

Appendix B: John Ash Report

**A STUDY TO IDENTIFY LOW RISK AND APPROPRIATE METHODS FOR APPLYING
THE RESULTS OF BESPOKE RESEARCH TO HAZARDOUS RESCUES**

**A research project for the
CAMBRIDGESHIRE FIRE AND RESCUE SERVICE**

By

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THE RESULTS OF BESPOKE RESEARCH TO HAZARDOUS RESCUES**

Background

1. Within the purview of its responsibility for the safety of personnel, the Cambridgeshire Fire and Rescue Service (CFRS) undertook a research project to identify circumstances in which Crew Commanders were likely to over-commit to rescues during hazardous operational situations (Ash, 2003). The majority of the operational incidents that were considered involved special services and factors examined included moral pressure and high victim allegiance (*ibid.*). This work has been reported widely for the benefit of other organisations with interests in dynamic risk management (Ash, 2004a, 2004b, 2004c; Ash and Smallman, 2003, 2008).

2. **At a meeting with the principal investigator (PI) for the original research, conducted on 13 May 2008, CFRS Management identified that a particular focus for the application of this project is first response procedures for water-related special service incidents. CFRS has equipped itself with boats and other specialist equipment that may be applied to water incidents, including turntable ladders, and floating devices carried on specialist rescue tenders. However, at time of writing, the majority of the 36 Water Tender Ladder Rescue (WTLR) appliances operated by the Brigade are not specifically equipped for water rescues, and provisioned only with devices such as ladders, lines and lifejackets, that may potentially facilitate some limited response in such incidents. Moreover, WTLR crews are not generally trained for deepwater or swiftwater incidents. For this reason, CFRS procedures strictly limit personnel in the extent to which they may enter water when effecting rescues (Ash / CFRS, 2008; SOP 9). Specifically, this is interpreted as a dictum that in the absence of prescribed training and equipment, no firefighter is permitted to enter a water depth greater than the height of the uniform boot (Ash / CFRS, 2008; SOP 9).**

3. The rescue vehicles (RVs) and other specialist tenders capable of undertaking water rescues are expensive and few in number. Inevitably, the response time for these resources may be greater than ideal, given that their deployment will be from specific stations that may be at some distance from the rescue location (Grimes, 1996). The first response to a water incident is therefore likely to be a WTLR. This raises a number of risk related issues that CFRS Management have a moral or legal duty to address, and many of these are in conflict:

- a. The protection of those members of the general public who fall victim to water incidents.
- b. The protection of personnel deployed in first response to water incidents.
- c. The preclusion of ill-judged rescues by civilians on the incident ground who perceive the actions of first response crews as insufficient.
- d. The protection of the CFRS from injury to its reputation that may arise from a perception that a first response to a water incident has been insufficient. Such injury may include damage to recruitment, to personnel retention, corporate memory and cooperation from the public.
- e. The preservation of good order and discipline in the Fire Service.

4. At time of writing, the Fire and Rescue Services have no statutory duty to attend water rescues, and do so only within the generality of their remit to provide special

services for the public benefit¹. Attendances at water incidents in the county has led to conflict between actions necessary to produce a rapid resolution and tasks permissible under the extant Standard Operating Procedure (SOP) 9, which enjoins safe methods for work for such situations. It has been suggested to CFRS Senior Management that prompt attention be given to the current policy regarding WTLR crew actions when conducting a first attendance at a water incident. Mindful of the several and conflicting duties they owe, Senior Management elected to request an independent enquiry by the PI, pursuant to the research already conducted on behalf of the Service (Ash / CFRS, 2008; Ash, 2003). The purpose of this was twofold: to build upon the work already conducted, moving it forward from the theoretical to the applied. Second, to ensure that an unbiased and objective enquiry was made into the problem.

Aim

5. The aim of this study was to provide CFRS Senior Management with sufficient and appropriate information to review the policy and provisions regarding first attendance by WTLR units at water incidents. *This did not, and does not presume any specific outcome or decision by Management.*

Method

6. **The study was conducted in five phases:**
- a. **Preparation of research materials.**
 - b. **Initial data capture.**
 - c. **Analysis.**
 - d. **Verification of findings with subjects.**
 - e. **Reporting.**

The preparatory phase featured the design and production of data capture materials, including a set of images. In order fully to understand the issues and challenges involved in water rescue, the PI attended and participated in an in-water training session conducted by CFRS at an outdoors swiftwater simulation facility².

7. **The study focussed on a specific set of water incident types, to each of which a WTLR might plausibly be summoned as part of a pre-determined attendance (PDA). The incident types are listed at Annex A. Typically, the PDA for a water incident includes an RV³, and the research was aimed at that period elapsing between the arrival at the incident ground of the first (local) WTLR, and the arrival of the RV. As a vehicle for the decision process that participants were invited to undertake during data capture, an image was created for each incident type using a digital camera. Interviewees were briefed on the research and then encouraged to comment on each incident image. The following questions formed the basis for the discussion of each water incident:**

a) What action, if any, would you take?

¹ Fire and Rescue Services Act 2004, Part 2, Section 11 "Power to respond to other eventualities".

² In addition to his research experience and qualifications, the PI is an ex-submariner and qualified open water diver.

³ At time of writing, the PDA for a water incident consist of three appliances: a local WTLR, which is likely to be the first in attendance, an RV, and a supporting WTLR. The crew of the RV will be on-water trained, and the supporting WTLR crew will include in-water trained personnel.

- b) What mitigating equipment, if any, would you use?
- c) What mitigating procedure, if any, would you use?
- d) What specialist skills and training, if any, would you use?
- e) What prospective rules, if any, would you propose for this type of incident?
- f) Has anyone here faced an incident of this type, and if so, what happened?

8. In addition, appropriate supplementary questions were put by the PI as prompted by the discussion, to clarify data or pursue the themes arising. Following test of the data capture method, the process was applied at those stations identified by the CFRS as most likely to be called upon to conduct first response to water incidents with WTLRs. At each initial station visit, the PI was introduced by a senior CFRS officer who then left. The group discussion facilitated by the PI followed a semi-formal format, and the results were recorded for analysis on audiotape. Unit locations and sample sizes are at Table 1.

Table 1: Stations and Sample Populations from Which Primary Data Were Collected.

STATION	SAMPLE SIZE AT FIRST INTERVIEW	COMMENTS
ELY	n = 5	Day crew
LITTLEPORT	n = 8	Retained crew
MARCH	n = 17	Retained crew
WISBECH	n = 5	Day crew
WISBECH	n = 8	Retained crew

9. The ordering of the stations and crews is strictly alphabetical. Some fluctuation of personnel occurred between first (data capture) and second (verification) visits to units, with the result that the sample population is larger than the numbers suggest. As a sample within the sum of the 28 stations operated by the Brigade⁴ (CFRS, undated), these units include the areas of the county within which the majority of the water incident risk is judged to be.

10. In contrast to the Grounded Theory method used for the original study (Ash, 2003), audiotapes and notes from the data capture sessions were analysed by the PI using a more general qualitative approach. Personnel perceptions were collated and compared with emphasis on common factors, novel solutions and risk tolerability. Verification of findings was undertaken using a second round of visits. The PI discussed the findings for each station with the crews, to ensure that the information is representative and that they were content that their views had been correctly and thoroughly recorded.

Confidentiality

11. The identity of individual firefighters in relation to specific opinions and comments was treated in confidence and not revealed by the PI to persons not present when the data

⁴ This number includes the Peterborough Volunteer Fire Brigade.

were collected. This was important, not only to ensure an open and frank discussion of issues including those with moral and ethical dimensions, but also to counteract the effects of peer pressure, which had been raised as a factor in previous research into incident ground decision making (Ash, 2004d). Each participant was issued with a card on which was printed a number. Participants prefaced their comments with their individual number, both to disguise their identity and facilitate subsequent transcription of tapes. In addition, each card bore an email address to which interviewees could send any comments they did not care to make in front of colleagues. The PI retained the original data and released only processed results to the CFRS. The PI also gave an undertaking to preserve the anonymity of interviewees in any academic materials published in connection with this work.

Results

12. The results are reported here under a number of headings:
 - a. Previous experience of water incidents and perceived hazards.
 - b. Comments relating to equipment.
 - c. Comments relating to skills and training.
 - d. Proposed responses and judgements related to specific incident types.
 - e. Proposals and comments concerning rules for water incidents.
 - f. SOP 9.
 - g. Comments relating to water rescue becoming a statutory duty.
 - h. Other comments.

Previous experience of water incidents and perceived hazards

13. The previous experience of interviewees attending water incidents may be considered under two categories. There were *types* of operational activity, and in general these fell under lost or stranded persons, body recovery, persons stranded in immersed vehicles, immersed vehicles containing bodies, immersed vehicles without occupants, and animal rescues. The second category of experience consisted of *negative memories* of incidents at which the restrictions of current procedures led to a conflict of duty. Experience accumulated during flood response operations was also reported, but is not reported here in depth as it lays outwith the scope of this project.

14. Conspicuously absent within the primary data was explicit mention of cases in which an appliance had been called to an incident and discovered a person struggling in open water. However, not only did the image-based approach generate a considerable volume of data concerning how firefighters would address the incidents as depicted, but it also catalysed extensive comment regarding additional aquatic environments extant in the usual duty area served by the stations. It is worth noting two of these environments in particular: the River Nene, and shallow ditches.

15. The Nene is a riparian feature of considerable size that drains practically all of Northamptonshire, reaching the Wash at Sutton Bridge (Fenland District Council, 2005). With tidal speeds exceeding 6 kts during large spring tides, it is one of the UK's fastest flowing navigable rivers (MAIB, 2001). The tidal range varies between 3-6m (*ibid.*), and tidal effects can be measured to a point 8 km downstream of Peterborough (Fenland District Council, 2005). The Nene represents a significant challenge to rescue activities by virtue of its steep banks and lack of suitable access points for launching boats or other emergency response activities. These features are largely the result of anti-flooding

measures; raised earth embankments for the extent of the tidal river, and concrete and steel sheet floodwalls where it flows through Wisbech (*ibid.*). The river's fast flowing currents may have a misleadingly modest surface manifestation due to the structure of the water column. These factors are compounded by some confusion between government and other agencies regarding the most appropriate means of undertaking search and rescue (SAR) upstream of Sutton Bridge. While legally this duty accrues most identifiably to the Police Service, agencies that have contributed to rescue activities in the past have included the Police Service, Spartan Rescue Limited, the Wisbech Harbour Authority (WHA), the Maritime and Coastguard Agency (MCA), the Royal National Lifeboat Institution (RNLI), and CFRS, which formerly maintained a cathedral hull boat of its own, moored at Wisbech.

16. Spartan Rescue is a private company operating under contract to nine Police forces (Surrey Police, 2002). In discharging its responsibilities it deploys trained personnel and an equipment inventory that includes boats, underwater cameras that can be used to examine submerged vehicles, sonar and infra-red sensors (*ibid.*). Spartan Rescue is reported to face a similar difficulty to that associated with Cambridgeshire's RVs, in that it may take some time for the company's assets to arrive at the incident scene from its closest operating base. It was noted during data capture that the company are engaged by the Police to affect body recoveries from the Nene. The MCA operate from a Rescue Coordination Centre at Great Yarmouth, and can mobilise various assets, including a group of volunteers who have experience of the marsh areas and operate under MCA jurisdiction (Tomlinson, pers comm). This group is based at Sutton Bridge, and is provided with a radio-equipped Toyota four wheel drive vehicle, plus PPE for land area search conducted on foot (*ibid.*). The RNLI have a station at Hunstanton, from which they operate a B class (Atlantic) rigid inflatable plus a hovercraft (*ibid.*; RNLI, 2007). The RNLI are reported to be able to respond to incidents in upstream tidal waters, with a recall time of up to 8 minutes and a transit time to scene of some 20 minutes (Tomlinson, pers comm). In addition to their own land-based assets and the ability to call on the RNLI, the MCA can deploy a helicopter (*ibid.*). This is based at RAF Leconfield in Yorkshire, and subject to serviceability, has a response time that averages 60 minutes (*ibid.*). It was also noted during the interviews that the Police have deployed one of their own helicopters in a previous rescue, although there is doubt as to whether the crew are trained for aquatic SAR. The WHA operate a small rigid inflatable plus a 27 ft survey vessel (Harvey, pers comm). WHA personnel are not established or trained for SAR, but can provide a coxswain on any day of the year (*ibid.*). Having once been recalled, transit time upstream to Beavers Hall or downstream to the river mouth is approximately 20 minutes (*ibid.*). However, the time to affect a recall cannot readily be predicted (*ibid.*). The Harbourmaster notes that he is willing to collaborate with CFRS in responding to emergency calls, and to discuss a memorandum of understanding on that subject, but in addition to the issue of response time, can only provide a vessel and coxswain (*ibid.*). A crew trained in rescue procedures would need to be provided, and in order to undertake collaborative training and exercises, WHA would require funding support as this is an un-established task (*ibid.*). The Wisbech Harbourmaster opined that the only way in which CFRS can guaranteed that all year, 24 hour cover will be provided from assets it has control of, would be to provide its own boat and crew. He advised that a suitable vessel would be a rigid inflatable of not less than 6-7m length with a 75hp engine, and that it should be water based rather than road-transported, due to launch difficulties on the Nene. A similar situation to that of the Nene once existed at Dartmouth (*ibid.*). The Dartmouth Harbour Authority provided a SAR service but this was eventually superseded by an inshore vessel operated by the RNLI (*ibid.*).

17. The second aquatic operational environment noted as typical by interviewees consisted of dikes or large ditches with a relatively modest depth of water; perhaps some 0.6m. Usually, crews would be called to attend vehicles lodged in these features. It is inferred that while often contaminated, or containing trip or slip hazards including vegetation, such an environment is unlikely to constitute a significant drowning risk to a rescuer unless that individual first suffers another accident.

18. Experience of the *types* of operational activity reported by interviewees featured extensive information on two categories of emergency, those involving vehicles and those involving animals; in particular, heavy quadrupeds such as cattle and horses. Vehicle incidents can involve cars that are immersed but grounded, submerged, or buoyant – the latter perhaps floating inverted and tilted, due to the weight distribution. Vehicles may be bereft of passengers, contain casualties, or corpses. In checking vehicles for signs of life, interviewees were aware they might have been at the incident location for some time before the emergency services have been alerted. Moreover, firefighters were sensitive to the hazards posed by vehicles; either by toppling onto or otherwise impacting a rescuer, or entrapping or otherwise harming that person. For example, there is a potential for an air bag to activate in the course of a rescue. Vehicles are not infrequently immersed and grounded, such as those cars that become immobilised on a flooded road. A significant proportion – an approximation was 25% - of Road Traffic Collision (RTC) incidents involved partial immersion or submersion in natural waters.

19. Animal rescues were reported generally to be cases of stranding in mud, rather than animals swimming freely but in distress because of an inability to leave the water. For stranded large animals, either the owner or a veterinary surgeon will be in attendance, and heavy lift equipment is generally required. The firefighter role has been to lay straw on, or cut steps into mud, and attach strops or hose to pull an animal clear. In one case an inflatable rescue path was deployed so that the owner could walk out to the animal and encourage it to place its forelegs on the path and extricate itself. The hazardous nature of large animals in rescue situations was noted, one firefighter having been charged by a cow once back on shore, while a second suffered a permanent hand injury, having been kicked, and a third had almost been crushed against a teleporter during a horse rescue.

20. Firefighters expressed considerable frustration at operational incident in which procedures forbade more active involvement in a water rescue. These *negative memories* of incidents featured conflicts of moral and service duty, and were often accompanied by moral pressure from civilians, although peer pressure was also reported. There was a clear expectation that having been summoned, Fire Service crews should be seen to be 'doing something' to alleviate the situation. This issue will be addressed in further detail below.

21. The primary data contains mention of three related classes of hazard in respect to water incidents, and these are summarised at Table 2. The first class is environmental, and refers to the water mass itself and the risk of drowning, exacerbated by flow rates, tides and currents, low water temperatures and the prevailing weather, distance to the casualty, entrained contamination, entrapping vegetation, submerged obstacles and difficulty in detecting them as a result of water turbidity. The water bank may contribute to the immersion hazard through falls and slips, and impede rescue operations by its gradient or viscosity. The second class of hazard is anthropogenic and consist of vehicles, which may in themselves impact or entrap a rescuer, and riparian alterations such as locks, weirs, sluices and pumped flow – the latter being a common occurrence in Fenland. These features enhance the depth, speed or turbulence of the water mass and enhance its

associated risk. The final class of hazard is the casualty; human or animal. Casualties can strike, drown or infect a rescuer. Of these hazards, one of the most consistently mentioned was the cold, and its ability rapidly to incapacitate a rescuer.

Comments relating to equipment

22. The equipment issued to WTLRs was discussed in the context of mitigating measures for water incident hazards and means of applying safe methods of work to rescue problems. An overwhelming body of opinion favoured the provision of drysuits, and the discussions identified appropriate accessories for this PPE as a thermal under-suit, water helmet of the type worn by canoeists, gloves and a lifejacket. Some discussion addressed the provisioning of a better lifejacket, both for use with the drysuit and for the shore party. It was noted that designs are available that automatically inflate and right the wearer, even if unconscious. One issue that was clearly of concern was the ability of a rescue swimmer to release their tether to shore if necessary in order to escape entrapment or towed submersion. The scale of equipment attracted considerable discussion, with the spectrum of opinion varying from the proposal to provide drysuits for every member of a WTLR, on the grounds that incidents such as a vehicle in a dike or a large animal stranded in mud, require the entire crew to address them; to the perception that crew control was challenging for the Incident Commander to enact if the number of personnel at any one time in the hazard area exceeded 2 persons. An interesting parallel was drawn here with breathing apparatus (BA) team procedures – a parallel that will be alluded to in the context of risk judgements elsewhere. The significant mitigation offered by a drysuit against cold hazard was very evident in the primary data. Another of the hazards mentioned against which drysuits offer some mitigation is contamination. This might take a number of forms, but biological contamination was mentioned in two respects; first, waste from agricultural activities entering water bodies. Second, an incident was noted in which a firefighter was contaminated with fluids from an infected human corpse. Within the course of data collection it emerged that although the onboard water supply carried on a fire appliance may not be of drinking water quality, bulk contamination can be removed from a rescue swimmer by copious irrigation on scene. In the case of a firefighter wearing a drysuit, this is more satisfactory than removing contaminants from firefighting PPE, as the waterproof material tends to exclude microorganisms, leaving only the exposed head and hands to be disinfected.

Table 2: Hazards Associated with Water Rescue Reported in the Primary Data

HAZARD		RISK	SAFETY TACTICS AND MITIGATION
Environmental	Cold	Probability of hypothermia Probability of impaired operational capacity	Avoid by procedures PPE (drysuit)

	Contamination	Probability of infection from waterborne pathogens.	Avoid procedures Immunisation PPE (drysuit) Decontamination	by
	Distance to casualty	Probability of exhaustion and subsequent drowning. Probability of impaired operational capacity.	Avoid procedures Lifejacket Buoyant tether Rescue float	by
	Entanglement	Probability of trips and falls. Probability of immobilisation. Probability that trips, falls, or immobilisation may lead to drowning.	Avoid procedures Wading stick	by
	Flow and currents	Probability of swimmer becoming overwhelmed or exhausted, and drowning.	Avoid procedures Lifejacket Buoyant tether	by
	River banks	Probability of physical injury through slips and falls. Probability of drowning following slips and falls.	Avoid procedures if possible Ladders	by
Anthropogenic	Enhanced Flow	Probability of swimmer becoming overwhelmed or exhausted, and drowning.	Avoid procedures	by
	Entrapment or impact	Probability of physical injury. Probability of becoming enclosed or incapacitated and drowning.	Avoid procedures Water helmet	by
Casualty	Human	Probability of physical injury by distressed or disturbed person. Probability that physical injury or grasping by casualty may lead to drowning. Probability of infection through contact.	Avoid procedures Rescue float PPE (drysuit and water helmet)	by
	Animal	Probability of physical injury by distressed or disturbed animal. Probability that physical injury may lead to drowning.	Avoid procedures	by

23. An aspect of provisioning drysuits was the problem of sizes. The requirement to be able to fit any member of the crew, and therefore the need to carry suits in a variety of sizes provoked considerable discussion, particularly in retained units, where it cannot necessarily be known in advance which firefighters will respond first to a recall and make up a crew. It was noted that when a recall is broadcast, on advice that the task is water-related, personnel could simply take bags pre-packed with dry suits of an appropriate size from stowage in the station and take them onto the appliance. However, it was pointed out that this measure would be ineffective if an appliance was re-tasked from a non-water

incident. The discussion regarding drysuits also included a comment that the inventory should include at least two suits per station for training purposes.

24. One proposal uncorrelated by spontaneous comments at other units concerned the procurement of rescue floats for each WTLR. A rescue float is a buoyant, streamlined device with handles and an attachment point for a line. Such devices are manufactured in conspicuous colours and may have surface contouring to improve security of grip or reduce hydrodynamic drag. While such a device might facilitate the accurate throwing of lines, it provides additional mitigation against contact hazards including grasping or contamination of the rescue swimmer by providing a physical barrier between the rescuer and casualty.

25. Other proposals for water incident related equipment included the provision of a megaphone to support the shouting tactic advocated in SOP 9, and an uncorrelated suggestion that a combined seat belt cutter and hammer be provided for incidents involving vehicles. One suggestion concerned the issue of binoculars to facilitate the evaluation of incidents at some distance. Several units expressed a desire for wading sticks to be re-introduced, although it was noted both that the design of stick originally provided and later withdrawn, was too easily contaminated by materials in the water, and that chimney rods may be used for the same purpose. One piece of equipment in use that received criticism was the Grapnel. It was reported by more than one station to be insufficiently strong for the task of recovering vehicles; so much so that on one unit, a local businessman had donated a more robust replacement item fabricated from stainless steel.

26. There were widespread proposals to augment the inventory of equipment on the WTLRs with various buoyant devices. These varied from the hose inflation kit, which attracted some very laudatory comment for its utility, through the inflatable rescue path, to the inclusion of an inflatable boat. The primary data include discussion of the stowage problem. The consensus view is that space can be found for an augmented scale of water rescue equipment on WTLRs, even if it means offloading some of the hose, or even the light portable pump, although this latter suggestion was rejected by a rural unit for which finding reliable hydrants can prove difficult. However, it may be inferred from these comments that the desire by personnel to have access to an augmented scale of water rescue equipment is a strong one. Personnel did not regard devices such as inflatable rescue paths or (non-rigid) inflatable boats as appropriate for use on the Nene, but observed that the paths had application for the ice and unstable ground that accompany aquatic features.

27. There was disagreement concerning the availability of a boat at Wisbech for use on the Nene. Although it was argued that the Nene constitutes a special case in terms of hazards in the region, others noted the difficulty in maintaining training levels. There was similar disagreement between personnel who favoured a collaborative arrangement under which trained CFRS personnel would crew a WHA vessel, and those who believed that CFRS should own and operate its own rescue watercraft. The CFRS vessel formerly stationed at Wisbech is reported to remain the property of the Service, but loaned elsewhere. It was noted that typical response times for the vessel when it had been stationed at Wisbech had been 10-15 minutes to launch plus 20 minutes to reach either Sutton Bridge or Peterborough.

28. Mention was made of the use of opportunistic equipment during water incidents. Principally, this involved asking civilians in powered boats to assist with a rescue by

operating their own craft. Although beneficial in the past, it was reported that it was not always straightforward to communicate instructions to participating members of the public.

Comments relating to skills and training

29. While some personnel reported previous training in the wearing of drysuits, and others had received civilian lifesaving training, the overwhelming theme arising from the primary data in respect to this topic was the desire of personnel to enhance competence levels. This was manifest in a number of ways. Perhaps most significant was the candid admission by firefighters in commenting on proposed solutions to water incident scenarios that if they had appropriate training they might not make the same judgement, because they might better appreciate the risks inherent in the situation. At the Incident Commander level, the desire for training in both in-water and on-water competencies was expressed, in order to ensure that operation with personnel who possessed such skills would be facilitated, and also to better conduct risk assessments. Because of the nature of the skill requirement at Incident commander level, one suggestion was for bespoke training to be provided. While the generality of view favoured training of all personnel at least in in-water skills, the problem of training time was understood as a barrier, particularly for the retained personnel. It was noted that a minimum of 75-80% of personnel would require training to in-water standard in order to ensure that crews would always be available, while the remaining 20-25% would need to be competent to don and wear drysuits for wading operations – tasks in still water too shallow for personnel to be buoyant.

30. Further proposals to ease the training burden included restricting training to those stations frequently called to water incidents, to organise water competencies on a regional basis, and to use water trained personnel to instruct others. In connection with a proposal to have the CFRS boat returned to Wisbech, personnel mentioned a willingness to train in extra time in order to achieve boat crew competence. One suggestion to ease the task of Incident Commanders was to introduce some form of identifying marker on the PPE of personnel trained in water rescue skills, in much the same way that other brigades have badges to identify BA wearers.

31. The primary data includes reference to the issue of the interim period between initiating a process of augmented training and reaching the desired level of competency. This period represents a zone of vulnerability that requires careful management.

32. A specialist course in emergency animal handling, taught by the College of West Anglia, attracted laudatory remarks for its value. One point noted by the PI was a suggestion that during horse rescues firefighting helmets should be removed as the animals are disturbed by bright colours. While this may be factually correct, it is noted that careful thought should always be given to the wearing of PPE⁵ in the presence of hazards – removing a helmet may actually increase risk.

Proposed responses and judgements related to specific incident types

33. The responses to the specific incident scenarios created for this study explored the perceptions of different water incident risks held by firefighters, the degree to which they were prepared to expose themselves to those risks, and the mitigating measures they judged appropriate. Three themes dominate the primary data collected by this phase of

⁵ As a pertinent example, the PI's grandfather was a cavalry farrier, and carried on his face for most of his life a scar from having been kicked.

the study. First, the concept of a 'saveable' life and how that is interpreted. Second, the concept of value of a casualty life when interpreting emergency situations. The final dominating theme was the adherence to the measures prescribed in SOP 9.

34. The first scenario featured a person struggling in water some distance from the bank. In all cases, proposals for addressing the incident commenced with the SOP 9 protocol (hereafter, 'the protocol') of "shout, reach, throw, row.." but with one exception, should those measures fail, personnel elected to adopt an offensive⁶ mode and despatch a rescue swimmer, equipped with lifejacket or where available, waterproof PPE, and usually carrying another lifejacket or line for the casualty. The exceptional case was a group in which a minority favoured an offensive approach. The counterargument voiced was that if an individual is conscious and struggling there is no need for water entry. Three groups elected for passive measures if the environment was tidal or fast flowing.

35. The second scenario presented the case of a figure floating face down in water. Once again, the majority of the groups chose to apply the protocol or part of it, to attract a response from the figure and check for signs of life. Two of the groups elected to adopt passive measures only. A view voiced from one of these held it to be a 'life already lost'. Two groups took the view that an offensive tactic would depend on the duration of immersion as gleaned from whatever incident history could be gleaned. One of these saw the choice as debatable, but that a small risk could be taken, as it was not possible to judge if there was still a life to be saved. Interviewees in two of the three groups that supported the proposal for an offensive option noted that they would commit if the casualty were a child (the images were of an adult). This finding correlates with the conclusions from previous research regarding high allegiance victims (Ash, 2004; Ash and Smallman, 2004, 2008). The PI was also requested by interviewees to conduct a search of the medical literature on near-drowning survival. Firefighters appeared persuaded by reports of cases in which children had survived extended submersion. This material will be discussed further, below.

36. The third, fourth and fifth scenarios depicted an immersed vehicle. The images differed in respect to evidence of a casualty. In the third image the casualty was attempting to climb out of the car window. In the fourth, no casualty could be seen, while in the fifth image, the casualty was slumped over the instrument panel. Other than proposals to shout to attract attention and listening for sounds of banging, the image with no visual casualty elicited a general decision to do little or nothing other than to await the RV. With a visual casualty in a vehicle, group responses tended to focus on two factors – the condition of the casualty and the stability of the vehicle. Rescue tactics were generally progressive in the sense that if the vehicle was stable, that is, grounded and unlikely to either sink or float away, and the casualty could be coaxed to take a line or thrown lifejacket and leave the vehicle, or simply await the RV, then that was the preferred approach. By contrast, if the platform was unstable, or the casualty likely to deteriorate, then a more offensive approach was considered. An alternative proposed to retrieving the casualty was to drag the vehicle closer to the bank.

37. Scenarios six and seven both featured a horse. Scenario six depicted the animal stranded up to its flanks in water while scenario seven was a picture of the horse trapped up to its neck in a sizeable body of water. A defensive mode only was chosen for the

⁶ The terms 'offensive' and 'defensive' shall be used for convenience in this report in the context of water rescues notwithstanding any lexical restrictions customary in the Fire Service. 'Offensive' shall denote a mode entailing water entry; 'defensive' tactics entail no water entry.

trapped animal. Two groups suggested coaxing; two others noted the risk to crew members. One view was that it was a 'life already lost'. By contrast, the stranded animal case was noted by one interviewee as a 'saveable life'. Measures to resolve the situation included summoning a veterinary surgeon, the owner or pinder ⁷, coaxing, and using cinches or strops to retrieve the animal. However, it was observed that an animal is not worth the life of a firefighter.

38. Interviewees identified cases of particular hazard associated with aquatic environments. In general, fast flowing waters were viewed as more hazardous than contaminated environments, in which offensive operations would still be attempted unless the degree of contamination was obviously extreme. Anthropogenic aquatic hazards such as locks or sluices were viewed as environments for passive modes only unless control could be affected through an appointed competent civilian operator.

39. Comments invited on the scope of the scenario set elicited two observations of particular note. The first was that most of the vehicle incidents involved water that was waist height at most and still. The second was that an immersed vehicle might contain child passengers occupying the back seats and that children react differently to stress to adults. High allegiance to child casualties was acknowledged in several comments, and was explained by one remark that most of the personnel have children of their own. Again, this correlates with the previous research (Ash, 2004; Ash and Smallman, 2004, 2008) and is significant in identifying safe methods of work.

40. There were a number of observations concerning operation decision-making. The first set of these affirmed that a backup plan should always be prepared in case the preferred tactic failed. This is interesting in that it is not clear from the data whether the backup is likely to consist of the next stage of the SOP 9 protocol, or a regression to an initial and less promising tactic. The second set of observations concerned decision-making under time constraint. It was noted that such pressure creates tunnel vision, while activity such as setting up equipment brings time to think and calms an incident.

⁷ A person responsible for impounding stray animals.

Proposals and comments concerning rules for water incidents

41. During the course of the discussions it was possible to identify a set of rules from the data and these were discussed with personnel at the conclusion of the second visit by the PI to each unit. These measures are at Annex B. With modest refinement, they found general acceptance with the personnel consulted and may thus be viewed as the foundation of a refined SOP 9. There was a spectrum of opinion ranging from those groups that favoured greater operational freedom to be accorded to the Incident Commander, with guidelines instead of rules, through groups that favoured clear prohibitions such as no entry for tidal waters, to personnel who viewed SOP 9 as fundamentally sound. One interviewee warned against attempting to implement too complex a set of rules, as this may lead to confusion. A second warning concerned the problem of boundary encroachment in the use of rules. For example, if procedures define physical boundaries such as boot tops, firefighters are likely to accept immersion to the knees; if knees are the permitted maximum, immersion to the waist may be attempted.

SOP 9

42. SOP 9 evoked conflicting perceptions. A minority view held that the procedures were basically sound, although more training and equipment were needed. The majority regarded the procedures as unreasonably restrictive. Some personnel saw inconsistency in not empowering Incident Commanders to make commitment judgements in water incidents when they were permitted to choose whether or not to order firefighters into equally hazardous circumstances in committing a BA crew into a burning structure. At least one interviewee opined that tactical freedom would be preferable to equipment augmentation. Some comments reveal a clear sense of grievance, including a perception that the SOP is an attempt by Management to evade responsibility, a complaint that the extant procedures are demoralising, and a statement that the rules might actually provoke firefighters to go 'off duty'; that is, to break ranks and attempt a swum water rescue in their private capacity. One comment suggested that at least one Incident Commander would condone such action.

Comments relating to water rescue becoming a statutory duty

43. The proposal that water rescue become a statutory duty for the Fire and Rescue Services throughout the UK found general approval. No individual expressed the view that this would be either an undesirable or unnecessary measure. Indeed, one view was that if such activities were not to fall with the Fire Service remit, the word 'rescue' should be removed from appliances.

Other comments

44. Two categories of comment stand out in the primary data, and these link to much of the information reported above. The first category concerns duty, and the second time. Although it was clear that in making risk assessments Incident Commanders placed crew safety as their highest priority, it was also noted that firefighters would risk 'a lot' to save a 'saveable life'. The concept of a saveable life will be discussed further below, but there was evidently a conflict felt between the moral duty to save life and duty to the Service. Certainly, personnel were sensitive to moral pressure and abuse from civilians on the incident ground, and this appeared to be a catalyst in the conflict of duty. Although not

universally expressed in the sample population, there was a view that if personnel were not going to be permitted to act, and properly trained and equipped to do so, they should not be despatched to a water incident. Moreover, not only was it commented that sending personnel to an emergency under such conditions was morally wrong, but at least two firefighters opined that Management worked on the assumption that personnel would exceed their orders and attempt rescues. The restrictions on acting was stated to be the most significant issue surrounding water incidents, and in addition to comments noted above regarding going 'off duty' to effect a rescue, it was stated by retained personnel that a reprimand was preferable to watching someone die.

45. Related to these observations were three statements concerning equipment and training. The first noted that if personnel continue to be sent to water incidents without appropriate equipment, a firefighter will die attempting a rescue. On a similar theme, the second comment suggested that the provision of additional equipment may preclude water entry, enhancing confidence in the "shout, reach, throw.." procedure. A final statement confirmed that while rescue swimming should not be a compulsory duty, there would be no shortage of volunteers for training.

46. The second general category of comment that stood out in the primary data concerned time. It was mentioned that the moral duty to attempt a rescue was conditional on the incident history. Specifically, submersion time was regarded as critical, with estimates of brain death varying from 3 to 15 minutes after water entry. However, firefighters regarded children as more resilient, indicating that a child might be judged a 'saveable' life some time after an adult would be judged a 'body recovery'.

47. Other perceptions regarding time included time compression – an exaggerated sense of time passing that affected both firefighters and civilians on the incident ground, sensitivity that water related incidents could change in seconds, and a comment that there was no assumption of life in a submerged car.

Discussion

48. Amongst the various issues that emerge from this project, two stand out as priorities for attention. The first is the knowledge shortfall that some Incident Commanders may have that would enable them to identify the incident ground sensory cues upon which risk assessments are founded. The second is the conflict of duty that results from the extant policy concerning water incidents. Both are critical to the protection of firefighters and will be discussed in turn.

49. In terms of firefighter safety, the most significant decision that rests with the Crew Commander of a WTLR appliance that is first in attendance at a water incident is almost certain to be whether and by what means a water entry will be undertaken. This is the direct equivalent of the choice between offensive and defensive modes in a fire incident. The offensive mode equivalent entails a water entry prior to the arrival of a RV, with its associated inflatable boat, rescue path and on-water trained personnel. The defensive mode equivalent is the restriction of rescue measures to the 'shout, reach, throw, row' options identified in the extant SOP 9.

50. The choice to adopt an offensive mode appears to rest on two key factors. First, there is the issue of whether the casualty represents a 'saveable life', and second, whether a rescue is practicable; literally, whether the 'saveable life' can be saved without

intolerable crew risk. The judgement of a 'saveable life' is straightforward when the casualty exhibits signs of life. However, in the absence of such signs, incident history and the judgement of submersion time is strongly influential. There is clear evidence in the primary data that child casualties are likely to be evaluated as a 'saveable life' in circumstances in which an adult would not be, which correlates well with the findings in the previous research concerning over-commitment and high allegiance victims (Ash, 2003; Ash and Smallman, 2003, 2008). Some firefighters appear mindful of cases of children having survived extended periods of immersion. The anecdotal evidence is supported by some aspects of the literature. Siebke et al. (1975) report a case of submersion of a chilled child for 40 minutes without subsequent neurological deficit, while Schmidt et al. (1995) have published an even more remarkable case of a 4 year old boy who survived an 88 minute submersion after breaking through ice on a frozen lake, later making a full recovery. Bradley (1976) infers from this "the importance of attempting resuscitation even in cases of lengthy submersion". However, Suominen et al. (2002) caution in a study of drowning and near-drowning cases that patient age, water temperature and rectal temperature on admission are not significant predictors of survival, and that submersion time is the best prognostic measure. Intact survivors in their study had a median submersion time of 5 minutes (range: 1-21 minutes), while non-survivors had a median submersion time of 16 minutes (range: 2-75 minutes).

51. Time also appears to be an influential factor in the practicability dimension of the offensive mode decision. There could there be a significant disparity between the arrival of the first on-scene appliance and an RV; a typical period of 20 minutes or more was reported by some personnel. Of equal significance was the perception of time dilation experienced by crews of a WTLR when under pressure to act. Literally, 15 minutes seeming like 30, both for firefighters and civilians on the fireground. Clearly, a precondition for an offensive choice is a 'saveable' life, but while passing time diminishes this quality in a casualty, the perceived urgency increases, and may condition commitment to water entry with a less than desirable system of work. In other words, the moral duty to rescue the 'saveable life' may override the risk to personnel in the 'practicable' aspect of the calculation.

52. Some personnel spoke frankly of the limited knowledge on which they were basing decisions during the interviews. This goes to the heart of the 'safe person' concept. Paradoxically, constraining the actions of firefighters in water incidents may be denying them an opportunity to build an experiential base on which to establish sound judgements when moral compulsion becomes irresistible, thereby increasing the risk to which they will be exposed when attempting a rescue, rather than diminishing it. Of course, such an inference is difficult to prove in any mathematical sense. However, the comments, and the manner in which they were expressed, left the PI in little doubt that if WTLR crews continue to be sent to water incidents with the current SOP 9, scale of equipment and level of training, there is an increasing likelihood that they will choose an offensive mode in preference to waiting for the RV to arrive. Such a choice may mean that one or more personnel choose to 'go off duty' at the incident ground. That is, remove their firefighting PPE and act in their private capacity, attempting to swim out to the casualty, whether they actually have that legal entitlement or not. Even more disturbing was the report that an Incident Commander would likely unofficially condone such action, and the perception that Management send crews to water incidents in the expectation that personnel will adopt an offensive mode without permission. Clearly, should a firefighter be injured under such circumstances any arrogation of 'implied consent' made against Management might be reinforced by the repetition of such a perception in court.

53. Sensory cues are critical in naturalistic decision-making of the sort that occurs in operational incidents⁸. The ability to look at a body of water and determine if a safe system of work can be established with the equipment, personnel and training available, or if it cannot, is a critical skill to cultivate and preserve in Incident Commanders. To this skill must be added a measure of local knowledge. The route to acquiring and preserving such skill when restrictions have been placed on exercising judgement on the incident ground is likely to be found only by a carefully devised programme of training, and since the intention is to inculcate Incident Commanders in a limited period of time into a mode of thinking that reflects the preferences of Management, that training may well have to be bespoke. Such an approach may be the only way of ensuring that CFRS embodies high reliability as an organisation. As Weick (1987) observes, an organisational culture “creates a homogenous set of assumptions and decision premises”. This is achieved by an initial process of centralisation (*ibid.*) – the inculcation of personnel. However, while training is critical in this process, a willingness to accept and fully collaborate in the process may rest on the bond of trust that exists between Management and other personnel. In removing equipment from stations, applying the strict safety measures in SOP 9 and then despatching crews to water incidents, some of that trust may have been eroded. Re-establishing it may require a restructuring of the SOP to affirm that Management shares common values with its personnel, and the issue of water rescue equipment as an icon of trust.

54. Trust is a quality that has to exist in a highly reliable organisation. Personnel noted on various occasions a perceived disparity between empowering Incident Commanders to make a tactical mode choice in fire incidents and denying them that choice in water incidents. Had the incident type featured a novel hazard, for example, nanoparticle contamination, this might have been accepted as a situation in which the only appropriate course of action was to make up for a specialist. However, equipment had already been provided and subsequently withdrawn from the majority of the appliances. The result was a conflict of Service obligations with moral duty, often accompanied by pressure from peers and civilians with whom firefighters, particularly retained personnel, are in contact. Notwithstanding the obligations of duty of care, and other legal imperatives placed on management, such a situation, if unresolved, tends to undermine the relationship with other organisation members.

55. In making the choice of offensive mode, Incident Commanders must weigh a perception of a saveable life against the risk to crew. In situations where a lack of equipment or procedural constraints limit measures to almost complete inactivity in the face of public, peer, and perhaps self-expectation also, the conflict of moral and Service duty may become intolerable. The fact that transgression has to date been minor cannot be taken as an assurance that it will continue to be. By allowing the conflict of duty to persist – in other words, choosing to take no action with regards to water incidents – Management may inadvertently provide the pre-conditions that lead to over commitment.

56. Time is a critical factor in conditioning the decision process. Whether the need is to retrieve a casualty and maximise their chance of survival, or to busily apply a method of work that assures the public and buys time to plan or prepare until the RV arrives, it has to be used preciously by the Incident commander of the first on-scene WTLR. It is evident from the primary data that equipment such as inflatable hose kits may not only obviate the

⁸ A good introduction to naturalistic decision-making may be found in Klein (1998).

need to be 'doing something' in the eyes of civilians but also reduce the temptation to commit to an offensive mode; for example if the casualty is floating face down and may have been dead for some time, the ability to pull that person to the bank as rapidly as a swimmer might have reached them, and without physical contact, obviates the compulsion for water entry. By contrast, a grapnel that fails to latch onto a vehicle even after several attempts may provoke the opposite effect as time is wasted and tempers wear thin. However, the best use of time requires not only equipment but also procedures. As part of the data collection process the PI discussed the issue of crew turnout procedures with personnel. There was a view in favour of dressing personnel in drysuits before leaving the station in order to arrive fully kitted on scene. It was suggested that such a procedure would take no more time than donning firefighting PPE.

Management options

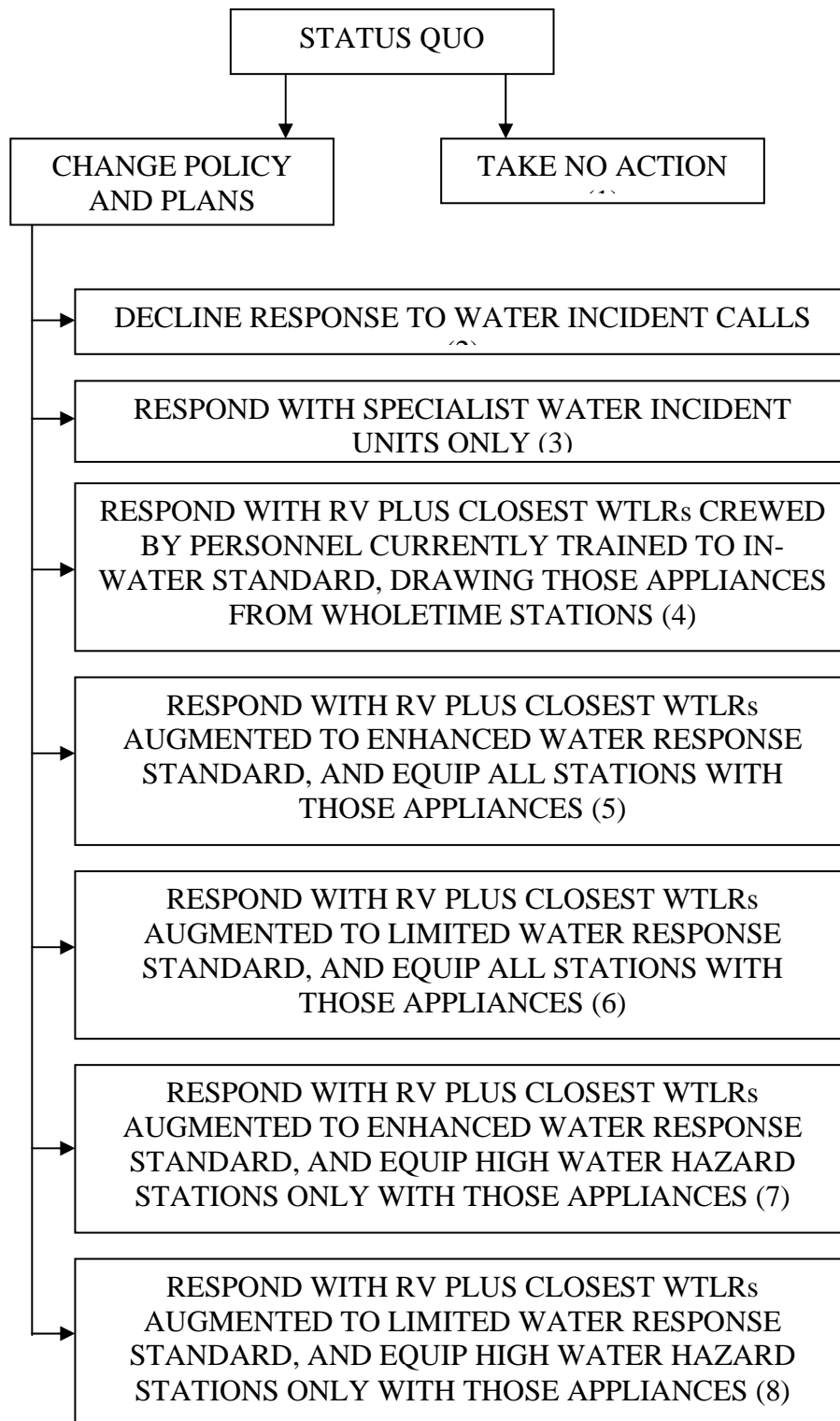
57. The aim of this study was to provide CFRS Senior Management with sufficient and appropriate information with which to review the policy and provisions regarding first attendance by WTLR units at water incidents. Unfortunately, the volume and complexity of the information explored in this report are such as potentially to impede the process of policy review. For this reason, it is helpful to compress the issues into two sets of prospective options; one for the freshwater case, and another for the non-freshwater case⁹. An overview of the freshwater case is provided at Figure 1. Figure 2 proved the overview of the non-freshwater case. Clearly, each option has a number of implications, including:

- a. Physical risk to CFRS personnel.
- b. Physical risk to the public, or other agencies.
- c. Legal risk to the CFRS and to Senior Management.
- d. The risk to the Service, its good order, discipline, reputation, and the related risks to its ability to recruit and retain personnel, and potential loss of corporate memory arising from personnel retention harms.
- e. Resource implications.

Many of these implications are related, but in making a judgement, it is possible for Management to rank each option by reference to implications a-e.

⁹ 'Non-freshwater' in this case refers to natural waters that are brackish, tidal, or estuarine; principally, the Nene.

Figure 1: Summary of Options Available to CFRS Management with Respect to Freshwater Incident Rescues



58. In respect of the issue of first attendance at freshwater incidents by WTLR units, the following options are available to CFRS Management. These will be considered in turn. *No option is proposed that entails the issue or deployment of equipment to any appliance without full and appropriate training being given to the personnel crewing that vehicle. No part of this report should be interpreted as implying such a proposal.*

a. Option 1: take **no action**. Although an increment in training for water incidents is presently underway, Management might choose to make no material changes to current procedures and policies. The advantages of this choice are that it is simple, inexpensive in estimable resources, and superficially a legally defensible position. That is, should a firefighter be injured as the result of over-commitment or unauthorised commitment to an offensive response, at the subsequent inquiry and in any legal proceedings, it might be argued that, having expressly forbidden such actions, Management were blameless. Such a choice bears certain consequences. First, as indicated above, a prosecution argument based on the concept of 'implied consent' might be adduced with success, given that a crew was knowingly dispatched to a water incident without adequate means of attempting an offensive response. Moreover, if firefighters cross-examined in open court repeat the belief that Management is currently despatching crews to incidents in the expectation that they will, in practice, disobey instructions and commit to an offensive mode without adequate provisions; the prosecution may carry the argument. The non-legal risks associated with this option are even less desirable. Management will have to live with the realisation that a firefighter death was occasioned while following an unsafe method of work, and may in some sense have been the causal outcome of their choice. Similar moral consequences would be occasioned by the death of a civilian attempting a rescue in lieu of a calculated and professional response provided by CFRS, while the reputation injury attracted to the organisation by such an event is difficult to calculate.

b. Option 2: **decline response** to water incident calls. Under this option, Fire Control might be directed to decline to respond to water incidents as they are reported, or to send only a PDA that includes a substantial inventory of equipment, including at least one boat and an inflatable rescue path, plus crews that are fully trained for in- and on-water rescue. The issue of a revised PDA will be considered as a separate option, below. The option to decline water incidents, while within its legal remit, will almost certainly attract some of the moral and reputation consequences at Option 1. The public have developed an expectation of rescue service, as reflected in CFRS's own nomenclature, and indeed the nomenclature of other UK brigades. Not only has a considerable investment in equipment and training already been made by the CFRS in water rescues, but there is a distinct possibility that they may become a statutory duty in the future, and any attempt to disinvest in measures to address them may have to undergo a costly reversal. To these legal, political, moral, reputation and financial implications must be added the operation complexity that not all water rescues may be reported as such to Fire Control, or may develop into water incidents as they proceed. For example, a vehicle at the edge of a road having been involved in an RTC may simply be reported as a crash. It may in fact already be in a dike, or subsequently slither down a bank into one.

c. Option 3: respond with **specialist water incident units** only. Some brigades have chosen to augment their fleet with light off-road vehicles for water

incidents. For example, Landrover vehicles have been deployed by brigades both to tow rigid inflatables and carry inflatable boats and/or inflatable rescue paths to water incidents. While such a solution potentially offers a higher road speed than a WTLR or RV, towing may limit that advantage. Moreover, if an asset such as a rigid boat has to be towed, such an activity can be undertaken by a heavy vehicle such as a WTLR, which then retains the advantage of ensuring that a larger crew and fuller equipment inventory arrive on scene at the same time. For example, it may be desirable to winch a vehicle, complete with casualties, from water. For that task, once a line has been attached from a boat, a powerful winch and heavy vehicle are necessary. The light off-road vehicle option entails fleet augmentation with less capable assets that still require garaging and maintenance. As noted above, water rescues may either be misreported to Fire Control, or may actually entail heavy recovery, in which case the light off-road vehicle is simply another appliance that has to be despatched with an RV, which already carries inflatable on-water equipments and trained personnel. The principal advantage of such an asset consists therefore of deploying a rigid hull boat county-wide. Since the Nene is the primary risk requiring a rigid boat in the county, and its banks inhibit launch access for much of its length, a mobile rigid boat has limited benefit.

d. Option 4: respond with RV plus the closest WTLRs crewed by personnel currently in-water trained, drawing those appliances from wholetime stations. This option entails a modest resource commitment and ensures that only personnel with in-water training arrive at the incident. The difficulty is that water incidents may well occur at some distance from whole time stations, and the time-critical nature of such emergencies entails that the risk to casualties and to civilians who act in lieu of a professional response increases. Moving wholetime stations, establishing new ones or augmenting to wholetime standard existing units closer to zones of likely incident occurrence would be resource intensive and have implications for the conduct of non-water related incidents.

e. Option 5: respond with RV plus the closest WTLRs augmented to enhanced water response standard, and equip all stations with those appliances. An 'enhanced' water rescue capability means that the appliance shall carry, in addition to the existing floating lines and lifejackets, at least all of the equipment and skills of a 'limited' capability WTLR (see 'f' below), plus an inflatable rescue path. Under this option, all 36 pump appliances in the Brigade will have the capability to respond instantly and by a safe method of work to a broad range of water incidents, including persons struggling in still water up to 25m from shore, persons stranded in grounded vehicles up to 25m from shore, persons on ice and unstable ground up to 10m from a safe surface, and take at least some first aid and preparatory measures for stillwater rescues requiring either a boat or heavy recovery equipment. All crews will be able to work in greater safety on animal rescues and vehicle incidents involving shallow still water including natural water with bio-contaminants. This strategy may prove of considerable value should the county suffer a major flood event requiring the mass evacuation of persons from their homes to places of safety, as the rescue paths could be deployed as rescue floats with personnel able to work for longer periods.

f. Option 6: respond with RV plus the closest WTLRs augmented to limited water response standard, and equip all stations with those appliances. In this case, a 'limited' water rescue capability means that the appliance shall carry, in addition to the existing floating lines and lifejackets, at least two dry suits

(complete¹⁰), a rescue buoyancy aid, a hose inflation kit, three personnel trained to rescue swimmer¹¹ standard (including the Crew Commander) plus two personnel trained to rescue wader¹² standard. Under this option, all 36 pump appliances in the Brigade will have the capability to respond instantly and by a safe method of work to a limited range of water incidents, including persons struggling in still water up to 25m from shore, persons stranded in grounded vehicles up to 25m from shore, and take at least some first aid and preparatory measures for stillwater rescues requiring either a boat or heavy recovery equipment. All crews will be able to work in greater safety on animal rescues and vehicle incidents involving shallow still water including natural water with bio-contaminants.

f. Option 7: respond with RV plus the closest WTLRs augmented to **enhanced water response standard**, and equip **high water hazard stations only** with those appliances. This choice entails that all pump appliances in those stations most likely to be involved in water incidents will have the capability to respond instantly and by a safe method of work to a broad range of water incidents, including persons struggling in still water up to 25m from shore, persons stranded in grounded vehicles up to 25m from shore, persons on ice and unstable ground up to 10m from a safe surface, and take at least some first aid and preparatory measures for stillwater rescues requiring either a boat or heavy recovery equipment. The crews will be able to work in greater safety on animal rescues and vehicle incidents involving shallow still water including natural water with bio-contaminants. However, appliances from other stations will not have the capacity to properly provide support in large water incidents. Moreover, this strategy may create the impression that stations are not being treated equally by Management.

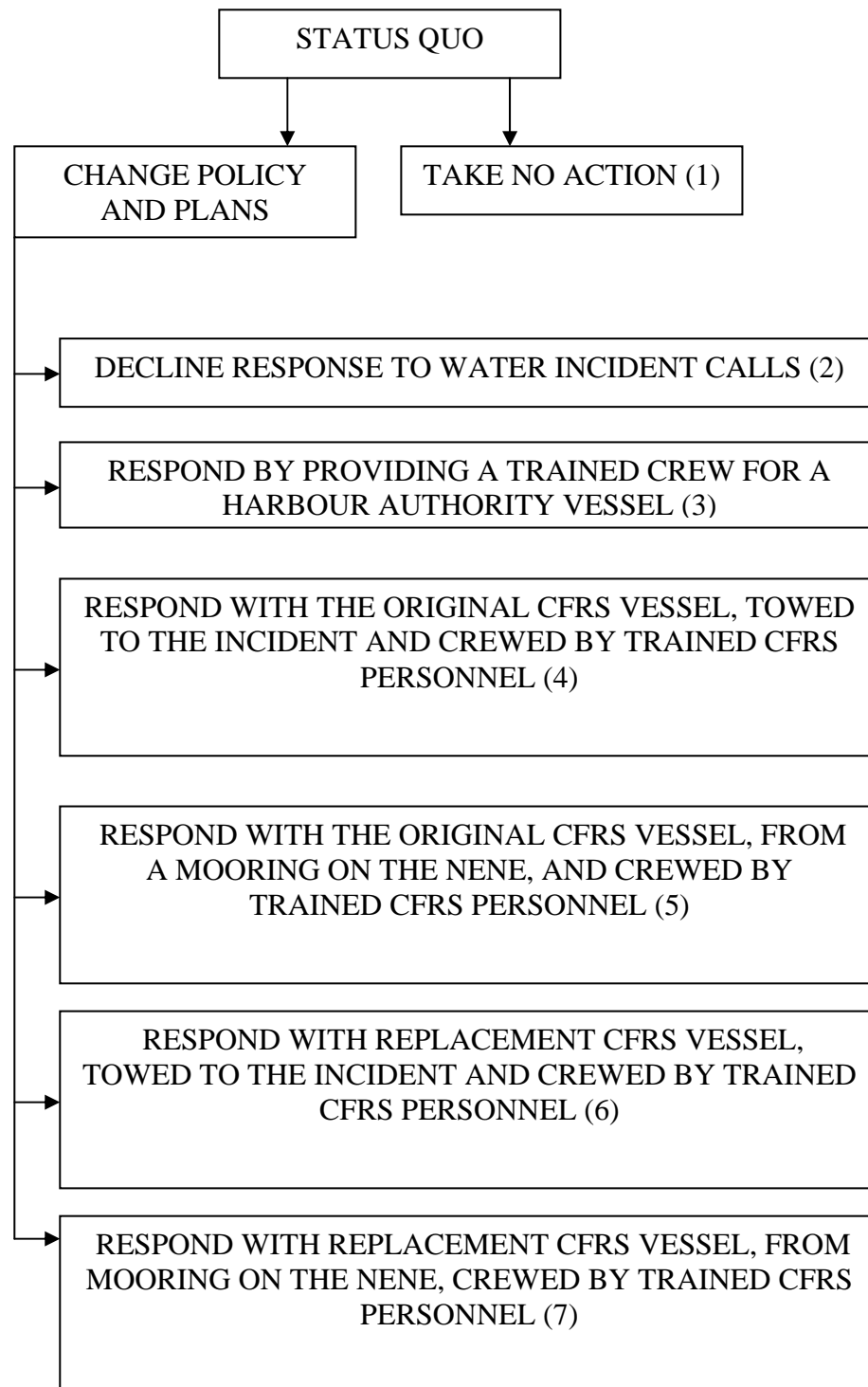
g. Option 8: respond with RV plus the closest WTLRs augmented to **limited water response standard**, and equip **high water hazard stations only** with those appliances. Under this option, pump appliances in those stations most likely to be involved in water incidents will have the capability to respond instantly and by a safe method of work to a limited range of water incidents, including persons struggling in still water up to 25m from shore, persons stranded in grounded vehicles up to 25m from shore, and take at least some first aid and preparatory measures for stillwater rescues requiring either a boat or heavy recovery equipment. The crews will be able to work in greater safety on animal rescues and vehicle incidents involving shallow still water including natural water with bio-contaminants. However, appliances from other stations will not have the capacity to properly provide support in large water incidents. Moreover, this strategy may create the impression that stations are not being treated equally by Management.

¹⁰ A 'complete' drysuit has a thermal undergarment, a lightweight helmet similar to the type worn by canoeists, gloves, and a lifejacket with a quick release for a safety tether to shore. It is most desirable to include within the inventory waterproof flouorochemical light sticks for attachment to the helmet at night and a waterproof torch.

¹¹ A rescue swimmer is an in-water trained firefighter.

¹² A rescue wader is a firefighter trained to don and safely wear a dry suit and use it in still water in which they are not buoyant.

Figure 2: Summary of Options Available to CFRS Management with Respect to Non-freshwater Incident Rescues



59. In respect of the issue of first attendance at non-freshwater incidents by WTLR units, the following options are available to CFRS Management. Once again, these will be considered in turn. *No option is proposed that entails the issue or deployment of equipment or personnel without full and appropriate training being given. No part of this report should be interpreted as implying such a proposal.*

- a. Option 1: take no action. Management might choose to make no material changes to current procedures and policies. This choice is simple, inexpensive in estimable resources, and superficially a legally defensible position. It also suffers from all of the shortfalls of the 'no action' for the freshwater case (above).
- b. Option 2: decline response to water incident calls. Under this option, Fire Control might be directed to decline to respond to water incidents reported on the Nene, and agree instead to pass them to the MCA Rescue Coordination Centre (RCC). Given the that the reaction time for RNLI assets matches that of either CFRS or collaborating CFRS/WHA assets, and that the RCC has a greater range of assets available, this option appears to offer both a rescue service that is as effective as any other but without the commitment of CFRS to deploying its own vessel, or the additional necessary on-water training. However, CFRS may well still be called upon by the RCC to provide shore support, and the arrangement may have to be revised if water rescue becomes a statutory duty for the Fire and Rescue Services.
- c. Option 3: respond by providing a trained crew for a Harbour Authority vessel. At time of writing, the Wisbech Harbour Authority (WHA) operate two vessels, including a survey boat. Search and Rescue (SAR) is not a task for which WHA personnel are established or trained, although they bear the general duty of mariners to respond to mayday calls within their area of responsibility. WHA provide duty cover on a 24/7 basis, but that does not entail that a duty person will be either readily available or that a rapid response is guaranteed. Moreover, due to the limits of their training for SAR duties, WHA prefers to respond with a CFRS crew on board. In addition to finding training time and costs, CFRS would doubtless be asked for funds for joint exercises and training. As noted above, this option does not provide a reaction time better than that of option 2.
- d. Option 4: respond with the original CFRS vessel, towed to the incident and crewed by trained CFRS personnel. The principal advantage of such an asset consists of being able to deploy a rigid hull boat county-wide on a 24/7basis. Since the Nene is the primary hazard requiring a rigid boat in the county, and its banks inhibit launch access for much of its length, a mobile rigid boat has limited benefit. This option entails a resource commitment for maintenance and training, and it is not possible to determine if the reaction time betters than that of option 2.
- e. Option 5: respond with the original CFRS vessel, from a mooring on the Nene and crewed by trained CFRS personnel. The principal advantage of such an asset consists of being able to deploy a rigid hull boat 24/7 to the primary hazard risk requiring a rigid boat in the county. This option entails a resource commitment for maintenance and training, and it is not possible to determine if the reaction time betters than that of option 2.
- f. Option 6: respond with a replacement CFRS vessel, towed to the incident and crewed by trained CFRS personnel. This option has the same advantages and disadvantages to option 4, but brings the additional advantages of a vessel more suited to rescue duties and entails additional cost. It is not possible to determine if the reaction time betters than that of option 2.

g. Option 7: respond with a replacement CFRS vessel, from a mooring on the Nene and crewed by trained CFRS personnel. This option has the same advantages and disadvantages to option 5, but brings the additional advantages of a vessel more suited to rescue duties and entails additional cost. It is not possible to determine if the reaction time betters than that of option 2.

Proposals

60. On the basis of both the findings of this study, and the previous research undertaken by the PI on incident ground decision making, the following proposals are made to CFRS Senior Management in respect of the policy and provisions regarding first attendance by WTLR units at water incidents. It should be understood that this project was aimed at a very specific population and defined set of water incident types; for that reason, *no attempt should be made to apply the findings in this report to broader populations, such as Fire and Rescue Services in other regions, or to incident types other than those defined here.*

- a. The 'no action' options for both freshwater and non-freshwater incident response should not be adopted.
- b. For non-freshwater incidents, it is recommended that under a collaborative agreement with the MCA, incidents reported on the Nene shall be referred to them, with the understanding that shore support shall be provided for defensive mode operations only.
- c. For freshwater incidents, it is recommended that subject to the availability of resources, the maximum number of WTLRs in the fleet be augmented to at least limited water response standard.
- d. Prior to release of the augmented equipment scale, 80% of the personnel on augmented WTLR stations be trained to in-water standard, and the remainder be trained as rescue waders.
- e. Prior to release of the augmented equipment scale, all Incident Commanders on augmented WTLR stations receive bespoke training in water rescue management, including aquatic hazard identification and a practical exercises in RTC procedures conducted in water.
- f. Rescue swimming should be a voluntary duty, and water qualified personnel issued with distinguishing insignia for ease of identification on the incident ground.
- g. The grapnels shall be replaced with a more robust version.
- h. Turnout procedures shall specify that drysuits be donned prior to station departure.
- i. SOP 9 should be reviewed to reflect the rules proposed at Annex B.

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ANNEX A

LIST OF WATER RELATED INCIDENTS ON WHICH FIRST RESPONSE CREWS WERE INVITED TO COMMENT

1. Person reported struggling in water.
2. Person reported floating motionless in water.
3. Person reported stranded at a flooded location.
4. Vehicle in water – no visible occupant.
5. Vehicle in water – person reported and visible.
6. Animal stranded at a flooded location.
7. Animal trapped in water.
8. Incidents at which the water is especially hazardous by virtue of its depth, speed or degree of contamination.

Notes:

- a. Water shall be assumed to be of a depth greater than a firefighter's height.
- b. Water shall be assumed to be sufficiently cold to cause numbness and shivering within five minutes, and progressive incapacity thereafter.
- c. A stranded victim is one surrounded by water, but not immersed.
- d. An animal is a large quadruped weighing not less than 500kg.
- e. All persons reported are adult, gender not described.