

Flood water & river water control measures for waterborne diseases.



This has been put together to enhance the current methods of protecting rescue crews from bacteria, virus and disease in water.

Flooding and rescue from water is becoming a huge part of the various incidents that fire crews attend today. Also the same precautions should be used when fire fighting uses open water sources for a water supply. At the end of the report I have included guidelines issued to foul and drainage water workers, who face the same risks in water that we do.

Highlighted problems for fire & rescue service

Today the modern fire and rescue service attends a huge variety of calls. Water related calls include

Water rescue, boat or line rescue

Flooding - River overflow or drainage unable to cope.

Sewer rescues

Just about anything else the public will call us too

The fire and rescue service act dynamically to these events which are then risk assessed by the incident commander.

The incidents are often protracted and currently the welfare of employees is not adequate and fit for purpose.

The following are areas that I believe should be addressed and I also include some possible solutions. At the end of the document I have included evidence of the need for these changes and references to my sources of information.

The problem the UK fire and rescue service has is that the incidents are reactive and it is not possible to pre-empt the incidents. The incidents are normally in a large geographical area with numerous on going incidents involving large numbers of appliances. With regards to high volume pumping they could be working in another fire and rescue service area. This makes a mobile welfare appliance an unlikely full solution.

The first problem is the crews consuming food or drink.

The current position is.....

.....Employees told not to eat or drink until back at a station where full hand washing is possible.

This is not always practical and fire ground eating and drinking will often take place during spare conditions due to crews attending numerous call or protracted incidents.

The call can also be received just prior to an expected food break where members are then requiring fluids or food fairly quickly at the call.

The hot cans provided and tea/coffee facilities are normally adequate for such times, however we have no facilities to adequately hygienically clean hands etc to allow crews to eat or drink.

The problem is also with the PPE. The fire tunics have the ability to hold contaminated water in the Cuffs and the wet weather gear is a possible "drip hazard". Water running off to contaminate food, drink or areas previously cleaned.

Solution

Firstly a designated member should set up a clean sterile area for consumption of Food and drink. This may where ever possible be someone who has no contact with flood water or equipment used. The Driver could be told to remain sterile.

Prior to eating or drinking all contaminated clothing should be removed to stop dripping water or run-off from sleeves from contaminating food drink or previously cleaned skin.

Soap (liquid) should be available on all appliances and dispensed onto the hands of crews by the sterile member of crew. Care taken to avoid contact and cross contamination.

Cold clean water should be sourced if hot water not available and poured by sterile member over hands of crew members. The requesting of warm water from local resident can also be utilised.

Paper towels should be available on all fire appliances for members to be able to dry hands. A waterproof bag should be provided to place contaminated towels in for safe disposal.

Crews entering the appliance after such incidents also have the ability to further cross contaminate. Perhaps some container should be provided for collection of contaminated kit.

To avoid the possible contamination of expensive fire tunics, maybe we could look at a cheap alternative to wear under the wet weather kit. This could be washed after use.

Disinfectant could be carried on appliances for washing of boots before crews get on appliances; this is not a perfect solution but better than current solution.

The fire and rescue service could also provide antibacterial cream or wash for crews hands.

Antibacterial wipes should also be carried and used where any possible contamination has occurred.

Including

Door handles on appliances

Steering wheel of appliances

Steering wheel of car - flexi duty officer

Fire craft leather gloves, Debris gloves and latex gloves.

All the gloves above are inadequate for flood and water incidents.

Fire craft gloves - Leather not waterproof, cloth cuff has ability to hold contaminated water.

Debris gloves - not waterproof

Latex gloves - not strong enough to withstand hard work - easy to rip.

Solution

Initially perhaps wearing two pairs of latex gloves, long-term we should look for a cheap but fit for purpose waterproof glove that can either be washed adequately after use or a disposable version.

If washable then the best method would be personal issue gloves so user has ability to maintain the cleaning of their personal kit and keeping it in a hygienic and safe state..

The chance of contamination from water is a constant threat.

Where possible the advice not to eat or drink should remain the best way to avoid contamination, however these guidelines should help where this is not practically possible.

This should be carried out with any open water source including fire fighting from open water not just flood related calls.

I believe a training pack needs to be put together for this and also a demonstration of effective hand washing. The area of most risk is the area between the fingers. This is often missed when cleaning and so effectively the bacteria remain. Effective hand cleaning techniques have been undertaken by medical institutes and handwashing without the correct technique has been found conclusively to be ineffective in controlling the spread of virus and disease.

References to legislation and information sources

This section covers some work place legislation and references regarding some of the disease and viruses that can be found in contaminated water. This section also covers some of the ways they can enter the body and why at risk to firefighters.

The following areas of control measure are requirements by the following

The Control of Substances Hazardous to Health Regulations.

Amongst the requirements of the regulations is the need to conduct an assessment of the risks presented by biological agents and hazardous substances, and to decide what precautions are required to prevent or control exposure. Employees should be properly informed, trained and supervised with regard to the risks associated with exposure to hazardous substances and biological agents.

The Health and Safety at Work etc Act requires employers to ensure, so far as is reasonably practicable, the health, safety and welfare of their employees, other people at work, and members of the public who may be affected by the work. This duty extends to the provision and maintenance of a working environment for employees that is safe, without risks to health and has adequate welfare arrangements.

The Personal Protective Equipment Regulations require employers to provide suitable personal protective equipment to those employees that require it unless the risk has been adequately controlled by other means. Adequate training in the use and care of the PPE should be provided for employees and provision should be made for the cleaning, storage and maintenance of the equipment as appropriate.

The risk to emergency services and possible effects of contamination

The majority of illnesses are likely to be relatively mild cases of gastroenteritis, but potentially fatal diseases, such as leptospirosis (Weil's disease) and hepatitis, are also possible.

Spread of water-borne diseases such as diarrhoea, dysentery, typhoid, Weil's disease and

cryptosporidiosis can be found in flood water.

Some possible diseases in floodwater and other water courses and the likely effects.

Dysentery is caused by amoebae which are microscopic parasites found in contaminated food or drink. Some types of amoebae are able to burrow through the intestinal wall and spread through the bloodstream to infect other organs, such as the liver, lungs and brain.
Infectious diseases in the workplace

Cryptosporidiosis is a diarrhoeal disease caused by microscopic parasites of the genus *Cryptosporidium*. Once an animal or person is infected, the parasite lives in the intestine and passes in the stool. The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very resistant to chlorine-based disinfectants. Both the disease and the parasite are commonly known as "crypto."

Hepatitis - This is a viral liver disease with three main forms, A, B and C. Those at risk include healthcare workers, sewage workers, police and emergency services, morticians and embalmers and others who come into contact with bodily fluids.

Hepatitis A is easily contracted from close contact with infected individuals or ingesting contaminated food or faeces. Symptoms can range from virtually no effect through fever, nausea, lack of appetite, diarrhoea, abdominal pain and jaundice to coma and death. Prevention is achieved by good sanitation, waste disposal and personal hygiene.

Hepatitis B is 100 times more infectious than HIV, and carried in blood, saliva, semen and urine. One third of those infected are without symptoms, and there are up to 50,000 symptomless carriers in the UK; one third suffer a mild flu-like illness and one third suffer severe illness for up to six months with nausea, vomiting, fever, pain, fatigue and jaundice. Cirrhosis or cancer of the liver can develop. Prevention can be achieved by vaccination, good personal hygiene and avoiding contact with bodily fluids.

Hepatitis C can cause chronic illness and ultimately death. It is also transmitted in body fluids though to a lesser extent than hepatitis B. There is no vaccine currently available.

Leptospirosis or commonly known as Weil's Disease is a potentially lethal disease contracted from water contaminated with the urine of rats or possibly other animals, infected with leptospirae, which is a form of bacteria. Infection can occur through contact with the eyes and mouth or through cuts and abrasions. In humans the disease is called Weil's disease, which can lead to jaundice or meningitis. Vulnerable groups are water and sewage workers.



How do micro-organisms enter the body?

The most common way is by hand-to-mouth contact during eating, drinking and smoking, or by wiping the face with contaminated hands or gloves, or by licking splashes from the skin. By skin contact, through cuts, scratches, or penetrating wounds, i.e. from discarded hypodermic needles. Certain organisms can enter the body through the surfaces of the eyes, nose and mouth.

By breathing them in, as dust, aerosol or mist.

The following measures can further reduce risk of infection and illness:

Ensure that employees and line management understand the risks through proper instruction, training and supervision.

Provide suitable personal protective equipment that may include waterproof/abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important.

Provide adequate welfare facilities, including clean water, soap, nailbrushes, disposable paper towels, and where heavy contamination is foreseeable, showers. For remote locations portable welfare facilities should be provided. Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities.

Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings.

Health effects associated with exposure to sewage are related to three groups of disease:

- Infections caused by bacteria, parasites or viruses.



Entry into the body:

Sewage drainage and sewage in watercourse

(a) **Ingestion** this is an area where people are at risk from contact with contaminated surfaces due to aerosols and splashes that land on surfaces and on individuals working in the area. Ingestion usually is a result of hand-to-mouth contact i.e. eating, drinking, smoking or wiping the face with contaminated hands.

(b) **Skin contact** with sewage can be direct or in-direct through cuts, scratches or penetrating wounds. Cracked skin and open wounds are particularly susceptible to infection. Infections can also occur by touching the eye surface with contaminated hands. This can occur almost everywhere on a sewage path. Equipment used to divert or pump contaminated water.

(c) **Inhalation** Exposure is normally from aerosols generated by splashes, and sprays. Possible when moving equipment in and out of contaminated water.

(d) **Injection** this can occur through penetrating wounds i.e. from discarded needles / hypodermic syringes or other sharp objects such as broken glass that may get trapped in screens or from water jetting. Possible to have discarded needles imbedded in strainer on suction hose.

Where work that involves contact with sewage is unavoidable, the best control measure available is good personal hygiene practice on the part of the individuals involved in that work. These are guidelines for employees working in foul water.

PERSONAL HYGIENE

This section provides guidance on achieving and maintaining a high standard of hygiene for all persons that come into contact with sewage.

Welfare facilities

(a) Hygiene facilities

All persons that come into contact with sewage must have access to a means of cleansing exposed skin areas.

Adequate washing facilities should be available either on site or within a reasonable travelling distance. It is considered best industry practice to provide warm running water, liquid soap in a dispenser and disposable paper towels as a means to dry hands. Where possible facilities should be utilised on site. Where this is not practicable a suitably designed vehicle with facilities on board comprising of a hot water unit, liquid soap and Disposable towels should be provided. Hand wipes or waterless cleansing gel should be available for when washing facilities are not available.

The provision of conditioning hand cream is recommended to replace the skins natural oils after each hand wash. Nailbrushes should only be provided for individual use and stored safely with

bristles upwards so they remain clean and dry when not in use. When using nail brushes care must be taken not to abrade the skin creating an 'open' wound. Showers or access to running water should be provided where there is a risk of gross contamination occurring. In some circumstances where welfare amenities are not available nearby, it may be necessary to consider bringing in portable facilities.

Vehicles

A system for the segregation of dirty equipment and clothing should be established within vehicles. The cab should be kept clean and free from contamination by removing contaminated overalls and washing hands prior to entering. It is preferable to have the cab separated from the storage area by a bulkhead. Hard surface wipes should be available to allow cleaning of the steering wheel and surfaces within the cab that may become contaminated. Disposable, waterproof seat covers should be considered where there is a possibility of contamination. Eating, drinking and smoking should be discouraged within vehicles used by persons working with sewage.



References & Sources of information

<http://www.medic8.com/infectious-diseases/cryptosporidiosis.htm>

<http://www.water.org.uk>

<http://www.healthandsafety.co.uk>

<http://www.dalbeattie.com>

<http://www.gmbunion.org>

<http://www.floodwarn.co.uk>

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