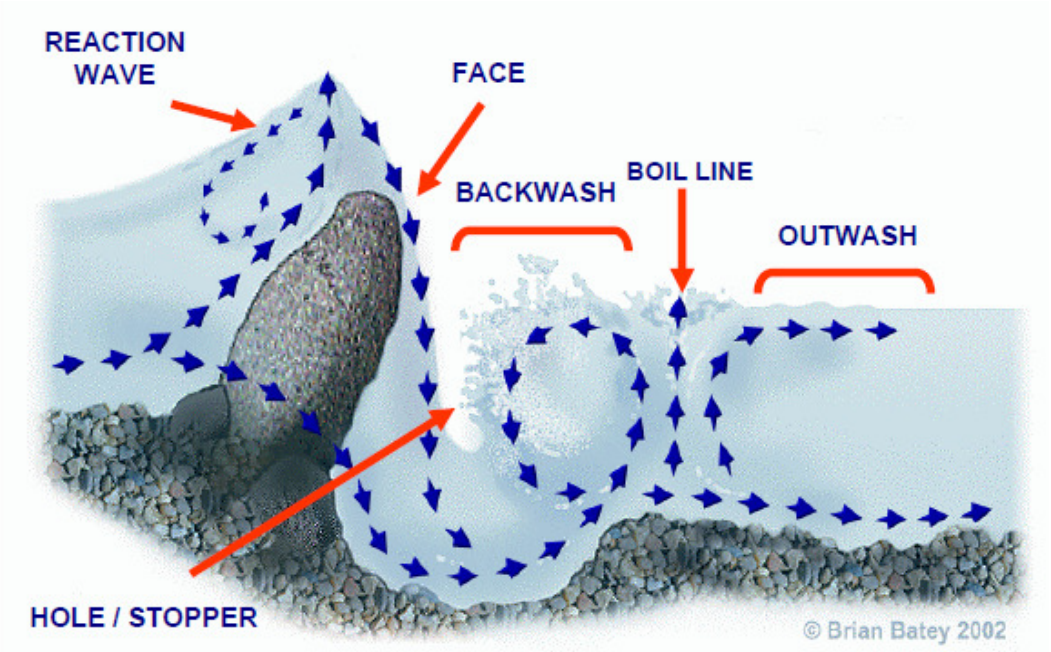

Diagram 2 – Holes/Stoppers

Weirs

- A low head dam or weir is possibly the most dangerous hazard on a river, and is often referred to as a "drowning machine". The face of the weir is often steep and as the water flows over the lip it hits the deep slow water below, creating the towback as the water comes back upon itself. The severity can be judged by the distance from the slot, to the boil line - the towback.

- The towback will often hold a buoyant object or will re-circulate a swimmer (even with a life jacket), offering little chance of escape. A boat approaching from downstream will be pulled towards the face and once it has crossed the boil line, it is likely to be swamped and overturned. In many cases the person or object is again caught by the towback and circulated in a similar manner.

Strainers

A strainer is anything that allows water but not solid objects to pass through it. The main hazard associated with a strainer is that a person or object may be drawn against it and trapped by the force of water passing through it. Examples of strainers are tree roots, fences, gates, cars and vegetation.

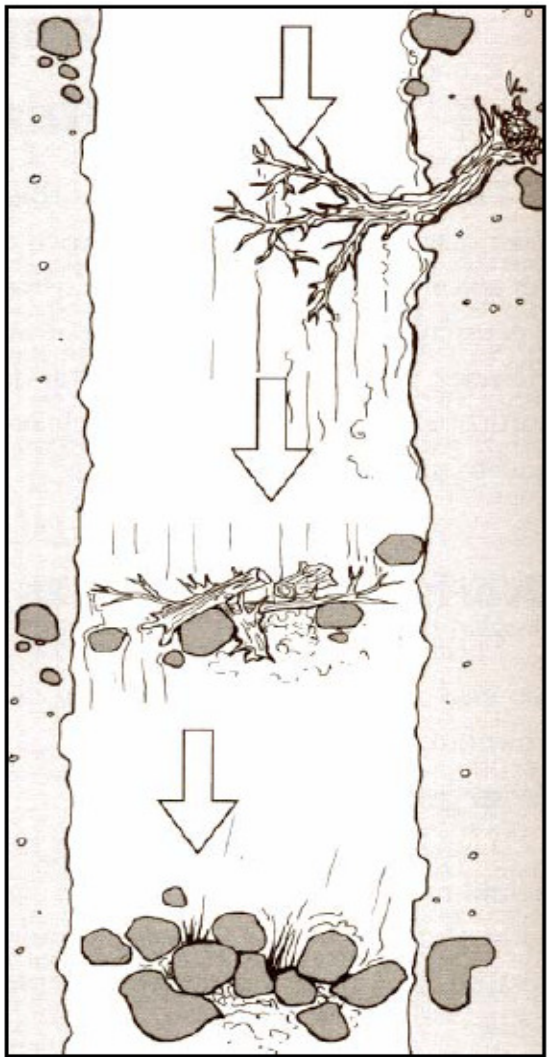

Diagram 3 - Strainers

Debris

All watercourses contain debris of some sort, all of which may act as an entrapment hazard, thereby causing problems during a rescue attempt. This is the load carried by a river and can be debris picked up along the way and carried by the flow either on the surface or suspended in the water, such as, trees, driftwood, or manmade debris. Any of the debris could pose a threat to the casualty and a danger to personnel. Open water (especially flood water) contains lots of fine particles. These particles affect the clarity of the water, resulting in little or no visibility through the water.

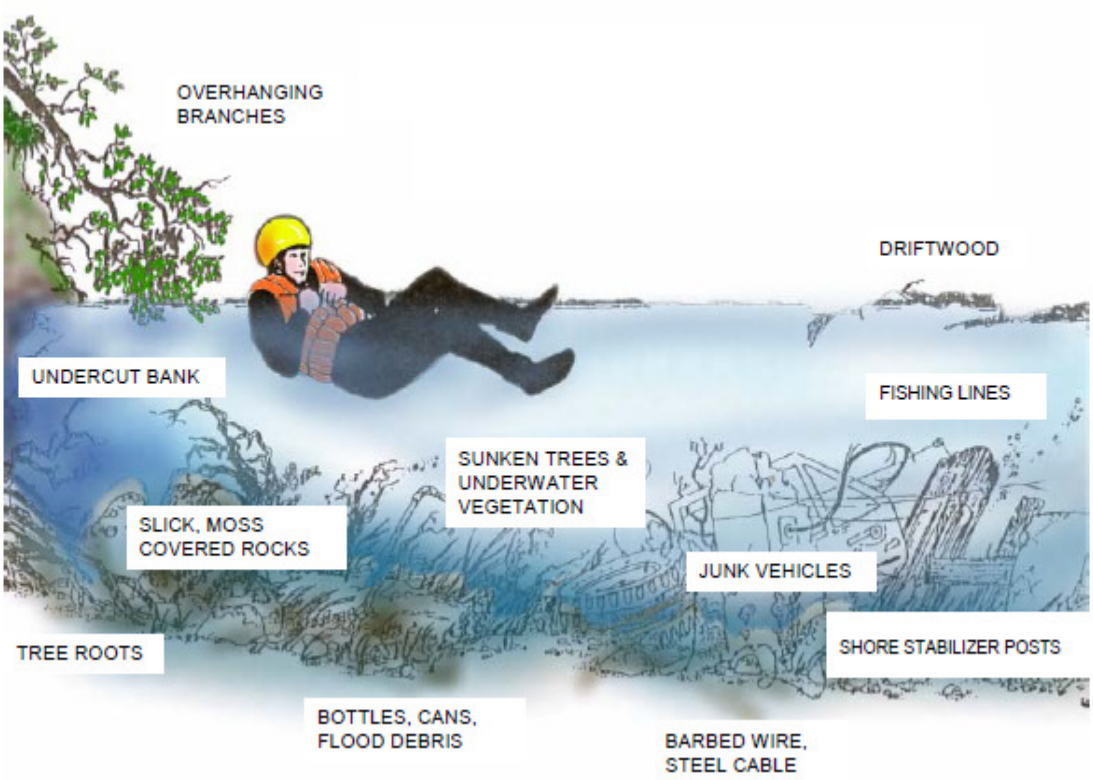

Diagram 4 – Entrapment Hazards

Accidental Immersion

Should a crew member fall into moving water, they must adopt the "safe swimming position", ie, keep feet up and pointed in the direction of travel; use arms for directional movement; **do not put feet down to regain stability**.

Eddies

Where water flows around an obstacle such as a boulder, the area behind the obstacle is usually calm water, possibly flowing back upstream. This can provide a good area for a swimmer to rest or to bring a casualty ashore. However, in fast flowing rivers with a high volume of water, the current in the eddy can be fast flowing and turbulent. Remember that similar eddies and places of refuge may be found in urban flooding situations.

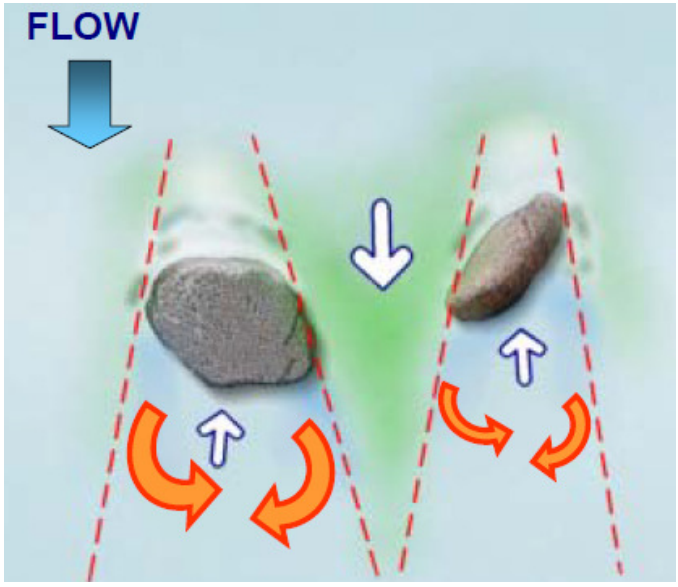

Diagram 5 - Eddies

Canals

Although regarded as slow moving water, canals present similar hazards to those associated with rivers and the water will often be polluted. The canal bed may be strewn with debris and could be deeply silted, presenting the same hazards as incidents involving mud.

Sluices/Locks

- Locks can be found on both rivers and canals and are a means of raising or lowering the level of the water to allow boats to navigate gradients.

- If a craft is going downstream the lock is first filled by opening a sluice (trap door) in the lock gate and allowing water to pass from upstream into the lock until the water levels equalise, allowing craft to enter the lock. The water is then released by opening a sluice in the downstream gate, allowing water to exit the lock and thereby lowering the water level within the lock to that of the downstream level. The lock gate is opened when the levels equalise, allowing the craft to proceed downstream. Craft travelling upstream follow the same principles of operation.

- When the sluices are open, anything or anyone in the lock or above it is likely to be sucked through the sluice opening. Personnel attending an incident at a lock should secure the sluice controls, preventing unauthorised operation, which could compromise a rescue effort or the safety of anyone in the water. Where available, a lock keeper or responsible person should be requested to operate the sluice. Personnel should be aware of the hazard posed by pump intakes located at or near pumping stations.

2.2.3 BIOLOGICAL HAZARDS

Waterborne Diseases

Personnel must be cognisant of the various types of waterborne diseases that may be present in polluted water. The following information provides a basic outline of the most common diseases and their subsequent signs and symptoms. The most important factor to remember is that if you feel unwell, and symptoms persist or become progressively worse following contact with water that you suspect to be polluted, professional medical advice should be sought immediately.

Weils Disease – Leptospirosis

The infection is caused when Leptospires (minute bacteria) enter the human host through a skin abrasion or through the lining of the mouth, throat, or eyes, after contact with an infected animal's urine or contaminated water. There are many different types of this organism, each associated with different animals. The most commonly found strain in this country is associated with cattle, but cases have also been associated with rats.

Signs and Symptoms

The first sign of Weil'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 a 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 the liver, pancreas and intestines can occur, resulting in heart failure. If any symptoms develop seek medical advice immediately and state that you are at risk from Leptospirosis.

Blue/Green Algae (Cyanobacteria)

Blue/green algae - frequently found in fresh water. During extended periods of warm settled weather they multiply and form a bloom on the surface of the water. The blooms may be flocculent or look like jelly or paint and are normally blue/green in colour, though other colourants, red, brown and black can occur. The blooms can appear and disappear with changing weather and the majority of blooms produce allergens and toxins.

Signs and Symptoms

- dermatitis;
- eye irritation;
- gastro-enteritis;
- joint and muscle pain;
- pneumonia;
- liver damage;
- neurological conditions.

The types and potency of toxins produced vary considerably, although ingestion of small quantities of concentrated bloom could be fatal, human deaths are extremely rare. There have been numerous cases of animal deaths.

Hepatitis A

A virus present in faeces, which therefore are present in water, contaminated by sewage. All workers in and around inland waterways, including emergency rescue personnel, could be exposed to the disease.

Signs and Symptoms

Hepatitis A has a variable incubation period of 15 - 50 days. The onset is usually abrupt, producing fever and abdominal discomfort, followed by jaundice. Many infections are relatively mild but in some cases progress to a prolonged and severely disabling disease.

Man-Made Pollution

- Another significant risk is the ingestion of bacteria that cause gastrointestinal infection. Sewage contains large numbers of organisms. Salmonella infection is probably the principal bacteria risk but Campylobacter, Shigella, e.Coli and Listeria may also be present.

- Consideration should be given to industrial/agricultural pollutants, also the presence of man-made contaminants such as needles and glass.

2.2.4 DECONTAMINATION

Where necessary, the attendance of a Hazmat Officer should be requested to assist in identifying the level of decontamination required. Strict hygiene procedures, particularly control of eating, drinking and smoking should be adhered to and post-incident health monitoring provided in conjunction with Occupational Health, where necessary.

2.2.5 EFFECTS OF WATER ON THE BODY

Still water will take heat away from the body 25 times faster than air; if the water is moving the effect will be even more dramatic. A 5-mph current flowing past a stationary body will take up to 250 times more heat away from the body than air.

Cold Water

- NIFRS personnel must be aware of the hazards associated with cold water and their effects upon a person who has been submerged or who requires to be rescued.

- Cold water will quickly sap the strength of even the strongest swimmers and cause confusion and irrational behaviour. The dramatic effect of the cold water upon the body cannot be over-stressed to a potential rescuer, who should not put themselves into a life-threatening situation.

- When a person is first immerged (either fully or partially) in cold water the first hazards to contend with are panic and shock. The initial shock can place severe strain on the body, which could result in an instant cardiac arrest. Reflex actions that occur immediately will include an involuntary gasp and sudden hyperventilation. Survivors of cold water accidents have reported the breath driven from them on first impact with the water. Total disorientation may occur after cold water immersion.

- Immersion in cold water can quickly numb the extremities to the point of uselessness. Cold hands cannot fasten the straps of a life jacket, grasp a thrown rescue line, or hold onto an over-turned boat. Within minutes, severe pain clouds rational thought. Finally, hypothermia (exposure) sets in, and without rescue and proper first aid treatment, unconsciousness and death.

- In summary, personnel must not assume that a casualty will be able to perform a self-rescue due to the impact of cold water upon the casualty's body. Personnel must also be aware of the unpredictable nature of a casualty in water, as a person's natural instinct to survive may affect their actions and ultimately affect rescue attempts.

2.3 CONTROL MEASURES

2.3.1 OPERATIONAL HEALTH AND SAFETY MAXIM

- All NIFRS personnel should remain cognisant of the Operational Health and Safety maxim:

  "We may risk our lives a lot, in a highly calculated manner, to protect saveable lives.

We may risk our lives a little, in a highly calculated manner, to protect saveable property.

We will not risk our lives at all for lives or property that are already lost."

- Rescuers may be faced with extreme moral pressure at water rescue incidents but the Operational Health and Safety maxim should always be adhered to. This will ensure personal safety and avoid reckless and often needless rescue attempts.

2.3.2 THE RESCUE FORMULA

The Rescue Formula shall provide personnel with a hierarchy from which to attempt a rescue. Personnel must consider and/or attempt each level before moving onto the next level, ie:

1 talk;
2 reach;
3 throw.

Talk

Personnel should always encourage the casualty to self-rescue in the first instance. This shall pose the least amount of risk to personnel as it can be conducted at a safe distance from the water's edge.

Always:

- communicate with the casualty;
- maintain eye contact;
- reassure and encourage the casualty;
- maintain a positive attitude.

Reach

Personnel may use various equipment to effect a rescue by reaching equipment to casualties, eg, inflation hose or reach poles. This method increases the risk to the rescuer as they will need to operate in close proximity to the edge of the water.

Always:

- communicate with the casualty;
- determine the most effective equipment to be used;
- use a minimum of 2 personnel to hold a reach device.

Do not over-stretch as you may become injured and you will be poorly balanced; therefore if a casualty pulls on the reach device you may also fall into the water.

Throw

25 m Throwlines are readily available on all appliances and are good for an initial rescue attempt. They can also be used as a downstream back-up plan. Personnel should also be aware of, and use where appropriate, rescue equipment that may be available at the scene, eg, life rings.

2.3.3 GENERIC CONTROL MEASURES

The following generic control measures will promote safe systems of working for all personnel, by mitigating the amount of risk posed by significant hazards.

- All personnel must carry out a personal DRA to ensure their safety, which should be updated when operational circumstances dictate.

- The minimum number of personnel should be used within the hazard area.

- Establishing an early initial cordon will control access to the scene. This may be adjusted further into the incident.

- The IC should ensure that communications are established to deal effectively with the incident.

- The Rescue Formula must be adhered to at all incidents:

  1 talk;
  2 reach;
  3 throw.

- Any rescue from water or associated hazards should not be attempted without the correct equipment and PPE. Where possible, all rescues should be attempted from firm ground or a permanent structure.

- All personnel must wear life jackets or buoyancy aid when working within 3 m of the edge (this distance can be increased or decreased after risk assessment).

- Never rely on the casualty to assist in their own rescue.

- If attending an animal rescue, then personnel must be aware of the unpredictable nature of how animals will react to rescue attempts.

- If a line or inflatable hose is to be used as a safety cableway across a current it should be positioned at approximately 45 degrees to the current. This allows anyone who is swept onto the line to be washed to the bank and to safety.

- Helmets should not be worn during water rescue incidents, however, if the IC's DRA deems it necessary to wear helmets during the incident, chin straps should be undone.

- If a line is tensioned across the water, always stand on the upstream side of the line.

- When time and resources permit, ICS should be instigated to ensure adequate command and control of the incident.

- Early consideration should be given to the mobilisation of a helicopter [refer to SOP No 27 (*Working at Height*)].

- Always have a back-up plan. This may consist of further rescue equipment deployed downstream from the scene of operations.

- Spotters should be deployed upstream from the scene of operations, ideally on both sides of the river, to warn of any change in river conditions or of any surface debris.

- Under no circumstances shall breathing apparatus be worn to attempt a rescue.

- Weather conditions and incident duration may necessitate crew rotation.

- Where visibility is poor, all personnel should wear a high visibility jacket under their life jacket, and switch their torches on (care should be taken not to dazzle water-based rescue teams or helicopters).

Personal Hygiene

Personal hygiene is important where crews have been in contact with open water, mud or similar. The following information is provided to assist prevention.

- Treat all water as potentially contaminated.

- Cover all cuts and broken skin with waterproof plasters before and during work.

- Be aware of biological hazards.

- Wear appropriate protective clothing.

- Wash hands after contact with water, animals or any contaminated clothing or other materials and always wash before eating, drinking or smoking.

- Where possible, avoid contact with stagnant or slow moving water.

2.4 PRE-PLANNING

2.4.1 INTERNAL

- Operational intelligence visits and exercises should be conducted where appropriate, based upon the station risk profile. Whilst it is not expected that detailed inspections are carried out for every site, a co-ordinated programme based on local knowledge and risk analysis will identify locations where NIFRS may be likely to attend incidents in, on, or near water. Particular attention should be given to:

  - identifying the location and name(s) by which the site is known;
  - access points for vehicles and/or personnel;
  - any hazards in or around the water (ie, weirs, pumps, etc);
  - any other information deemed appropriate/necessary.

- Water rescue training should be conducted in accordance with relevant NIFRS Training Notes in order to achieve competence. Training should be conducted using scenarios that may replicate operational incidents; where possible these should be conducted at sites within the relevant station area.

2.4.2 EXTERNAL

- Liaison with other emergency responder agencies will be essential to ensure that incidents can be resolved safely and effectively. Personnel should be aware of the procedures and equipment that are utilised by other agencies in order to provide a co-ordinated and effective response to incidents. Liaison should occur at local and national level to support response at incidents, and to ensure that examples of best practice are shared.

- ICs should be aware that volunteer organisations may have skills and expertise which they wish to bring to an incident, and could, on occasion, frustrate NIFRS operations. Pre-planning and liaison may avert potential problems when operational incidents arise. The development of a specific Memorandum of Understanding could be considered to provide more clarification of roles and better operational understanding.

2.5 RESOURCE MANAGEMENT

2.5.1 PRE-DETERMINED ATTENDANCE

- Upon receipt of an emergency call that includes a casualty involved in a water-related incident, RCC shall mobilise the following resources:

  - 2 x Pumping appliances (1 of which must be a call sign 01);
  - 1 x Rescue vehicle;
  - SRT;
  - 1 x Station Commander*;
  - 1 x Group Commander*.

  ** Minimum role - Nearest Officer principle shall apply.*

- RCC shall also inform (where relevant):

  - Police Service of Northern Ireland (PSNI);
  - Northern Ireland Ambulance Service;
  - Maritime and Coastguard Agency (MCA);
  - Duty Headquarters' Officer;
  - Voluntary Groups.

2.5.2 NIFRS RESOURCES

Level 1 Water Rescue Equipment

This equipment is carried on all frontline appliances for personnel to attempt an initial rescue or stabilise an incident prior to the SRT arrival. A combination of the following items is stored upon appliances and/or cars:

- hose inflation kit;
- throwlines;
- reach and rescue poles;
- life jackets.

Hose Inflation Kit

Due to the versatility of the inflation kit, the following information is for operational guidance purposes only. Personnel should train with the kit at locations in their station area in order to assess the most effective techniques to be used in preparation for operational incidents.

- Several lengths of standard 70 mm delivery hose can be added to the inflation hose (red) to provide a longer reach. They may also be doubled/trebled, etc, over to provide more stability to the hose when feeding it into the water, ie, 3 lengths may be folded near to each coupling to provide approximately a 25 m inflated hose (trebled over) that will be more stable when deployed in water.

- Lines may be attached to the termination eyelet at either or both ends to make an inflated portable safety line. Where possible, one end should be attached to a secure object.

- Inflated hose may be tensioned at an angle of approximately 45 degrees to the flow, as a safety barrier downstream of a casualty, allowing them to be carried out to the side of the river by the force of the river. Downstream, line should be easily releasable from its anchor.

- If required, the hose may be suspended horizontally from a bridge to catch a casualty in flowing water. Once secured, the free end of the hose may be released and allowed to swing to the riverbank.

- Inflated hose may be pushed into the "slot" of a weir or suspended from a bridge to assist a casualty in the water.

Throwlines

The versatility of throwlines means that they can be used as an immediate rescue attempt or they may also be utilised as part of the back-up plan. However, personnel should be aware that the effectiveness of throwlines will be dependent upon several factors, including wind, correct storage of line and technique of the thrower. The following factors will determine how far the line can be thrown.

- Length of throwline - 15 m/25 m.

- Ensure the line is stored correctly and that it is free from knots or loops.

- Throwlines must be operated from stable ground/platform to prevent personnel from losing their balance.

- Use a thrower back-up to aid stability.

- Before deploying a throwline look for overhead hazards or obstructions.

- Consider where the casualty will be "landed".

- Hold the line up so that the casualty can see it – throw slightly beyond and in front of casualty (within reach).

- Use the most comfortable throwing method.

Picture 1 – Throwline Deployment

- Avoid standing in the bight.
- In flowing water, anticipate shock loading when the casualty catches the line. Consider walking downstream – **do not tie off line**.
- The casualty should be instructed to hold the line across his/her chest and lie on his/her back whilst being recovered.

Reach and Rescue Pole

Reach and Rescue poles provide NIFRS personnel with an extended reach of approximately 4 m for water-related incidents. Personnel should be aware that the main risk to Firefighters is the possibility of losing their balance and encroaching towards potential hazards.

Use of Reach and Rescue Pole:

- A high visibility extendable reach and rescue pole providing a maximum of 4 m extended reach.
- This pole can be used for water, ice or mud rescue, also small animal rescue.
- Care should be taken not to over-reach or stand too close to the water.
- Avoid use near overhead power lines.
- Never over-extend sections – red section should not be visible.

Picture 2 – Over-Extension

Life Jackets

Life jackets are a control measure provided to mitigate the risk posed to Firefighters due to working near to the water's edge.

- Life jackets must be worn correctly when **working** within 3 m of the water's edge, where there is a hazard to personnel.
- NIFRS provides life jackets on all frontline appliances and cars.
- The life jackets are designed to ensure the wearer is kept buoyant and "face up", therefore maintaining an airway if they are unconscious.
- Life jackets provide immediate buoyancy by automatic inflation if the wearer should enter the water unexpectedly, even if unconscious. The buoyancy can be enhanced by further manual inflation.
- It should be secured to the wearer as per the manufacturer's instructions. An improperly fitted jacket will present an additional entrapment hazard to the wearer and may not provide effective buoyancy. Crotch and chest straps should be "comfortably tight" around the wearer.

SRT

- The SRT is the only NIFRS asset trained to a Level 3 Water Rescue capability, and are therefore the only NIFRS resource with the provision and training to deploy into water to effect swift and still water rescues.

- The SRT is automatically mobilised to water-related incidents when persons are unaccounted for. OiCs should, however, contact RCC to confirm the ETA for the SRT to be in attendance. The SRT has access to various specialist PPE and equipment which allows for safe systems of work at the following incidents:

  - swift and static water rescue using inflatable rescue sleds, pathways, boats and tethered swimming where necessary;

  - land and water search, including use of Global Positioning System (GPS), night vision equipment and search management procedures;

  - unstable surface rescue, eg, ice and mud;

  - high angle (rope access) rescue;

  - flood response;

  - additional safety measures for personnel working near water/ unstable surfaces.

- Whilst in attendance, the SRT Team Leader shall act as a Tactical Advisor to the IC.

2.5.3 EXTERNAL RESOURCES

- Personnel should be aware of non-NIFRS resources available to them at the scene. These resources may include other emergency responders, attendance of voluntary groups and resources available at the scene (life rings, etc).

- ICs should make an early judgement as to whether there is sufficient requirement for a helicopter to be mobilised, and for what purpose - search and rescue or for surveillance. Personnel should refer to SOP 23 (*Tasking and Operational use of Helicopters)* for further information.

2.6 WATER-RELATED INCIDENTS

2.6.1 RESCUES FROM ICE

Rescues from ice generally fall into 4 categories:

- the casualty has fallen through the ice and is visible;

- the casualty has fallen through the ice and is not visible;

- the casualty is apparently injured and lying on top of the ice;

- the casualty is stranded on an island, vessel, or object that is surrounded by the ice.

Hazards

- Hazards associated with rescue from ice are:

  - dangerous, unstable surface – variation in thickness across the surface;
  - hypothermia;
  - possible entrapment under ice due to movement of water;
  - inability to self-rescue.

- Safety of all personnel is the first priority and crews must assume that all ice is unsafe and shall therefore not be permitted onto it. If possible, the use of lines or inflated fire hose should be used to stabilise or remove the casualty. Ice rescues are high risk environments and the SRT is the only NIFRS resource equipped and trained to deal with such rescues, therefore, if personnel are unable to effect a rescue from a safe position they should prepare the scene for the arrival of the SRT, eg, establishing lighting, best access point, etc. The SRT can, if necessary, deploy onto or through the ice using an inflatable sled or boat, whilst maintaining a safety tether.

- Hypothermia may affect the casualty and rescuer. Persons removed from the ice must therefore be placed in warm, dry clothing and removed to hospital as quickly as possible. It should also be noted that foil blankets do not raise body temperature; they maintain an existing temperature, therefore dry blankets should be placed next to the skin and the foil blanket placed over the blanket.

- In situations where the casualty is not visible from the water's edge, especially if the water under the ice is known to be flowing, the last known position/point of entry of the casualty should be indicated at the water's edge to assist the PSNI Diving Team or SRT in locating the casualty.

2.6.2 RESCUES FROM MUD

At incidents where crews are faced with attempting a rescue from mud, the surface will be both soft and treacherous. The IC should assess the incident, conduct a DRA of the scene and then decide upon a Tactical Plan. Appropriate control measures must always be in place.

Hazards

- Hazards associated with rescues from mud are:

  - the threat from rising tide to those entrapped;
  - high levels of bacterial contamination embedded in mud;
  - access and egress routes affected by tidal flow;
  - potentially harsh weather conditions – hypothermia;
  - manual handling.

- ICs must ensure cordon control to restrict numbers in the hazard area. Appropriate PPE should be worn, eg, life jackets, as well as sufficient lighting at night. A Safety Officer should be nominated, eg, to liaise with the MCA regarding tide/weather.

- The Rescue Formula (or talk, reach and throw) should be worked through in the first instance, allowing the casualty to "self-rescue". Personnel should not deploy onto mud without appropriate PPE (drysuit, buoyancy device, etc) and mud rescue training.

- The SRT should be mobilised to all mud rescue incidents, and can deploy a variety of related equipment onto mud, including inflatable walkways/sleds; mud-lances; folding shovels; scene lights; mud stretcher and casualty care bag (survival bag, extrication harness, life jacket, water, etc).

Picture 3 - SRT Mud Rescue Equipment

- The casualty should be kept in a horizontal position after being freed from the mud as this will reduce the chance of post-release collapse (due to hydrostatic squeeze). The casualty should be removed to hospital as soon as possible.

2.6.3 CO-ORDINATED SEARCHES

- PSNI shall co-ordinate all casualty/missing person searches. PSNI may request the attendance of NIFRS personnel to control search procedures. Where NIFRS is mobilised, the IC shall liaise with PSNI to gain a full and comprehensive brief, which must be relayed on to crews before commencement of a search. Details of the brief should include:

  - boundary of area to be searched;
  - layout/terrain;
  - risk assessment of search area;
  - actions in an emergency;
  - casualty details if known – name, age, description, etc.

- The IC must ensure that there are sufficient resources in attendance or mobilised to the incident to conduct an effective search. This shall include ensuring that NIFRS personnel have access to the following equipment, where required:

  - appropriate PPE for weather, temperature, terrain and hazards;
  - life jackets;
  - high visibility jackets;
  - communications;
  - personal lighting;
  - map/drawings of area;
  - eye protection for searching undergrowth;
  - wading pole for checking underfoot conditions.

- The IC should consider what type of search would be most effective for the incident. Types of search include:

  Primary Search

  A primary search is a quick search of high probability areas, eg, boulder or strainer in a river.

  Secondary Search

  - A secondary search is a thorough and systematic search, eg, river banks and undergrowth.

  - During the search phase nominated personnel should inform the IC with updates at timely intervals. Information should include progress or barriers to progress, the area actually searched or any significant hazards encountered. The IC should then relay any relevant information to PSNI when available.

2.6.4 BODY RECOVERY

- It is not normally the role of NIFRS to recover bodies from water, and therefore the risks involved in doing so must be carefully considered by ICs. Apart from the inherent risks and hazards involved in working near water, there is the additional risk of contamination from decaying bodies.

- At any incident where a body is located or discovered, NIFRS personnel will liaise closely with PSNI and treat the location as a crime scene by disturbing the area as little as possible. Only the SRT shall recover a body from water.

2.7 POST-INCIDENT CONSIDERATIONS

2.7.1 DECONTAMINATION

Personal hygiene is important where crews have been in contact with open water, mud or soft ground. All personnel should wash and shower as soon as possible. All equipment should be cleaned and tested in accordance with the normal maintenance procedures.

2.7.2 DEBRIEF

- A debrief of incidents should be undertaken [refer to SOP No 30 (*Debrief*)] to determine if there are any significant findings in relation to:
  - personal injury or trauma;
  - SOPs;
  - effectiveness of equipment/PPE;
  - provision of specific training that would lead to a more effective response in a similar incident;
  - inter-service liaison;
  - any notable occurrences or methods of best practice.
- Where necessary, ICs should provide a written report of any findings to the relevant Group Commander (Operations) for the incident location.

2.7.3 WELFARE

Where relevant, ICs should consider the on-going welfare of crews post-incident. This may include a Critical Incident Debrief, procedures for which should be sought from NIFRS Occupational Health, Safety, Welfare and Establishment Department via individual Line Managers.

3 – SECTION C

3.1 LEGISLATION

- The Fire and Rescue Services (Northern Ireland) Order 2006;
- The Fire and Rescue Services (Emergencies) Order (Northern Ireland) 2011.

3.2 REFERENCE MATERIAL

- Operations Policy No 4 – *Working in or Near Water*;
- Chief Fire & Rescue Adviser – *Fire and Rescue Service Operational Guidance – Flooding and Water Safety;*
- SOP No 4A – *Water-Related Incidents – Water Awareness*;
- SOP No 4B – *Operational Tactics for Water-Related Incidents*;
- SOP No 4C – *Flooding Incidents*;
- SOP No 23 – *Tasking and Operational use of Helicopters*;
- The Stationery Office – Fire Service Guide, Volume 3 – *A Guide to Operational Risk Assessment*;
- NIFRS Technical Memorandum No 5/2009 - *Level 1 Water Rescue and Automatic Life Jackets*;
- DRA Booklet;
- NIFRS Training Notes.

CONCLUSION

The hazards associated with water-related incidents will present a serious risk to Firefighters. It is essential that ICs carry out a full assessment of the scene on arrival and adhere to the guidance contained within this document. The DRA will determine if any actions are necessary before the arrival of further specialist equipment and supporting crews. The information contained within this SOP will assist the ICs in gathering all relevant incident information, identifying the significant hazards involved, developing a Tactical Plan and implementing control measures appropriate to the risk.

This SOP has been developed through a process of consultation that has utilised the experience of NIFRS personnel and methods of best practice from MCA, PSNI and other responder agencies.

This SOP now constitutes NIFRS Training Note.

The SOP is supported by:

- NIFRS SOP No 4 Validation Exercise. This shall assess the level of knowledge and understanding amongst operational personnel against the safety-critical information contained within Section A;
- NIFRS Operational Aide-Mémoire, which shall readily provide details of Section A at operational incidents;
- NIFRS Training Note PowerPoint;
- NIFRS Operations Policy No 4 – *Working in, on or Near Water*.

Kevin Synnott
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