Environmental Protection Handbook for the Fire and Rescue Service

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Foreword

David Jordan, Director of Operations, Environment Agency

The partnership between the Fire and Rescue Service, The Environment Agency, Scottish Environment Protection Agency, Natural Resources Wales and the Northern Ireland Environment Agency has developed into an extremely successful working relationship, delivering benefits to all the partner organisations and most importantly to the environment.

By working together we provide an effective response to prevent or minimise the environmental impact of thousands of pollution incidents every year. This has protected water supplies as well as minimising the disruption to recreational activities such as angling by saving millions of fish. Our working relationship during flooding events continues to grow helping to reduce or mitigate the impacts upon the communities affected by these events.

The revision to this handbook has been necessary due to changes in legislation, new policies and procedures and developing risks to the environment. It will provide all firefighters with the essential knowledge required to understand how their actions both individually and collectively can safeguard the environment, whilst at the same time undertaking their principal role of saving life.

I am delighted to have been able to support the revision of this handbook. I feel sure that many will use it to learn more about the practical ways they can help protect the environment and create a better place.

Preface

Peter Holland CBE, Chief Fire and Rescue Adviser

This Environmental Protection Handbook for the fire and rescue service is the first revision of the manual originally published in 2008 dedicated to the protection of the natural environment. The information and guidance provided in this publication is designed to support firefighters, managers and trainers in their work at operational incidents, training events and during day-to-day activities within the fire and rescue services.

The original manual was well received by both the fire and rescue service and colleagues in the various environment agencies as a ground breaking publication providing technical, scientific, legal and practical advice on how, when and where to consider environmental impact. There is clear evidence that the fire and rescue service can, and do, make a significant contribution in protecting our environment and that as a consequence of our actions, significant harm to the natural environment has been prevented or mitigated. This handbook will play a leading role in ensuring that information is available which will result in effective planning and response to incidents which have the potential to cause serious harm to the environment.

The handbook would not have been produced without the support of the four UK environment agencies, for which I would like to express my appreciation and that of the Service as a whole.

Chapter 1

Protecting the environment

1.1 Purpose

This fire and rescue service (FRS) operational guidance is the first revision of the FRS manual *Environmental Protection* which was first published in 2008 to give FRS guidance on how to protect the natural environment. Since then operational fire personnel have become increasingly aware of, and knowledgeable about, environmental issues; this is due in no small part to the original guidance but also to a successful partnership following the signing of memorandum of understanding/working together agreements between environment agencies and the FRS. This has resulted in an improved pollution response at an increasing number of operational incidents. Other working agreements with organisations such as the Highways Agency have also contributed to the success of the initiative.

> The term 'environment agencies' includes the Environment Agency, England, Natural Resources Wales (NRW), the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA).

This guidance doesn't consider the impacts that climate change will have on the FRS; this is covered in the Communities and Local Government document, 'Effects of Climate Change on Fire and Rescue Services in the UK' (1/2006). But by providing guidance on preventing and, if necessary, dealing with, incidents with the potential to pollute, it will ensure that the FRS is in a better position to respond to any increase in pollution incidents that result from the impacts of climate change, for example, an increased risk of flooding at sites storing hazardous materials.

This guidance has been designed and written to contribute to the partnership approach adopted by UK environment agencies and the FRS. The aim of the partnership and this guidance is to protect the environment at operational incidents, during training events and as part of the day-to-day management of FRS premises and activities.

1.1.1 What's behind it?

'Sustainable development' is a term used to describe society's strategy to improve the quality of life for everyone, now and for the future. The European Community (EC) Treaty, Article 6, promotes sustainable development (EC 1992) and is supported by our government. This is achieved by promoting the Agenda 21 initiative. Agenda 21 encourages local authorities to formulate vision statements, develop objectives and implement action plans to progress sustainable development. A widely-used international definition of this approach is:

'Development which meets the needs of the present without compromising the ability of future generations to meet their own needs'.

To achieve this, society must act in an environmentally conscientious way, in all aspects of living. Although the idea is simple, the task is substantial. It means meeting four objectives at the same time, in the UK and the world as a whole:

- Social progress which recognises the needs of everyone
- Effective protection of the environment
- Prudent use of natural resources
- Maintenance of high and stable levels of economic growth and employment.

If society ignores the need to develop in a sustainable way, the result is the breakdown of society itself through the destruction or contamination of the earth's natural resources such as water, air and land, with the consequential disappearance of species including mankind. Protecting the natural environment can be economically effective. Saving or reducing the amount of the earth's natural resources used or consumed is effective in terms of fuel and energy costs. Moreover, society benefits as a result of a cleaner, healthier, more diverse and pleasant environment in which to live. Within a quality environment, society will prosper to the benefit of this and future generations.

By being environmentally conscientious, the FRS can set an example to society through local communities. For a public organisation, this is not only expected but also required by central and local government directives. The FRS can achieve environmental good practice in three distinct areas of its activities.

At emergency incidents

FRS intervention can significantly reduce the impact that spillages or firewater run-off may have on the environment. Such actions can also provide public health benefits. Public drinking water is drawn from rivers, lakes, lochs and groundwater; FRS activities to protect these waters will help safeguard public and private drinking water supplies and public health (see Figure 1.1). So FRS pollution prevention and control activities can be associated with the FRS' stated aim of protecting public safety. FRS planners and incident commanders need to bear this in mind when prioritising environmental protection as an objective within their strategic plans (see Chapter 2).

The UK economy also benefits when FRS personnel implement environmental first aid measures such as sealing a leak, blocking a drain or using a controlled burn. It's quite simply more expensive to clean up pollution from the environment than from a reservoir of containment provided by the FRS.

The issue of air pollution and the fall-out onto land and water is considered later in this guidance (see Section 3.7, Controlled burn and Section 1.3.4, Pollution prevention and legal controls)

Figure 1.1

Protecting public health by preventing contamination of drinking water supplies is a significant concern at emergency incidents and underpins the philosophy behind FRS operational pollution prevention and control activities.

Training events

During training events, the FRS must strike a balance between realism and risk. Some training events, either at fire stations or at external venues, may give rise to water, land or air pollution, for example pollution from training with firefighting foam or real fire simulators.

Figure 1.2

Photo courtesy of the Fire Service College

A typical firefighting foam training event which has the potential to pollute the environment and breach environmental legislation. Risks to the environment and possible breaches of environmental law must be included within training risk assessments. This is discussed in section 2.10.

Management of FRS premises and activities

Many aspects of FRS day-to-day activities have implications for a sustainable society: use of paper, energy conservation, vehicle use, management of waste. Considering such issues as part of an environmental management system (EMS) makes for economic, social and environmental best practice. Guidance on EMS and how the FRS can prevent pollution from its own premises is in Chapter 4.

Figure 1.3

Photo courtesy of the Fire Service College

Vehicle workshops are an example of where activities that pose a risk to the environment take place and should be prioritised for environmental risk assessment.

This guidance focuses on high environmental risk activities at operational incidents and advice and guidance on training for such incidents is included. This may be achieved by additions to this or existing FRS national operational guidance. Any new or revised guidance will include environmental information where relevant.

1.2 Ecology and environmental science

This section outlines some basic concepts of environmental science, pollution studies and ecology relevant to FRS personnel; a basic understanding of these subjects and their interrelationships will provide them with some of the tools necessary to prioritise environmental protection activities.

1.2.1 Environmental science

There are three relevant underlying natural laws of physics: the law of the conservation of matter; the first law of thermodynamics; the second law of thermodynamics.

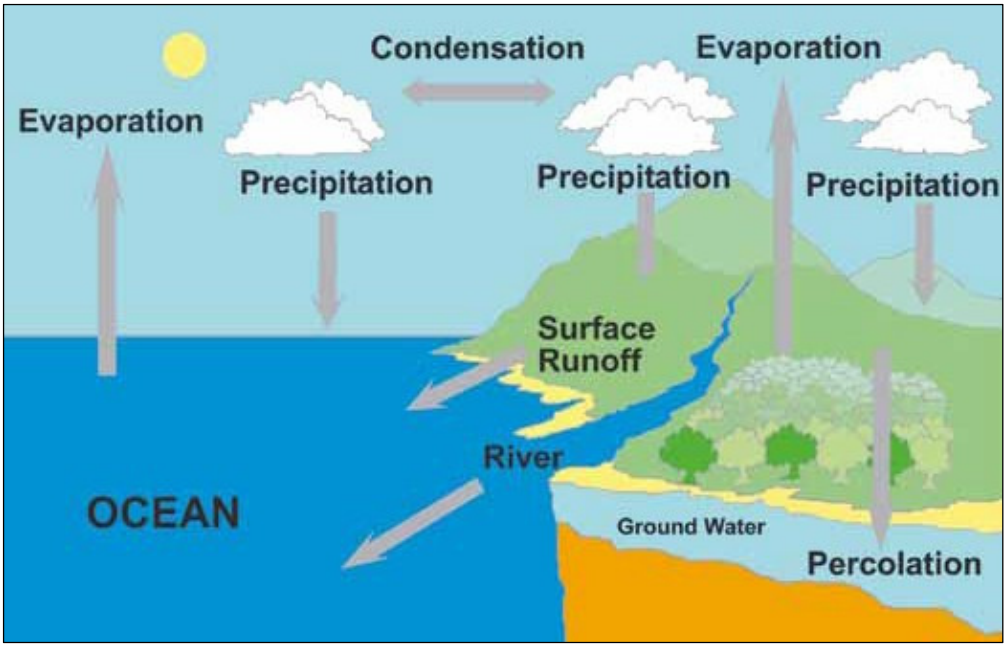
Where is 'away'?

The law of the conservation of matter states that no atoms are created or destroyed; there is no such thing or place as 'away' (Dr Anne Miller 2001). So, when waste is thrown, flushed, washed or otherwise taken 'away', it merely ends up at another location. FRS personnel responsible for dealing with energy and waste including waste produced at incidents need to understand and consider this basic concept.

On a global scale, material continually cycles around the global system – this is known as *biogeochemical cycling*. Figures 1.4 and 1.5 show how water and carbon move around the globe. If

pollution of the water or air occurs in one part of the world, it can affect others. Examples include acid rain, ozone depletion and concentrations of chemicals such as polychlorinated biphenyls (PCBs) in the environment.

Figure 1.4 The water cycle

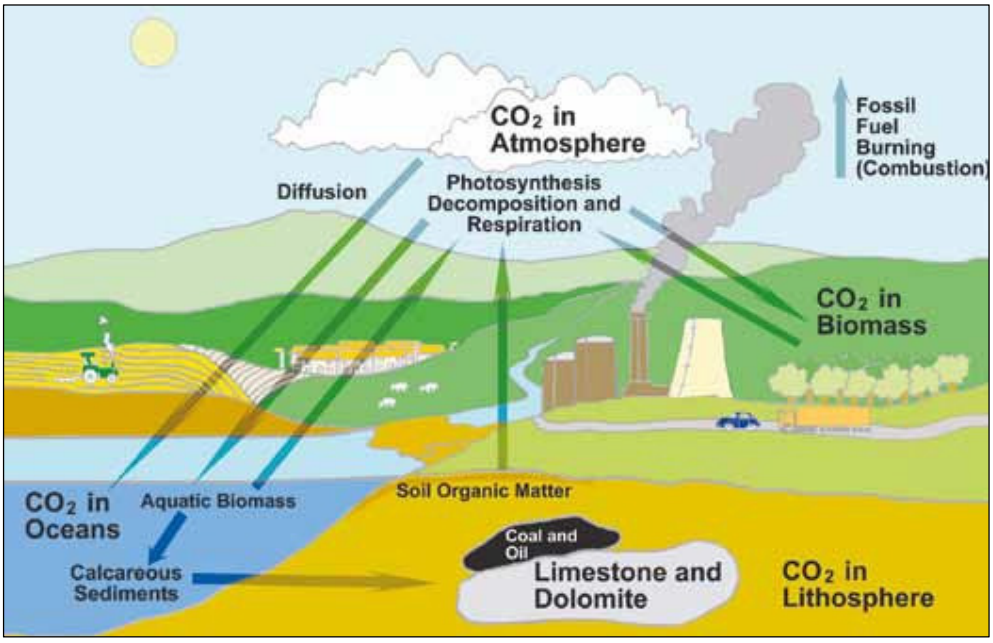


Pollutants discharged into the water environment in one country can migrate to others via rivers, groundwater and the oceans.

Understanding these concepts will provide FRS personnel with the knowledge to consider the longer-term and broader effects of the pollution of water, land and air.

To understand the mechanics of pollution, we have to consider the laws of thermodynamics.

Figure 1.5 The carbon cycle



Carbon discharged into the atmosphere in the form of CO_2 will cause a range of impacts worldwide, including climate change.

The first law of thermodynamics is that energy can be changed from one form to another but it can't be created or destroyed; total energy remains constant.

The second law of thermodynamics is that energy always moves from highly organised to more chaotic states. This is called entropy which is a measure of this disorder. Once energy has degraded to a low-quality, disorganised state, for example, as waste or pollution, a lot of extra high-quality energy is required to upgrade it to a useable form.

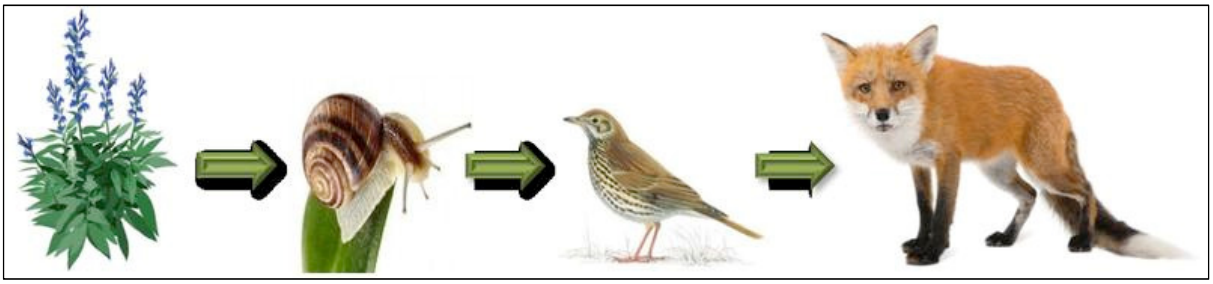
So if waste or pollution is created it will always take a lot more energy to clear it up once it becomes 'disorganised' and dispersed than if it can be contained and treated when it is still in one place; for instance, contained on a roadway rather than dispersed in a ditch or river. This is the basic principle behind the hierarchy of pollution control (see Section 3.2, Environmental protection operational strategies and techniques).

1.2.2 Ecology

The relationship between plants, animals and the environment is called ecology. Each food chain is a linked series of living things, each of which is the food for the next in line in the chain (see Figure 1.6). Ecosystems consist of species within trophic levels. Typically these consist of:

- Producers
- Primary consumers
- Secondary consumers
- Tertiary consumers
- Detritivores

Figure 1.6



Components of a simple food chain. Pollution may destroy one or more components causing species higher up the food chain to starve and/or species lower down the food chain to overpopulate.

Producers

These are mainly plants with some bacteria and protists (e.g. Protozoa), which produce their own nutrients using sunlight energy and simple compounds such as carbon dioxide, water and small amounts of minerals. They are the powerhouses of all living systems and should these organisms, which are sensitive to pollutants, be eliminated, everything else would starve.

Consumers

Primary consumers (herbivores) feed directly on living producers. Secondary consumers (carnivores) feed on living primary consumers. Tertiary consumers (carnivores) feed on living secondary consumers. Omnivores eat everything and so may be at any of these levels.

Detritivores (decomposers) feed only on dead organisms and the waste products of living organisms, but eventually all the producers and consumers will end up in the detritivores area. They take in complex organic materials and break them down into simpler components, some of which they use, and others which they release into the environment. Eventually these simple components will become available to be taken up again by the producers, so completing the recycle loop.

If one or more levels of the food chain (also known as trophic levels) are removed, for instance, as a result of a pollution event at an emergency incident, the whole local ecosystem may fail. Agricultural systems often involve only two levels of consumer, but lakes and oceans may have four or more levels.

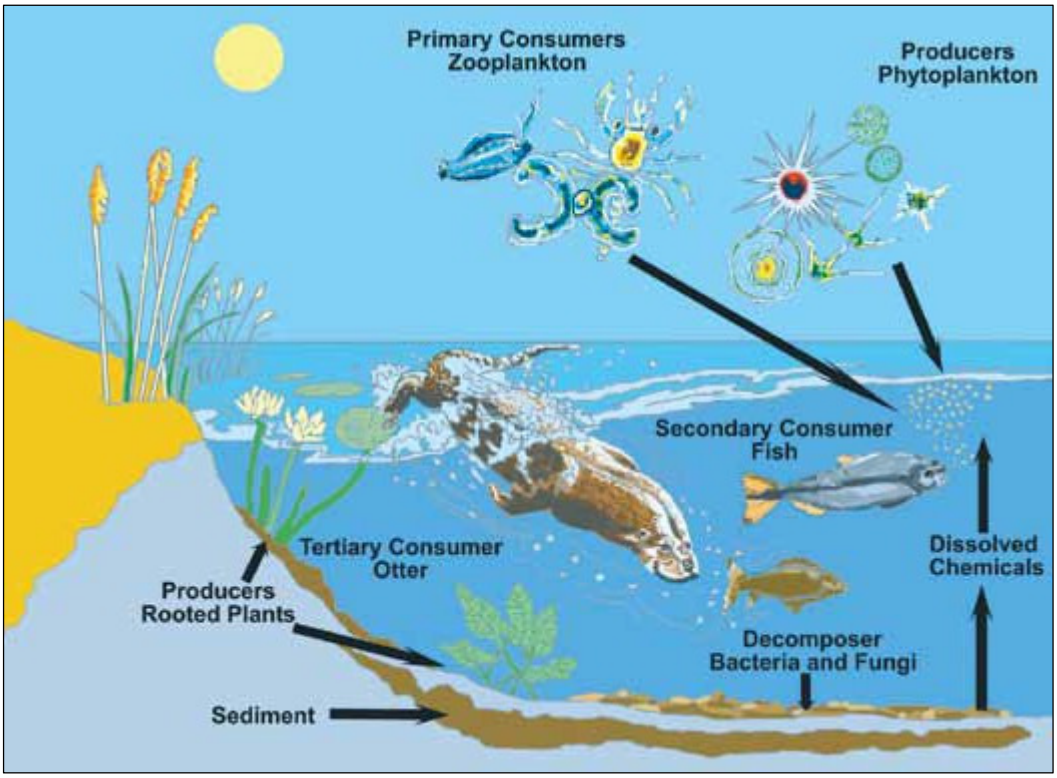
Most ecosystems are much more complicated than those described above since they contain some organisms that feed at different levels in different situations, so creating a complex web of feeding pathways instead of a simple chain.

Uptake of essential elements

Bacteria, protists, fungi, and simple plants like mosses and seaweeds, take in nutrients (and pollutants) all over their surfaces by simple diffusion through their cell surface membrane.

More complicated plants take in nutrients through specialised parts of their leaves and through roots. Such structures may make it easier for a plant to be selective; for example, to exclude certain unwanted substances. Animals may take in nutrients via their mouths and respiration. Some animals respire using lungs or gills and others simply breathe through their skin. All organisms can take up such substances in soluble forms making them susceptible to the effects of toxic pollutants. Figure 1.7 shows a simple aquatic food chain.

Figure 1.7 Components of an aquatic food chain



These are far more complex in reality and can be seriously affected by pollution.

The water environment

All ecosystems require a supply of energy and materials. Plants within river ecosystems provide some of these but the main supply is usually from external sources; for example dead leaves dropping into the river in autumn. Organic matter has a standard pathway through such systems, as shown below.

Pathway of organic matter in river ecosystems

Organic matter (dead leaves or animals)

↓

Microbes (fungi, bacteria, protozoa)

↓

Detritivores (freshwater shrimps, water louse)

↓

Carnivores (dragonfly larvae, leeches)

Water pollution

The environment is often considered as three components: air, land and water. But these don't exist in isolation from each other. For example, sulphur dioxide pollution of the atmosphere can result in the acidification of lakes and rivers (see Figures 1.4 and 1.5).

The water component is divided into sections: oceans, rivers, groundwaters, lakes, lochs. Elements within the water component are also inter-linked. River pollution can lead to oceanic pollution; surface water pollution can lead to groundwater pollution and groundwater pollution to surface water pollution. Pollutants are defined as anything that harms the environment. So water pollutants include not only chemicals, oils and pathogens but also organic materials, heat and suspended solids. A list of the major categories of pollutants is in Table 1.1.

Organic pollutants

Not all pollutants are toxic (poisonous); for example, organic matter (carbon and hydrogen-based material that can decompose, or matter associated with living organisms). Sources of organic matter include agricultural wastes (such as slurry or silage), blood, food (milk, beer and orange juice, for example), sewage and many other materials. Although many of these pollutants are not in themselves toxic to aquatic organisms, they can still have serious indirect consequences. This is because rivers, lakes and other waterways are organic matter processing systems. If we add large quantities of organic matter (such as sewage or a tanker of milk or beer) this has effects that are similar to adding large quantities of dead leaves except that it's finely divided (soluble) and so easy for the bacteria and fungi to consume rapidly; see Figure 1.8.

Table 1.1 Categories of pollutants

Acids and alkalis
Anions (e.g. sulphide, sulphite, cyanide)
Detergents
Domestic/Industrial sewage effluent and sludge
Farm effluents/slurries/manures
Food and beverages including processing wastes/animal feeds
Fire fighting foams and chemicals
Gases taken into solution in water (e.g. chlorine, ammonia)
Heat
Metals (e.g. cadmium, zinc, lead)
Nutrients (especially phosphates and nitrates)
Oil (mineral and vegetable) and oil dispersants
Organic chemicals (e.g. formaldehydes, phenols)
Pathogens
Pesticides
Polychlorinated biphenyls (PCBs)
Radionuclides
Solvents and Suspended solids,for example silts, sands etc

So what happens?

The microbes process the organic matter and their populations grow exponentially due to the extra food source. As the microbes increase, they consume more and more dissolved oxygen, which reduces dissolved oxygen levels in the water. If enough organic pollutant enters the waterbody, all the dissolved oxygen will eventually be used and anaerobic conditions will arise. In such conditions most species of aquatic animals including fish will die.

If anaerobic conditions persist, for example due to a continuous discharge of sewage, specialised microbes, called ‘sewage fungus’, will thrive. This appears as a grey filamentous growth in the water. A smell of bad eggs will also usually be noticed. Even if anaerobic conditions don’t arise, some aquatic organisms may still die. This is because some aquatic organisms are particularly sensitive to any reduction in dissolved oxygen levels, for example, stonefly and mayfly larvae, trout and salmon.

Over time, the organic matter is used up and disperses. River water re-oxygenates moving downstream as oxygen dissolves in from the atmosphere and plant growth.

As the oxygen returns so does the typical fauna, although it may take some time for the ecosystem to recover fully. This illustrates the river’s ability to self-purify following organic pollution.

Figure 1.8

Organic Pollution incidents can have serious but usually temporary effects on the local ecosystem

Measuring organic pollution: Biochemical Oxygen Demand (BOD)

The 'oxygen sag' is an indirect measure of the amount of organic matter in a liquid. The BOD test is designed to quantify the amount of change imposed on the river by the entry of the particular organic substance. A measure of oxygen requirement will indicate the likely impact of an organic pollutant on the river. The *biochemical oxygen deman*d (BOD) test was developed at the turn of the 20th century to measure the ability of any particular organic matter in water to use up oxygen. It's carried out in standard conditions; over five days, at 20º C, in darkness and is called the BOD 5/20 test.

This test provides a standard by which organic pollutants can be compared (Table 1.2) and it's used to monitor both river pollution and the effectiveness of treating organic materials before discharge into the water environment, for example from a sewage treatment works.

Table 1.2 BOD values for different wastes/effluents

Typical BOD values	(mg oxygen/l)
Natural rivers	0.5–5.0
Crude sewage	200–800
Treated sewage	3–50
Poultry waste	24,000–67,000
Silage liquor	60,000
Dairy waste	300–2,000
Milk	140,000
Brewery waste	500–1,300
Orange juice	80,000
Paper mill effluent	100–400
Typical firefighting foam concentrate	50,000

Biological water quality testing methods

An assessment of the number and type of living organisms in surface water can also be used to monitor organic and other forms of pollution including heat or chemical.

These assessments are referred to as biological indicators. Different organisms have different tolerances to low oxygen levels or pollutants. Using the presence or absence of particular organisms (freshwater insects, larvae and worms, visible with naked eye), water quality specialists can directly monitor the level of pollution. An ecologist (see Figure 1.9) moves across a river pushing a net over the riverbed. S/he then identifies and counts the organisms caught in the net. The more sensitive the organisms present, the better the quality of water in the river.

Figure 1.9

Environment Agency officer sampling a river

Other forms of pollution

Other pollutants include inorganic substances, like metals and acids, and man-made organics such as pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), phenols. When considering toxic substances entering a watercourse, we need to consider some key terms in the science of eco-toxicology (see Table 1.3). When the FRS attends incidents which involve substances with these properties, they should be prioritised.

Perhaps the best-known example of a pollution event that affected humans was in the 1950s in Minemata Bay, Japan. Mercury (mercuric sulphate) was discharged untreated into Minemata Bay over many years where it accumulated in the sediment offshore. Here it was naturally converted into methyl mercury, a more soluble form readily taken up by plants and animals. The food chain included several different carnivorous fish and eventually humans who ingested 500,000 times the normal seawater concentration of mercury when they ate the fish. The local population developed various ailments and serious birth defects also occurred. This form of mercury poisoning is known as Minemata Bay disease.

Table 1.3 Definition of key terms

Environmental term	Description of meaning
Persistence	Persistence of chemicals indicates that they are stable and long-lived in the environment, resisting degradation,for example lead, cadmium, mercury, PCBs, and many man-made organics
Xenobiotic	Not friendly to biological organisms in general (includes many man-made substances, especially pesticides, lead, cadmium

Environmental term	Description of meaning
	and mercury)
Biodegradation	Breakdown of a complex chemical into (simpler) components by actions of biological organisms. It's not always broken down into more benign components, the pesticide Dieldrin biodegrades into photodieldrin, which is considerably more toxic
Bioconcentration (Biodegrading)	Extraction of chemicals from the environment, and concentration within the organism. For example, seaweed concentrates iodine from the seawater within its tissues, so it's very useful for humans as a source of concentrated iodine. Similarly, plutonium is present at very low levels in seawater. It's concentrated within tiny algae, (phytoplankton) that make up the producers in the open sea ecosystem (up to 3,000 times stronger in one of these algae than in the sea water). Algae also concentrate PCBs to 2,000 times the ambient sea water levels
Bioaccumulation or biomagnification.	Concentration of pollutant; gradient that occurs in moving from one trophic level to another, such as when an animal eats a plant or another animal

1.2.3 Environmental conditions

Environmental conditions in any particular geographical area of the UK can directly influence the toxicity of pollutants in a waterbody. Environmental specialists within the FRS should consider these when pollutants are released into the water environment.

Hardness: in hard water, high concentrations of dissolved calcium and magnesium reduce the toxicity of metals such as cadmium, lead or copper. Such waters will also be better able to cope with an acid spill due to better buffering capacity. However the toxicity of other substances such as ammonia is increased.

Acidity: the solubility of many metals is increased as water becomes more acidic. This can lead to negative impacts on aquatic ecosystems.

Temperature: high water temperatures naturally reduce dissolved oxygen levels. These conditions also encourage greater microbial growth, so the effect of an organic spill during the summer period may be more severe, but self-purification is accelerated.

Mixtures: pollutants can change their toxicity in the presence of other toxins. They may produce three possible outcomes:

- Additive toxicity
- Increased toxicity
- Decreased toxicity

The presence of chromium, for example, can increase the toxicity of nickel ten-fold whereas the presence of strontium can decrease it three-fold.

1.2.4 Effects of pollutants

For each pollutant type, we can predict the likely effects on the immediate ecosystem, as shown in Table 1.4

Table 1.4 Types of pollution and their effects

Type of pollution	Effects
Suspended inorganic solids: for example silt pumped into a river	Substrate changed due to the riverbed being covered with silt. Fish gills and filter feeders become blocked. The penetration of light is reduced, reducing photosynthesis and plant growth. Changes in the community of organisms present. A loss of diversity occurs
Thermal Pollution: for example from fire run-off water	Water body is heated. Oxygen content of the water is reduced but self-purification processes are accelerated if oxygen levels don't fall too low. Some species, for example trout and salmon are also particularly sensitive to elevated water temperatures. Changes in the community of organisms present. A loss of diversity occurs
Inorganic chemicals	Some are toxic and some cause change to acidity or alkalinity (pH) of the water. Change in the community of organisms present. A loss of diversity occurs
Organic matter: for example milk spillage	Reduction of oxygen levels. Changes in the community of organisms present. A loss of diversity occurs
Nitrogen and phosphates for example fertilise spillage	Eutrophication, producing algal blooms, which can lead to deoxygenation of water bodies. Changes in the community of organisms present. A loss of diversity occurs. Many fertilisers are also acutely toxic, particularly those based on ammonia
Toxic organic chemicals	Poisonous. Changes in the community of organisms present. A loss of diversity occurs. Bioaccumulation and/or persistence possible
Pathogens	The spread of disease, so a need to remove them from drinking, bathing and recreational waters.

1.2.5 Pollution of the water environment

Pollutants released during fires or other emergency incidents, including hazardous materials (hazmats) and other spills, can pollute air, land and water. But the water environment is arguably the most vulnerable to pollution from emergency incidents and is the part of the environment that the FRS can protect most readily.

All living things need water to live. Rivers and lakes are fragile ecosystems that depend on water to be non-toxic, clear and containing adequate dissolved oxygen. Importantly for humans, we all depend on clean water for drinking water supplies, watering of livestock (see Figure 1.10), and irrigation of crops, gardens, industrial and recreational use.

Surface water

Surface water is the term used to describe water contained in rivers, streams, ditches, lakes, lochs and reservoirs. As well as drinking water supplies, surface waters provide an important recreational and economic resource, for example recreational and commercial fisheries. UK government policy is to develop fisheries because they provide important social and economic benefits. Other recreational uses include canoeing, boating and walking along the river banks.

Groundwater

Groundwater is the term used to describe the water underground in areas of permeable rocks, known as aquifers. Aquifers hold at least 20 times more water than all the UK's surface reservoirs. This means that underground water is a major national resource. For example, groundwater provides 75 per cent of public drinking water supplies in south-east England, 13 per cent in the north of England, five per cent in Wales, 3.6 per cent in Scotland and six per cent in Northern Ireland.

Figure 1.10

Photo courtesy of the Environment Agency

Livestock watering is one of many uses of water that can be affected by pollution

The above percentages of groundwater used for drinking water within a region will not necessarily reflect local use. For instance, for some towns or areas, 100 per cent of drinking water will come from groundwater whereas in others all will come from surface

Groundwater abstractions are also an important source of water for agriculture and industry and provide for people or businesses that cannot, or would rather not, use water from the public mains. Private wells are controlled by local authorities.

This water is also ecologically important. Many wetlands, lakes and rivers depend on it. Removal of groundwater can cause low river flows or for rivers to dry up. Reducing the quality or the quantity of groundwater can in turn impair river quality and levels and vice versa (see Figure 1.11).

Figure 1.11

Over abstraction of groundwater can cause rivers and lake levels to fall

Often groundwater is out of sight, so out of mind, but it can be vulnerable to pollution from emergency incidents. Unlike a river, once an underground water resource is polluted – for example through chemical spills or firewater run-off – it may remain contaminated for many decades and could be costly or impossible to clean up.

Water beneath and near urban areas often suffers from current or past industrial pollution from chemical works, waste sites, gas works, leaking underground tanks, drains and sewers. As a result, aquifers under cities such as Birmingham and Coventry can't be used for drinking water abstraction without expensive treatment.

Groundwater levels change throughout the year, depending on the weather and how much water is abstracted from the aquifers. Groundwater is mainly replenished by winter rainfall. This process is termed 'groundwater recharge'. Groundwater droughts occur when the amount of recharge in the winter is low. Dry summers with increased demands for water also affect groundwater levels.

It's an offence to pollute groundwaters under UK and EU pollution prevention legislation (see Section 1.4, Environmental law).

Groundwater protection zones

Groundwater is everywhere beneath our feet – the most important groundwater areas have been categorised into source protection zones (SPZ) depending on their importance and vulnerability to environmental damage (see Figure 1.12). The shape and size of SPZ depend on the hydrogeological conditions of the ground, how the groundwater is removed, and other environmental factors.

Each SPZ can be divided into three distinct zones:

- Source Protection Zone 1 (SPZ1) – Inner protection zone
- Source Protection Zone 2 (SPZ2) – Outer protection zone
- Source Protection Zone 3 (SPZ3) – Total catchment protection zone

The Environment Agency uses the zones in conjunction with their Groundwater Protection Principles & Practice guidance (commonly known as GP3) to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby.

Source Protection Zone 1 (SPZ1) – Inner Protection Zone: this is the area of land around an abstraction where groundwater takes 50 days to travel from any point below the water table to the groundwater source. Where a SPZ1 has not been formally mapped, a minimum radius of 50 metres is assigned around the abstraction source.

Source Protection Zone 2 (SPZ2) – Outer Protection Zone: this is the area of land around an abstraction where groundwater takes 400 days to travel from a point below the water table to the groundwater source. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction.

Source Protection Zone 3 (SPZ3) – Source Catchment Protection Zone: defined as the area around a source within which all the groundwater is presumed to be discharged at the abstraction source.

Information about areas can be obtained from the local environment agency office; when operating in groundwater SPZs, the FRS should consider the environmental impact of its operations on groundwaters through liaison with the relevant environment agency.

Figure 1.12

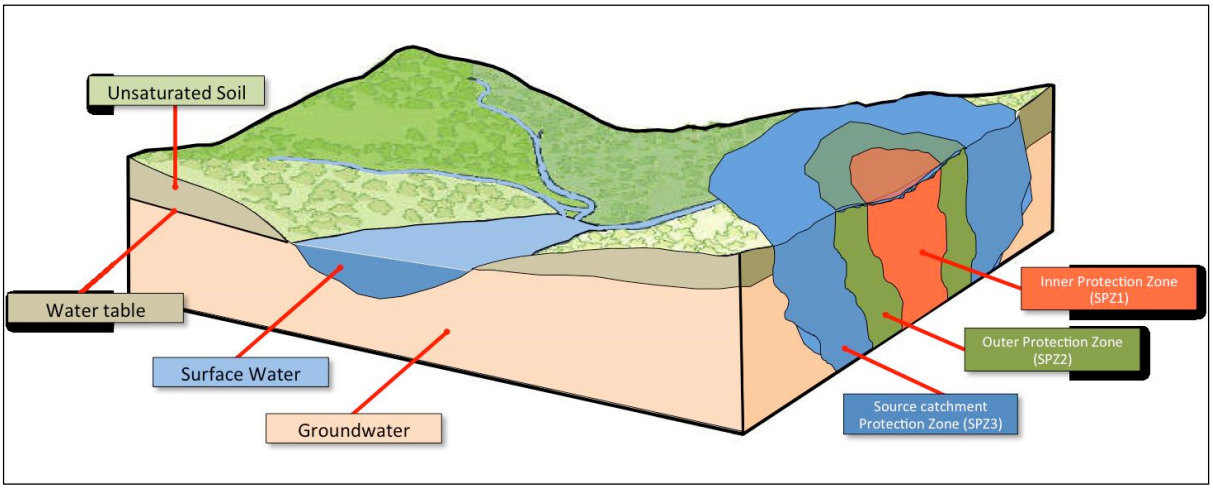


Diagram courtesy of Kent Fire and Rescue Service

Groundwater comes from rain, snow, sleet, and hail that soak into the ground. The water moves down into the ground because of gravity, passing between particles of soil, sand, gravel, or rock until it reaches a depth where the ground is filled, or saturated, with water. The area that is filled with water is called the saturated zone and the top of this zone is called the water table.

Incidents that threaten the water environment

The FRS deals with a variety of emergency incidents where there's a risk of polluting the water environment. The highest priority in these situations will always be public and crew safety but protecting public and private drinking water supplies and the environment should still be a high priority to Incident commanders and crews.

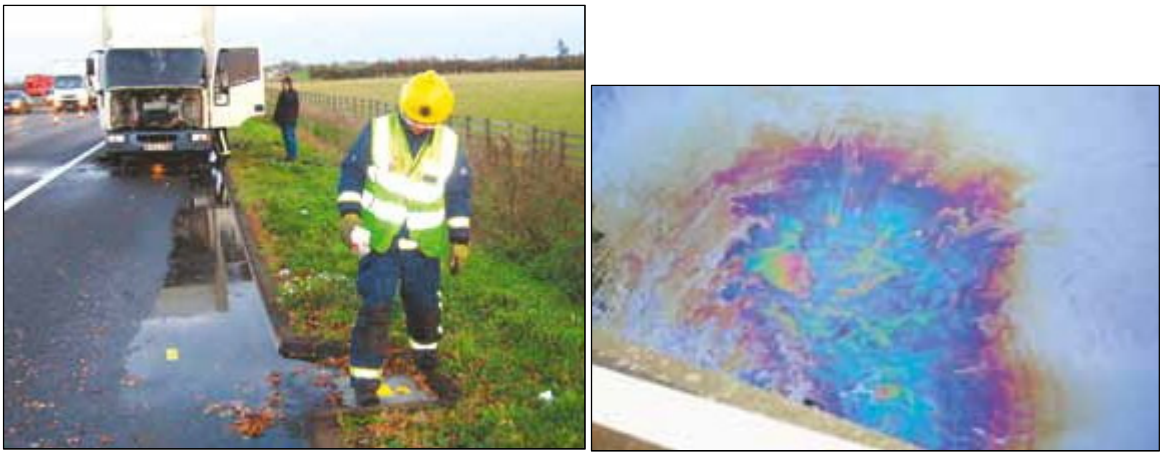
Where fire extinguishments or precautionary actions such as applying a foam blanket to reduce vapour emission are taken, it may be the FRS actions that are either causing the pollution or contributing to its severity. In these circumstances, UK environmental law requires us to take mitigating actions (see Section 1.4, Environmental law). Where the risk to the environment is high, Incident commanders may decide on a course of action to reduce or eliminate environmental impact completely. Guidance on operational tactics designed to protect the water environment is in Section 3.2.

The range of potentially polluting incident types is summarised in Table 1.5.

Spillages of oils and fuels are the most common source of water pollution in the UK (15 per cent of the total). Many of these are as a result of road traffic collisions (RTCs). In 2011, 22,783 serious or fatal RTCs (source www.dft.gov.uk) were recorded. Although each incident alone will not normally constitute a serious pollution incident – even though a spilt lorry fuel tank could be enough to close a public water intake – the sum total of such spillages in the UK from RTCs over twelve months is substantial. So every time FRS crews prevent a pollutant entering into the environment, they reduce the overall impact (see Figure 1.13).

The FRS attends around 250,000 fires each year and in England and Wales alone there are around 4,000 hazmat incidents and 10,000 incidents classified as spills and leaks (source www.gov.uk), many of which present potential and actual pollution to attending FRS crews. This risk requires a common approach to environmental protection if we are to meet the aims of the EC Treaty, Article 6, to promote sustainable development (EC 1992).

Figure 1.13



Leaking oil is contained on a roadway by a firefighter using a clay drain mat following a vehicle fire. But a small quantity of oil has entered a nearby river at the outfall from the road, causing a typical iridescence; half a litre of oil can cover an area of water equal to a football pitch.

Table 1.5 FRS incident types with the potential to pollute the water environment

Incident type	Effect
Fires	Fires involving buildings, vessels, plant or materials, where firewater, contaminated with products of combustion and materials stored on site and if used, firefighting agents (such as firefighting foam) that can flow from the fire scene into drainage systems, surface or groundwater
Road Traffic Collisions (RTCs)	RTCs, where the contents of vehicle fuel tanks, engine block, cooling system, braking system, steering system, suspension system and/or pollutants being transported in tanks and other storage vessels may be released following a moderate to

Incident type	Effect
	serious collision
Hazmat	Incidents involving hazmats classified by the UN in the current *United Nations (UN) Recommendations on the Transport of Dangerous Goods,* known as the 'Orange Book', where toxic or harmful matter can flow into water
Eco-toxic	Incidents involving the spillage of eco-toxic materials such as inks, dyes, detergents that are not classified by the UN as hazardous
Organic	Incidents involving the spillage of organic matter such as milk, beer, blood, sewage that enters the water environment
Inorganic	Incidents involving inorganic matter such as silt, cement, sand that enters the water environment

1.3 The environment agencies

Responsibility for protecting the environment in the UK rests with a number of different organisations at central and local government levels. The most significant of these are the four UK environment agencies: the Environment Agency in England, Natural Resources Wales (NRW), the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA).

These are referred to as 'environment agencies' throughout this document unless specific issues relate to individual organisations.

The three UK environment agencies in England, Scotland and Northern Ireland were formed in April 1996 as a result of the Environment Act 1995. They have similar duties, powers and responsibilities to protect and improve the environment, although there are some differences between the areas of the UK on flood risk management works, radiation licensing, fisheries, waste regulation, discharges of pollution from industry and water quality.

In April 2013, Natural Resources Wales (NRW) – a new body formed by the Welsh Government – took over the responsibility for environmental matters and the functions previously carried out by the Environment Agency in Wales, alongside those of the Forestry Commission Wales and the Countryside Council for Wales.

1.3.1 Water resources – quantity

For water resources (quantity), the environment agencies are responsible for the conservation, redistribution and augmentation of surface and groundwater supplies. They have powers to encourage water conservation and to promote transfer schemes. They aim to balance the needs of water users and the environment by issuing licences for water abstraction from rivers and groundwater (see Figure 1.14).

Figure 1.14

A typical water abstraction point on an inland waterway. Environment agencies are responsible for issuing permits or licences for abstraction from rivers and groundwater.

1.3.2 Flood risk management

In England the Environment Agency, in Wales Natural Resources Wales, and in Northern Ireland the Rivers Agency, Department of Agriculture are responsible for protecting people and the built environment from flooding by providing effective defence. This includes flood warning, operating and maintaining river structures and promoting works that are sustainable and work with nature. In Scotland, SEPA provides the flood warning service and advice while local authorities are responsible for providing flood defence (see Figure 1.15).

1.3.3 Fisheries, recreation and conservation

In England the Environment Agency, in Wales Natural Resources Wales, in Scotland the Scottish Executive and in Northern Ireland the Department of Culture, Arts and Leisure (Inland Fisheries) are responsible for maintaining and improving fisheries, both game and coarse. They do this by licensing, regulation, enforcement schemes, improvements to fisheries and habitat, fish stocking and by advising fisheries owners. The environment agencies also have a general duty to promote the recreational use of water and land. In fulfilling these functions, there is a requirement to contribute to the conservation of nature, landscape and archaeological heritage.

Figure 1.15

Photo courtesy of Cumbria Fire and Rescue Service

The FRS works with the environment agencies during planning or responding to flooding incidents.

Figure 1.16

Angling is a popular activity that the environment agencies support and improve

1.3.4 Pollution prevention and legal controls

The environment agencies' pollution control function and regulation have various facets.

Waste

The agencies are responsible for:

- Setting consistent standards for waste management practice to regulate the treatment, storage and movement of controlled waste, for example, by permitting landfill sites (see Figure 1.17)
- Registering and monitoring those who produce waste, imposing obligations to re-use, recover or recycle products and materials
- Regulating the management and remediation of contaminated land designated as special sites

The agencies aren't responsible for collecting or disposing waste and will only act to do so when all other routes have been exhausted or in an emergency where people and/or the environment are at risk (see also Section 3.10, Hazardous waste).

Figure 1.17

Environment agencies are responsible for regulating waste in the UK.

Industrial sites

The Environment Agency regulates industrial sites prescribed as 'Part A (A (1)) Process' in England as does NRW in Wales under the Environmental Permitting (England and Wales) (Amendment) Regulations 2013. These regulations transpose the requirements of the Industrial Emissions Directive (IED). More information on the IED is on the Environment Agency's website (www.environment-agency.gov.uk)

SEPA regulates the process industry in Scotland through the Pollution Prevention and Control (Scotland) Regulations 2012 (PPC 2012) as does NIAE in Northern Ireland through the Pollution Prevention and Control (Industrial Emissions) Regulations (Northern Ireland) 2012 (PPC(IE)) Regulations.

Any new installation in the UK requiring a permit must comply with the IED; existing installations have had to comply with the IED from 7 January 2014.

These sites are the most polluting or technologically complex industrial processes, for example large power stations and chemical complexes and their regulation covers any discharge made to land, air

or water, as well as other environmental considerations such as waste. The environment agencies also advise the government and local authorities on air quality. In Scotland and Northern Ireland the environment agencies also regulate Part B processes. These are normally smaller sites and are mainly concerned with emissions to air. In England and Wales, local authorities undertake this role.

Smoke from fires

The environment agencies aren't responsible for the effects of smoke within the environment from a fire or fire training; this duty rests with environmental health departments in local authorities.

The environment agencies seek to minimise the likelihood of a fire at sites they regulate by setting conditions relating to accidents as part of the operator's permit. This could include, for instance fire prevention measures such as sprinklers. If a fire occurs, they may also be able to provide the FRS and other responders with details of products and processes at the site and their likely environmental impact.

If there's a major air pollution incident, the relevant environment agency will work with public health officials, the Meteorological Office, the Health and Safety laboratories and the Food Standards Agency to coordinate the provision of air quality data to public health officials and Gold Command. This information will help the emergency services take the appropriate intervention measures and provide meaningful messages to the public via the media (see also Section 3.8, Air Quality). Each FRS should contact its local environment agency office for more details.

Radioactive substances

The environment agencies are responsible for regulating the disposal and accumulation of radioactive waste, including that from nuclear licensed sites. They also regulate the keeping and use of radioactive materials, except on nuclear licensed sites.

Water quality and pollution control

The agencies are responsible for preventing and controlling pollution in all inland waters, including dry ditches which may contain water in wet conditions, estuaries and coastal waters to three miles. They do this by regulating discharges, monitoring, undertaking water quality pollution prevention initiatives and responding to incidents. The environment agencies and FRS partnerships in the UK form a key element in the strategy to control pollution and maintain and improve water quality.

1.3.5 Role of local authorities

The agencies don't cover all aspects of environmental legislation and services to the public. Local authorities are responsible for most complaints associated with noise, litter, domestic/small scale fly-tipping (see Figure 1.18), odour excluding sites permitted/licensed by environment agencies and air pollution arising from vehicles, household areas, small business and industries. They also have responsibility for planning, environmental health and work on contaminated land with the agencies. The environment agencies have responsibility for noise, odour and air pollution from the larger and/or more complex industrial sites and processes they regulate (see Section 1.3.4).

Figure 1.18

Local authorities and the land owner have responsibility for dealing with fly-tipped materials but the environment agencies should be notified of incidents involving fly-tipping if there's a risk of pollution and/or criminal activity is suspected

1.4 Environmental law

1.4.1 Legal background

At incidents involving potential pollution, Incident commanders must be aware of the legal implications of FRS actions, the duties that environmental legislation places on them and the defences available; the FRS could be prosecuted and/or be liable for clean-up costs if it can be proved they have caused or permitted pollution.

Table 1.6 summarises environmental legislation relevant to the FRS at operational incidents. FRS managers also need to consider environmental legislation when:

- Polluting materials are stored or used at FRS premises. This includes waste (see Section 3.10, Hazardous waste) and the use of firefighting foam during training (see Section 3.9, Firefighting foam)
- Developing operational risk information plans (see Section 2.2, Pollution intervention planning
- Undertaking fire safety audits of sites regulated by EAs (see Section 2.9, High risk open air storage sites

Although the amount of UK environmental legislation is substantial, much of it is not relevant to FRS incident commanders and ; they need only familiarise themselves with the general requirements of four areas of environmental law:

- Water quality – surface and ground waters, including, including coastal waters
- Sewerage systems
- Land and soil
- Waste legislation and in particular hazardous waste

Table 1.6 Key environmental legislation for the FRS

Area of Control	Country	Title of Statutory Instrument
Surface, ground and coastal waters and certain territorial	England and Wales	The Environmental Permitting (England and Wales)

waters– three miles		Regulations 2010
	Northern Ireland	The Water (Northern Ireland) Order 1999
	Scotland	The Water Environment (controlled Activities) (Scotland) Regulations 2011 (as amended)
Sewerage systems	England and Wales	The Water Industry Act 1999
	Northern Ireland	The Waste and Sewerage Services (NI) Order 2006
	Scotland	The Sewerage (Scotland) Act 1968 (as amended)
Groundwater and land/soil	England and Wales	The Environmental Permitting (England and Wales) Regulations 2010
	Northern Ireland	The Groundwater Regulations (Northern Ireland) 2009
	Scotland	The Water Environment (Controlled Activities) (Scotland) Regulations 2011
Hazardous Waste (see Section 3.10)	England and Wales	The Hazardous Waste Regulations 2005 (as amended
	Northern Ireland	The Hazardous Waste Regulations 2005 (as amended)
	Scotland	The Special Waste Amendment (Scotland) Regulations 2004
Environmental damage	England and Wales	Environmental Damage (Prevention and Remediation) Regulations 2009
	Northern Ireland	Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009
	Scotland	Environmental Liability (Scotland) Regulations 2009

This relevant environmental legislation helps us comply with European Directives and/or meet national and EU water quality standards. All have the aim of protecting or improving the environment by preventing or controlling pressures on the environment. Much of the legislation either directly or indirectly also aims to protect public safety, for example by protecting people from the effects of hazardous wastes or safeguarding public drinking water supplies.

1.4.2 Surface water protection

For England and Wales, the principal water pollution offences are contained in the Environmental Permitting (England and Wales) Regulations 2010 (EPR 2010):

Regulations 38(1).makes it an offence to cause or knowingly permit a water discharge activity or groundwater activity unless complying with an environmental permit or exemption. Things that count as water discharge activities are listed in Schedule 21. They include:

- Discharging poisonous, noxious or polluting matter or solid waste matter into inland freshwater, coastal waters and relevant territorial waters
- Discharging trade or sewage effluent into inland freshwater, coastal waters and relevant territorial waters
- Cutting or uprooting substantial amounts of vegetation in any inland freshwaters, without taking reasonable steps to remove it

'Causing' must involve some active operation or the failure to take action, for example maintenance. There's no need to show that a person or organisation knew about the activity or intended it. If pollution is due to a chain of events, a person may be regarded as having caused it even if someone else's actions immediately triggered the pollution.

Knowingly permitting' involves a failure to prevent the pollution, which must be accompanied by knowledge and includes cases where a person or company is aware of a polluting incident but refuses to take steps to stop the pollution. For example, an incident commander would be in contravention of Regulation 38(1) of the EPR 2010 if they allowed polluted firewater run-off to enter a watercourse without taking any action to prevent it and without notifying the Environment Agency.

In Scotland, SEPA regulates pressures on the water environment via a system of permitting and enforcement under the Water Environment (Controlled Activities) (Scotland) Regulations 2011(as amended) (CAR). Since 1 April 2006 it has been an offence to undertake the following activities without a CAR authorisation:

- Any activity liable to cause pollution of the water environment, including discharges of polluting matter and disposal of waste sheep dip and waste pesticides
- Abstraction of water from the water environment
- Construction, alteration or operation of impounding works (e.g. Dams and weirs) in surface water or wetlands
- Carrying out building or engineering works:
- (a) in inland water (other than groundwater) or wetlands; or
- (b) in the vicinity of inland water or wetlands and having or likely to have a significant adverse effect on the water environment;
- Artificial recharge or augmentation of groundwater
- The direct or indirect discharge, and any activity likely to cause a direct or indirect discharge, into groundwater of any hazardous substance or other pollutant
- Any other activity which directly or indirectly has or is likely to have a significant adverse impact on the water environment. .

In Northern Ireland The Water (Northern Ireland) Order 1999 covers the pollution of water in Northern Ireland. The main differences are that in Article 7(1) underground strata are included, and impeding the proper flow of water in a manner likely to cause pollution is also an offence. Available defences are set out in Articles 7A and 7B.

1.4.3 Protection of groundwater

The EPR Regulations 2010 also cover the protection of groundwater. Under the regulations, 'groundwater activities' relate to inputs of pollutants to groundwater. The regulations also replace the Groundwater Regulations 2009.

Discharges to ground/groundwater are called a groundwater activity. The term 'groundwater activity' covers:

- The discharge of a pollutant that results in, or might lead to, a direct or indirect input to groundwater
- Any other discharge that might lead to a direct or indirect input of a pollutant to groundwater
- An activity in respect of which a notice under Schedule 22 has taken effect
- An activity that might lead to a discharge mentioned above where that activity is carried on as part of the operation of a regulated facility of another class

It's an offence to cause or knowingly permit a groundwater activity unless authorised by a permit or registered as exempt.

Within the scope of the Regulations, groundwater means 'all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil'(see section 1.2.5).

In Scotland the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) are intended to control or prevent polluting discharges to groundwater. The definition of groundwater is the same as above, but the pollution definition and offences are different.

In Northern Ireland the Groundwater Regulations (Northern Ireland) 2009 legislates on the discharge of hazardous substances and non-hazardous pollutants to the environment. Article 19 details the offences.

1.4.4 Defences

Regulation 40 of the EPR 2010 provides a defence if FRS actions cause pollution. This is based on three criteria, all of which must be in place for the defence to succeed; they are if:

- The discharge was made in an emergency to avoid danger to human health
- The person takes all steps as were reasonably practicable for minimising pollution
- Particulars of the acts were furnished to the regulator as soon as reasonably practicable after the pollution occurred

Due to the partnership initiatives and protocols that have developed between the FRS and the Environment Agency, the FRS should - if they have fully implemented them - be able to demonstrate that they've taken many of the practicable steps required in advance. They should, for example, be equipped, trained and have plans in place which ensure that they have already gone some way to mitigating pollution events before they happen, without compromising (and indeed in many cases supporting) the FRS's duty to protect people. Examples of these initiatives include:

- Joint training of firefighters and environment officers locally and at the Fire Service College (FSC)
- Development of local working agreements, based on the framework set out in the National Protocol between the Environment Agency and the Local Government Association (on behalf of local authorities)
- Provision of pollution control equipment including grab packs for all pumping appliances/HVPs and larger scale pollution control equipment for FRS Environmental Protection Units
- Development of an environment section within operational risk information plans
- Implementing the guidance contained within this national operational guidance

In Scotland, defences to principal offences are detailed in Regulation 48 of the Water Environment (Controlled Activities) (Scotland) Regulations 2011(as amended). There is a defence where the contravention is a result of:

(a)

(i) an accident which could not reasonably have been foreseen; or

(ii) natural causes or force majeure which are exceptional and could not reasonably have been foreseen; and

(b)

(i) all practicable steps are taken to prevent deterioration of the water environment;

(ii) all practicable steps are taken as soon as is reasonably practicable to restore the water environment to its condition prior to the contravention; and

(iii) particulars of the contravention are furnished to SEPA as soon as practicable after it occurs.'

In Northern Ireland, defences are detailed in Article 7A (Exceptions) and 7B (Discharges into and from Public Sewers) of the Water (NI) Order 1999. Article 7A specifically states:

'A person shall not be guilty of an offence under Article 7(1), (2) or (6) in respect of the discharge or deposit of any effluent or other matter if:

a) The discharge or deposit is made in an emergency in order to avoid danger to life or health;
b) That person takes all such steps as are reasonably practicable in the circumstances for minimising the extent of the discharge or deposit and of its polluting effects; and
c) Particulars of the discharge or deposit are furnished to the Department as soon as reasonably practicable after it occurs'

1.4.5 Penalties

Regulation 39 of the EPR 2010 covers the penalties; a person guilty of an offence under Regulation 38(1) is liable:

- On summary conviction in a Magistrates Court to a fine of up to £50,000 and/or a maximum of twelve months' imprisonment
- On conviction on indictment in a Crown Court to an unlimited fine and/or a maximum of five years' imprisonment

In Scotland, the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) states that a person guilty of an offence under Regulation 44 is liable:

- On summary conviction to a fine not exceeding £40,000 or to imprisonment for a term not exceeding 12 months, or to both; and in the case of a continuing offence, to a further fine not exceeding £250 for every day during which the offence is continued after conviction
- On conviction on indictment to a fine or to imprisonment for a term not exceeding five years, or to both; and in the case of a continuing offence to a further fine not exceeding £1,000 for every day during which the offence is continued after conviction.

In Northern Ireland, Article 7 of the Water (NI) Order 1999 states that a person guilty of an offence under Article 7 shall be liable:

- On summary conviction, to imprisonment for a term not exceeding three months or to a fine not exceeding £20,000 or to both.
- On conviction on indictment, to imprisonment for a term not exceeding two years or to a fine or to both

1.4.6 Environmental Damage Regulations (EDR) 2009

The Environmental Damage (Prevention and Remediation) Regulations (EDR) 2009 came into force on 1st March 2009. They're based on the 'polluter pays principle' so those responsible prevent and remedy environmental damage rather than the taxpayer paying.

Environmental damage refers to:

- Adverse effects on the integrity of a Site of Special Scientific Interest (SSSI) or on the conservation status of species and habitats protected by EU legislation outside SSSIs
- Adverse effects on surface water or groundwater consistent with a deterioration in the water's status under the Water Framework Directive; this refers to serious damage only, not short term effects
- Contamination of land by substances, preparations, organisms or micro-organisms that results in a significant risk of adverse effects on human health

There's also liability where an operator has intended to cause damage or has been negligent but only for damage to SSSIs or EU species or habitats.

Operators must:

- Take steps to prevent damage or further damage and notify the authority.
- Provide information and undertake preventative and remedial measures as required by the authority
- Submit proposals for remediation
- Pay costs claimed by the authority in relation to 'environmental damage'

Interested parties may notify authorities of imminent threat or damage with supporting information.

The EDR 2009 applies to 'activities' engaged upon by any 'operator' whether they be a public body or private company and whether these activities are carried out for profit or not and as such apply equally to all FRS operations.

Three exemptions to the EDR 2009 exist, these being damage caused by:

- Acts of terrorism
- Exceptional natural phenomena if the operator took all reasonable precautions to prevent them**.**
- Activities which have the sole purpose of protecting against natural disasters, and activities which have the main purpose of serving national defence or international security

Authorities must:

- Establish whether damage is ‘environmental damage’ and identify a responsible operator
- Serve a remediation notice taking account of any measures proposed by the operator
- Take steps to prevent or remedy damage
- Require information or action from operators

1.4.7 Actions for the FRS

To comply with the regulations, the FRS must:

1. Take all practicable steps to prevent environmental damage as a result of its activities - where there is an imminent threat of damage occurring (Regulation 13) or where some damage has already occurred and there is a threat of further damage (Regulation 14)
2. Notify all relevant details to the enforcing authority - regulations 10 and 11 specify different enforcing authorities, according to the type of activity and damage (see section 1.4.10). Operators must report threats of damage or actual damage to the authority that appears to be the appropriate one

Failure to comply with the above duties is an offence.

The Environment Agency will expect the FRS to take action to mitigate the impact of any of its activities that may cause or contribute to environmental damage; this could include blocking drains and/or modifying fire fighting activities providing it doesn’t compromise public safety.

The FRS must remediate where environmental damage has been caused. If FRS activities cause environmental damage and the regulations apply, the enforcing authority has a duty to serve a notification of liability. If this happens, the FRS would be asked to submit proposals for remediating the damage. The enforcing authority would consider the proposals, consult members of the public if relevant, and would then serve a remediation notice, detailing the measures that FRS would have to take within a specified timescale. This means;

- For water and biodiversity damage, the regulations set high thresholds so remediation under the regulations will only be required in the most serious cases. But thresholds for land damage are lower so incidents of land contamination may be covered.
- If environmental damage does occur, the FRS may itself be liable on the basis that its own activity caused the damage; but, depending on the circumstances, the case may be viewed as the activity of the site/vehicle owner whose property caught fire. Enforcing authorities may serve the notification of liability on any person they consider to be legally liable.
- Although the enforcing body has a duty to serve a liability notice, it also has the power to withdraw the notice if it is satisfied that the notice should not have been served, or an appeal is likely to succeed.

1.4.8 Defences

There are no defences to the duty to prevent environmental damage but there are some defences to a notification of liability to remediate damage which include:

- The emission or event was authorised and in accordance with a permit.
- The damage was the result of an act of a third party.
- The damage was caused as a result of compliance with an instruction given by a public authority.

Requirements for remediation consist of:

- If damage is caused to water or biodiversity, the remediation objective is to return the environment to the condition it was in before the incident. If it's not possible to restore the damaged resources themselves, complementary remediation has to be carried out, usually at another site. Compensatory remediation is also required. This is additional remediation to compensate for the time it has taken to fully achieve the remediation objective.
- If land damage is caused, the land needs to be returned to a state where it no longer poses a significant risk to human health.

1.4.9 Implications of defences

Compliance with permit: If environmental damage is caused by a permitted or consented activity, the FRS would have a defence if it were not at fault or negligent and if the event or emission was expressly authorised in the permit.

Damage caused by third party: If damage is caused by a third party on FRS premises – for example premises storing oil – the FRS would not be liable if it had taken proper measures to secure the site and prevent pollution.

Instruction from a public authority: An operator can't take advantage of this defence if the instruction is to do with the very event that caused the damage in the first place. So, for example, if there's a leak from equipment on an operator's premises and the operator follows instructions from a public authority to control the discharge, the operator will not be able to hide behind that instruction and avoid liability. It follows that the FRS would not *necessarily* have a defence just because the Environment Agency asked it to undertake an action, such as pumping firewater to a foul sewer and damage to a sewage treatment works (STW) resulted. Each case would need to be taken on its merits.

1.4.10 Who enforces the regulations?

The allocation of enforcing authorities under the regulations is set out in Regulations 10 and 11 as follows:

1. The Environment Agency is responsible for:
    a. all types of environmental damage (water, biodiversity and land) from activities it authorises under the Environmental Permitting Regulations 2010 (EPR)
    b. all water damage
    c. biodiversity damage in inland waters
    d. biodiversity damage in the sea caused by activities it authorises
2. Local authorities are mainly responsible for land damage
3. Natural England/Natural Resources Wales are mainly responsible for biodiversity damage, on land
4. The Secretary of State or Welsh Ministers are mainly responsible for biodiversity damage in the sea

Similar arrangements exist in Scotland under the Environmental Liability (Scotland) Regulations 2009 and in Northern Ireland under the Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009 (see the SEPA website – www.sepa.org.uk and NIEA website – www.doeni.gov.uk for further information).

1.4.11 Implications of allocation of enforcing authorities

Ongoing support for the partnership work between the FRS and environment agencies at a local and national level should ensure that the FRS units and the environment agencies work together to implement the regulations.

The FRS should discuss with other regulators at a national and local level its particular requirements on reporting and other aspects of the regulations to base those requirements around the procedures and initiatives already agreed between the FRS and the environment agencies. The agencies will endeavour to support the FRS in these discussions.

1.4.12 Protecting sewerage and drainage

It's an offence to discharge polluting material into a sewer without a consent (see Section 1.6). This is because polluting material can:

- Affect the sewage treatment process at a STW resulting in partially treated or untreated sewage entering the water environment
- Pass through a STW unaltered and enter the water environment

Sewage undertakers must therefore be:

- Informed of all accidental discharges of polluting materials into sewers
- Asked for permission before a deliberate discharge can take place, for instance to divert firewater run-off away from the water environment

In Northern Ireland, and further to the notification protocols set out in the NIEA - NIFRS Memorandum of Understanding, the NIEA will ensure that Northern Ireland Water Ltd is informed about any material that will significantly affect the sewerage infrastructure in the event of any pollutant detailed in Article 168 of the Water and Sewerage Services (NI) Order 2006, being introduced as part of NIFRS actions.

1.5 Relevant FRS law

1.5.1 Fire and Rescue Services Act 2004

Section 7 of the Fire and Rescue Services Act (FRSA 2004) places a statutory duty on a fire and rescue authority (FRA) to plan and in England, Wales and Northern Ireland, Part 2, 11 (2) (b) of the Fire and Rescue Services Act 2004 provides for the *'Fire and Rescue Authority to take any action it considers appropriate – (if) the event or situation is one that causes or is likely to cause harm to the environment (including the life and health of plants and animals)'*.

The Act doesn't place an explicit duty or requirement on the FRS to protect the environment. But each integrated risk management plan (IRMP), also known as a safety improvement plan or risk reduction plan (RRP) (Wales) should demonstrate how an FRS will take account of the built and natural environment in its wider community safety strategy.

Risk planning and the requirement to protect the environment through plans produced by risk assessment allow the FRS to approach its local environment agency contact with evidence to support local pollution prevention initiatives. The requirement to consider the environment within the IRMP, together with the strengthened commitment from the environment agencies, should ensure that the FRS plays a key role in ensuring public safety by protecting the natural environment and public drinking water supplies. More information on risk planning is in Chapter 2.

In Scotland, the Fire (Scotland) Act 2005 places a duty on the Scottish FRS to mitigate the environmental impact of the spillage or release of pollutants.

1.5.2 The Fire and Rescue Services (Emergencies) (England) Order 2007

Article 2 of this order places a duty on the FRS in England to:

- Make provision to remove chemical, biological, radiological, nuclear (and latterly) high-yield explosive – CBRN(E) contaminants from people in the event of an emergency
- Contain any water used for decontamination for a reasonable period of time, and when decontaminating people, a FRS must take reasonable steps to prevent or limit damage to the environment (see Section 1.6.6)

The Fire (Additional Function) (Scotland) Order 2005 places a similar duty on the Scottish FRS as does the Fire and Rescue Services (Emergencies) (Wales) Order 2007 in Wales. The duty is extended to Northern Ireland in the Fire and Rescue Services (Emergencies) Order (Northern Ireland) 2011.

The role of an environment agency officer at a CBRN(E) incident is to support and advise as part of the multi-agency response, including:

- Assessing the environmental risk by helping to identify how materials might disperse and what might be at risk
- Advising on disposal and treatment of wastes
- Advising on temporary storage sites for waste removed to allow for forensic analysis
- Identifying contractors and decontamination locations
- Notifying stakeholders
- Regulation – issuing permits and taking enforcement action where appropriate

During a terrorist-related CBRN (E) incident environment agencies will not normally attend incidents but will provide advice either by phone, or from silver control.

1.5.3 Civil Contingencies Act 2004

The Civil Contingencies Act 2004 and accompanying regulations and non-legislative measures aim to deliver a single framework for civil protection in the UK. Part 1 of the Act defines an emergency as *'an event or situation, which threatens serious damage to human welfare in a place in the UK, the environment of a place in the UK, or war or terrorism which threatens serious damage to the security of the UK'*.

The duties placed on both the FRS and environment agencies by the Civil Contingencies Act 2004 and the associated regulations and guidance include working together in many areas, such as emergency and incident response planning, and sharing information. By implementing aspects of this guidance, the FRS will discharge some of its duties under the Act.

The Act is divided into two parts:

Part 1: local arrangements for civil protection, establishing a statutory framework of roles and responsibilities for local responders – for localised emergencies.

Part 2: emergency powers, establishing a modern framework for the use of special legislative measures that might be necessary to deal with the effects of a more serious emergency – affecting a larger geographical area.

The Act divides emergency responders into Category 1 and 2 responders.

Category 1 responders are those at the core of emergency response and include personnel from the FRS (although not in Northern Ireland), the Maritime and Coastguard Agency and environment agencies (although not in Northern Ireland). Category 1 responders are required to:

- Assess the risks of emergencies occurring and use these to inform contingency planning
- Put in place emergency plans, business continuity management arrangements and arrangements to make information available to the public about civil protection matters
- Maintain arrangements to warn, inform and advise the public in the event of an emergency
- Share information with other responders to enhance coordination
- Cooperate with other local responders to enhance coordination and efficiency
- Provide advice and assistance to businesses and voluntary organisations about business continuity management (local authorities only)

To be deemed an environmental emergency under the Act, the incident must come within the following definitions:

- Contamination of land, water or air with harmful biological, chemical or radiological matter or oil
- Flooding
- Disruption or destruction to plant life or animal life

At an *emergency*, which threatens serious damage to the environment of a place in the UK, the role of the FRS is to:

- Save life – this may include responsibility for mounting rescue and evacuation
- Protect property
- Protect the environment

The environment agencies' role at incidents is covered in Section 3.6, Environment agencies' response to incidents.

Category 2 responders are those bodies who have a role in supporting Category 1 responders in their duties under the Civil Contingencies Act (2004) and include:

- Utilities:
- Electricity
- Gas
- Water and sewerage
- Public communications providers (landlines and mobiles
- Transport:
- Network Rail
- Train Operating Companies (passenger and freight)
- Airports
- Highways Agency
- Government:
- Health and Safety Executive
- Health sector
- Strategic health authority

1.5.4 Clean-up and waste disposal after an incident

The environment agencies will look to the landowner, site operator or polluter to clean up a site, watercourse or groundwater following an environmental incident. They will advice, wherever possible, on suitable contractors and appropriate disposal routes for any wastes generated during the incident (see Section 3.10, Hazardous waste).

Where the built or natural environment is contaminated following a pollution incident, the Government Decontamination Service can be contacted for advice on clean-up protocols.

The UK Government Decontamination Service provides advice, guidance, management support and contractual arrangements to support those responsible for decontamination of the built and natural environment (www.gds.org.uk).

1.6 Drainage and sewerage systems

During emergency incidents involving fire or spillages, contaminated firewater run-off or polluting materials including hazmats may enter drains and drainage systems. These systems will then transport the polluting materials into streams, rivers, lakes, lochs or groundwaters, or to sewage treatment works (STW) or waste water treatment systems.

Some industrial sites will have their own waste water treatment system.

To facilitate emergency pollution prevention and control strategies, FRS personnel need to have information about the direction and destination of drainage systems both at the planning stage and during incidents. The direct or indirect pollution of the water environment will result from allowing pollution unchecked into drainage systems (see Figure 1.19). The following information is designed to provide a basic understanding of how these systems operate and their vulnerability to polluting material.

Figure 1.19

An example of a pollutant that has travelled through a drainage system to discharge into a nearby river.

1.6.1 Sewerage systems

Sewage is the waste water carried in sewers to the STW. Sewerage is the network of pipes and sewers which carries the sewage to the STW. The FRS can use sewerage systems at incidents either to contain polluting material, including firewater run-off, or to divert the material to a holding facility such as a storm tank or balancing pond until it can be safely removed. Caution should be exercised when considering using foul sewers to contain polluting material as they may have storm water overflows built in; blocking the foul system could cause a direct discharge via these overflows to a watercourse. Where practicable, permission to discharge polluting materials into sewers must be obtained from sewerage undertakers before the discharge takes place. Where polluting material has, either before the arrival of the FRS or during FRS intervention, unintentionally entered the sewerage system, sewerage undertakers must be informed.

There are three main types of sewer as detailed in Table 1.7.

Table 1.7 Types and functions of sewers

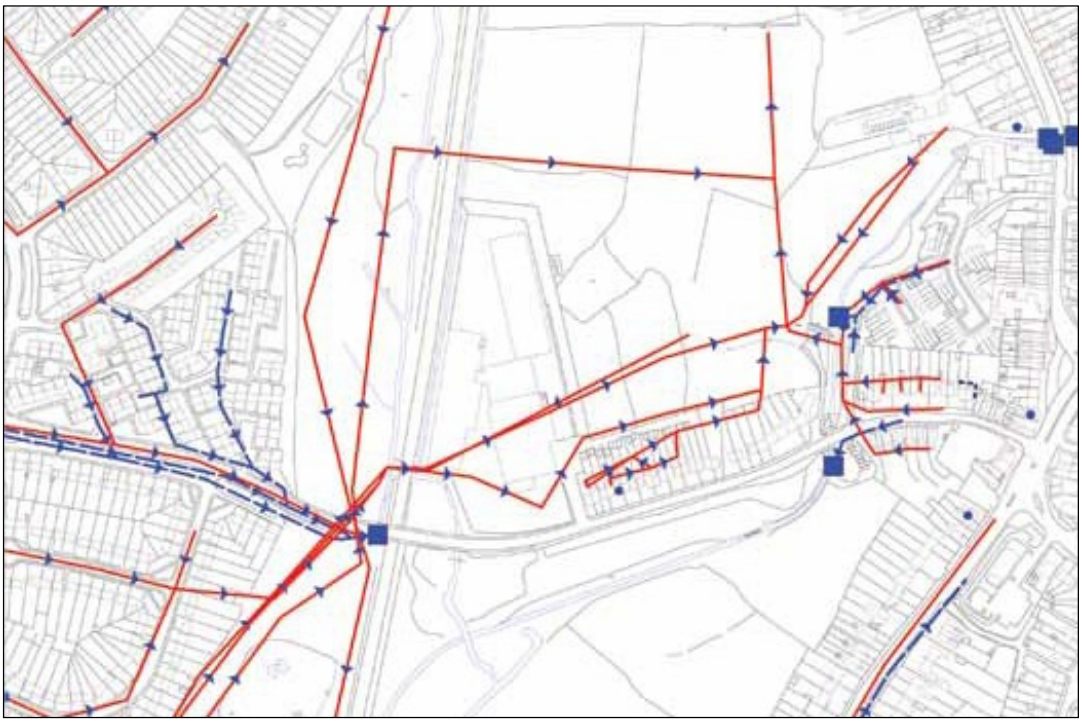
Sewer Type	Function
Surface Water	Transports rainwater direct to the nearest river, lake or sewers groundwater.
Foul Sewers	Transport sewage to a STW.
Combined sewers	Transport both sewage and rainwater to the STW. (found in urban areas) During Storms they may overflow watercourses.

If contaminated water or other polluting material enters a drainage system, locate a drainage plan as soon as possible to identify the type and destination of the system. FRS crews' own local knowledge can be useful. Also, geographical information systems (GIS) drainage maps for surface and foul systems may be available from sewerage undertakers, environment agencies, site occupiers or highway authorities (see Figure 1.20). Such plans can be installed into fire control or in-cab Mobile Data Terminals. Section 2.3.5 has more information on drainage plans for use during the planning process. Ideally drainage plans should be made available to personnel at the scene of a pollution event to help decisions on appropriate intervention points and tactics.

Table 1.8 Recommended colour-coding of access chamber covers

Colour of drain cover	Type of sewer
Blue	Surface water sewer
Red	Foul sewer

Figure 1.20



Picture courtesy of Severn Trent Water

A typical drainage plan showing the location and direction of surface and foul water sewerage systems.

Some drainage systems include pollution control devices, such as oil separators, drain shut-off valves, penstocks (see Figure 1.21), storage lagoons and balancing ponds (see Figure 1.22). With permission and planning, the FRS can use such devices to prevent pollution to surface and groundwater and to protect STW. To allow emergency responders to rapidly identify drainage systems, environment agencies encourage operators to colour-code access chamber covers on their premises (see Figure 1.23). The recommended colour-coding is shown in Table 1.8.

Figure 1.21

Photo courtesy of Carillion-URS

Sluice valves can be used to control the flow of water within drainage systems

Figure 1.22

Photo courtesy of Carillion-URS

Emergency responders can use storage lagoons or balancing ponds which are open water ponds with controlled outlets to contain pollutants until arrangements can be made for collection and disposal. Such facilities can be 'closed off' using penstocks or drain blockers

Figure 1.23

Drain covers and grills at industrial or commercial premises may be marked with colours, for example red for foul and blue for surface. Other sites may have other types of pipe work, for example radioactive water or oily water.

FRS managers may wish to consider marking drain covers at FRS premises as part of an environmental management system.

1.6.2 Sewage treatment

Most industrial or commercial sites will discharge their sewage to a STW operated by their local sewerage undertaker. But some sites may not be connected to a public foul sewer or they may have additional treatment on site; this might be because of their remote location, the hazardous nature of their activities, the cost of disposal to the public sewer or because of the site's size. In such cases the operator may use one of the methods of liquid waste treatment listed in Table 1.9.

Further details of these systems are in the Environment Agency's *Pollution Prevention Guidance Note PPG4* available at www.environment-agency.gov.uk.

Table 1.9 Sewerage Systems

System	Works by
Cesspool	Sealed tank, no discharge; must be pumped out regularly by tanker.
Septic tank	Solids settle out in tank, liquids discharge to ground; should be emptied regularly.
Private sewage	Small treatment plant with discharge to ground or surface treatment plant water. Treats effluent on site or locally.
Industrial	Treatment on site; usually effluent discharges to the foul.
Treatment works	Sewer but may discharge to surface or groundwater.

1.6.3 The sewage treatment process

Sewage from industrial and domestic premises is normally discharged via foul or combined sewer systems to a sewage treatment works (STW). Once at the facility, the sewage is passed through physical, biological and sometimes chemical treatment processes which remove contaminants. The treated sewage or effluent is then discharged either directly or indirectly into the water environment.

Although they are designed to remove pollutants, if the concentration of a pollutant in water entering a STW is too high, it can impair or destroy the biological treatment process. This can result in the pollutant and/or untreated sewage entering a receiving surface or groundwater. If the biological process has been destroyed, the discharge of untreated sewage may go on for some time.

Many STW aren't staffed or staffed for only part of the day. If not fitted with warning alarms, it may be some time before anyone notices that a pollutant has affected the operation. So the protection of foul or combined sewer systems by FRS personnel is just as important as the protection of surface water sewers and watercourses.

An understanding of sewerage systems and how STW operate is useful to Incident commanders and Hazardous Materials and Environmental Protection Officers (HMEPOs) (also known as Hazmat Officers)

There are four main stages in the treatment of sewage:

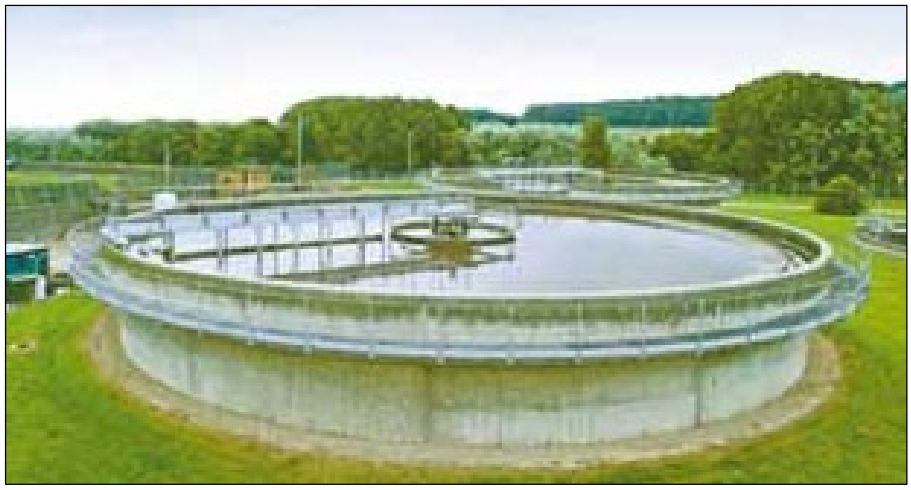
1. Preliminary treatment
2. Primary sedimentation or settlement
3. Secondary or biological treatment
4. Tertiary treatment

Preliminary treatment removes large solids such as rags, which could cause blockages, and sand and grit, which could cause damage due to abrasion. The main processes are screening (with or without maceration) and grit channels, which slow the flow to allow grit and sand to settle out.

Primary sedimentation removes suspended solids by allowing the sewage to remain in the tanks for typically six to eight hours under non-turbulent conditions. The solids, which are denser than the liquid, will settle as sludge towards the bottom of the tank (Figure 1.24).

Secondary or biological treatment processes oxidise the organic matter in the sewage to reduce the biochemical oxygen demand (BOD). This stage relies on the activities of micro-organisms, mainly bacteria, to break the sewage down into carbon dioxide and water using oxygen.

Figure 1.24



A sedimentation tank.

The two main types of biological process are activated sludge, in which the micro-organisms (biomass) grow in a freely suspended form, and percolating filtration, in which the micro-organisms grow attached to a solid support such as activated carbon 'trickle beds' (see Figure 1.25). Whichever biological process is used, there must be a method for separating the biomass from the treated effluent. This involves circular secondary sedimentation tanks to allow the biomass to settle out.

Figure 1.25

A biological treatment 'trickle bed'

Tertiary treatment may be necessary at some STW if the quality of effluent required is higher than the traditional 30mg/l suspended solids and 20mg/l BOD and/or specific quality issues need to be addressed. Examples include nutrient stripping of an effluent that discharges into eutrophic water (rich in nutrient) or disinfection of an effluent that discharges into a bathing water.

There are five basic methods of tertiary treatment:

- Prolonged settlement, for example in lagoons
- Irrigation over grassland or reed beds
- Micro-straining
- Filtration through media such as sand and gravel
- UV treatment (to meet bathing water quality standards)

Many STW have storm tanks, which are designed to store excess water and sewage during high rainfall. When the flows drop back to normal after the storm, the stored sewage re-enters the treatment process at a controlled rate. Storm tanks may also be used to store polluting material produced during an emergency.

Permission to intentionally discharge polluting material into foul sewers must be obtained before discharge takes place. The FRS should plan for such activities and set up systems/procedures to request permission to discharge with sewage undertakers. Sufficient time for polluting materials to be diverted to storm tanks must also be provided. Once contained at the STW, pollutants can be removed and taken to a waste treatment facility or 'bled' slowly into the sewage treatment system.

At incidents where hazardous material has entered, or is likely to enter, a sewerage system, the sewerage undertaker must be told immediately. This will allow them to evacuate their own employees or contractors who may be working in a sewer downstream of the incident and to take precautionary action at the STW.

Figure 1.26

Photo courtesy of Severn Trent Water

All sewage works discharge into the water environment. If polluting matter disrupts the sewage treatment process, untreated sewage and the pollutant may enter the water environment and cause pollution.

1.6.4 Discharge permits

Discharges from STW into surface or groundwaters are controlled by discharge permits or licences issued by the environment agencies. It is an offence to allow any poisonous, noxious or polluting

matter or any solid waste matter to enter any surface or groundwater unless the discharge is made in accordance with the conditions of the permit or licence issued by an environment agency.

The environment agencies have a duty to determine an application for a permit or licence, either unconditionally or subject to conditions such as the nature, origin, composition, temperature, volume and rate of discharge. Once a permit or licence is granted, they monitor the discharge to ensure compliance. Any failure to comply with the permit or licence conditions is an offence and may result in legal action.

1.6.5 Oil separators

Oil separators, sometimes referred to as 'interceptors', are installed within drainage systems to protect receiving waters (surface or ground) from pollution by oil or fuel.

Such pollutants may be present due to minor leaks from vehicles and plant, from accidental spillages or due to deliberate and illegal tipping into drains. Oil separators are found on fuel station forecourts, at oil storage facilities, vehicle workshops, or fire stations with fuel dispensing facilities. These units are often identified at ground level by the presence of three inspection covers in line and close to each other (see Figure 1.29), although single chamber models are now the preferred design. They are designed to hold back floating materials such as oils and fuels but to let clean water pass through. Figure 1.27 shows the flow through a three-channel oil separator.

Oil separators will only be effective if they're regularly maintained and emptied. Some installations have an oil level alarm to indicate when emptying is required. Figure 1.28 shows a modern single-chamber separator.

A common misconception associated with oil separators is that they will collect all types of pollutants. This isn't the case; they only collect floating materials such as oil or fuel. Other material that mixes with water or is heavier than water, for example some solvents will pass through the system and enter the foul or surface water system. Also, a separator won't work for dissolved (soluble or emulsified) oils or detergents (e.g. firefighting foam) or if degreasers are present, as in vehicle wash water. Such discharges should be drained to foul sewer, or a sealed tank.

Although standard size oil separators contain fuels and oils in 'daily' spillage conditions, they're unable to separate out these products from large quantities of water that might be found during firewater run-off conditions. In these circumstances, the system may be overcome by the 'shock load' and let the pollution pass through into surface water.

Oil separators at fuel filling stations must be able to retain the contents of one road tanker compartment, around 7,600 litres. Where the risk of rainfall and large spillages occurring at the same time is considered small, a bypass separator may be used. These units are much smaller than conventional full retention separators as they're designed to only treat rainfall up to 5 mm/hr. They're useful where there is a risk of frequent small spillages and/or where the aim is to capture the first flush of polluting material washed off when it starts to rain. When rainfall exceeds this volume or there is a very large spillage, the extra flow will bypass the separator.

Waste oil contained in separators is classified as hazardous waste and should only be disposed of using registered waste carriers and licensed/permitted waste sites.

PPG3 applies to oil separators and can be found at www.environment-agency.gov.uk

Figure 1.27

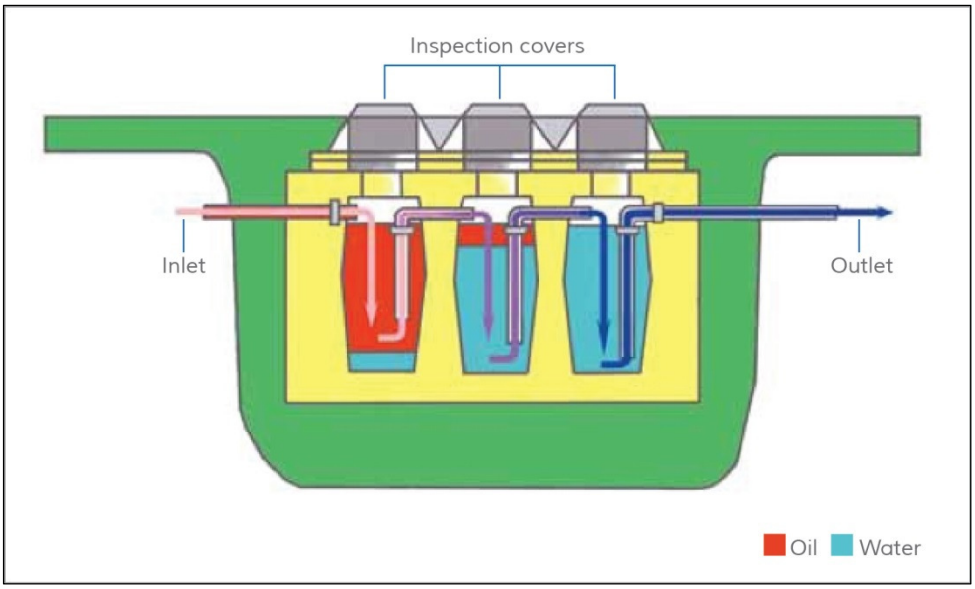
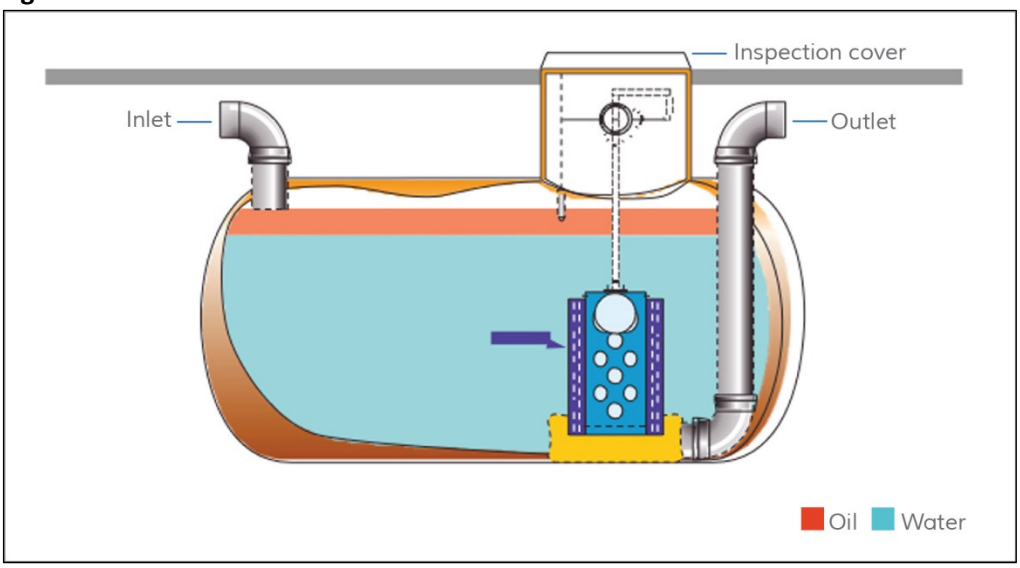


Diagram courtesy of the Fire Service College

The diagram above details an older style three-chamber oil separator and the flow of water and floating material (such as oil or fuel). Commonly these devices discharge to surface or groundwater.

Figure 1.28



A single-chamber oil separator showing oil or fuel floating on top of water.

Figure 1.29

The older style of oil separator can often be identified by three in-line inspection covers. Where these discharge to surface water, they should be colour-coded blue.

1.6.6 Protocol for disposing of contaminated water and associated wastes at incidents

The revised *Protocol for the disposal of contaminated water and associated wastes at incidents* is the outcome of collaborative work undertaken by the Environment Agency, Environment Agency Northern Ireland, Water UK and CFOA in response to the implementation of the Environmental Damage (Prevention and Remediation) Regulations 2009 (EDR 2009) and the Environmental Permitting Regulations 2010 (EPR 2010). The Protocol doesn't apply to Scotland and the Scottish FRS should contact SEPA for advice.

The protocol provides guidance to the FRS and other responders on their liabilities and possible defences for contravention as well as detailing the practical considerations involved in discharging their legal responsibilities under the regulations.

Purpose

The protocol provides guidance for dealing with contaminated water and associated solid wastes arising from washwaters, firewater run-off, spillages and contaminated potable water, which could harm human health, pollute the environment and/or damage the sewage treatment processes. The aim is to achieve this through effective control and co-operation between the:

- Emergency services
- Water industry
- Environment agency, natural resources wales, the Northern Ireland environment agency (collectively known as the environment agencies)
- Local authorities
- All other responders and interested parties

Principles

Unless it results in a significant increase in the potential risk to human health, these principles should be applied:

- Contaminants and contaminated water and associated wastes should be contained either at the scene, for example in a holding tank and/or by blocking drains, or remotely off site for example in a STW storm tank, until they have been properly identified.
- Once identified, a decision can be made on the treatment needed to render the contaminated water harmless for disposal, or following a risk assessment, the most appropriate disposal process. This may include direct discharge to the water environment if it is established that the contained liquid/water isn't polluting or is unlikely to cause pollution.

Section 3.2 details the hierarchy of pollution control.

Scope

The scope of the protocol is to safely manage and control - through containment, treatment and disposal - contaminated water and wastes arising from them, containing substances that are hazardous to human health and the wider environment including CBRN (E) materials.

Contamination that falls within the scope of the protocol may originate from:

- Wash water
- Firewater
- Spillage or release
- Contaminated potable water

Containment and management of wash water

The principles of containment apply to all wash water where this is reasonably practicable. The nature and amount of contaminants need to be identified so that the wash water can be correctly treated before disposal.

In most cases, the ratio of dilution of any chemicals in decontamination wash water will guarantee minimal impact on the sewage treatment process and the environment. The FRS and ambulance service's system of removing a casualty's clothing before washing will also reduce potential impact. But there are a few contaminants which may cause problems even with the recommended rates of dilution.

Discharges of contaminated water to sewer must be at a controlled rate to ensure the capacity of the foul sewer isn't exceeded. Advice should be sought from the sewerage undertaker and environment agency. Failure to do so could lead to the discharge of contaminated water directly into the environment following the operation of combined sewer overflows (CSOs) and/or from surcharging sewers.

Drains should be identified and surface water drains blocked off to contain wash water. The sewerage undertaker and environment agency must be consulted as soon as is practical. If agreed, the wash water should be directed towards the foul sewer or collected for disposal. The sewerage undertaker can advise emergency service personnel on identifying foul and surface water drainage systems.

Irrespective of the urgency of improvised and interim decontamination, the hierarchy of containment should still be applied as soon as operational priorities and resources allow. Environmental protection equipment carried on front line fire appliances and on environmental protection units (EPUs), such as clay drain seals, pipe blockers and portable tanks may be suitable for this (see Section 3.2).

1. Radioactive contaminants can have a long term impact on people, the environment and drainage infrastructure; all reasonably practicable measures should be taken to contain potentially contaminated run-off.
2. There's no legal defence if pollution is caused following the decontamination of responder equipment or body bags under the Environmental Permitting Regulations.

In the absence of any advice, and where the waste can no longer be contained safely, the waste should be directed to a foul sewer rather than surface water drains. The sewerage undertaker must be informed as soon as possible to protect the sewerage network and STW operational personnel.

Disposal of firewater run-off (including foam) and spillages

The principle is to contain firewater run-off or a spillage on site. Where this isn't possible, early contact should be made with the environment agency to identify the best option for minimising the environmental impact. If firewater has already entered the foul sewage network, the sewage operator must be informed so they can assess the risk to the treatment process.

If the environment agency and FRS believe that the foul sewerage system is the best disposal option, they must contact the sewerage undertaker as soon as possible to seek approval to do so, or to warn of contaminants in the sewerage system. The sewerage undertaker must consider the request, taking into account the:

- Polluting substance
- Rate of discharge to the sewer
- Presence of storm water overflows
- Ability of the STW to deal with the pollutant
- Impact on the discharge permit
- Effect of not allowing the discharge

If there's likely to be a delay in doing this, the environment agency or sewage undertaker will advise the FRS on temporary storage options.

Where a request is made to accept contaminated liquid into the sewer, the environment agency must be part of that approval decision. If it's agreed that the best disposal route is through the STW via the foul drainage network or by direct tanker delivery, the environment agency must issue a letter of agreement to the sewerage undertaker.

When a discharge to the foul sewer has been agreed, the environment agency, FRS and sewerage undertaker must continue to liaise throughout the course of the incident until the contaminated firewater has either been treated or stored safely.

Further guidance can be found on the containment, disposal and treatment of contaminated water and associated wastes in the *Protocol for the disposal of contaminated water and associated wastes at incidents,* issued jointly by the Environment Agency, Northern Ireland Environment Agency, Water UK and the Chief Fire Officers' Association and available at the Water UK website (www.water.org.uk).

More guidance on CBRN (E) incidents and firefighter and mass decontamination is in FRS operational guidance: incidents involving hazardous materials, available at the publications section of the www.gov.uk website.

1.6.7 Trade effluent

The Water Industry Act 1991 defines any wastewater produced in the course of a trade or industry carried out at a trade premises as 'trade effluent'; this includes any wastewater derived from a production process and can vary in size from small launderettes to large chemical manufacturing facilities.

The discharge of trade effluent without a consent is an offence. Water companies employ trade effluent officers to protect all assets from trade effluent discharges and maximise trade effluent income. They investigate unsatisfactory or illegal discharges to sewer and impose trade effluent discharge consents. They follow up any breaches of consent conditions which may result in legal proceedings in cases of persistent gross non-compliance. This is to ensure that the receiving wastewater treatment works meets its own permit conditions set by the Environment Agency.

1.7 Motorway and highway drainage

1.7.1 Road drainage

This section describes the types of drainage found on roads in the UK and suggests options for containing polluting material. This, together with local knowledge of the type, location and destination of such systems, will enhance FRS ability to protect the environment from polluting material produced at incidents on roadways. It describes:

- How rainfall falling on roads (the 'run-off') is collected and conveyed
- How and where it is discharged
- What arrangements exist to reduce the risk of pollution

Just as there are many classes of roads, there are many different ways for dealing with the run-off.

Highway authorities

The Highways Agency is responsible for managing motorways and trunk roads in England, Transport Scotland for similar roads in Scotland, and in Wales and Northern Ireland, their respective Assemblies. Some roads are now managed by private companies. Other 'A' roads and minor roads, bridleways and footpaths are managed by local authorities – the highways departments – usually the county councils or unitary authorities.

The highway authorities, both national and local, are exempt from the need to apply for discharge permits/consents for roads draining to surface or groundwaters. But they have a duty to ensure that road run-off doesn't cause pollution. They do this by installing and operating pollution control measures on roads under their control.

Drainage principles

Unlike urban roads, which are almost all kerbed and drained using gullies, rural roads (which include most motorways) can be drained using various methods. The drainage method chosen for a location will vary according to the volume and quality of the run-off, distance from a watercourse, local geological, topographical features and availability of drainage infrastructure in the locality. The three major objectives in draining roads are to:

1. Remove surface water quickly to provide safe roads and minimum nuisance
2. Provide effective drainage to maximise the life of the road
3. Minimise the impact of the run-off on the receiving environment

Types of road drainage

Road drainage is classed as: surface and sub-surface. They're not completely separate, as surface water will infiltrate into road foundations, earthworks or structures through any surface that is not completely impermeable, and will then be removed by the sub-surface drainage.

The drainage objectives can be achieved by either:

- A combined system where surface and sub-surface water are collected in the same pipe
- Separate systems, where the sub-surface water is collected separately using a variant of a sub-surface drain, as described below

There can be three elements in the drainage of a highway:

- Collection
- Treatment/pollution prevention (not always present or effective against all pollutants)
- Discharge

The selection and design of systems will depend on the age and importance of the road, environmental vulnerability, pollution potential and the risk of spillage or flood.

In practice, the network is likely to have a combination of systems.

Incident management

Because it's important that water drains quickly from the road surface, it can be difficult to intercept polluted run-off from an incident before it enters a local watercourse. It's only since the early 1990s that effective pollution prevention measures have been installed in new roads. Their effectiveness depends on the type of pollutant involved, the suitability of the pollution prevention measure installed and how well they've been maintained.

To reduce the impacts on the environment that vehicle related incidents may cause, the Highways Agency (HA) and the Environment Agency have developed a Memorandum of Understanding to clearly define the relationship between the two organisations and promote a partnership approach for dealing with, and preventing, environmental damage.

Where an incident has occurred as a result of a fire or RTC, FRS personnel will often be the first on the scene. If the spill is from a vehicle breakdown or minor accident, FRS personnel may not necessarily have been called. In these situations, the first responders on the scene are more likely to be from the Highways Agency or local authority. If the Highways Agency or local authority traffic officer (HATO) considers they need further assistance, they may summon the FRS.

Although normal HATO units carry limited environmental protection equipment, more specialised equipment is available on Highways Agency Incident Support Units (see figure 1.30). HATOs can help incident commanders manage firewater run-off and pollution control. The HATO will have access to a wider knowledge base of the roads they're responsible for, including drainage plans and the location and operation of pollution control devices. They will also be able to call on extra environmental protection equipment and resources from their own Incident Support Units.

Figure 1.30

Photo courtesy of Carillion-URS

Highways Agency traffic officers deploying pollution control equipment from an Incident Support Unit

Many motorways now have pollution control stations in the area of motorway on-slips (see figures 1.31 and 1.32). These are bin-style pods, coloured green, containing pollution control materials. These stations are kept locked; keys are held by the HATOs and in some cases Environment Agency Officers. The FRS can gain access to them if necessary by cutting off the locks.

Figure 1.31

A pollution control station next to a motorway.

Figure 1.32

The contents of a typical pollution control station.

Contents of a typical pollution control station

- 50 heavy weight universal absorbent pads (oil, coolants, solvents)
- 50 hazmat pads
- 2 x 3m long floating booms
- 10 drain blockers (flat clay pad type)
- 3 x 30 litre bags absorbent granules
- 10 x universal absorbent socks
- 10 x hazmat socks
- 5 absorbent pillows (oil, coolants, solvents)
- 5 hazmat pillows
- 50 large cable ties
- 4 x super size disposal bags
- 10 x black waste bags
- roll of waterproof tape

1.7.2 Disposal arrangements

Discharge to receiving waters

Road run-off will be discharged either to surface waters (rivers, streams, ditches) or to groundwater.

Surface water

After passing through appropriate treatment systems, run-off may be discharged to the nearest suitable surface water. In the case of older roads, the outfall headwall is often the only point to

control the run-off, if the pollutant cannot be contained on the roadway or at gullies or access covers. Locations of outfalls are available from the highway authorities.

Outfalls

Road drainage discharges to watercourses at outfalls (see Figure 1.33). These are located wherever the road crosses a watercourse, such as a river. Outfalls on a road can be closely or widely spaced up to a mile apart. They usually comprise a headwall, if the road drainage is piped, or they may be ditches flowing into a river.

Where it hasn't been possible to control a pollutant on the road, it may be possible to intercept it at the outfall by using a boom or pipe blocker or within the ditch using booms or by damming techniques (see Section 3.2.6).

Figure 1.33

Outfalls from drainage systems may be some distance from the roadway itself. This photograph shows a surface water outfall from a viaduct (background).

Groundwater

Sub-surface run-off will often discharge directly to groundwater via soakaways. These are usually large depressions that fill temporarily with water that soaks into the ground. They may also be vertical drainage pipes.

Any pollution from roads in areas which discharge to groundwater should ideally be intercepted before they reach the soakaway point as once a pollutant has entered groundwater, it's usually impossible or very difficult and costly to remove. Modern roads have some form of pollution control

before the soakaway, but older roads may not. FRS personnel should study drainage plans of the area to identify areas likely to be drained to ground, particularly those roads located above sensitive aquifers, used for drinking water.

1.7.3 Run-off collection systems

Surface run-off collection systems

Surface water run-off from the edges of roads is collected by a variety of systems. These are described below, together with any methods that can be used with them to prevent pollution.

Road gullies (see Figure 1.34) are a familiar and common system of collecting road drainage. They generally discharge to associated longitudinal carrier drains, except on low embankments with ditches where it may prove more economical to discharge gullies direct to the ditches via discrete outfalls.

There are two main types of gully: trapped and untrapped. Trapped gullies contain a sump that collects silt, whereas untrapped gullies allow any debris in the road run-off to flow down the drain. Trapped gullies have to be cleaned out at least once a year. Gullies are usually connected to the main drain by a 150mm connection pipe, which can be anything from half a metre to 15m long depending on the location of the main carrier drain. Gullies can be sealed temporarily using the clay mats in a standard grab pack or inflatable pipe blockers.

When sealing a gully, the liquid mustn't be allowed to flow along the road surface to the next gully unless that too can be sealed.

Figure 1.34

A typical road gully which can be blocked using a clay drain mat or inflatable drain blocker.

Surface water channels

Surface water channels are formed as an extension to the basic pavement width of a highway, and are normally a triangular concrete section, set at the edge of the hard strip or hard shoulder and flush with the road surface. They discharge either to gullies, at about 100m intervals, or occasionally to ditches, by way of drainage chutes. Gullies can be blocked using clay mats, as described above.

Improvised blocking of the channel can also be achieved using polyboom or building a dam with earth and/or sand.

Linear drains

Linear drainage channels are closed conduits into which water drains through slots or gratings. Combined channel and pipe systems are made up of surface water channels having an internal pipe formed within the base of the units. Where there are gratings, it may be possible to block these using the clay mats as described above. Where there's a slotted drain, it may be possible to use a road boom to seal this; or it may only be possible to control the spill at the outfall (see figure 1.35).

Grips

Some minor roads are drained by 'grips', which are shallow channels excavated across verges to allow drainage from the highway to roadside ditches. It may be possible to block the grips using a boom or by constructing a soil dam.

Figure 1.35

Linear drains. Note the access cover in the foreground

Combined kerb and drainage blocks

Combined kerb and drainage blocks are precast concrete units, either in one piece or comprising a top and bottom section. A continuous closed internal channel section is formed when interlocking blocks are laid. The part of a unit projecting above road level looks like a wide kerb and contains a pre-formed hole that admits water into the internal cavity (see Figure 1.36).

These tend to be used where the road has a very shallow gradient, and the road is at risk of flooding. It's not easy to seal them; if a spill occurs near this system and it can't be contained on the roadway or absorbed with sand or other material, identify an access cover or the outfall and intervene there.

Figure 1.36

Combined kerb and drainage blocks allow rapid transportation of pollutants to surface water ditches. An access cover is shown in the foreground.

Combined channel and pipe systems

These are similar to surface water channels, with the addition of a pipe formed within the system. Where they're used in situations that require sub-surface drainage of the pavement, the sub-surface drain will be located between the pavement construction and the channel. These may be blocked using a pipe-blocker and possibly a dam of earth or sand.

Figure 1.37

Over-the-edge drainage allows rainwater and any pollutant to spill from the road into a water trough.

The trough will often have a grille (shown in this photograph) to prevent larger material entering the piped drainage system. This is a point to intervene if it's safe to do so. From the point beyond the grille, a downpipe transports water into a ground level drain that then discharges to nearby surface water.

Over-the-edge drainage

This method of drainage, which applies to embankments or viaducts, simply allows water to spill from the road edge over a continuous front. Intervention at roadside, in the trough (see Figure 1.37) or at the outfall may be suitable.

Separate system or French drains

A separate sub-surface water collection system uses a trench or trenches filled with a high permeability material such as coarse gravel, or with a proprietary drainage system (fin drains) (see Figure 1.38); these are commonly known as French drains. In general the water environment is less likely to be affected by polluting run-off as French drains have some buffering capacity. In an emergency, it's best to intercept at the outfall.

Narrow filter drains

Narrow filter drains are intended for use as edge of pavement sub-surface drains and use a free-draining material compatible with the adjacent soil or construction layer with a pipe wrapped in geo-textile at the base of the trench.

Fin drains

A fin drain is a corrugated plastic sheet with a layer of filter material either side. This is laid in narrow trenches and discharges to a manhole on the surface water collection system.

Carrier drains

If suitable outfalls to ditches aren't available, carrier drains are needed. Carrier pipes are unavoidable in cuttings more than a few hundred metres in length. When discharge into a longitudinal carrier pipe is necessary, access chambers are normally at 100m intervals.

Figure 1.38

French drains are trenches filled with highly permeable material that discharges to a piped system or outfall. As can be seen in this photograph, grills may be incorporated where intervention may be possible. Alternatively, intervention at the outfall is available.

Porous asphalt

Many roads in the UK are surfaced with porous asphalt (see Figure 1.39). This is an open-textured surface that reduces spray from vehicles and can also retain some contaminants. So run-off from roads with this surface may be slightly less polluted than otherwise, but for the purpose of this guidance, it should be considered similar to normal run-off. Porous asphalt surfaces connect to filter drains or similar.

Figure 1.39

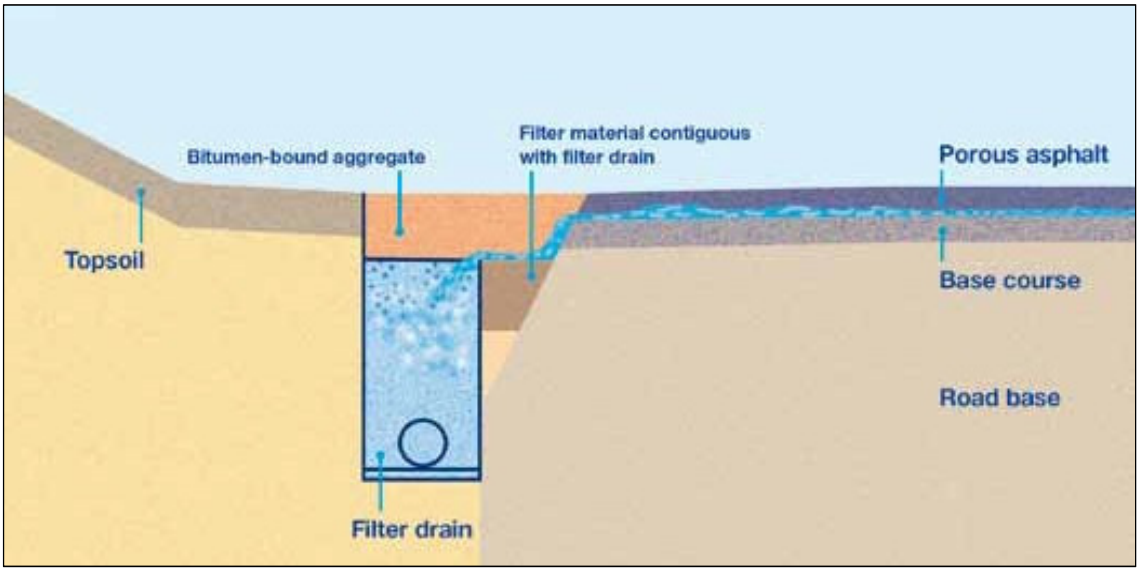


Diagram courtesy of The Highways Agency

Porous asphalt is a drainage system designed to reduce vehicle spray on the carriageway. Water and any polluting liquid drain through the asphalt to a base course below. Here it moves across the carriageway to a filter drain and onward to a discharge point. Where these systems are installed, containment of liquids on the roadway isn't an option and local crews should plan to contain at the outfall.

Table 1.10 Summary of drain types with means of controlling pollution

Drain Type	Means of controlling pollution
Gullies	Clay mat or inflatable drain blocker
Surface water	Clay mats, polyboom, earth channels or sand
Linear drains	Clay mats, polyboom or control at outfall
Combined kerb and drainage	Contain on roadway or intervene at outfall
Combined channel and pipe system	Pipe blocker or dam in system
Over-the-edge drainage	Dam at grate or intervene at outfall
Sub-surface run-off	Prevent entry into system collection system
Separate system (e.g. French drains, narrow filter drains, fin drains	Prevent entry into system, intervene at outfall.
Porous asphalt	Intervene at roadside drain or outfall.

1.7.4 Treatment/pollution prevention systems

Roadside treatment and/or pollution prevention devices include oil separators, sediment traps, filter drains, wetlands and other vegetated systems. These are located between the collection and disposal elements of the drainage system and may be remote from the highway, although they're

usually located within the highway boundary. Except for balancing ponds, these vegetated systems have until recently only been fitted on new road systems however there is now a move to retro fit them on existing roads. . Where they require regular maintenance or access in emergency, they will usually be signed from the highway (see Figure 1.40). Emergency responders can use them as described below.

The types of day-to-day pollution treatment relevant to highway drainage are:

- Sedimentation – the removal of suspended solids
- Separation – the removal of all solids and non-aqueous liquids
- Containment – preventing flow from leaving the system
- Vegetated treatment processes – including filtration, settlement, adsorption, biodegradation and plant uptake, for example reed beds

Sedimentation lagoons and tanks

These structures slow the velocity of flow from the drainage collection system and retain flows for a period to settle particulates such as grit. They're constructed above flood plain level if they're required to provide storm water control. In some cases, bypass facilities are provided so that only the first most polluting flush of run-off is given full settlement. Emergency responders can use them to temporarily store spilt materials – a containment facility. In such cases the outfall, including any bypass arrangements, should be sealed or blocked (see figure 1.41).

Figure 1.40

Photo courtesy of The Highways Agency

A typical sign indicating a pollution control device. Other signs such as 'Pollution Control Valve' may also be found.

Figure 1.41

A typical sedimentation lagoon with a headwall containing a penstock. Emergency responders can close them off to use the lagoon as a containment facility until the highways agencies can deal with the polluted material.

Oil separators

Oil separators exist within the road network. Their primary function is to remove floating oil from the roadway run-off (see also Section 1.6.5).

Containment devices

Containment devices are designed to retain pollutants within the system for subsequent treatment or removal. The devices include:

- Penstocks: a flat plate, fitted to a pair of guide slots on a headwall or chamber wall. They are the most common device. They're raised and lowered using a screw thread operated by a wheel. Spilled material can then be removed by suction or other methods
- Handstops are similar to penstocks, except the plate is raised and lowered manually by a lever
- Weirs and baffles typically retain the first flush of a run-off event but allow excess flows to overtop. They're sometimes provided with a notch or orifice that can be blocked by a pipe blocker, sandbag or board in an emergency (figure 1.42)
- Hanging walls are simple baffles constructed across open ditches, to retain oils and other non-miscible pollutants; the oil can be recovered from the upstream side of this device.

FRS personnel should receive training by the highways agencies before using these devices.

Figure 1.42

A typical weir baffle system next to a modern road development. Using penstocks or other FRS intervention, these systems can collect pollutants until recovery.

Vegetated drainage systems

These are used as components of a drainage network to convey, store and treat storm water running off the highway before it discharges to the receiving water. They're not designed to treat large spillages. They may either convey run-off to the disposal point, retain water for infiltration to groundwater or permit settlement of pollutants. The most common systems are described below, as are their limitations.

Swales

There's no clear distinction between swales and grassed channels, though historically the term 'swale' described a wide, grassed channel. Water flows directly from the highway into the swale along the edge of a highway. This makes it more difficult to retain a spillage on the surface of the highway, but some pollutants may be removed as run-off flows across the grassed surface. Dissolved pollutants aren't usually removed. If these channels discharge via gully gratings, the gratings can be sealed temporarily using clay mats or the flow diverted to an area where it can be contained and then removed. Small spills will be absorbed into the channels, to be cleaned up later by the highway authority. Dams or fence booms might be suitable containment devices.

Infiltration basins

Infiltration basins store and treat water, and provide a containment facility for polluting materials. They're designed to retain storm water flows rather than large spillages and allow the water to percolate through a filter layer of porous material, such as gravel. Run-off may then be directed to a surface water outfall, or it may continue to percolate through to groundwater. Infiltration basins can remove suspended solids and reduce metal loads but, as with swales, don't reduce soluble pollutants. But they may retain polluted run-off as described above for later removal. They should only be used as a last resort because they're difficult to clean.

Wetlands

Wetlands are areas that are permanently saturated by surface water or groundwater to support aquatic and/or semi-aquatic (emergent) vegetation such as reed swamps, marshes, or bogs. Many pollutants will be fatal to this vegetation so avoid discharging polluted run-off to wetlands.

Ponds

Some ponds retain water at all times. These are sometimes known as balancing or retention ponds. By storing road run-off, they can reduce flooding and allow sediments to settle out.

Other ponds, designed to be empty for some times of the year, are known as detention ponds or basins. These may be suitable for the detention and temporary storage of polluted firewater run-off, or a large spillage, provided the outlet can be sealed.

Combined systems

In some cases, swales and ponds/wetlands are used in series. These systems may contain spillages within the swale before the flow reaches the wetland. Dams or booms can control the spillage in the swale.

1.7.5 Drainage plans

The local highway authority or Highways Agency's agents for motorways and trunk roads in England should maintain drainage plans of their local network, including the location of any pollution prevention systems. The FRS should be able to use these during the planning process or at incidents.

Many highway authorities are now using GIS to digitally store details of their drainage systems. FRS units may be able to load this information as an overlay on the FRS GIS systems at Fire Controls and/or on FRS appliance Mobile Data Terminals. In areas where digital drainage data isn't available, the highway authority should be able to advice on the location and type of drainage systems.

1.7.6 Planning

FRS personnel should be aware of the types of drainage system most commonly found on roads in their area, whether they discharge into environmentally sensitive receptors, and whether they can be used to contain spillages or firewater run-off (see also Section 3.2). Such information should be included in Operational Risk Information Plans. Plans should be produced in consultation with environment agencies and highway authorities.

1.8 Marine incidents

The Maritime and Coastguard Agency (MCA) is the competent UK authority that responds to pollution from shipping and offshore installations. The National Contingency Plan for Marine Pollution from Shipping and Offshore Installation (NCP) sets out command and control procedures for incident response. These procedures have built-in thresholds to allow for flexibility of response to different degrees of incident. The MCA monitors the movements of maritime traffic and potentially polluting substances within the UK's pollution control zone.

The MCA's Counter-Pollution and Response (CPR) branch provides a command and control structure for decision making and response following a shipping incident that causes, or threatens to cause, pollution in UK waters. MCA's CPR is based on a regional response with central operational, technical and scientific support.

Figure 1.43

Photo courtesy of The Maritime Coastguard Agency

Typical incident with the potential to pollute coastal waters to which the MCA's Counter-Pollution and Response Branch would respond.

1.8.1 Advisory Committee on Protection of the Sea (ACOPS)

The Advisory Committee on Protection of the Sea (ACOPS) is one of the world's first environmental NGOs. Originally concentrated on encouraging international agreements to reduce marine oil pollution, ACOPS has expanded its interests to include land-based sources of marine pollution, as well as other aspects of degradation of the coastal and marine environment.

ACOPS has a broad constituent base, consisting of international associations of local authorities, wildlife and environmental protection organisations, trade unions, academic bodies, ports and harbours, tourist and shipping industries, as well as eminent individual members which include some of the world's leading politicians, administrators, scientists, economists and lawyers. There are no formalised central briefing mechanisms.

1.8.2 Response to an incident

Marine incidents are normally reported to one of Her Majesty's Coastguard(HMCG) Maritime Rescue Coordination Centres around the UK by various sources, for example a vessel in difficulty, passing vessels, or the public. HMCG will then instigate search and rescue operations where necessary; this action takes primacy over other forms of response. Where the incident involves counter-pollution or salvage control action, HMCG will alert the MCA's Duty Counter-Pollution and Salvage Officer (CPSO). The CPSO then decides the relevant course of action instigates the appropriate level of response and alerts relevant organisations. In the event of a major incident, the MCA may activate the Marine Emergencies Information Room at their headquarters in Southampton before deploying people and equipment to the scene. Three main response centres may be set up locally:

- A Salvage Control Unit supporting the Secretary of State's Representative (SOSREP). Provided certain conditions are met, SOSREP is empowered to intervene in the national interest to mitigate or remove the threat of pollution stemming from shipping accidents.

This includes the power to give directions. A similar unit – an Operations Control Unit – is set up to support SOSREP in incidents involving offshore oil and gas installations.

- A Marine Response Centre led by the MCA to coordinate all at-sea counter-pollution and clean-up operations
- A Shoreline Response Centre led by the local authority with technical support from the MCA. This centre coordinates the shoreline clean-up operations. In Northern Ireland, the Shoreline Response Centre is controlled by the NIEA.

Figure 1.44

Photo courtesy of The Maritime and Coastguard Agency

The MCA may monitor pollution events using their own aircraft or response vessels and pass information to local authority controls should the pollution threaten the shore line.

An Environment Group may also be set up in the very early stages of an incident, when a real threat to the marine and coastal environment is considered likely. This group provides environmental advice to all three specialist response centres. The Environment Group is made up of representatives of the relevant statutory nature conservation bodies, the environment agencies and Government fisheries departments.

In the UK, maritime spills are categorised by the internationally adopted three-tier system:

- Tier 1: a small operational spill employing local resources during any clean-up
- Tier 2: a medium-sized spill, requiring regional assistance and resources
- Tier 3: a large spill, requiring national assistance and resources. The National Contingency Plan will be activated in this case.

MCA takes the lead in pollution from shipping at sea. Other organisations are also responsible for responding to pollution in the UK:

- Ports, harbours, oil facilities and offshore installations have a statutory responsibility for clean-up in their jurisdictions: ports to Tier 2, offshore installations to Tier 3
- Environment agencies take the lead in responding to pollution from land-based sources
- Local authorities/NIEA (in Northern Ireland) have accepted the non-statutory responsibility for shoreline clean-up

The contingency plans of all involved organisations, whether national, regional or local, are compatible and linked where appropriate.

The MCA's CPR branch maintains response equipment stockpiles and oil dispersants around the UK.

The CPR branch also maintains satellite and aerial surveillance capability. Regular airborne surveillance flights monitor pollution from shipping across the UK pollution control zone and aircraft are regularly deployed following reports of incidents to assess the size and extent of any reported pollution, and to identify any contravention of national or international law. The MCA also maintains dispersant stockpiles for aerial spraying during major incidents.

International legislation governing contingency planning for hazardous and noxious substances (HNS) has also been implemented into UK law. The MCA is the responsible authority to administer this function and this has been achieved by introducing the National HNS Response Team (HNS-RT) for maritime incidents. This team is made up of chemical response specialists and salvage experts who provide a unit capable of rapid deployment and extended duration operations within a hazardous chemical environment.

Chapter 2

Planning to protect the environment

2.1 Liaison and protocols

Signing formal working together agreements has underpinned the development of partnerships between environment agencies and the FRS. These set out the roles and responsibilities of both parties at emergency incidents and identify the working arrangement when dealing with areas of mutual interest. This section explains how they work.

In Scotland, the agreement is a strategic Memorandum of Understanding (MoU) between the Scottish FRS and SEPA. In Northern Ireland, it's an MoU between NIEA and the Northern Ireland FRS (NIFRS) on 'Inter Agency Response to Pollution Incidents' involving environmental damage. In England and Wales, it's a protocol between the Local Government Association (LGA), the Welsh Local Government Association (WLGA), and the Environment Agency on FRS issues.

Although the format of the documents varies, they all have a common purpose: to ensure effective co-operation between the FRS and environment agencies when dealing with emergency incidents.

The key aims of the agreements are to:

- Minimise the hazard to the environment from FRS activities, including firefighting, and from incidents involving environmentally harmful substances caused by a third party, without compromising the role of the FRS role to protect people
- Encourage liaison between the FRS and the environment agencies, particularly at the planning stage, to ensure they co-ordinate their response to incidents which could pollute the environment
- In England and Wales, promote liaison to improve the planning and co-ordination of responses to flooding incidents by the environment agencies and the FRS

All parties recognise that implementing these agreements will help the environment agencies and the FRS carry out their roles and duties, Namely:

- FRS: the responsibility to extinguish fire, save life, protect communities and mitigate the impact of its activities on the environment
- Environment agencies: the responsibility to protect and enhance the environment
- The duty placed on both parties as Category 1 Responders by the Civil Contingencies Act 2004 and the associated regulations and guidance to work together in many areas; these include emergency and incident response planning, and information sharing (see Section 1.5, FRS legislation).

Many of the agreed procedures and working arrangements underpinning the partnership were originally included in the protocol or MoUs. With the publication of this FRS guidance, there's no longer a need for these documents to contain such procedures and advice in detail.

The agreements focus on setting out the roles, aspirations, direction and commitments to the development of the partnership of all parties with more detail of local issues included within local working agreements.

Local Working Agreements

The protocol/MoUs recognise the need for local flexibility on how individual FRSs and environment agency areas work together. This takes into account local needs and circumstances within a common National Framework. A template for producing such an agreement is in Appendix 1.

2.1.1 National partnerships

To ensure that the partnerships between the FRS and environment agencies continue to function and improve, a National Environmental Strategy Group (FRS and environment agencies) (NESG), a National Environmental Operational Group (FRS and environment agencies) (NEOG) and a network of local liaison meetings occur throughout each year. The aim of the initiative 'In Partnership towards a Safer and Cleaner Environment' is the basic remit for each group.

A summary of terms of reference for each group is in Appendix 2.

2.2 Pollution intervention planning

This section describes how to identify sites where there's a risk to the environment. Where such risks are identified (for example, during audits of premises for fire legislation or from information provided by environment agencies) it provides further guidance on the information FRS personnel should consider when developing an Operational Risk Information Plan. These may form part of the planning arrangements under 7(2) (d), 8(2)(d) or 9(3)(d) of the Fire and Rescue Services Act 2004 (or Scottish or NI equivalent) to gather appropriate information for dealing with fires, RTCs and other emergencies.

It explains why such plans are needed, what information should be included and suggests a template (see Appendix 3) for those preparing a plan. FRS personnel involved in pollution intervention planning should be aware of these recommendations and the operational options available to prevent or control pollution at incidents (also see Section 3.2, Pollution control techniques and Section 3.7, Controlled burn).

This section also provides guidance on how the FRS can help site operators, premises managers or other organisations or agencies reduce risks on their sites and develop their own pollution prevention and response plans. The sites or premises considered suitable include industrial, commercial and other premises which pose a significant risk to the environment in the event of a fire, explosion or spillage (see Section 2.3.3).

2.2.1 FRS roles and responsibilities in pollution

Intervention planning: Legislative background

The Fire Service Circular 7/2003, the Fire and Rescue Services Act 2004 and the Fire (Scotland) Act 2005 established the requirement for fire authorities to produce integrated risk management plans (IRMPs) or risk reduction plans (RRPs). Such plans are designed to improve the safety of communities and use FRS resources more productively. Further guidance on producing such plans is included in the FRS National Framework Document.

One aspect of response or reduction planning is to consider protecting the natural environment as well as public safety. The protection of plants and animals by the FRS,

although not a duty, is an expectation, as part of the IRMP (RRP in Wales). Section 1.5 discusses this.

The Department for Communities and Local Government has provided national guidance for the FRS to help it produce IRMP strategies including environmental elements. Guidance on environmental protection covers:

- Scope, including legislative, Government Public Service Agreements, National and Local Policy and Corporate Social Responsibility
- Risk analysis
- Strategy
- Delivery mechanisms
- Monitoring and review

The guidance – 'IRMP Steering Group Integrated Risk Management Planning: Policy Guidance Environmental Protection' is available at www.gov.uk.

The Civil Contingencies Act 2004 also requires the FRS and environment agencies to plan together as Category 1 responders (see Section 1.5).

The government monitors the most significant emergencies that the UK and its citizens could face over the next five years through the National Risk Assessment (NRA). This is a confidential assessment, conducted every year; it draws on expertise from a wide range of departments and agencies of government. The National Risk Register (NRR) is the public version of the assessment. To assist with national and local planning, the government provides a confidential list of the common consequences coming out of the NRA that cover the maximum scale, duration and impact that could reasonably be expected to occur as a result of emergencies. These consequences are referred to in the National Resilience Planning Assumptions (NRPAs).

The NRR identifies the hazards that Local Resilience Forums (LRFs) may wish to consider in developing their Community Risk Registers. Likelihoods, threats and vulnerabilities are assessed for a five-year period so that the risk assessment will support strategic planning for the medium term. Risks are categorised indicating the type of threat or hazard in question, including risks to the environment, for example, major pollution of controlled waters (HL4) and major land contamination (HL5). The FRS should consider the risks identified in their local Community Risk Registers when preparing an IRMP/RPP Environmental Protection Strategy. This information will also support FRSs when formulating Operational Risk Information Plans for specific premises.

2.2.2 Benefits of planning

FRS managers must consider environmental protection activities during the planning process to minimise the impact of incidents on the environment. Benefits include:

- Protecting public drinking water supplies, and public safety
- Minimising impacts on plants and animals which need a clean uncontaminated environment
- Using a pollution intervention or response plan that can be shown to have helped mitigate/prevent pollution as part of the defence described in water resource protection legislation (see section 1.4) for both site operators and the FRS

For these reasons, the FRS should allow for pollution prevention activities within its annual planning process.

2.3 Risk site identification and planning

Although many premises, activities and materials pose an environmental risk, the potential impact of an emergency incident isn't always realised. This is because three components need to be present before a risk to the environment exists: a source, a pathway and a receptor. If any part of the source–pathway–receptor link is missing, then the environmental risk is removed. Examples of sources, pathways and receptors are shown in Table 2.1 and illustrated in Figure 2.1.

Environment agencies recommend that all operators assess the nature and level of environmental risk that their site poses. At sites regulated by them, this will be a requirement of their permit.

The first stage in the risk assessment process should be a simple risk screening assessment followed by a more detailed environmental risk assessment if necessary.

The results of this assessment should be discussed with the FRS and environment agencies ideally at joint meetings.

Table 2.1 Pollution sources, pathways and receptors

Pollution sources
Hazmats, Eco-toxic, organic or inorganic, low hazard materials, or combustion products
Pathways
Dry ditch, Stream, River, Lake, Coastal waters, Permeable ground, Surface water drainage, System, Foul sewer system, Air, Roadways, Land drains
Receptors
Humans, plants, animals or birds either directly (e.g. drinking water or contact with contaminated water, inhaling smoke) or indirectly (e.g. through the food chain or reductions in the dissolved oxygen levels)

Figure 2.1

These three photographs show the source – water containing silt (top), the pathway – the drainage system (bottom left) and the receptor – the aquatic ecosystem into which the silty water is discharged (bottom right).

2.3.1 Carrying out the assessment

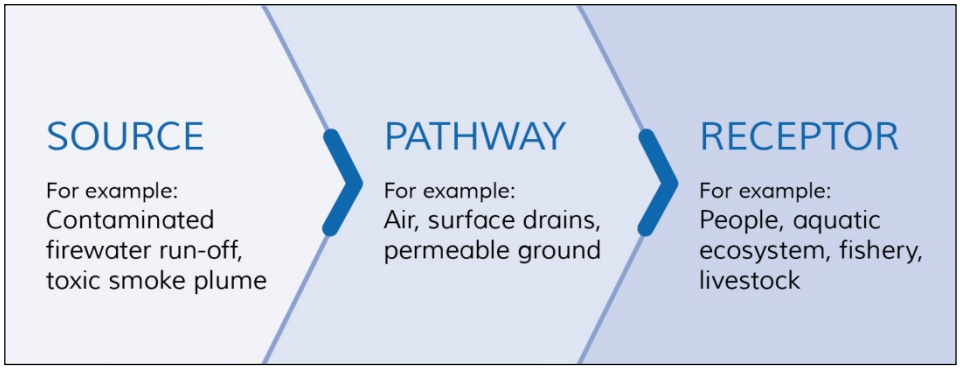
Although the responsibility of site operators, FRS personnel need to be aware of the process that operators must follow when carrying out an environmental risk assessment; the results of such an assessment are likely to influence the FRS operational risk information plan.

High-risk sites which have an existing operational risk information plan should also assess the environmental risk (environment agencies will help carry out initial screening of sites with such plans to ascertain whether an environmental risk exists). Where a significant risk to the environment is identified, the plan should include pollution prevention information and FRS and environment agency officers should undertake a joint inspection. NESG supports this approach (see figure 2.5).

An operational risk information model plan is in Appendix 3. FRSs may also decide to produce their own operational risk information plans of generic site types that might pose a particular

risk to the environment, for example agrochemical stores (see Section 2.8), timber treatment plants, plastic manufacturing and recycling sites.

Figure 2.2



Examples of sources, pathways and receptors. For pollution to occur, all three must be in place.

The starting point for any such environmental risk management evaluation is to identify possible hazards to the environment (**the source**) and, where identified, the appropriate preventative measures to reduce the risk of pollutants being transported (via **a pathway**) from the immediate area to the vulnerable aspect of the environment (**the receptor**) (see Figure 2.2).

Details of techniques for undertaking environmental risk assessments are in PPG 28, Controlled burn: https://www.gov.uk/government/publications/using-controlled-burn-during-fires-ppg28-prevent-pollution

More information on Operational Risk Information planning is in the FRS National Operational Guidance – Operational Risk Information (www.gov.uk)

2.3.2 Possible response strategies

Where an environmental risk assessment indicates a high or medium risk of pollution if there's a fire or spillage, site operators, in liaison with the FRS and environment agencies, need to consider how to reduce the risk to an acceptable level. The link between fire prevention or suppression and pollution prevention or reduction is a key factor for FRS personnel who advise operators or environment agency officers.

There's a hierarchy of four principal ways to reduce the risk:

1.Prevention

Ensuring everything is done to prevent a fire or spill in the first place is the most important part of the risk reduction strategy. Examples of prevention measures include controlling sources of ignition, making sure staff follow safe working practices, good site security and introducing a regular maintenance and inspection programme.

2.Detection and Suppression

if a fire or spills occurs pollution can be still prevented or minimised if the incident is tackled promptly. Measures that operators can take to ensure this happens include, installing fire or spill detection systems such as smoke, heat or flame detectors, overflow alarms and fire suppression systems such as sprinklers (see Figure 2.3) or other fixed installations. The provision and training of firefighting teams may also be considered. Environment agencies

and other regulators may require such systems within an accident plan for sites they permit. See Section 1.3.4.

Figure 2.3

An example of foam sprinklers installed in racking at a warehouse storing highly flammable materials. Such suppression systems can prevent or reduce the environmental impact of a fire.

3.Containment

Although good preventative and early detection measures will reduce the likelihood of an emergency incident, they won't eliminate the risk of pollution from firefighting or a spillage. So environment agencies promote the installation of firewater and spillage containment systems.

Several options exist such as bunds (see Figure 2.4), containment lagoons, tank shut-off valves/penstocks, oil separators and emergency containment systems such as a bunded car park; that can store a predicted volume of firewater run-off or spillage until removal and disposal. More guidance is in CIRIA 164, Containment systems for the prevention of pollution (http://www.ciria.org/default.aspx)

When sprinkler systems are installed, it may be possible to reduce the storage volume of any bunds or firewater ponds. This should be considered following discussions between the operator, FRS and the environment agency.

Figure 2.4

The yellow line in the foreground of this photograph is the top of a bund that serves the chemical handling area in the background of this photograph. The draining system transports the spillage to a 'blind tank' (tank without an outlet) where a suction tanker can remove it.

4. Mitigation

This involves planning for the use of firefighting and/or spill containment strategies, such as:

- Reducing the amount of firewater generated, for example, by using sprays or foam branches rather than jets
- Recycling firewater run-off where this isn't hazardous. See section. 3.2, environmental protection operational strategies and techniques
- A controlled burn, when appropriate, whilst protecting adjacent risks (e.g. nearby storage tanks) with water sprays or curtains; the potential for contamination of this water should also be considered (see section 3.7, controlled burn)

2.3.3 Determining which strategy to adopt

The decision to adopt a strategy or combination of strategies should be made at the planning stage, but might be made during the incident (see Section 3.4 Operational environmental risk assessments). During the planning process, the risk assessment should consider:

- The scale and nature of the environmental hazards presented by the site and the activities that take place on it
- Whether the products/building involved in fire are likely to be lost to it
- The risks (likelihood and severity) posed to people and the environment by adopting a controlled burn, or not
- The local topography and different meteorological conditions likely at the site
- The difficulties in deciding and justifying the adequacy of the risk management measures
- The sensitivity of the local environment

As part of the planning process, a meeting with the site operator, local FRS and environment agency officer should take place to consider the best environmental option. Hazmat or

HMEPOs will usually be the most suitably qualified FRS officers to attend such meetings (see Figure 2.5).

Figure 2.5

An Operational Risk Information Plan inspection undertaken jointly between FRS and environment agency staff will result in a more effective plan.

When agreement has been reached, the FRS Operational Risk Information Plan for the site should be produced. This should fit in with the Operator's Incident Response Plan (see Section 2.3.5).

2.3.4 Site operators

Pollution legislation (see Section 1.4) requires that site operators protect the environment from the effects of polluting incidents; a pollution incident response plan can help them achieve this by minimising impacts on the environment should an incident take place. For sites falling under the Environmental Permitting Regulations, such a plan, know as an Accident Plan will be a requirement of their permit.

2.3.5 Developing incident response plans

When a risk site has been identified, operators should be encouraged to produce an emergency pack or wallet for the site, in consultation with the FRS and environment agency. At licensed or permitted sites, this may be a requirement of the regulator.

The emergency pack should include:

1. A contact list
2. A site layout and drainage plan
3. Site chemical, product and waste inventory
4. Emergency procedures

Contact list

The contact list should contain telephone numbers for:

- Emergency services
- Relevant environmental regulators
- Local water supplier and sewerage undertaker
- Health and safety executive
- Appropriate clean-up contractors
- Key holders
- Staff to be contacted in the event of a significant incident
- Specialist advice such as chemical suppliers whose products are held on site.

Site layout and drainage plan

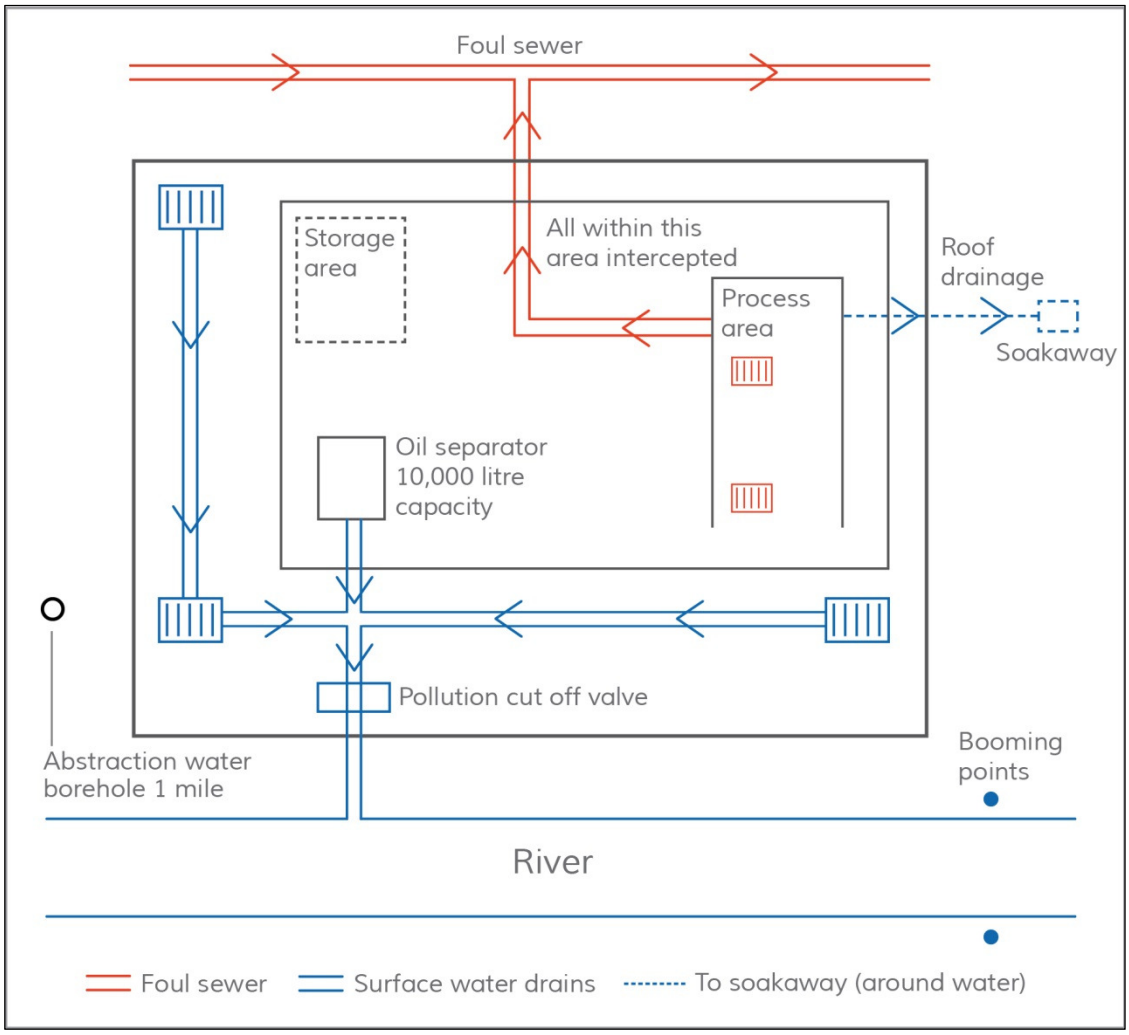
Operators should provide a clear diagram of the site showing layout and access details, and the site drainage arrangements. The site plan would ideally be kept in an emergency box and contain (see Figure 2.7):

- The general layout of buildings
- Site access routes for emergency vehicles
- Location of process areas and any on-site facilities for trade effluent or domestic sewage
- Areas or facilities used for the storage of raw materials, finished products and waste (including tank sizes)
- Any bunded areas together with details of products stored and estimates of how much the bund can retain
- Any potentially sensitive and/or vulnerable areas of porous or unmade ground on site or in the immediate area
- Location, depth and construction details of any soakaways receiving surface water discharges
- Location of mains water supply stopcock and any sprinkler control valves
- Location of hydrants, ‘fire boxes’ and pollution equipment, for example spill kits, booms
- Facilities such as:
- Inspection points to detect pollution
- Oil separators (includes capacity and type)
- Spillage retention or balancing tanks
- Firewater retention ponds
- Containment tanks and pollution control devices
- Suitable locations for sitting portable storage tanks or for creating containment reservoirs by blocking drains

Brief descriptions of how each facility operates and clear marking above ground are essential. Others plans may be needed to provide detailed information; these should be attached to the main plan and referenced in it.

A site drainage plan (see Figure 2.6) should be produced using red to mark foul drainage and blue for surface water with an indication of direction of flow. A similar marking system for drain covers should be used. These can be numbered to assist identification during an incident (also see Section 1.6.1).

Figure 2.6



A simple site drainage plan

The plan should also indicate:

- Off-site discharge points for surface water and trade effluents
- The sewage treatment works and the nearest foul sewer pumping station serving the site (this information will be available from the local sewerage undertaker)
- Any watercourse, spring, borehole or well, located within or near the site
- The estimated time of travel and direction of flow to any surface water and/or any vulnerability of boreholes and wells
- Suitable points for installing pollution control booms, pipe blockers and/or dams

If possible, permanent boom anchor points should be installed, taking into account possible watercourse flow conditions; these may be installed as a condition of the permit or licence for the site issued by environment agencies or other regulators.

3.Site chemical, product and waste inventory

Operators of sites that pose a significant risk to the environment because of the ecotoxic nature of their inventory should provide an inventory in the 'emergency pack'. The product and/or waste inventory should provide up-to-date records of all substances on site with an indication of the maximum quantities likely to be stored or found in production facilities or pipelines. Product data sheets and Control of Substances Hazardous to Health Regulations 2002 risk assessments should be attached for any substance posing a risk to health and/or the environment. Operators must also consider the possibility of products mixing and their combined effect on the environment.

4.Emergency procedures

Detailed emergency procedures produced by the operator in consultation with the FRS and environment agency should define:

- The scope of the activities covered
- Staff responsibilities
- Procedures for dealing with events such as spillages, leaking containers and fire water run-off

The level of on-site response will depend on the hazards and risks associated with the spilled materials, the levels of staff training and numbers of people, personal protective equipment (PPE) and pollution control equipment available. Strict guidelines for when to call the FRS must form part of the emergency procedure.

Operators and FRS personnel should consider the checklist below when formulating emergency procedures:

- Alert the FRS immediately using the 999 system as well as environment agency, sewerage undertakers, local authorities and other stakeholders in the event of an incident
- The most suitable firefighting strategy: is an intervention or controlled burn appropriate based on environmental and other risk factors, for example risk to firefighters? (see Section 3.7)
- A systematic approach to alerting abstractors and other river users who could be affected by the incident; this would normally be a role undertaken or coordinated by environment agencies
- Procedures for alerting site and adjacent site staff; this should include evacuation procedures.
- The selection of appropriate PPE
- Means of making leaking containers safe
- Procedure for containing spills and firewater run-off including equipment and material provision; the availability of FRS pollution equipment may also be agreed at this stage
- Procedures for recovering spilled product or firewater run-off including the appropriate hazardous waste arrangements

Emergency plans should be reviewed and exercised during training events involving all parties. This will help minimise the effect that incidents have on the environment.

There are over 11,500 sites with an environmental permit or licence in the UK where the FRS may advise environment agencies if appropriate on suitable measures to prevent or reduce pollution. Such advice might include automatic fire detection (AFD), fire sprinklers, maximum storage quantities, provision of fire breaks and likely containment requirements for firefighting water. These may be addressed within the permit or licence condition.

Discussions should take place locally during the permitting/ licensing process to ensure that such advice is considered when determining the permit or licence conditions for the site.

Further guidance on pollution incident response planning is in PPG 21 Pollution Incident Response Planning:
http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/pmho0309bpna-e-e.pdf

Availability of emergency pack

When an emergency pack or wallet has been produced, operators should be advised to store it in a secure location or 'fire box' away from the main areas of risk, near to the site entrance and clearly marked. Operators should be instructed that they must have procedures to ensure that the emergency pack is handed to, or immediately available to, the FRS on arrival at an incident. Where an Operational Risk Information Plan exists for a site that is provided with an emergency pack, it should identify the location of the pack (see Figure 2.7).

Figure 2.7

Photo courtesy of Gerda Technology Ltd

Emergency boxes either inside premises or next to perimeter access points are designed to contain emergency response information. Such emergency packs may be a requirement of the licence or permit to operate the site issued by regulators.

Mobile Data Terminals

Many FRSs use mobile data terminals (MDTs) to store information on fire appliances; this may include Operational Risk Information Plans. Once the information on pollution intervention planning has been obtained and collated, it should be loaded onto the MDT. This information will enable planning for environmentally damaging incidents and support timely and informed operational decisions to instigate pollution prevention measures.

Figure 2.8

Photo courtesy of Lancashire Fire & Rescue Service

A typical mobile data terminal (MDT) that could store critical environmental protection information.

2.4 Control of Major Accident Hazards planning

The Control of Major Accident Hazards Regulations 1999 (COMAH) establish requirements to prevent and limit the consequences to people and the environment of major accidents at higher hazard industrial sites. These include duties on operators of sites and also on emergency planners. The emergency services are consultees and are invited to participate in testing the plans.

Whilst the generic emergency response arrangements as developed for Civil Contingencies Act (CCA) will form the basis for emergency planning, CCA strictly does not apply for COMAH risks and COMAH establishes its own legislative requirements. COMAH requires emergency plans to be tailored to the accident scenarios that may occur at the site and establishes arrangements for developing, reviewing, testing and revising COMAH plans. The arrangements of all emergency responders, including the FRS and the site operator, should dovetail to provide a high level of protection to people and the environment.

The FRS has an important role to play in the planning stage for many COMAH accident scenarios but its role is particularly important from an environmental perspective in helping prevent and mitigate the impact of fire; experience has shown that fires are the most common cause of serious accidents to the environment from COMAH facilities. The duty is on the COMAH operator to carry out the risk assessment and take the measures to prevent and mitigate harm from accidents such as fire. The FRS will in many cases be asked to contribute to this process. This may involve describing the structured response arrangements (e.g. as in

CCA) or ideally providing more detail on the measures available for responding to each accident scenario, and the FRS preferred response strategy.

A key element for COMAH planning is that all interested parties should discuss the responses required for each scenario. This needs to be not only the initial response to a 999 call, but the response throughout the incident, for example including damping down and maintaining foam blankets on flammable liquid pools after fire is extinguished. For example, if a warehouse fire with the potential to escalate to adjacent tank storage is a scenario, the FRS can advise on fire fighting strategies and the potential consequences of those.

Discussions should cover the likely/expected quantities and application rates of firewater or foam, including cooling water, during the incident. The site operator might need this type of information to plan environmental protection measures, such as firewater containment systems/firewater managements plans. The FRS can't commit to specific volumes as these will differ for each incident, but it will have a good idea of how to deal with any given scenario and estimate the volumes of liquid that might need to be contained.

Those with operational experience should be included in discussions to help assess the strategies that could be adopted. The consequences of these strategies need to be explored in advance so that information to support the response and limit consequences can be planned and included in the FRS Operational Risk Information Plan for the site. Such planning may include mobilising an Environmental Protection Unit as part of the pre-determined attendance.

Figure 2.9

Photo courtesy of Royal Chiltern Air Support Unit

COMAH sites require comprehensive multi-agency plans which consider the environmental impacts of a fire

Following the fire and explosion at the Buncefield oil storage depot, the Buncefield Major Incident Investigation Board, MIIB, produced a 'Recommendations on the emergency preparedness for, response to and recovery from incidents' (EPRR) report which can be accessed at the Buncefield investigation website (www.buncefieldinvestigation.gov.uk). This report made recommendations for the COMAH Competent Authority (CA) to consider which included:

- Improve the CA's guidance for producing on and off-site emergency plans, having regard to integration of the requirements under COMAH with those established under the CCA.
- Check that those with legal duties under COMAH are discharging them.

The CA, working with industry, emergency planners and other external organisations, has produced COMAH-specific guidance to help integrate COMAH and other emergency planning requirements in response to the recommendations.

The "Competent authority guidance for inspectors on emergency arrangements for COMAH establishment" can be downloaded free at the HSE's website (www.hse.gov.uk)

The guidance reflects the Civil Contingencies Secretariat (CCS) guidance on aligning emergency plans; whilst the actual response to an incident has to be specific to the event, the arrangements for preparing for the response, including out-of area provision and escalation mechanisms, are generic. The guidance is written with CA inspectors as the primary audience, but its comprehensive coverage of emergency planning makes it relevant to all involved in COMAH emergency arrangements and they should consult it.

2.5 Local environmental protection planning

To enable FRS crews to deal with incidents that can pollute the environment, they must have knowledge of, and access to, information on:

- Potential pollution sources
- The sensitivity and vulnerability of the environment in their local area
- The pathways that any pollutant will follow before it enters the environment

FRS personnel should research this information for their locality and contact the appointed FRS environment agency liaison officer and other parties such as highway agencies and sewerage undertakers. These contacts will be able to provide details of environmentally sensitive areas, for example those where an incident could threaten a water abstraction point and/or important nature conservation site as well as information such as drainage systems, sewage treatment works and their outfalls, in most cases in GIS overlay format. The Environment Agency also publishes much of this information on line and it can be found at http://www.geostore.com/environment-agency/WebStore?xml=staticweb/xml/dataLayers.xml

Once the information has been obtained and collated, maps or plans of station areas indicating these features should be produced and displayed at fire stations. These will enable managers and firefighters to develop operational incident tactics that include environmental aspects. Such plans should be

- Displayed within training or other appropriate areas of fire stations
- Carried on front-line appliances, environmental protection units and command units, ideally in GIS format
- Installed in fire control rooms
- Coordinated and supported by HMEPOS or equivalent.

2.5.1 Local watercourse plans

These include the location, flow, direction and destination of streams, rivers and inflows/outfalls from lakes, lochs or reservoirs, together with suitable intervention points.

2.5.2 Water abstraction points

Knowledge of the areas where an incident could threaten public surface water abstraction points, wells, boreholes and springs will help attending crews.

Local water companies (who provide drinking water), environment agencies and environmental health departments of local authorities, can provide this information which may be available as GIS overlays.

2.5.3 Local drainage plans

Equally important is identifying surface and foul water drains, including the direction of flow. Maps of the public sewer system are available from sewerage undertakers and some environment agencies. Private drainage system plans, for example those for an industrial estate, may be available from environment agencies or from the estate owner or site operators.

2.5.4 Vulnerable habitats

The location of any important nature conservation sites such as Sites of Special Scientific Interest (SSSIs) or similar can be identified and included within fire station plans. These are available from the appropriate conservation body (see Section 2.6, Areas of nature conservation).

2.5.5 Groundwater

Environment agencies can supply maps of sensitive groundwater and aquifers.

2.5.6 Bio-security and non-native species

In recent years, new plant diseases and pests have emerged and threats to plant health/ecosystems have escalated. The globalisation of trade and increased travel has raised the volume and diversity of plants, seeds and soil, entering the UK. This has increased the likelihood of introducing plant diseases and pests which spread through gardens, woodlands, heathlands, and the wider countryside.

In the event of a notifiable disease outbreak, there are compulsory bio-security measures which must be followed. These measures are required by law and a breach may result in a criminal penalty. For up to date measures and restrictions, refer to the Gov.UK website (https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs).

Bio-security is a set of precautions and practical steps to prevent the introduction and spread of disease-causing agents. Any equipment taken onto site should be restricted as much as possible and should be clean, serviceable and free from organic debris. Tools and equipment should also be cleaned and disinfected before leaving the site.

Actions to take

There are three steps to follow as outlined on the Defra website:

- Check equipment and clothing for living organisms. Pay particular attention to areas that are damp or hard to inspect.
- Clean and wash all equipment, footwear and clothes thoroughly. If any organisms are present, leave them in place.
- Dry all equipment and clothing - some species can live for many days in moist conditions. Take care not to transfer them elsewhere.

When the FRS is called to attend an incident on a farm which is within a Restricted Infected Area, for example following an outbreak of 'Foot and mouth' disease, there are compulsory bio-security measures to follow; these include cleansing and disinfecting any vehicles on the outside and underside when entering or leaving a premises. This should take account of tyres, wheel arches, mudguards and mud-flaps and all visible traces of mud and slurry must also be removed including any inside the vehicle on pedals or in the foot-well. No one should enter or leave the premises wearing clothing or boots which are visibly contaminated and have not been disinfected. Special attention should be paid to the soles of boots to make sure they're clean.

Routine day to day trips to farms which are not under restrictions but which are still at risk from diseases such as Bovine Tuberculosis (TB) are potentially more important. Maintaining bio-security measures such as using disinfectant sprays on footwear and vehicles at all times is good practice and will help prevent the spread of disease.

Bio-security can also apply to incidents such as flooding where the FRS may be involved. Pumping water from flooded areas could have associated risks and any pumps or other equipment that is used should be thoroughly cleaned and disinfected afterwards.

Alcohol based disinfectants (such as industrial methylated spirit or isopropyl) at 70 per cent concentration are recommended as they are effective against most pathogens. Disinfectants approved for use in England, Scotland and Wales are listed on the Gov.UK website (https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs).

2.5.7 Vulnerability of the water environment

The impact that a pollution event has on the environment is influenced by the:

- Toxicity/polluting potential of the source material
- Pathway by which the pollution finds its way into the environment
- Sensitivity of the receiving environment or receptor; the uses of the waterbody, for example abstraction, fishery and physical factors such as temperature, the dilution afforded and the chemical composition of the receiving waters themselves will determine this sensitivity (also see Section 1.2.3).

As an example, a spillage of the same quantity of a hazardous material into a small trout stream directly upstream of a public drinking water intake is likely to have a greater impact than if the discharge was made into the estuary of a large river. Similarly the effect of a spillage of an organic pollutant such as milk at the same location in a river is likely to be more serious in summer due to lower flows and higher water temperatures.

FRS planning officers and crews should understand the sensitivity of local watercourses and groundwater. For areas that drain to environmentally sensitive locations, containing spillages and polluting firewater run-off should be a high priority during the planning process and at

incidents. FRS personnel should consult their local environment agency office to obtain this information.

Table 2.2 lists examples of the features to consider when determining the sensitivity of the site.

Table 2.2 Sensitivity of receiving waters in relation to location

Sensitivity	Location
High	Over a major aquifer
High	Within a designated Groundwater Source Protection Zone
High	Within 250m of any well , spring or borehole used for drinking water abstraction other than within a Groundwater Source Zone
High	Above a shallow water table (< 2m and with free-draining ground)
High	Above a fissured rock, for example chalk, posing risk of rapid flow to groundwater or surface water
High	Less than 5km upstream of an important surface water industrial or agricultural abstraction point
High	Firewater/spillage would affect a commercial fishery and/or a national or internationally important conservation site
High	Firewater/spillage would affect a site of high amenity value
Medium	Situated over a minor aquifer
Medium	Between 5km and 20km upstream of a surface water drinking water abstraction point
Medium	Between 5km and 20km upstream of an important surface water industrial or agricultural abstraction point
Medium	Firewater/spillage would impact on a coarse fishery or locally important conservation site
Medium	Firewater/spillage would affect a site of moderate amenity value
Low	Situated over a non-aquifer
Low	Outside any designated Groundwater Source Protection Zones
Low	Situated above deep water tables
Low	Situated on low permeable ground such as clay
Low	More than 20km upstream of a surface water drinking water abstraction point
Low	More than 20km upstream of a surface water industrial or commercial abstraction point
Low	Firewater/spillage would have limited impact on fish populations or wildlife
Low	Firewater/spillage would affect a site of limited amenity value

2.6 Areas of nature conservation

Areas of nature conservation (ANC) such as Sites of Special Scientific Interest (SSSI), (Areas of Special Scientific Interest (ASSI) in Northern Ireland) are important sites designated and protected for being the best examples of their characteristic wildlife and geology. Many of these varied habitats have developed over hundreds of years through management practices such as grazing and forestry and, in most cases, need active management to maintain their conservation status.

2.6.1 Legal status of SSSIs

SSSI (Scotland, England, and Wales) and ASSI (Northern Ireland) legal arrangements differ between the countries of the UK.

The decision to notify an SSSI is made by the relevant nature conservation body (the *appropriate conservation body*) for that part of the United Kingdom: Northern Ireland Environment Agency, Natural England, Scottish Natural Heritage or Natural Resources Wales. For England and Wales, SSSIs are legally protected under the Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way (CROW) Act 2000 and the Natural Environment and Rural Communities (NERC) Act 2006, in Scotland by the Nature Conservation (Scotland) Act 2004 and in Northern Ireland the law relating to ASSIs is in the Environment (Northern Ireland) Order 2002.

The Environmental Damage (Prevention and Remediation) Regulations (EDR) 2009 or equivalent in Scotland and Northern Ireland cover environmental damage which adversely affect the integrity of a SSSI or the conservation status of species and habitats protected by EU legislation outside SSSIs (see Section 1.4 Environmental law).

2.6.2 Background

There are over 4,100 SSSIs covering 8 per cent of the land area in England alone. They include some of the UK's most spectacular and beautiful locations. They are essential to preserve our remaining natural heritage for future generations. Wildlife and geological features are under pressure from development, pollution, climate change and unsustainable land management.

SSSIs include: woodlands and forests, wetlands, rivers, heathlands, meadows, beaches, moorland and peat bogs. Each site will have its own citation, describing the reasons why it was designated. In recognition of their importance at national and international level, SSSIs can have other designations, including landscape ones:

- National Nature Reserves
- Areas of Outstanding Beauty
- National Parks
- Local Nature Reserves
- Marine Protected Areas
- Heritage Coasts
- Special Areas of Conservation
- Special Protection Areas
- Ramsar Sites (designated under the Ramsar Convention for wetlands of international importance)
- Local Geological Sites
- Biosphere Reserves

2.6.3 Condition assessment for SSSIs

All SSSI features are assessed against six conditions (see table 2.3). All sites are divided into units (although some only have one). Each unit is assessed separately and this can often result in a mix of Favourable, Unfavourable and Destroyed units across one SSSI. Each unit is assessed at least every six years.

Table 2.3 Definition of SSSI Condition Assessment Terms

Condition	Definition
Favourable	SSSI is being adequately conserved and is meeting its 'conservation objectives', however there is scope for enhancement of these sites.

Unfavourable recovering	SSSI is not yet fully meeting the conservation objectives but all the necessary management measures are in place. Provided that the recovery work is sustained, the SSSI will reach favourable condition in time.
Unfavourable no change	SSSI is not meeting the conservation objectives and will not reach favourable condition unless there are changes to the site management or external pressures. The longer the SSSI remains in this poor condition, the more difficult it will be, in general, to achieve recovery.
Unfavourable declining	SSSI is not meeting the conservation objectives and will not reach favourable condition unless there are changes to the site management or external pressures. The site condition is becoming progressively worse.
Part destroyed	Part destroyed means that lasting damage has occurred to part of the special conservation interest of a SSSI such that it has been irretrievably lost and will never recover. Conservation work may still be needed on the residual interest of the land.
Destroyed	Lasting damage has occurred to all the special conservation interest of the SSSI such that it has been irretrievably lost. The land will never recover.

2.6.4 Categorisation of areas of nature conservation (ANC)

There's a risk of damage to ANC from FRS activities in some places across the country. So a method of categorising ANC locations has been devised in conjunction with Natural England and the Environment Agency. This works by dividing ANCs into four categories based on their susceptibility to environmental damage from FRS actions.

The categories are numbered 1 to 4 with category 4 presenting the highest risk of environmental contamination from an incident.

Very low risk (Category 1)

These sites have been designated as geological sites. They present a very low risk or are not deemed to be susceptible to environmental damage from FRS operations. The contamination/damage will be minimal and will not affect the Condition Assessment of the interest. Nature conservation interests will not require restoration and will recover in the short term.

Low risk (Category 2)

These sites tend to be woodland or meadows. Controlled fires in these areas can sometimes have a beneficial effect but they may include protected animal and plant species. These sites present a low risk of environmental damage as a result of FRS operations. The contamination/damage will be temporary but could affect the Condition Assessment of the interest. Geological and nature conservation interests will require minimal restoration but will recover in the short term.

Significant environmental damage risk (Category 3)

These sites include various wetlands, rivers, ponds and lakes, and shorelines. Nationally protected species of animal, insects, bio-diverse habitats, flower and fauna are contained within these areas. This type of site will require a strategic approach to limit any possible environmental damage. At such sites the abstraction of water for firefighting may be a problem in maintaining water levels and may lead to the biodiversity being placed at risk. Any contamination/damage will partially damage and will affect the Condition Assessment of the interest. Geological and nature conservation interests will require moderate restoration and/or will recover in the medium term.

High environmental damage risk (Category 4)

These sites are extremely susceptible to environmental damage as a result of FRS operations. Similar to Category 3 locations, these areas include various wetlands, rivers, ponds and lakes, and shorelines. But they also contain nationally protected species of animal, insects, bio-diverse habitats, flower and fauna which are extremely susceptible to environmental damage. Any damage is likely to be permanent and will significantly affect the Condition Assessment of the interest. Geological and nature conservation interests will require total restoration and/or will only recover in the long term. Where incidents occur on or near these sites, Incident commanders should identify any environmental risk, put in place environmental protection measures, inform the relevant agencies and, where necessary, request them to attend.

A SSSI identified by Natural England as a Category 4 site is the South Thames Estuary and Marshes in Kent (see Figure 2.10). The site is on the south side of the Thames Estuary and the marshes extend for about 15 km along the south side of the estuary and include intertidal areas on the north side of the estuary.

The site consists of an extensive area of grazing marsh, salt marsh, mudflats and shingle, characteristic of the estuarine habitats of the north Kent marshes. There‘s a former oil storage depot within the area and a railway line borders part of the south west boundary, running from the Isle of Grain, which is used to convey fuel to and from locations on the island.

Figure 2.10

Photo courtesy of Kent Fire and Rescue Service

The South Thames Estuary and Marshes

2.6.5 FRS operations in sites of nature conservation

The following FRS operations can damage a site of nature conservation if mitigating measures are not taken:

- The use of foam and other fire fighting chemicals
- Leakage/run-off of chemicals including run-off generated by the decontamination of personnel
- Fire fighting leading to the run-off of contaminated firewater
- Over-abstraction of water by high-volume and other pumps
- Removing earth and vegetation (for indirect attacks, wildfire tactics)
- Vehicles movements, leading to ground compression or ground disturbance

Assessment

The Incident commander should assess wider priorities when considering damage on sites of nature conservation. S/he will need to consider:

- Incident type: fire, wildfire, flooding, chemical pollution
- Impact on FRS risk priorities, for example human life, property and wider environment
- Likely impact on national and critical infrastructure
- Likely impact of not undertaking action on ANC
- Mitigation measures to reduce contamination/damage

Mitigation measures

These measures should be considered to reduce the impact of contamination and damaging operations:

- Sensitive removal of earth and separate storage of materials for later restoration or to reduce overall impact of contamination/damage
- Use of pollution control equipment and materials
- Surveying for the most important/valuable feature or interest and safeguarding them

The FRS should consider having separate Operational Risk Information Plans with Environmental Risk Notes for sites of nature conservation that are more susceptible to environmental damage. An example of an Environmental Risk Note for a SSSI is in Appendix 10.

Although each nature conservation site will have its own environmental damage risks, a set of generic actions plans has been developed in conjunction with Natural England and the Environment Agency for each category of risk (see figures 2.11 and 2.12).

These plans are aide memoires to help personnel identify the preventative actions to take when attending incidents on or close to sites of nature conservation. They relate to general site information based on an identified ANC category. Where there is any doubt as to the environmental impact on a SSSI, Natural England should be contacted for more information. FRSs in Scotland, Northern Ireland and Wales may wish to consider a similar approach with their relevant nature conservation body.

Natural England, and other environmental organisations, manages a number of SSSIs directly, as National Nature Reserves. The majority of these sites have individual Emergency Plans which are prepared, and shared, with the local FRS. (See also Section 2.5.6 – Bio-security and non-native species).

Figure 2.11

Area of Nature Conservation
Generic Action Plans
Category 1 ANC
(Very low environmental damage risk)

Site information
These sites have been designated as geological sites and are not deemed to be susceptible to environmental damage from fire service actions.

Types of Contamination

None

Operational Actions

On site
- No action required

Proximity of site
- No action required

Chemical Incidents
- No action required

Area of Nature Conservation
Generic Action Plans
Category 2 ANC
(Low environmental damage risk)

Site information
These sites tend to be woodland or Meadows. Fires in these areas can sometimes have a beneficial effect. However these sites may also include protected species.

Types of Contamination
- Chemical contamination
- Firewater run-off

Operational Actions

On site
- Carry out an Environmental Assessment as part of the DRA
- Use water only as extinguishing media
- For incidents up to 6 pumps: IC to inform Natural England by e-mail after the incident.
- For incidents over 6 pumps inform Natural England and the EA via FC

Proximity of site
- For fires there is no requirement to inform Natural England unless site becomes involved in the incident

Chemical Incidents
- Carry out an EARA
- Inform Natural England and Environment Agency via FC

Figure 2.12

Area of Nature Conservation
Generic Action Plans
Category 3 ANC
(Significant environmental damage risk)

Site information
These sites are various wetlands, rivers, ponds and lakes, both within and adjacent to these areas and shore lines are nationally protected species of animal, insects, flower and fauna as well as bio-diverse habitats. These site will require different approaches to protecting them from environmental damage.

For example it is critical that the level water in a river is maintained above a critical level. The abstraction of water for fire fighting would present a significant issue in maintaining the level in the river especially during the summer months.

Types of Contamination
- Compromising water levels
- Pollution of water/habitat from firewater run-off
- Chemical contamination
- Foam/chemical damage
- Ground compression

Operational Actions

On site
- Carry out an Environmental Assessment as part of the DRA / EARA
- Limit Fire water run-off
- Block Drains
- Use only water where possible
- Use fire fighting foam as a last resort (an assessment must be carried out in conjunction with an EA officer)
- Keep to designated tracks and paths
- Try to keep to a single vehicle path
- Inform Natural England and Environment Agency

Proximity of site
- Incorporate site as part of any Risk Assessment
- Carry out an Environmental Analytical Risk Assessment for the location of the incident. Implement any control measures highlighted as a result of this assessment.

Chemical Incidents
- Carry out an EARA
- Inform Natural England and Environment Agency via FC

Area of Nature Conservation
Generic Action Plans
Category 4 ANC
(High environmental damage risk)

Site information
These sites are various wetlands, rivers, ponds and lakes, both within these and adjacent to these areas and shore lines contain nationally protected species of animal, insects, flower and fauna as well as bio-diverse habitats. These sites will require different approaches to protecting them from environmental damage

Types of Contamination
- Pollution of water/habitat from firewater run-off
- Chemical contamination
- Ground Compression
- Ground disturbance
- Foam/chemical damage

Operational Actions

On site
- Inform Natural England and Environment Agency request their attendance via FC
- Carry out an Environmental Assessment as part of the DRA. An EARA must also be completed at the first available opportunity.
- Controlled use of fire fighting media
- Limit fire water run-off / discharge
- Block drains
- Where possible only use water
- Use foam as a last resort (an assessment must be carried out in conjunction with the EA officer)
- Keep to designated tracks and paths
- Try to keep to a single vehicle path

Proximity of site
- Incorporate site as part of an Environmental Assessment included within the DRA. If necessary carry out an EARA
- Carry out an appropriate Environmental Risk Assessment and ensure any control measures highlighted as a result of this assessment are implemented and are effective.

Chemical Incidents
- Carry out an EARA
- Inform Natural England and Environment Agency via FC

2.7 High-pressure oil pipelines

This guidance doesn't cover high-pressure gas pipelines. Other pipelines transporting liquids, such as brine, exist in the UK too. Similar response planning activities to those detailed in this section may be suitable for these risks.

2.7.1 Background

A network of high-pressure oil pipelines used to transport flammable liquids (products) underground has been constructed through most regions of the UK. A high-pressure oil pipeline can extend for hundreds of miles and have branch lines feeding from it, controlled by remotely-operated valves. Liquid pipelines are constructed of between 100 mm and 410 mm diameter high-grade welded steel pipes (typical wall thickness of 8–10 mm). Except at refineries, storage facilities, above-ground river crossings or pumping stations, the pipelines are laid into approximately 1.5 m deep excavations (see Figure 2.13). Pipeline operating pressures vary from 40 to 100 bars and function day and night. Their operation is based on advanced computer and mechanical technology. Software-based monitoring and sensing, supported by remotely-operated mechanical valving systems, have ensured that the UK has not experienced a major oil pipeline disaster to date (see Figure 2.14).

Figure 2.13

Oil pipelines can operate between 40 and 100 bar, are constructed from 8-10 mm steel and are laid as shown here in a 1.5 metre deep trench.

Figure 2.14

A typical high-pressure oil pipeline control centre that oversees the remote operation of pipeline control valves.

Examples of products transported by high-pressure oil pipelines in the UK are:

- Petrol
- Diesel fuel
- Dyed diesel fuel (red diesel)
- Aviation fuel
- Crude oil of varying viscosity
- Ethylene.

Oil pipelines transport a variety of products. At any one time, several products may be in a pipeline destined for a different location in the UK. This is achieved by pumping or 'backing up' products into the pipeline immediately following one another; only limited mixing of products occurs because of flow characteristics and pressures used. Any mixed products are drawn off and recovered for reprocessing. If a leak or breach occurs, it's therefore possible for two or even three different products to be released into the environment.

The quantity of product expelled from a breached pressurised liquid pipeline depends on the:

- Size of the breach
- Type of product involved
- Pressure and size of the pipeline
- Topographical location of the breach

If a break occurs, between 30,000 and 2 million litres of product could be ejected over a 30-minute period, causing a significant public safety and/or environmental disaster.

A large road petrol tanker has a 40,000-litre capacity.

Commercial companies and the government operate the network of high-pressure oil pipelines in the UK. Each pipeline operator controls product distribution via control centres (see Figure 2.14) that can remotely open and shut valves to direct a product to its

destination. Manual valve operation is also possible at intermediate valving locations (see Figure 2.15). Both types of valve can be used during a breach.

2.7.2 Planning

Identifying pipelines within each FRS area

The majority of high-pressure oil pipeline operators in England and Wales subscribe to the Linesearch website (www.linesearchbeforeudig.co.uk) which allows contractors planning excavations to identify the proximity of subterranean oil and gas pipelines. In Scotland, no such system exists so direct contact with oil refinery companies is needed. Oil pipelines that operate in Northern Ireland run from Cloghan Jetty on the North side of Belfast Lough to Larne Power Station and from a river berth to Londonderry Power Station.

The FRS can use another website, Linewatch (www.linewatch.co.uk) for planning and training. This allows searches to identify the location and dimension of oil pipelines. Using phone numbers given on the website, the FRS can contact companies for GIS maps of routes and valve locations. But not all pipeline operators subscribe to this service.

Information such as the likely product type, pipe diameters, pipe depth, and manual valve locations, as well as the associated GIS maps, should be transposed onto FRS control room systems and local emergency response plans. Contingency arrangements including public safety and evacuation, firefighting foam, pollution control strategies and equipment for dealing with the likely consequences of a high-pressure oil pipeline breach should be considered at the planning stage. Local

FRS personnel should be familiar with oil pipeline risks including the location of pipeline marker posts and the size, product type of the pipeline within their station areas and receive training for dealing with breaches. Training should include lectures, site visits and practical exercises involving all stakeholders identified as a result of local analysis of the risk.

Pipeline marking

The UK uses two methods for marking the position of underground high-pressure oil pipelines: marker posts and aerial markers. Examples of these can be downloaded from www.linewatch.co.uk website.

Marker posts (see Figure 2.16) are positioned where pipelines cross roadways, railways, rivers and land ownership boundaries. They are also at most hedge and fence lines. They give information on the pipe diameter, product characteristic (high- or low-flash; multi-product pipelines are usually shown as low-flash) the location and the pipeline owner.

Figure 2.15

A typical remote valving location. FRS crews may be asked to operate such valves in an emergency so must know their location.

Figure 2.16

Oil pipeline marker post.

Aerial markers (see Figure 2.17) are primarily for oil pipeline operators who commission helicopters to over-fly pipelines to check for the visual signs of small leaks, such as discoloured vegetation, and unscheduled activity, for example excavations. Aerial marker posts provide a visual guide for the helicopter crew along the route of the pipeline. FRS personnel can also use them to identify pipelines routes.

Figure 2.17

Aerial marker post.

Incident notification

The integrity of high-pressure pipelines can be threatened by:

- Unauthorised excavations (third-party damage, see Figure 2.13)
- Landslips
- Lightning strikes
- Flooding
- Mechanical failure or corrosion of the pipeline
- Operational errors
- Terrorism
- Theft

Pipeline operators in the UK average 70 incidents each year where contractors' activities threaten to breach high-pressure oil pipelines.

Where the FRS receives calls to incidents involving oil pipelines, personnel should contact the oil pipeline operators' control centre as soon as possible using pre-arranged direct dial numbers. This will enable early valving down of the affected pipeline section, reducing the quantities of product released. The remote sensing systems used by pipeline operators detect serious breaches to allow early isolation of the affected section. But it's sometimes difficult for pipeline operators to identify the exact location of the breach.

Figure 2.18

This photograph shows road markings by a utility company who planned to excavate a roadway in line with a high pressure oil pipeline. Note the writing on the roadway and the aerial marker post in the hedge opposite!

Where pipeline operators remotely detect breaches, they will contact FRS control rooms whose areas might be affected. The pipeline control rooms hold emergency contact details for each FRS area and form part of their emergency procedures which they test regularly. FRS personnel should record these tests for reference should an incident occur. Planning for oil pipeline incidents should be included within each FRS major incident planning regime. It's essential to identify the pipeline operator and the location of the control room, especially where more than one pipeline flows through an FRS area.

Emergency response to incidents involving high-pressure oil pipelines

FRSs should decide when to attend suspected or confirmed incidents involving oil pipelines. Where damage is sustained but no breach has occurred, the FRS may be asked to stand by during emergency draining-down procedures, before repair.

Dealing with an incident involving a breached high-pressure oil pipeline will vary depending on:

- Topography
- Population
- Weather conditions
- Sensitivity of the local environment
- Ignited or unignited product
- Proximity of resources
- Availability of foam and pollution control equipment

For oil pipeline incidents, it's best practice for HMEPOs to attend oil pipeline control rooms to liaise with and advise Incident commanders at incidents. Because pipeline control rooms will often not be near any breach, the FRS will need to make arrangements with pipeline operators and the FRS whose area covers oil pipeline control rooms to facilitate such support.

This information relates to oil pipeline incidents:

- Oil pipelines are mainly routed through open countryside but also flow through residential, commercial and industrial areas, passing under or over motorways, major roads, rivers railway lines, factories.
- The initial breach may produce a jet of product up to 10 storeys in height.
- The jet, although diminishing in height, will be of significant force for up to 30 minutes after the initial breach.
- Oil pipeline operators will mobilise clean-up contractors who may take two hours or more to arrive at the scene, depending on traffic and location.
- The FRS may receive requests from pipeline operators to operate manual valves at intermediate intervention points (see Figure 2.15).
- Pipeline operators will mobilise 'field engineers' to incidents to provide advice to Incident commanders.

2.7.3 Guidance on actions at oil pipeline incidents

Highly flammable product is likely to be released following a pipeline breach, so the Incident commander will declare it a major incident. Incident commanders should consider:

- Evacuating members of the public
- Providing adequate resources to suitable rendezvous points including sufficient EPUS/pollution control equipment
- Intervention tactics considering firefighter safety
- Initiating the delivery of large quantities of firefighting foam
- Blanketing product with firefighting foam to reduce vapour and the risk of ignition
- Providing resources, to protect important wildlife habitats and sewer systems in the local area and 'downstream' from the incident
- Tactics designed to divert product to 'sacrificial' areas such as lakes, or other low-lying areas such as roadways, in consultation wherever possible with the environment agency office, highways authority, or landowner
- Ensuring water companies/other abstractors are aware of threats to drinking water and other abstractions, which can be achieved via environment agency emergency response phone lines

FRS planning to deal with oil pipeline breaches should aim to work effectively with oil pipeline operators and other stakeholders who might be involved in such incidents

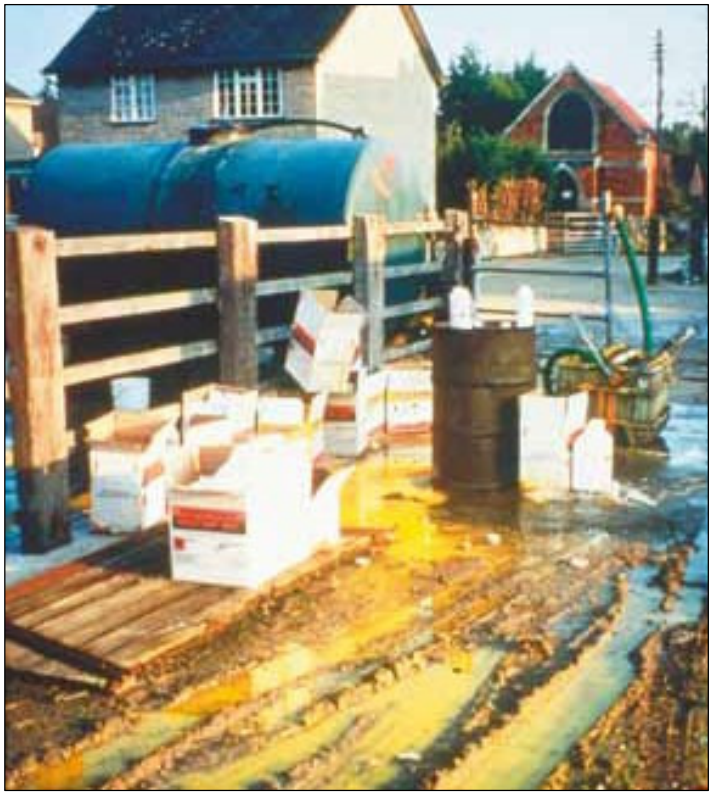
2.8 BASIS (Registration) store inspection scheme

BASIS (Registration) Ltd. is an independent registration, standards, certification and training organisation serving pesticide, horticulture, forestry, amenity and other relevant interests. It works with, and through, industry organisations to implement relevant sections of the Control of Pesticides (Sustainable Use) Regulations 2012 and other legislative and industry Code of Practice requirements. The BASIS system is designed to be self-regulating by the agrochemical industry for the safe storage and transport of pesticides.

The Control of Pesticides (Sustainable Use) Regulations 2012 has continued to provide powers to control the storage of pesticides and reduce the impact of pesticides on the environment. The Regulations also provide that storage of pesticides is subject to **all reasonable precautions** being taken to protect people, creatures, plants and the environment.

Even when diluted, some pesticides are toxic to fish and other aquatic life. In extreme cases, one teaspoonful could be enough to kill all the wildlife in a watercourse. Small quantities of pesticides can be detected in water and the limits set for water abstraction for public drinking water are exceptionally low. As little as a tea-cup full of concentrate could be enough to cause the daily supply to a city the size of London to exceed the permitted limits (see Figure 2.19).

Figure 2.19



A spillage of pesticides. The quantities involved are sufficient to have a significant impact on local drinking water supplies and wildlife.

The Chief Fire Officers' Association (CFOA) and BASIS have established and agreed joint working arrangements which promote opportunities for the FRS to acquire operational risk information, including the risk to the environment, and to target fire safety resources towards higher-risk-to-life premises. The guidance is designed to assist FRS inspecting officers

responsible for inspecting BASIS-registered premises. Some FRSs have indicated that they will not be undertaking inspections any longer but periodically auditing the self-assessment risk assessments produced by the site; but environmental risk should be considered as part of the IRMP process and operational risk information inspections.

Agrochemicals are used as an essential part of efficient modern farming. Their use is seasonal with much larger stocks being held in farm stores in the spring and autumn. The manufacturers of agrochemicals often store them on premises remote from manufacture.

Agrochemicals are normally distributed through a network of distributors and intermediate distributors who should be registered with BASIS (Registration) Limited. The locations of such premises and distributors are notified to the FRS. Operators are required to comply with the safety provisions of the scheme, not only for storing these chemicals, but also when in transit.

These arrangements are recognised and supported by HSE/CRD as an industry standard for storing and distributing professional pesticides.

2.8.1 Protocol procedure

BASIS audits its members' premises annually to ensure compliance with industry requirements. Part of this audit involves the BASIS Assessor reviewing the fire risk assessment. BASIS supplies a risk assessment model to all its members; but members can use another model if they wish. The satisfactory completion of a suitable and sufficient fire risk assessment is a critical feature for the BASIS audit.

If the BASIS Assessor determines that the risk from the storage/process is low or medium, s/he will advise the relevant FRS so personnel can update any hazard information systems held. The FRS won't require a fire safety inspection, although the need for a 7(2)(d) and 9(3)(d) (FRS Act 2004) visit may be determined locally.

If the BASIS Assessor has assessed the premises as high-risk, s/he will advise the relevant FRS and request a visit by a FRS inspecting officer. The high-risk criteria will be allocated by the BASIS Assessor according to the quantities and type of storage. BASIS will inspect each high-risk premises annually and request a report from the FRS once every five years, as long as it remains in the high-risk category.

For operational information purposes, BASIS will notify the FRS of the risk category (A, B, C; A being the highest) allocated by the environment agencies to each site.

An environment agency contact will also be provided if the FRS needs more information. In the absence of information to the contrary, non-registered premises will be categorised as high risk.

2.8.2 Administrative arrangements

To enable BASIS to handle the bulk of correspondence electronically, FRSs should update BASIS with their email contact details. To avoid updating problems, this shouldn't be an individual's email address.

BASIS will initiate the process by contacting the relevant FRS using a standard letter. Once email contact has been established, notifications will be emailed. Where a premises has been inspected recently, the local fire safety manager will decide whether a site visit or a remote audit of the fire safety file is most appropriate.

Following a FRS inspection/audit of a BASIS-registered premises, the FRS should inform BASIS of the outcome. They should respond to BASIS within four weeks of receiving a notification.

2.8.3 Inspection/audit

BASIS-registered premises should be audited/inspected using the same inspection criteria as any other premises; the inspector makes an assessment of the fire precautions and determines whether these are adequate for the hazard. It is not the remit of the FRS officer to assess the appropriateness of the storage facilities or process; BASIS will have done this. Approval of a premises by BASIS doesn't preclude the FRS taking enforcement action. If enforcement action is necessary, BASIS should be informed with details of the reasons for action so they can update records.

During the inspection/audit, the FRS inspecting officer should collect any information required to meet local operational planning needs; environmental risks, new dimensions, Fire Service Emergency Cover data, access, water supplies, firefighting hazards, pollution control equipment and update the service information systems.

Inspecting officers should also consider whether the premises are subject to, and compliant with, the Dangerous Substances (Notification and Marking of Sites) Regulations 1990 (referred to as the NAMOS Regulations).

The NAMOS Regulations require the person in control of any site or premises where a total quantity of 25 tonnes or more of dangerous substances is used or stored – or is to become used or stored – to give written notification to both the FRS and the HSE. The HSE is the enforcing authority for notification of the storage of dangerous substances and, once notified, the fire authority is the enforcing authority for the marking of sites with warning signs. The fire authority is responsible for giving directions as to the quantity, type and location of signs (see Figure 2.20). Some exceptions exist.

Figure 2.20

Warning signs required by the NAMOS Regulations at a BASIS site.

2.8.4 Guidance for store holders

Those involved in the sale, supply and storage of pesticides approved for agricultural use must comply with the *Code of Practice for Suppliers of Pesticides to Agriculture, Horticulture*

and Forestry, otherwise known as the 'Yellow Code' and subsequent codes of practice incorporating the 'new' regulations (Control of Pesticides (Sustainable Use) Regulations 2012).

The Code recommends that environment agencies, the FRS and others should be consulted during the planning of a new store or the redesigning of an existing one (see Figure 2.21). Once a store has been built or commissioned, storeowners must notify the environment agency and the FRS in writing. All stores should hold written approval from the environment agency and the FRS issued after their primary inspection. These inspections consider means of escape, spillages of chemicals and firewater containment as well as firefighter safety.

Figure 2.21

A typical BASIS store. Store owners must notify the FRS and environment agencies once a store has been built or commissioned.

2.8.5 Contingency planning

Site operators who have complied with the registration scheme conditions will have a contingency plan for in-store and out-of-store spillages and fires. Employees will be trained in the correct response to incidents.

The contingency plan, which should be kept away from the risk area and be provided to the FRS on arrival (also see Section 2.3.5), should include:

- Detailed plans of the buildings and drainage systems
- A current stock list of chemicals stored and the maximum quantities likely to be held at any one time
- Contact details of a suitable waste disposal contractor able to deal with emergency disposal operations
- Name, address and telephone number of an out-of-hours contact

2.8.6 Drainage systems

On new sites, drainage systems outside the store containment areas should be provided with a drain shut off valve and if needed additional containment capacity in the event that firewater volumes exceed the bunded volume. Such valves should be clearly identified on the site drainage plans, and provided with durable on-site notices (see Figure 2.22).

On existing sites, if valves can't be installed, pipe blockers should be available in safe storage away from the main store; their whereabouts should be clearly marked and the position shown on the site plan.

Drain mats, sandbags (made of durable material) and absorbent materials should be held in safe storage away from the main store (in addition to any absorbents held within the store to deal with small spillages.

Other agencies also have an interest in contingency planning at BASIS sites, such as Environmental Health Officers, water companies and sewerage undertakers.

Figure 2.22

A remotely operated cut-off valve operated by a remote switch at a BASIS site.

2.8.7 Additional pollution control aspects of pesticide stores

From a pollution prevention viewpoint, a pesticide store (whether registered under BASIS or not), is treated as an industrial building containing chemicals potentially capable of causing serious pollution of surface and groundwaters. Environment agencies will apply the relevant pollution prevention and control policies, taking into account individual circumstances.

The principle applied to pesticide stores is of secondary containment (see Figure 2.23) for each storage building, with provision for emergency tertiary retention encompassing adjacent yards, access-ways and drainage systems. Some compromise may be needed for existing stores but must be acceptable to the environment agencies. A controlled burn may also be considered if it's not possible to contain all the firewater and there's a risk of serious water pollution, and/or a controlled burn will reduce air pollution (see Section 3.6, Controlled burn).

The presence of certain materials may affect the FRS's strategy of dealing with a fire on site, which could have consequences for the environment. The FRS will make a decision which strategy should be referred to in the store emergency response plan.

Figure 2.23

Secondary containment at a BASIS store will usually involve a ramp over entrances and a bund around the perimeter of the building.

2.9 High risk waste or recycling storage sites – operational planning guidelines

2.9.1 Introduction

This section provides guidance to FRS managers in preparing Operational Risk Information plans and/or advising site operators, Environment Agencies and/or other enforcing authorities on fire safety and response measures for sites storing combustible materials in bulk. In particular those storing waste materials such as:

- Rubber
- Wood
- Plastic
- Paper
- Refuse derived fuel (RDF) and solid recovered fuel (SRF)
- Waste electrical appliances
- End of life vehicles
- Compost
- Other combustible wastes

Fires at such facilities have become an increasing problem in recent years as waste is diverted from landfill to be recycled or treated. The effects of such fires can be many and include harm to firefighters, the public and the environment from:

- Toxic smoke plumes
- Firewater run-off
- Thermal radiation
- Hazardous waste and residues - produced by the fire and/or impacts of fire fighting
- Explosions and projectiles

These effects can be immediate and long-lasting.

They are also likely to be a significant incident for the FRS and other agencies to respond too as they can be; very large, difficult to extinguish, long lasting and require significant time and resources. There are often significant costs associated with such fires. These are not just to the polluter, FRS and other responders but also local communities and businesses due to the disruption and pollution that result.

Appropriate fire and pollution prevention measures, material storage arrangements and fire plans can prevent a fire starting in the first place or reduce a fire's impact if one should break out; for example, appropriate separation distances and/or firewalls to stop the spread of fire between stacks and/or to buildings and other features both on and off the site.

When dealing with such sites, Fire Officers should refer to fire safety and health and safety legislation on combustible stacks and employee safety and any local acts which may apply to storing combustible materials (see section 1.5, Relevant FRS law).

Fire Officers should be aware that if the materials stored are classified as waste, then waste legislation enforced by environment agencies will apply. Such legislation includes requirements on the operator to produce a Management Plan which must set out how they will prevent/mitigate the impact of accidents - including fires - on people and the environment. Environment agencies view fire prevention as pollution prevention and will require operators to take appropriate fire safety measures, as well as developing a fire response plan as part of the site's management plan. If these measures are not in place, they can take enforcement action.

But the environment agencies aren't fire safety experts; the FRS and environment agencies should therefore work together, and with the site operator, to agree:

- Fire safety measures, for example good site security, reducing the risk of self heating, maximum stack sizes and minimum separation distances between them (see below)
- A fire response plan for the site, which should include fire fighting tactics and how to manage firewater (see section 2.3 identifying 'at-risk' sites by operators)

Joint visits to support such work are encouraged.

To guide them, the FRS should check if there's any relevant generic or sector guidance. The Waste Industry Heath And Safety (WISH) Forum and Wood Recyclers Association (WRA), for example, have worked towards producing their own guidance in consultation with CFOA/EA and the HSE

The FRS and environment agencies should be mindful of the outcome they wish to achieve and be prepared to be flexible to allow solutions that recognise the characteristics of the site and enable the operator to run a successful business whilst still reducing risk to an acceptable level.

If an operator is uncooperative and won't follow best practice enforcement action may be considered and the FRS, environment agencies and if appropriate other regulators should decide between them which agency is best placed to take action as well as the level of support needed from the other parties.

Figure 2.24

Photo courtesy of Greater Manchester Fire and Rescue Service

The environmental impact of fires at bulk storage sites, such as stacks of used fridges, can be limited by applying restrictions on stack sizes and separation distances.

2.9.2 Stack sizing and separation

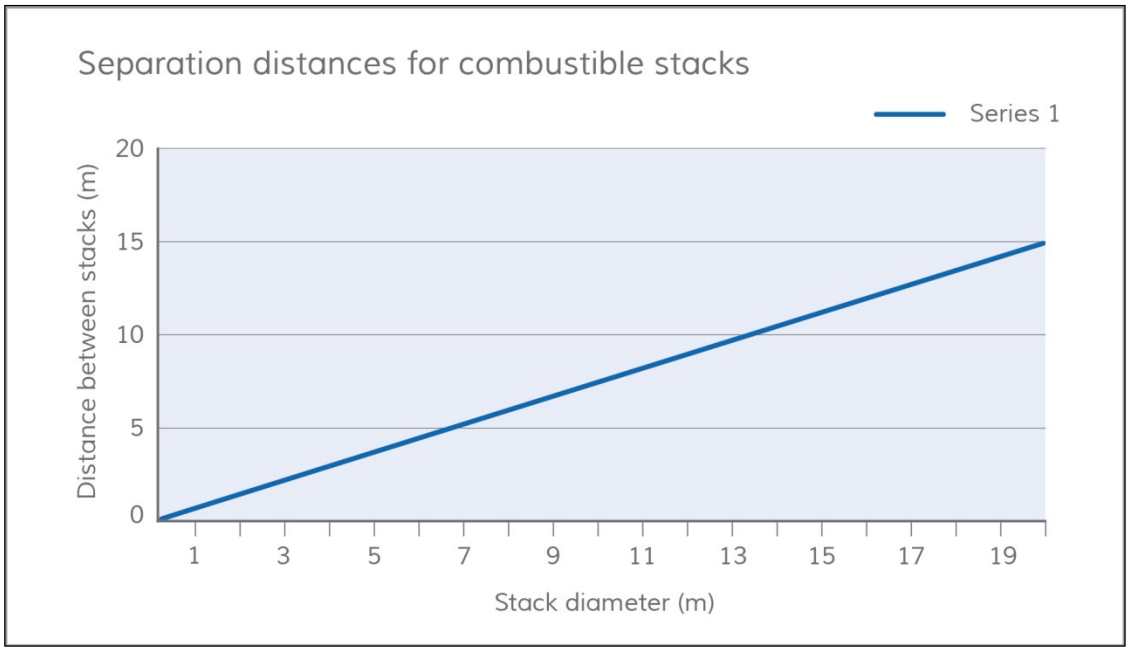
One of the most effective ways to reduce the risk of a fire spreading is by providing suitable stack sizing and separation distances. This is the advice:

Table 2.4 Calculation of the separation distance in stacks

	Diameter	**Distance**
Enter diameter of stack (or equivalent linear length) (metres)	6	
Enter radiant heat ignition (kw/m^2)	12.5	
Equivalent diameter M (metres)	6.769836	
R Value, including diameter of stack	7.780102	
Stack separation (metres)		4.395184

1. The stack size is presumed as a cylinder with a correction factor giving the equivalent diameter, the programme allows the parameters such as radiant heat, separation distances and diameter of the stack to be calculated.

2. Radiant heat equivalent is based on the sustained ignition of a timber surface from a pilot source in kw/$m^{2.}$



Materials should be stacked at distances that limit the growth of large fires and the spread of fire between stacks and to nearby buildings and property. Calculate separation distances using the calculations outlined in Table 2.3. An example of a typical stack size and proportional distance is shown. The calculation used for separation distances between wood stacks and between wood stacks, buildings or property is:

qrad = 15.45(R/D)-1.59
Where qrad = incident radiated heat flux
15.4 = constant for heat release rate from fire
R = distance to target from centre of stack
D = diameter of the stack (equivalent)
–1.59 = proportionality constant1
This assumes that the maximum allowable radiated heat incident on an adjacent body to be 12.5 kW per square metre (piloted ignition for wood).

The calculation is based on broad assumptions and is considered suitable to apply as simple heat release models for determining stack separation distances. More detailed examinations of heat release models are available in published literature.

The local FRS should formulate detailed and site-specific advice on means of escape, adequacy of water supplies for firefighting and fire appliance access.

2.9.3 Firefighting tactics

Fires in stacks can be particularly difficult to extinguish using conventional firefighting approaches. Direct application of water, with or without firefighting additives such as foam, to burning stacks is often ineffective and may generate large volumes of polluted firewater and/or more smoke due to lower combustion temperatures. This is particularly the case at sites storing treated wastes such as tyre crumb, wood chip, compost, due to their small particle size and the density of the stack.

FRSs should refer to any recognised guidance for fighting fires at waste sites, They may need to consider other tactics such as separating burning material from the fire and quenching it with water jets, or in pools or tanks of water, which has the advantage of reducing the

amount of contaminated firewater to be contained to avoid water pollution, and/or use of a controlled burn. See Section 3.7, Controlled burn and Table 2.3 below.

2.9.4 Fire safety legislation

Stacked storage sites may be deemed a workplace and should comply with the Regulatory Reform (Fire Safety) Order 2005. Compliance with the recommendations outlined below should help operators meet the requirements of the legislation.

Where combustible waste materials, such as used tyres, waste wood or end-of-life vehicles (see Section 2.9), are stored or treated, a waste management permit, licence or exemption issued by environment agencies will be required, (see 2.9.1). A requirement of the permit, licence or exemption is that the operator takes measures to prevent or mitigate the impact of accidents including fires. Environment agency staff are not fire safety experts and are encouraged to seek the views of their local FRS during the permitting/licensing process. FRSs should support such requests as well as any subsequent compliance assessments and/or enforcement action taken by environment agencies if an operator fails to comply.

New waste sites will also need planning approval from the local authority. Fire safety officers who comment on planning applications for such sites should make recommendations that fire safety provisions are made in line with this section of the guidance

The local planning authority can impose conditions requiring adequate water supplies for firefighting as well as the normal requirements of the Town and Country Planning Act 1990. When assessing the requirements for the fire safety of the employees and site conditions, the operator must confirm:

- The adequacy of local water supplies for firefighting
- Provisions for limiting fire spread
- Access for firefighting appliances
- Firefighter safety

Consultation should take place with all relevant enforcing authorities for permitting, licensing and/or planning approvals. Joint visits where appropriate to support such approvals are recommended

Table 2.5 is a checklist for FRS managers to use when considering the implications of fires involving large amounts of combustible materials which also addresses the safety of firefighters and the public.

Figure 2.25

Storage of waste such as used tyres is controlled by either permits or licences issued by environment agencies.

Table 2.5: Checklist for assessing the risk to the environment from stacked storage facilities

1 Description of site • How are the materials/units stacked? • Number/quantity of materials/units on site? • Is the material combustible or do units contain combustible material (e.g. insulation materials, plastics)? • Are any processed or recovered materials stored awaiting disposal? • Are sources of ignition separated sufficiently from combustible and flammable materials. • Are stacks at or below maximum recommended sizes? • Are the distances between stacks, buildings and other structures, sufficient to limit fire spread from radiated heat? • Is there suitable and sufficient first aid firefighting equipment and trained staff? • Are the means of escape in case of fire between stacks and from the site adequate? • Is there access around the stack perimeter for firefighting appliances and operations? • Is there an adequate water supply available for firefighting? • Is water or foam likely to be effective or will other fire fighting tactics be needed • Is there a site plan available for use by the FRS for operational planning?
2 Open water and hydrants for firefighting • Is an HVP/hose layer appliance required if a fire occurs at the facility? • Are suitable open water supplies identified and available? • Have hydrant locations been identified? • What are the expected flow rates from the hydrant supply?
3 Access. Is access restricted by: • Prevailing winds causing smoke and fumes around access areas? • Terrain? • Buildings? • Security fencing?

4 Environmental considerations

- Is the site drainage adequate, and where's the likely destination of a spillage and/or firewater?
- Are local watercourse vulnerable
- Do you know which local surface waters and/or groundwater firewater run-off will flow to and how much may be affected by firewater run-off?
- Where's the nearest sewage treatment works, and does it have the capacity to contain and or treat firewater run-off?
- Are there suitable firewater containment facilities on site? Should the EPU/Pollution Control Equipment be deployed?
- If firefighting foam is used, can it be contained?
- If firewater can't be contained, is a controlled burn suitable?
- Is a controlled burn also the best option for air quality and/or fire fighter safety?

Wind direction

- Are there surrounding properties and residential areas that might be affected by smoke in prevailing winds?
- Is there planned advice to tenants and occupiers concerning keeping doors and windows closed, etc?
- Has plume modelling information been considered in advance to identify vulnerable populations, for example hospitals, schools, and residential homes?

5 On-site personnel

- Is there a plan to ensure evacuation of site workers?
- Has firefighter safety been considered within the stack design if a fire occurs?
- Has potential fire development on and around the site been assessed and the operational plan formulated?

6 Rendezvous point(s)

Location of FRS primary and secondary rendezvous points and Incident Command location bearing in mind the slope of the ground and prevailing wind.

When considering rendezvous points:

- Are they located appropriately?
- Do they provide sufficient space for PDA?
- Do they have marker plates provided?
- Are there alternative locations?

2.9.5 Waste crime and information sharing

The Environment Agency leads on the investigation and enforcement of serious waste crime which is often organised, large-scale and profitable. Priority waste crime types include large-scale illegal dumping, illegal waste sites and illegal exports of waste. The Environment Agency will also take remedial action to reduce risk, if there's an imminent threat of significant flooding or pollution from the illegal disposal of wastes. It uses an intelligence-led approach to tackling waste crime; this involves achieving a better understanding of the whole waste crime picture to address the root causes of the problem rather than just dealing with the symptoms. Intelligence analysis assists in gaining and understanding waste crime activity and trends. It also helps to identify priority offenders responsible for the most serious types of waste crime. The FRS and environment agencies should share information where illegal waste

activity is suspected or identified as part of a strategy to reduce the incidence of waste fires and fly tipping of hazardous materials.

2.10 Training

One key element to the successful implementation of the FRS and environment agencies' partnership has been the development of training courses and supporting materials. These have been designed for FRS personnel and delivered in the UK at the Fire Service College and the Scottish Fire Training College at Gullane, as well as at regional and local levels. The courses and materials are continuously reviewed and the colleges can be contacted for details.

The NESG commissioned a report (OHES 2005) to examine the delivery of environmental training within the FRS. The report recommended adopting a structured approach to environmental training that could be delivered centrally, regionally, at local FRS training centres and fire stations. Based on its recommendations, this section of the guidance outlines the identified training needs for the various roles within the FRS.

2.10.1 Firefighter

Firefighters must receive initial and ongoing training on environmental protection. This is reflected in Unit FF5, 'Protect the environment from the effects of hazardous materials' in the firefighter role map. This unit requires that individuals understand why they are protecting the environment, how to most effectively use pollution control equipment and techniques, and have knowledge of the local environmental hazards (aspects) and risks (impacts).

Figure 2.26

Photo credit – Lancashire Fire and Rescue Service

Firefighters should be aware of basic concepts of environmental protection including the use of equipment such as the grab pack shown here.

During initial (Phase 1) development, trainees should learn the basic aspects of pollution and its impact on ecosystems, public drinking water supplies, public health and other recreational and economic activities.

They should acquire the ability to select and deploy pollution control equipment carried on fire appliances (see Figure 2.26) within the concepts provided by the 'hierarchy of pollution control' (see Section 3.2.7).

During Phase 2, development in the workplace, they should also be able to select and deploy the pollution control equipment carried on specialist Environmental Protection Units or equivalent. The Environment Agency DVD *In Partnership Towards a Safer and Cleaner Environment* has been designed to support this. They should also be able to identify significant local environmental hazards and the risks they pose to the environment (see Section 2.3, Identifying 'at risk' sites by operators) this includes the ability to identify environmentally sensitive receptors, such as surface and groundwaters and areas where pollution could threaten drinking water abstractions and important ecosystems.

2.10.2 Crew manager

Firefighters progressing to this role make decisions and initiate actions during the initial stages of an incident; they are in an influential position to prevent or reduce environmental damage. During their development, crew managers should gain knowledge of:

- Basic environmental concepts
- Pollution causes, types and effects
- Environmental legislation and the role of environment agencies
- Partnership initiatives including the interaction between FRS and environment agency officers
- Pollution control at incidents explaining the source–pathway–receptor concept
- Tactical options and techniques for dealing with spillages and firewater run-off
- Pollution control equipment supplied by environment agencies (or others) and its effective use
- Hazards and risks to the environment which may arise from operational or other activities

This knowledge should be expanded by:

- Case studies
- Desktop exercises involving environment protection measures
- Practical exercises using equipment

Crew managers should also be able to:

- Include environmental risks within the dynamic risk assessment (DRA) process
- Assign an appropriate priority to environmental protection measures based on the DRA (see section 3.4)
- Develop incident management strategies using first responder pollution control equipment and identify the need for specialist equipment

During workplace development, crew managers should gain awareness of:

- Local premises that present identifiable and significant environmental hazards and risks
- The need to manage environmental inputs and outputs, such as water, energy and waste, in their area of local responsibility, for example a fire station

2.10.3 Watch manager

During workplace development, watch managers should gain the ability to:

- Assess likely hazards and risks from local premises or facilities and plan, together with other stakeholders, to manage these at emergency incidents (also see the Environment Agency's Pollution Prevention Guidance No. 21 and Section 2.3.3)
- Train firefighters in the basics of environmental protection
- Manage the environmental hazards and risks of premises such as fire stations and the training school

2.10.4 Station manager

During their development, station managers should:

- Identify and manage environmental hazards and risks arising from work-based activities
- Identify hazards and risks from larger, more hazardous premises, for example COMAH/EPR sites and plan with stakeholders to reduce or manage these, including the level of operational response
- Work with stakeholders at the planning stage to provide solutions to reduce environmental hazards and risks of premises and their contents
- Manage larger incidents where environmental hazards and risks are substantial
- Understand strategic environmental issues associated with incident management at larger incidents including decontamination, the use of foam,, controlled burn, firewater and spill containment and the management of waste

This should be achieved by theoretical training supported by desktop and practical exercises to reinforce environmental protection in relation to operational priorities.

2.10.5 Group manager

People operating in this role should be able to produce systematic environmental risk assessments of the hazards and risks in the FRS area and produce systems and procedures to mitigate risk and develop tactics to deal with associated incidents.

2.10.6 Area manager

Area managers should be aware of FRS strategic responsibilities in relation to environmental risks and controls, involvement in incident command, and community and partnership working. This should include:

- The partnership initiative, including the development of Local Working Arrangements
- Summary of key national, European and international issues affecting the environment:
- Climate change
- Kyoto and other international agreements
- EU/UK legislation
- Public attitudes
- Likely future issues, how these are likely to be tackled and how they affect the FRS
- Roles of UK environment agencies and other environmental bodies
- Risk-based environmental regulation
- The legal and moral issues associated with FRS actions at incidents and the working relationships with environment agency personnel, particularly at larger incidents

2.10.7 Brigade manager

They must be able to carry out strategic impact assessments including consideration of large-scale pollution events.

2.10.8 Hazardous materials and environmental protection officers (HMEPOs)

HMEPOs or equivalents must understand the consequences of hazardous materials entering the environment and know the protocols and techniques which could be used to protect the environment.

FRS managers who are likely to be in command of an incident involving hazardous materials and/or environmental risk, or are likely to perform the specialist advisory role of HMEP Officer should receive specialist environmental training (see Figure 2.22). This training should supplement that received by non-specialist operational fire officers as part of their role preparation, with emphasis on larger-scale incidents where there is significant environmental risk.

2.10.9 Training video/DVD

The environment agencies produce a variety of training aids to help increase environmental awareness in the FRS, for example its DVD *In Partnership Towards a Safer and Cleaner Environment – The Environment Agency Grab Pack*. These and other environment agency training aids can be obtained by contacting either local or regional representatives.

2.10.10 Local training initiatives

Locally arranged training initiatives have formed an ongoing if largely unstructured part of developing the partnership initiative. Joint exercises have always proved to be beneficial and can be carried out at the request of either party.

Local training sessions can improve liaison between the FRS, environment and other agencies and raise awareness of environmental protection and either party's incident response capability. They can also address other operational issues such as equipment deployment techniques and the effective provision of incident command support. Equipment suppliers may deliver this training through local agreement (see Figure 2.27).

Figure 2.27

Local training initiatives between FRS and environment agency personnel can improve liaison at local level and may be delivered by equipment suppliers through local agreement.

Training of this nature should be undertaken by anyone who might become involved in dealing with emergency incidents, including hazmats specialists. Training activities should address local information and environmental sensitivities and vulnerabilities.

2.10.11 Environment agency officer training

Training sessions for environment agency officers can provide them with an awareness of FRS Incident Command issues and incident ground protocols. Many environment agency officers have already benefited from participating in local FRS awareness/familiarisation training sessions or courses at the Fire Service College. FRS managers should encourage and support this training/experience.

Figure 2.28

Photo courtesy of the Fire Service College

Environment Agency staff at a HMEP training exercise at the Fire Service College.

2.11 The End-of-Life Vehicle (ELV) Regulations 2003 and use of other wastes during training

Controls on end of life vehicles (ELV) are imposed through the End-of-Life Vehicle Regulations and the Environmental Permitting Regulations. The aim of the regulations is to reduce or eliminate the environmental impact caused by polluting materials contained within scrapped road vehicles. The storage and treatment requirements are now referenced out to the standards specified in the End of Life Vehicle Directive. The regulations are enforced by environment agencies in the UK. They are relevant to the FRS because of their use of end-of-life vehicles to simulate rescuing people trapped in RTCs. Figure 2.29 depicts a typical RTC training event.

The regulations control the recovery and disposal of vehicles that have become waste (scrap) and their polluting contents as well as ensuring that they are de-polluted in an environmentally effective way. A vehicle becomes waste when it has been discarded, or is intended or required to be discarded. Vehicles recovered by local authorities will normally become waste after the statutory period for retaining them expires.

The ELV Regulations require all facilities (such as scrap yards) wishing to store, dismantle and de-pollute vehicles to obtain a permit. Permitted vehicle dismantlers are known as Authorised Treatment Facilities (ATFs). The permits specify the conditions under which storage and de-pollution may be undertaken to minimise the risk of pollution to the environment or harm to human health (including from fire). The transportation of such vehicles must be by a registered waste carrier.

Figure 2.29

Photo courtesy of Oxfordshire Fire and Rescue Service

Legal requirements are in place to control the storage and treatment of scrap vehicles including those used for RTC training.

2.11.1 Impact of the ELV Regulations on FRS RTC training

Under the regulations, the FRS should have a permit for storing and using vehicles in training exercises but the Environment Agency has set out in a Regulatory Position Statement (RPS) that it won't normally enforce this provided certain criteria are met.

This gives two options for using scrapped vehicles for training:

- Vehicles can be obtained from a permitted/licensed ATF or a local authority and delivered to fire stations and collected after use subject to the conditions set out in the EA RPS, or
- Crews might visit licensed/permitted ATFs to undertake training on vehicles.

If FRS vehicle workshops want to de-pollute scrapped vehicles before they are used in training they themselves must become an Authorised Treatment Facility, which will not normally make sense financially.

Further guidance for FRS that wish to source vehicles for training purposes is available in the Environment Agency Regulatory Position Statement. (RPS) 'The use of end of life vehicles and other controlled wastes for training purposes and in demonstrations by the emergency services and armed forces'. A copy is included in Appendix 11.

The preferred option is to use depolluted vehicles that have had all oils and polluting substances and components removed although leaving shock absorbers and air-bags intact where necessary is acceptable. But if FRSs wish to obtain vehicles which have not been depolluted additional requirements must be met. During RTC training, it's possible that

polluting fluids, such as engine oil, coolant, brake or clutch fluid, suspension fluid, will be spilt and enter drainage systems that discharge either to a Sewage Treatment works and/or a watercourse or groundwater. Such discharges are likely to be an offence under pollution control legislation (see Section 1.4, Environmental law). This can occur even if separators (also known as interceptors) are installed on site because separators only retain floating liquids such as oils, while other liquids such as coolants pass through the system (see Section 1.6.5, Oil separators).

FRS personnel wishing to use such vehicles need to ensure that drainage from these areas passes either to:

- A fully contained bunded training area with any spilt liquids collected by a registered waste carrier (the preferred option), or
- The public foul sewer, subject to the consent of the local sewerage undertaker

After use, the vehicle can only be passed to a licensed/permitted ATF as a vehicle still needing de-pollution treatment. The necessary DVLA paperwork will also have to be completed.

Seek further advice on how to manage and dispose of ELVs or containment facilities that may be required from the relevant environment agency.

2.11.2 Use of other controlled wastes by FRS during training

FRS may also want to use other wastes such as waste electrical and electronic equipment in training exercises, fire investigation work or for demonstration purposes. FRS wishing to use such wastes can do so without the need for an environmental permit, providing they follow the requirements of the Environment Agency RPS on FRS training. See Section 2.11.1

2.12 High-volume pumps (HVPs)

As part of a review of civil contingency arrangements, the government supplied high-volume pumps (HVPs) to the FRS. Their primary function is to deal with the movement of flood water or at other incidents with the potential to cause flooding, for example embankment failure. Procedures have been drawn up between the FRS and environment agencies for these situations. HVPs may also be used to provide water for firefighting. When water for the pumps is taken from surface waters, care must be taken not to over-abstract as this can place ecosystems and drinking water supplies at risk.

The Environment Agency is responsible for issuing licences for the abstraction of water that exceeds 4,400 gallons a day. By virtue of Section 32 of the Water Resources Act 1991, the FRS is exempt from the restriction on water abstraction:

a) For firefighting
b) For testing apparatus used for fire-fighting or training in the use of such apparatus

But each time HVPs are used to abstract water for firefighting or training, the environment agency must be notified.

To enhance pollution prevention and mitigation capability at operational incidents attended by HVPs, grab packs have been provided for every HVP in England and Wales.

An additional FRS use of HVPs is at incidents where contaminated water or other products with the potential to pollute need to be pumped to an environmentally safer location, such as

a containment tank or lagoon. Table 2.5 provides some possible uses for HVPs and other fire service pumps (e.g. light portable pumps) at pollution incidents.

Any proposal at planning stage to use this equipment at operational incidents should be subject to a generic risk assessment, supported by suitable safe systems of work and training. Before use, a dynamic risk assessment, including seeking technical advice – for instance, from a HMEPO or product specialist – should be carried out and recorded.

Environment agencies maintain a range of pumps at locations in the UK. These can be operated alongside FRS pumps to support, supplement or replace FRS pumps at longer incidents.

The transfer of pollutants from one location to another isn't an FRS function except as an operational tactic during the emergency phase of an incident. Where harmful or more hazardous products are involved, such tactics should only be considered when the benefits outweigh the potential risks and are documented in a written environmental risk assessment. During FRS activities where there is an operational need to transfer product to reduce or prevent environmental impact, environment agencies will work with the FRS to achieve a satisfactory outcome.

Figure 2.30

High-volume pumps (HVPs). Although designed for removing flood water, HVPs can also be used to transfer pollutants or run-off water, subject to a risk assessment.

The technical specification of each HVP is:

- Capacity: 7,000 l/min (7 m3/min, 420 m3/hr, 116 l/s)
- Lift: 60 m
- Hose length per HVP set: 3 km
- Hose diameter: 150 mm
- Hose fittings: manifold with 150 mm Storz coupling to FRS standard 70 mm hoses
- Pump drive: hydraulic
- Dimension of strainer holes: 7 mm
- Required attendance: 5 people minimum (for deployment)

2.12.1 HVP decontamination

Following any operational deployment where a HVP and its equipment becomes, or has potentially become, contaminated, action must be taken to remove the contaminants and leave the equipment safe and ready for future use; but the decontamination must be carried out correctly.

Legal issues

Under Regulation 38(1) (a) Environmental Permitting Regulations 2010, there's no defence if pollution is caused as a result of decontaminating FRS equipment unless there's a threat to people if the decontamination isn't carried out before pollution prevention measures can be instigated.

When using HVPs at incidents, the potential for the need to decontaminate HVP equipment must be identified as soon as possible. This will embed the requirement in the HVP deployment plan and environmental analytical risk assessment at the earliest opportunity. Early consideration should be given to acquiring technical advice from:

- The relevant environment agency
- FRS hazardous materials environmental protection officer (HMEPO) or DIM officer
- FRS HVP subject matter advisors (SMAS)
- Local sewerage undertaker

By initiating a timely HVP environmental protection and decontamination plan, the FRS can demonstrate compliance with the Environmental Permitting Regulations 2010.

2.12.2 Procedures

Planning

To decontaminate HVP equipment there has to be a place with adequate space and suitable drainage; FRS personnel should discuss this with the environment agency and local sewerage undertaker. Where appropriate, the FRS should enter into an agreement with the owners of a potentially suitable location to secure its use for decontamination as and when it may be required.

For local scale incidents, a survey of FRS station drainage systems will serve to identify local sites that may be appropriate for decontaminating HVP equipment.

Procedures

The first action before beginning the process of cleaning contaminated equipment is to seek technical advice from one or more of the sources listed above; the contaminant(s) has to be identified to decide on the correct course of action.

Contact should be made at the earliest opportunity with the local environment agency officer and sewerage undertakers to inform them of any potential HVP decontamination plan if it has been deemed necessary. Consideration should be given to decontaminating the equipment at the site of the incident, to negate the risk of spreading the contaminant beyond what is already a 'dirty zone'.

The approved guidance for potential decontamination of HVP equipment following a deployment can be broken down into three categories of incident:

- Level 1/2 local Incidents
- Level 3 regional scale incidents
- Level 4 national scale incidents

Level 1 & 2 (local incidents)

These are incidents that are dealt with by the host FRS. For this class of incident, the host FRS would normally carry out its own decontamination of HVP equipment. The assistance of a local FRS HMEPO or DIM Officer should be considered for advice on the nature of the contaminant.

Level 3 (regional scale incidents)

These are incidents that are dealt with by the host FRS and/or its regional neighbours. The decontamination process for this level of deployment will mirror that for level 1 & 2 incidents. Depending on the circumstances, it may be deemed appropriate to adopt some or all of the decontamination arrangements detailed for level 4 national scale incidents.

Level 4 (national scale) incidents

These are incidents that require resources from outside the home FRS region via the FRS National co-ordination centre (FRSNCC). The decontamination and repatriation of assets may be carried out by the National Resilience Prime Contractor working in conjunction with officers from the FRS National Resilience Assurance Team (NRAT).

An invoice for this service will be sent to the host FRS. The National Resilience Prime Contractor will already be at this scale of incident in support of the HVP capability.

Following discussion with the host FRS over the decontamination process, the National Resilience Prime Contractor may make arrangements to decontaminate and repatriate all the attending HVP assets.

Disposal of contaminated water and associated wastes at incidents

The guidance described in section 1.6.6, Protocol for the disposal of contaminated water and associated wastes should be followed to ensure the safe disposal of contaminated water and wastes arising from washwaters, firewater run-off, spillages and contaminated potable water.

Decontamination of HVPs and equipment following flooding

The following advice on the decontamination of HVP equipment directly follows guidance issued by the National Environmental Operations Group (NEOG) on decontaminating FRS equipment following flooding.

Vehicles (prime mover)

It's unlikely that prime movers will have been subject to any gross contamination during normal operations. These vehicles should be washed down as normal within designated areas on fire stations or at a purpose-built vehicle cleaning centre for example lorry/coach wash facility.

Pumps, hose, couplings and ancillaries

If an HVP has been used to pump river water, or similar, it's unlikely to require decontamination. All equipment should be flushed with clean mains water allowing the run-off to drain as normal.

Floodwater (low level contamination)

Flush all equipment with clean mains water and allow run-off to discharge to a foul sewer, with the local sewerage undertaker's approval.

Floodwater (high level contamination for example sewage)

For health and safety reasons, consider using detergent or bleach for the decontamination process after assessing the risk that this might have on HVP equipment. Only equipment which is known to have been contaminated is externally decontaminated using the above products. In this case, run-off water and any flush water used on equipment internally should either be contained and removed by a registered waste carrier or be discharged into a foul sewer with the local sewerage undertaker's approval. Liaison with the environment agency and local sewerage undertakers must take place before this method of decontamination.

Table 2.6: Possible uses of high- volume and other pumps at pollution events

Type of Pollutant	Example Situation	Destination of Material	HVP or other pump use suitable
Low toxicity or harmful substances	Product or Firewater contained on the roadway or similar	Foul sewer or containment area/tank	Yes, with permission of sewerage undertaker and environment agency. Consider appropriate personal protective equipment, compatibility with FRS equipment and decontamination of equipment.
Organic liquids/ sludge's, for example foodstuffs, silage liquor	Spillage of Milk contained in sewer or dammed watercourses.	Open land*, foul sewer* or *contaminated area/tank	Yes, with permission of landowner, sewerage undertaker of environment agency etc.

Type of Pollutant	Example Situation	Destination of Material	HVP or other pump use suitable
		(*Not if ground is saturated, land drains are present and/or located within the source protection zone and/or conservation site)	
Flammable liquids with firefighting water	Spilt fuel, foamed and contained in bunded area threating to overspill	Contaminated lagoon, balancing pond or other containment facility.	Yes, in liaison with environment agency. Avoid transfer of product itself. Only use water-driven pumps.
Inorganic solution, slurries, mixtures, suspensions/ colloids	Spillage of printing ink, non-organic, or silty water or cement slurry following breach, for example, of a balancing pond at a quarry into dammed stream	Pump to foul sewer or sealed tank or balancing pond. Or for cement slurry divert to an area where it can be contained and allowed to set and then remove.	Yes, with permission of sewerage undertaker or in liaison with environment agency. Consider possible corrosion and abrasion damage potential.
Firewater	Large food processing unit	Recycled firewater run–off and reapply to incident	Yes, need to ensure that firewater run-off is not harmful to firefighters or would worsen the fire or safety situation.
Contaminated Water	Flooded mineshaft threating to overspill	Pump to foul sewer lagoon, balancing pond or other containment	Yes, with permission of environment agency, and sewerage undertaker if to foul. Consider appropriate protective equipment and decontamination of equipment.

Chapter 3

Protecting the environment at incidents

3.1 Communication with environment agencies

FRSs have a system for notifying environment agencies of incidents they are attending that could cause environmental pollution. This is one of the most important elements of the partnership as it helps ensure quick and appropriate action to prevent or mitigate pollution. It should also ensure that the FRS complies with the notification element of the three-part defence available in pollution control legislation (see Section 1.4, Environmental law) if pollution results from its activities.

FRS Control centres should report incidents in line with locally agreed criteria. Examples include those involving hazardous substances, fires requiring four or more pumping appliances and/or the use of fire fighting foams. Appendix 4 lists a set of suggested reporting criteria for when this should happen, which can be modified to meet local need.

Incident commanders should consider informing or liaising with environment agencies whenever there is a potential for pollution, or pollution has already occurred; this includes FRS activities that may themselves give rise to pollution. Examples include:

- Decontaminating personnel/casualties
- Offensive firefighting tactics
- Use of controlled burn
- Recovery of a damaged but intact vehicle such as a milk tanker

The transmission of such information to environment agencies might only be possible when operational priorities allow but, in all cases, every effort should be made to report the information as soon as possible.

When there is no immediate risk to life or health (see Section 1.4, Environmental law), permission from the environment agency and/or the sewerage undertakers must be sought before any discharge of polluting material to a water body or sewerage system is made (see Section 1.6.6, Protocol for the disposal of contaminated water and associated wastes at incidents). An example would be cleaning contaminated hose lines or pumps after the emergency phase of an incident (see Section 2.12, High-volume pumps). No legal defence exists for pollution caused in non-emergency situations.

When the FRS informs them of a polluting or potentially polluting incident, environment agencies will consider the information and offer advice and help. This will initially be over the phone via FRS Control. For more complex incidents or where specific advice is required, direct communications between officers at the incident and the environment agency should be established, normally by mobile phone, until the environment agency officers can get to the site, if required. Systems should also be established to log decisions and advice, normally with FRS Control.

Environment agencies will try to attend all incidents involving a significant or potentially significant environmental impact and may attend other incidents involving a reduced risk where the Incident commander requests it, or for other reasons, for example an incident at a locally sensitive site. In all cases, the environment agency's decision to attend, or not, will be communicated giving an estimated time of arrival at the incident (see Section 3.6.1).

The use of the term, 'For information only' has caused confusion when the FRS has contacted the Environment Agency Incident Communication Service (ICS) to report incidents. This term should not be used when reporting incidents.

When FRS Control, fire station personnel or other departments receive information from landowners, premises operators or other members of the public that:

- Polluting activities are taking place or are proposed (e.g. burning large quantities of waste)
- Discharge of potentially polluting matter onto land or into water is planned
- Illegal activity is taking place, for example unregulated waste storage

they should inform the environment agency immediately and provide contact information. This will allow preventative or enforcement measures to be implemented.

3.1.1 Radioactive substances

Where radioactive materials might be involved in an incident, FRS Controls must inform environment agencies immediately for advice on how to handle the incident in the best practical, environmentally sound manner. In particular, they may provide radiological advice relating to the possible contamination of drinking water sources and may authorise the disposal of any radioactive waste. Contact with the environment agency may occur simultaneously with Radsafe or NAIR responders.

3.2 Environmental protection operational strategies and techniques

Environment agencies recognise the unique position that the FRS holds as primary responders to incidents. It's often only the FRS that can initiate early intervention to control pollution and prevent environmental damage and minimise clean-up costs. Successful deployment of pollution control equipment may bring about a more rapid resolution of the overall incident, releasing FRS resources to attend other incidents. With the exception of Scotland, where funding is direct from the Scottish Government, environment agencies have provided pollution control equipment to the FRS. This equipment can be categorised as either 'first strike' equipment such as the grab pack designed for carriage on front-line pumps, or 'specialist equipment' designed to be carried on a dedicated vehicle or environmental protection unit (EPU). Guidance on pollution control equipment and techniques for its use can also be found on the environment agencies' *In Partnership Towards a Safer and Cleaner Environment* training DVD issued free to the FRS (see Section 2.8, Training).

Standardisation has been a key development in the national equipment supply initiative. This has ensured the selection of the most appropriate equipment for the task that's compatible with neighbouring FRS and environment agencies, and has simplified training requirements.

The equipment supplied to or purchased by FRS reflects the emergency containment emphasis placed on FRS as opposed to any protracted clean-up which is not normally an activity for the FRS. The polluter, their contractor, the landowner or, if they're not identified and there is an immediate threat to the environment, the environment agency will normally undertake clean-up.

As a standard, every pumping appliance should be equipped with the basic grab pack. The quantity and type of additional and specialist equipment supplied to the FRS may vary

depending on local environmental hazards, vulnerabilities and funding, based on a risk-assessment.

3.2.1 Risk assessments

The responsibility to undertake generic risk assessments for the equipment supplied by environment agencies for use by firefighters rests with individual FRSs. Risk assessments should be completed using the product data sheets and product description information provided by manufacturers. These risk assessments must link with other associated safe systems of work (operational procedures) such as those for hazardous materials incidents. FRSs may wish to share risk assessments through regional liaison groups to establish a level of consistency and avoid duplication.

3.2.2 Equipment list

Table 3.1 and Figure 3.1 display items the environment agencies provide for the standard grab pack and other more specialist pollution control equipment. A catalogue of this equipment is available from environment agencies.

> Environment agencies don't normally provide oil or chemical absorbing granules, powders and/or fibres. Highway Agencies may utilise such materials at RTC's and maybe willing to provide them to FRS upon request.

The selection and deployment of environment protection equipment is based on breaking the source–pathway–receptor linkage (see Section 2.3, Identifying 'at-risk' sites by operators). At any potentially polluting incident there may be opportunities for positive intervention aimed at disrupting this linkage. A hierarchical model for such intervention is in Figure 3.2.

The hierarchy aims to contain polluting materials at the earliest opportunity to minimise both the quantities lost and spread of contamination. This is used to bring order and control to an event using existing resources/facilities at the incident with the deployment of carefully selected pollution control equipment. The principle behind this approach is that the more dispersed the pollutant, the more difficult it will be to recover (see Section 1.2, Ecology and environmental science). All five stages of the hierarchy require a DRA to be undertaken within the parameters of an appropriate safe system of work and appropriate personal protective equipment (PPE) worn as recommended by the Emergency Action Code system.

Table 3.1 Standard grab pack and more specialist environment protection equipment

Grab pack equipment
Grab pack bag (empty)
Laminated instruction sheet
Ready-mixed leak sealing putty in collapsible tub
Disposable clay drain sealing mat (45 x 45 cm)
Oil absorbent pads (45 x 52 cm approx.)
Polyboom (yellow) x 10 m length
Plastic waste bag (approx. 120 x 180 cm)
Cable ties x 2
'Miscellaneous' hazard diamond (self-adhesive) (100mm)
Roll of warning tape
Pop-up pool (optional)
EPU equipment
Supply of individual grab pack contents in greater quantities

Grab pack equipment
Polyboom – 100 m length Overpack drums (various sizes 114 – 360 litres) (with castellation) Pop up pools (100 or 250 litres) (these may also be carried on front-line appliances) Flexi-tank Flexi-tank liners Water turbine pump (peristaltic pump) Chemical and oil absorbent pads (45 x 45 cm or 45 x 52 cm) Inflatable drain blocker with lance (these may also be carried on front-line appliances) River boom (various lengths) fitted with lines and wooden securing stakes Larger booms and inflatable drain blockers for containment of firewater, wash waters and spillages may be supplied by Environment Agencies on request or purchased by FRS themselves.

Figure 3.1

Photo courtesy of Darcy Products Ltd

Standard grab pack contents

Figure 3.2

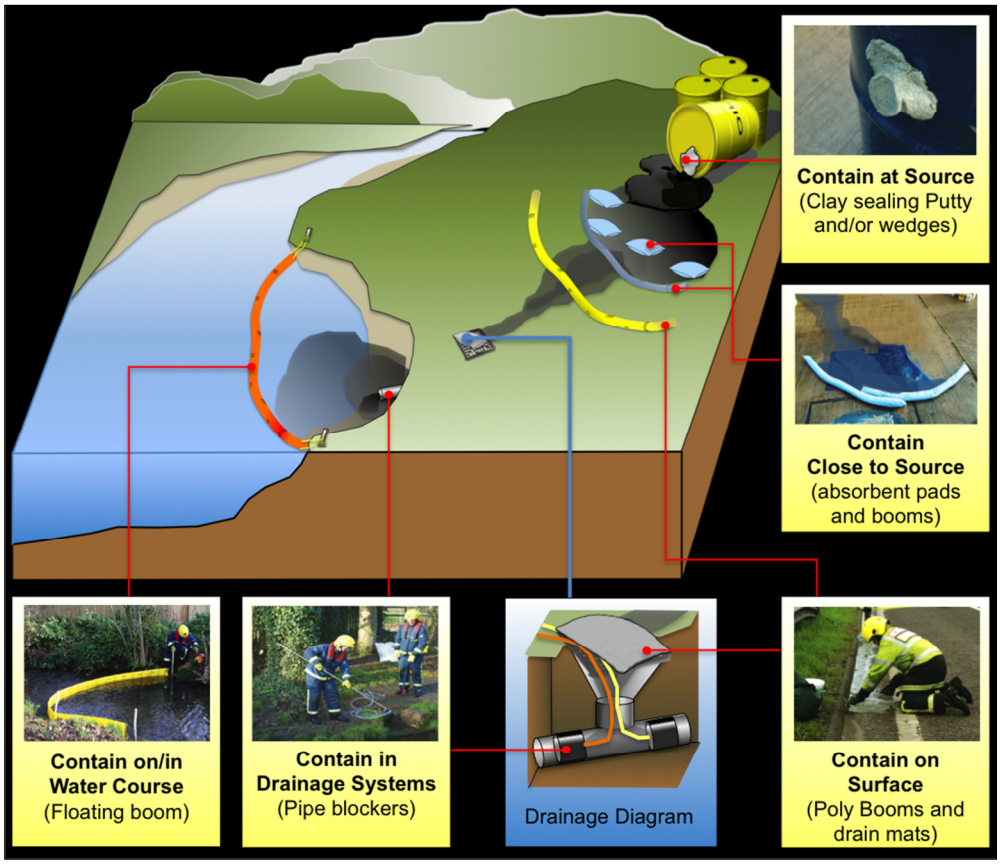


Diagram courtesy of Kent Fire and Rescue Service

Diagram showing hierarchy of pollution control

3.2.3 Hierarchy Stage 1 – contain at source

The most effective intervention point is where the source of the pollution can be controlled to stop or reduce the quantity of material released into the environment, for example a breach in a container, tank or pipework. Intervention options might be to:

- Seal the damaged vessel using a proprietary leak sealing putty or other device
- Turn a drum into a position where the breach is uppermost to stop the leak
- Where complete sealing isn't feasible, it may be possible to stem the flow to minimise the amount of product released
- Place small damaged containers/drums into a secure container such as an overpack drum
- Decant or transfer product from the damaged vessel into a temporary holding vessel or another tank/tanker
- Close valves on pipework to minimise further loss

Clay sealing putty

A collapsible tub of ready-mixed sealing putty is in the grab pack and can be applied to a leaking vessel. The putty, which is made from inert material so as not to react with product, is pressed into the hole using the base of the tub to form a temporary seal as shown in the sequence in Figure 3.3. The repair should be assumed to last for a maximum of 24 hours.

To use the putty, remove the screw lid wearing protective gloves. Press the container firmly down and away from you (to protect from product spraying during sealing) into the damaged area of the vessel. Don't disturb the applied putty as this may restart the leak. Where the surface to be sealed is torn or jagged, take care not to damage any PPE.

Depending on the nature of the container breach and the materials involved, the putty may be able to hold back pressures of around 0.25 bar or 2.5 m head.

Use more tubs of putty if needed, carefully removing the base of the original tub first, and more clay drain sealing mats cut to size.

Pneumatic leak sealing devices

Other methods exist for containing a release at source:

- Inflatable rubber sealing devices can be wedged into areas of damage and inflated to seal the hole (see Figure 3.4)
- Inflatable patches can be strapped onto damaged tankers

The environment agencies do not supply these devices as part of the equipment supply scheme but some FRS may well have them, or wish to consider them.

Wooden and other wedges can be used by FRS (see Figure 3.5). These are cheap and simple to use and may be suitable for local risks based on a risk-assessed approach.

Figure 3.3

This sequence (A-H) shows the application of sealing putty to a leaking drum using a collapsible applicator. Suitable PPE should be worn depending on the risk and appropriate chemical advice.

Figure 3.4

Inflatable leak sealing devices.

Figure 3.5

Wooden or other wedges.

Overpack drums

If a damaged container such as a weeping drum or smaller damaged containers are encountered, place the damaged container into a secure holding vessel such as an overpack

drum for further containment. Overpack drums come in a range of sizes (as shown in Figure 3.6).

Figure 3.6

A variety of overpack drums are available from environment agencies (not Scotland) or other suppliers.

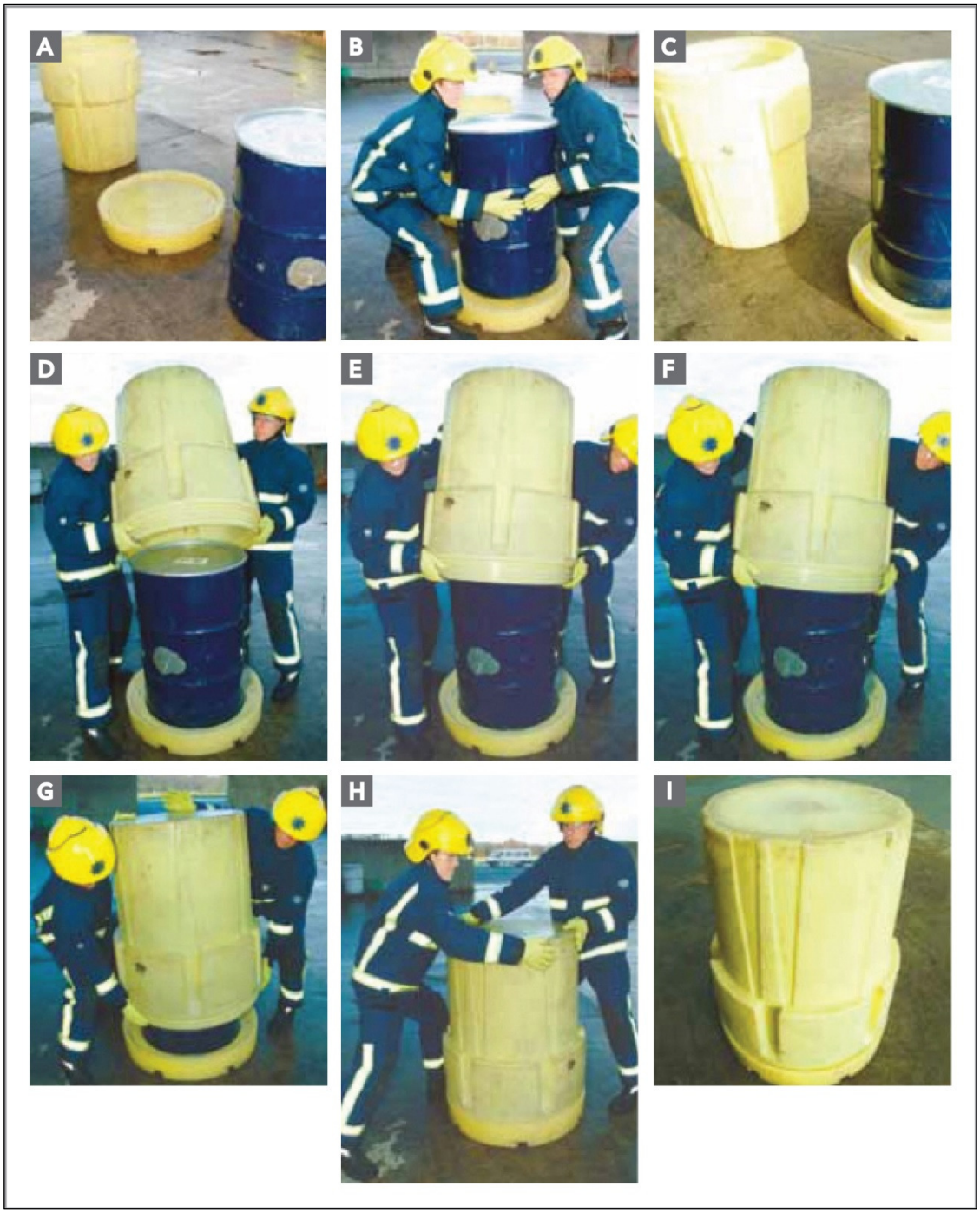
Assess the condition of the leaking drum before moving or lifting it as it may suddenly fail if it's badly corroded or damaged.

Place small containers into the overpack drum, which can be closed to form a liquid and gas tight seal when the markings on the lid and body of the overpack drum align correctly. Place larger or heavier damaged containers on the upturned lid of the overpack drum and place the main body of the overdrum over the top and screw down onto the lid (see Figure 3.7). Once the damaged container has been made safe, it can be recovered by a registered waste carrier for disposal. Only re-use clean and dry overpack drums; if there's any possibility of contamination of the drum from a previous use or any residual water or cleaning material, heat or gas may occur as a subsequent product is added. If in doubt, dispose of the drum.

Overpack drums supplied by environment agencies will be screw-top, with castellation to allow the use of a brace to screw the lid down tightly. Steel banded drums are no longer supplied or recommended for use but may be encountered at industrial premises or drum storage facilities. Take care when using these drums as there's a risk of damage to chemical protective gloves as the steel band is applied or tightened.

Caution: The production of gas or vapour from a product may preclude the use of gas-tight containers.

Figure 3.7



Sequence (A–I) for using an overpack drum for the safe containment of a leaking drum. FRSs should ensure there are a risk assessment and a safe system of work in place for this activity.

3.2.4 Hierarchy Stage 2 – contain close to source

Where it's not possible to contain the product at source, or there's already been a significant loss of product, the next point of intervention is to contain the spillage as close to the source as possible (see Figure 3.8) using items in the grab pack.

Absorbents

Absorbent pads/sheets, pillows, socks and booms are versatile materials widely used to contain minor spillages close to their point of release. The pads can be placed beneath a slowly leaking vessel/tank or where the loss of product is slight. Oil absorbent pads are colour-coded blue or white. Chemical pads which are yellow will absorb all liquids including oil and water. Oil pads won't absorb aqueous solutions.

Place absorbent pads in a single layer onto a spillage and repeat once it's saturated with product (see Figure 3.8). Hazardous materials still retain their hazardous properties when absorbed and so bear this in mind when handling soiled pads or booms.

Loose absorbents such as clay granules, although convenient, don't work as well at absorbing spillages and are more suited to clean up operations. They also present a problem with regard to the waste arising. Environment agencies don't supply or recommend loose absorbents to FRS for these reasons.

A bag, cable tie and warning tape are provided in each grab pack to contain any soiled absorbents. A small 'miscellaneous' UN hazard diamond should be fixed to the bag.

Figure 3.8

Stage 2 of the hierarchy – contain close to the leak, using absorbent booms and pads.

Petrol or other flammable or highly flammable liquid soaked absorbents should not be placed in sealed bags or drums; it may be better not to use absorbent pads on these types of spillages and instead, if safe to do so, let them evaporate in the open air.

A wide range of absorbent materials such as socks, cushions, loose absorbent material/fibre or clay granules may be encountered at commercial or industrial premises or at strategic locations on motorways or major roads. Colour-coding may not be uniform so take care to identify the type of absorbent before use.

Chemical absorbents won't float on a watercourse as they absorb water and will sink; similarly oil/hydrocarbon specific absorbents won't absorb water-based or water-soluble pollutants. If in doubt, use a simple test with a bucket of clean water.

Each FRS should ensure that operational personnel are familiar with the colours used within the service. Commercial premises may use a 'maintenance grade' absorbent pad or roll. This material, which is normally grey, is less expensive than oil or chemical coded material and often reacts negatively with corrosive substances.

Chemical absorbent pads made of polypropylene, supplied or recommended by environment agencies, are suitable for most hazardous materials including concentrated acids and alkalis. But they may react with oxidising agents so check the manufacturers' guidelines before use.

Commercial encapsulating products, supplied as a powder or granules, designed to suppress vapours/fumes and encapsulate the spilled chemical into a gel are also available commercially although these can also react with some oxidising agents.

Soil, sand and cement all have absorbent qualities and can be used to create containment barriers or bunds to minimise the spread of a spillage or firewater and keep it contained close to the source. Take care to assess any reaction that might take place between the product and the material used.

Pop-up pool

Where the amount of product is significant, a pop-up pool (see Figure 3.9) can be deployed quickly and easily. The pool is positioned beneath the leaking tank, pipe, vehicle fuel tank or container and can be used to contain product as it's released. It can also be used as a temporary sump before pumping/ transfer, using perhaps a water turbine pump into a larger alternative holding vessel.

The pop-up pool comes in two sizes: 100 and 250 litres. The low wall design of the pool makes it ideal for sliding under vehicles or beneath leaking tanks/pipework.

The pool can also be used during low-volume decontamination of firefighters. Take care when using these pools on an incline as they may overflow and become unstable. Don't drag the pools along the ground when they contain product as the base fabric will tear.

The pools can be cleaned and re-used if contaminated with low-hazard products such as milk and beer or hydrocarbons such as petrol and diesel. Each front-line pumping appliance should carry a pool as a rapid deployment tool.

Figure 3.9

A pop- up pool deployed under a leaking fuel tank; FRSs may wish to carry this equipment on front-line pumping appliances.

3.2.5 Hierarchy Stage 3 – containment on the surface

One of the most common ways for a spillage to enter the environment is by open drain gullies connected to the surface water drainage system. The drainage system provides a very efficient pollution pathway.

Polyboom

The polyboom (see Figure 3.10) is a one-use water-filled boom which can be deployed on hard-standing or roadways to contain a spillage or contaminated firewater run-off or to divert such material to a designated containment area, a foul sewer or a surface water sewer fitted with an oil separator (see Section 1.6.5). Each grab pack contains a 10 metre length of polyboom; longer 100 metre lengths form part of EPU loads (see Figure 3.10).

Figure 3.10

Photo courtesy of Lancashire Fire and Rescue Service

Polybooms carried in grab packs deployed in series to contain firewater run-off containing oil from a ruptured domestic heating oil tank.

The polyboom's three-tube construction prevents the boom rolling if deployed on a gradient. The boom is resistant to most chemicals but may be adversely affected by very aggressive solvents such as acetone. The two large outer tubes are designed to be filled with water from a hose-reel or open end supply. Before filling with water, the boom needs to be sealed at one end by using either an overhand knot or the plastic cable ties supplied. Once sealed, lay out the polyboom in the required position before filling with water; once filled, it can't be moved without tearing the polythene. When deploying a longer length of polyboom, fill the boom as it's rolled out to prevent it being blown by the wind. These booms aren't effective on roads and car parks surfaced with porous asphalt or other similar porous surfaces (see Section 1.7.4) or unmade ground.

A polyboom creates a satisfactory seal when deployed on a roadway or yard that's in good condition. On uneven surfaces, use soil or sand or absorbent granules if available to help prevent the product seeping under the boom. It can also be deployed across the inside of a doorway or yard entrance to contain contaminated firewater within a building (see Figure 3.12), and to direct a large spillage of contaminated firewater run-off to a designated containment area/facility.

Improvised solutions can be extremely effective; for example a charged length of hose can work as an improvised boom and soil/sand can be used to channel run-off to a containment area. Proprietary land booms can also be extremely effective (see Figure 3.13).

Figure 3.11

100 metre lengths of polyboom carried on EPUs can be deployed for larger spills such as a tanker roll-over. This series of photographs shows the correct method of boom deployment.

Figure 3.12

Photo courtesy of Oxfordshire Fire and Rescue Service

Using a polyboom across a doorway can act to contain firewater or a spillage within a building.

Figure 3.13

Photo credit – Gloucestershire Fire and Rescue Service

Firewater contaminated with chlorine-based products contained by land booms.

Clay drain mats

Each grab pack contains a clay mat designed to be placed over an open drain grating to form a seal that prevents polluting liquids entering the drainage system (see Figure 3.14). The mats are sealed in a plastic bag; remove them before use. The mat is sandwiched between two layers of plastic film to prevent the mat sticking to the inside of the bag. Remove the film from the underside of the mat using the tab provided before placing the mat over the drain to be sealed. The mat should be pressed down gently by foot around its edges to create the seal with the drain surround or surrounding concrete/tarmac road/yard surface. Don't remove the film on the top side of the mat; leave it in place to prevent contamination of the boot.

Figure 3.14

Clay drain mat deployed.

The mats can be cut to cover unusual shaped drain gratings or gullies or overlapped to cover a larger grating. They can also be used to plug unusual shaped leaks in tanks, containers or bunds.

When setting up a containment area using the mats, for example, in a car park, consider site gradients and the low point on site to anticipate where run-off or a spillage may naturally flow. A combination of polyboom and clay mats can be extremely effective in these situations (see Figure 3.15). Large areas of hard-standing such as car parks and yards can be used to contain significant quantities of firewater run-off, or a large spillage using this technique. At some premises, areas may have been designed specifically for this.

Site operators will often be able to help with finding and identifying drains and may confirm the presence of drainage features such as oil separators, drain closure devices, treatment plants or holding tanks.

Improvised solutions using soil/sand deployed around drains and even the rubber floor mat out of a vehicle weighted down with soil can also be very effective at preventing product entering a drainage system.

Figure 3.15

Photo credit – West Yorkshire Fire and Rescue Service

Clay drain mats and polyboom used together as an effective strategy to prevent firewater run-off from entering the water environment.

Peristaltic pumps and flexi-dams

These pumps use a water turbine powered from FRS pumps and are provided with product recovery attachments. They are ideally suited to moving product or firewater from a containment reservoir to a safer location such as a flexi-dam, pop-up pool, overdrum or improvised dam.

Once product is contained, the clean-up should be handed over to a responsible person on site, wherever possible. Only in exceptional circumstances, where a risk of further pollution and/or a danger to the public exists, should the transfer of product take place using FRS resources. Peristaltic pumps should be 'wet tested' quarterly and servicing arranged via the equipment replenishment system (England only) (see Figure 3.16).

Product or firewater contained by blocking drains can also be recovered from road/yard surfaces using vacuum tankers. If the material contained is organic, such as milk, beer, sewage or of low toxicity it may be possible, with the prior permission of the sewerage undertaker (see Section 1.6, Drainage and sewerage systems, to pump the contamination at an agreed rate to the foul sewer. Such materials may also be pumped onto agricultural or open land at a rate which allows attenuation of organic materials in surface soils without creating run-off or risk to groundwater sources. Such pumping isn't recommended if the land is waterlogged and/or there are land drains. Landowners' permission is required as well as the advice of the environment agency and the aim is to provide nutrient to the land within the limits and restrictions set down in 'Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers'. (www.gov.uk/government/publications/protecting-our-water-soil-and-air)

Where a flexi-dam is used, the dam must be positioned on level firm ground or hard-standing. The floating collar on the dam allows the dam to gradually rise to its full height as it receives pumped liquid. Should the dam be positioned on a slope there's a serious risk of the dam over toppling as it becomes full of liquid. Tethers will increase stability and should be used when erecting a dam on unmade ground.

Always use a flexi-dam liner to allow re-use. Flexi-dams should be pumped out rather than emptied from the bottom if a valve is fitted.

Figure 3.16

Photo courtesy of Lancashire Fire and Rescue Service

Peristaltic pump with attachments pumping to flexi-dam.

3.2.6 Hierarchy Stage 4 – contain in the drainage system

Pollutants will often enter drainage systems before pollution control equipment can be deployed. When this happens, the drainage system itself can be used for containment. At other incidents, drainage systems are the preferred option for containment. An important aspect of any environmental incident management strategy is knowledge of drainage systems in the area of the incident (see Section 1.6).

Pollution control devices

Drainage features such as oil separators, penstocks, drain closure valves and firewater/spillage containment basins may be installed at some industrial/commercial premises or on or near highways (see Section 1.7, Motorway and highway drainage , PPG18 and PPG22 (www.gov.uk/environment-agency). These may be used to contain a spillage within the drainage system and enable product recovery. The negative consequences of isolating a drainage system during high rainfall must be taken into account. Local crews need to be able to identify such features where they exist and, working with owners and/or relevant agencies, familiarise themselves with how they operate. Balancing ponds/natural features are often permeable so take care not to spread or exacerbate the pollution.

Pipe blockers

Inflatable pipe blockers are included in the recommended list of equipment to be carried by the FRS (see Figure 3.17). This equipment can be used in two ways;

1. Insert them into the open end of a drainage outfall and inflate to form a bung. Product or contaminated run-off/firewater will be retained within the drainage system for recovery by tanker or peristaltic pump normally from a drainage cover or other access point. Consider the consequences of blocking a surface water drainage outfall pipe particularly during rainfall. If the drainage system overflows as a result of flow back-up, contamination may spread and

affect a wider area. Similarly, pressure may build up behind the drain blocker and cause it to fail suddenly.

Figure 3.17

A range of inflatable pipe blockers are available and may be supplied by environment agencies.

2. Use them in the outflow pipe from a roadside gulley pot or oil separator or in a surface water drain at a drain cover access point. By blocking the outflow from a roadside drain, the drain gulley pot becomes a sealed sump, which can be emptied using a vacuum tanker or the peristaltic pump. This can be useful where contamination is spread thinly on a carriageway and the best means of recovery is to divert the product towards the nearest sealed gulley.

A pipe blocker applicator lance has been developed to enable the pipe blocker to be deployed inside a gulley pot without the user having to come into close contact with the material being contained. These operate using a bladder that can be used in pipes from 100 mm to 1,500 mm. Consideration should be given to stowing this equipment on front-line appliances (see Figure 3.18).

Figure 3.18

Outfall with inflatable pipe blocker on lance in use.

Sewerage systems

If polluting material enters the foul or surface sewerage system, the contamination may still be contained by:

- Blocking the sewer at a drain-cover access point using a pipe blocker (being mindful of the potential to back up the sewerage system or the presence of storm overflows)
- Using a penstock on site (see figure 3.19), off site at a balancing road or sewage pumping station, or at the sewage treatment works (see section 1.6)

Figure 3.19

An on-site penstock that could be used to contain product or contaminated firewater run-off within the drainage system.

3.2.7 Hierarchy Stage 5 – contain on or in the watercourse

FRS activity for the emergency containment of pollutants on or in a watercourse will be limited by the equipment carried the size of the water body and the practical skills and knowledge of the attending crews.

Rapid deployment of a river boom at an appropriate location downstream of an incident can be of tremendous benefit where the pollutant is less dense than water and floats; for example hydrocarbons, vegetable oils and some solvents. Where the pollutant is miscible with water or denser than water, other techniques have to be considered, for example damming. Where drinking water abstraction points are threatened by pollutants, booms may be deployed in a semicircle around the inlet. At incidents involving moored vessels, booms may be deployed to contain fuels (see Figure 3.20).

Solid buoyancy booms (see Figure 3.20) are available in three-metre lengths. They require no inflation and can be joined together to form longer spans. The boom can be quickly and easily deployed; they are non-absorbent and act to contain floating product to facilitate product recovery from the watercourse.

Figure 3.20

Photo courtesy of Oxfordshire Fire and Rescue Service

A river boom deployed around a vessel leaking fuel. Note the oil absorbent pads deployed within the boomed area.

Figure 3.21

Photo courtesy of OHES Ltd

Wooden planks being used to raise the water level in a shallow stream. With sufficient depth of water, river booms and absorbent material can be more effectively deployed.

Oil absorbent booms can be deployed together with the solid buoyancy boom to collect the polluting product.

There are some important considerations when deploying river booms, such as crew safety and the characteristics of the watercourse involved.

A suitable booming location should have:

- Safe access to the water's edge
- Water of sufficient depth to allow the boom to hang down unimpeded into the water column
- Slow river current; calm water is ideal for booming
- Good access for a road tanker to recover product retained by the boom
- Access to both banks to secure boom at either end if necessary
- No underground services which may be damaged by ground penetration during staking, for example oil pipelines or electricity cables
- A suitable separation distance from areas used by the public, particularly children and/or boats

The nearest suitable booming location which meets the criteria outlined above may be a considerable distance downstream from the pollution entry point.

In small ditches and streams, a boom placed across the river and secured against the banks at each end will be effective and permit the successful recovery of product. In a wider watercourse, angle the boom to bring product over to the preferred bank for recovery (see Figure 3.22).

To contain larger quantities of product, place booms in series at suitable locations downstream of the pollution entry point. For more protracted incidents, the environment agencies will facilitate any extra or larger scale deployment of booms and their management.

In the absence or shortage of booms, place planks of wood or a ladder wrapped in a salvage sheet across and into the watercourse to form baffle boards as an emergency boom.

Figure 3.22

Sequence for river boom deployment. Note the 'tick' shape that moves the spilt product towards the bank where flow is slower and it can be more easily recovered.

Damming

Where water in a stream or ditch isn't deep enough for booming, the water level can be raised by creating a dam/weir using sandbags (see Figure 3.23). A boom can then be deployed in the deeper water created immediately upstream. This technique allows the river water to flow unimpeded and will keep the depth above the dam/weir constant. Lay sandbags lengthways into the watercourse parallel to the riverbanks to create a dam which has strength.

Figure 3.23

Photo courtesy of OHES Ltd

Sandbags being used to raise water levels to allow deployment of river booms. Other booms are deployed in series to secure any overflow or underflow of pollutant.

When dams are constructed, in most cases the water flow must continue so that the dam doesn't overtop, taking with it any pollutant which may have collected. A successful means of managing flow is to install drainpipes or similar at a low level during dam construction. Flow is permitted through these low-level pipes (which can be blocked using inflatable drain blockers and/or left open to permit control of water levels behind the dam). A length of hard suction hose may be used for this.

The one exception to the need to maintain the flow is for pollutants that mix with water. If these pollutants enter a watercourse it may be possible to contain them by damming the watercourse completely using soil, sand bags, straw bales or a salvage sheet, or in the case of many canals simply closing lock gates (see Figure 3.24). This technique works particularly well in small watercourses with a slow flow. A wide range of pollutants including contaminated firewater run-off can be contained using this technique. They can then be recovered using a tanker, or pumped into the foul sewer with the approval of the sewage undertaker or treated at the site.

Where an immiscible pollutant is heavier than water (e.g. some solvents) it will move along the bottom of a watercourse. A dam is appropriate in these instances as it will halt the progress of the pollutant and permit its build-up on the bed of the watercourse whilst allowing river water to flow over the top of the dam rather like a weir. The contained pollutant can then be recovered by pumping from the bottom of the watercourse by suction tanker or similar.

Figure 3.24

Improvised dam using soil and a hay bale.

Where pollution control equipment has been used to contain fuels, oils, chemicals etc the resulting waste is likely to be classified as hazardous waste. See Section 3.8.

3.2.8 Additional techniques

Dilution

Occasionally, the best solution for a small spillage is to dilute with lots of water and release to the drainage system. But before doing this, give careful consideration to;

- The nature and quantity of the pollutant
- The chemistry and sensitivity of the receiving watercourse which could vary depending on time of year
- Flow conditions
- Exact location

Use containment measures initially and seek advice and guidance from environment agencies before making any attempt to dilute. Never add detergent or any other cleaning products to spillages and never hose spillages to drain without prior authority from the environment agencies and/or sewerage undertakers.

Neutralisation

A small spillage of dilute acid may be neutralised using soda ash if it's available. The responsible person for the premises must deal with the resulting hazardous waste. Soda ash isn't supplied as part of the environment agencies' equipment supply scheme. When a neutralisation material is added to acid, a chemical reaction takes place releasing carbon dioxide. Depending on the concentration involved and the rate of application, the reaction may become energetic, ejecting product. Crews should be warned about such a reaction during pre-entry briefings.

Aeration

Organic pollutants such as milk and sewage will remove oxygen from water bodies (see Section 1.2.2). The environment agencies and specialist contractors are equipped to oxygenate affected watercourses to raise dissolved oxygen levels either physically, using aeration units which bubble air through the water, or chemically, through the controlled introduction of hydrogen peroxide. FRS may be able to assist environment agencies to do this, particularly in the early stages of an incident, by pumping affected water into the air through hose jets.

Treatment

Treating pollution in a watercourse, for example, using activated carbon or hydrogen peroxide can be very effective but can also cause problems if carried out incorrectly. These are therefore techniques that should only be used by an environment agency or specialist contractor.

Diversion

See Section 1.6, Drainage and sewerage systems

Controlled Burn

See Section 3.7, Controlled burn.

Recirculation

Recycling fire water run at large fires can be used as a technique to reduce the amount of contaminated firewater and/or where water supplies are limited. The technique can be used by itself or in conjunction with other mitigation techniques, such as:

- Controlled burn
- Using sprays
- Diverting fire water to foul sewer and/or a containment area

There are however some issues which need to be considered before the technique is employed.

1.Water quality

There may be a health risk to firefighters and other people in the vicinity of water sprays when fire water recycling in being conducted. The material on fire must be assessed before the decision to recycle fire water run-off is made. For example if the material on fire is household waste then there may be an unacceptable risk of bacterial infection if the spray is

inhaled or ingested. If plastics, tyres or hazardous materials are on fire then firewater run–off may contain diluted products of combustion such as, dilute acids, heavy metals and hydrocarbons. The concentration of these materials and the risk is likely to increase if fire water is being recycled continually over a prolonged period of time.

To assess the risk, basic wet chemistry analysis can be undertaken on site by suitably trained personnel. Additionally, samples can be taken at intervals and sent for analysis. This assessment may determine that the technique is inappropriate or alternatively can be used providing the following measures are adopted:

- Unattended monitors should be used to direct water sprays/jets onto the fire
- Personnel should work upwind of water sprays
- Personnel who have to enter the area should wear appropriate PPE (firefighting kit, P3 particle masks, gloves)
- Any PPE or equipment in contact with water run-off should be washed or flushed with clean water after use
- Basic health and safety measures should be adopted including washing of hands, no eating, drinking or smoking in the vicinity of operations

2.Equipment and Filtration/Sedimentation

It's likely that debris may be carried along in the fire water run-off. This debris can over time, block pumps or the nozzles of branches.

There are small portable pumps available which are capable of pumping particulates without becoming blocked. Smooth bore branches should be used to avoid blockages.

One method of separating particulates from water run-off is the use of a dam or pool (fast/flexi tank) with a false bottom (made of plastic trays). These can be used to contain water run-off. Heavy particulates will settle to the bottom and become trapped in the plastic trays. Light debris will float and can be skimmed from the surface. Water can then be pumped from the dam or pool to the fire. Any oils or hydrocarbons on the surface of the water can be removed using oil adsorbent pads from the EPU.

Other features that could be used to reduce debris include containment tanks and lagoons if they provide sufficient retention time to allow particulates and oil/hydrocarbons to settle out. If such features are not available then it may be possible to construct them if this does not pose a risk to Groundwater.

Replacing a proportion of the firewater each time it is recycled with freshwater and tankering away the contaminated water could also be used to reduce polluting levels and debris

3.Public health impacts

The public health impacts of firewater reuse will need to be considered. Local populations may potentially be at risk from inhaling the aerosol although their location and distance from the fire will need to be considered. For example, whether populations are up or down-wind. Dilution and dispersion of the aerosol will be determined by distance from the fire, prevailing wind direction, weather conditions etc. Other public health considerations should include the robustness of the supply since prolonged extraction from the water supply could reduce system pressure and threaten the supply to local residents. In such circumstances, advice from the water company should be sought as recirculation of firewater may help reduce this.

Firewater recirculation issue to consider/adopt

What's on fire?

↓

Determine if firewater is safe to recirculate, for example chemical analysis

↓

Avoid unnecessary contact with water droplets

↓

Follow basic health and safety measures including PPE

↓

Use equipment which will not be blocked by particulates

↓

Take step to reduce pollutants/ debris in firewater

3.2.9 Decontaminating personnel

FRS decontamination is designed to remove contamination from PPE sufficiently well to ensure that the wearer can get out of it without becoming contaminated. But the impact on the environment must also be considered. The decontamination method selected must consider the safety of wearers and the receiving environment (see Figure 3.25).

Decontaminating the public or firefighters can be considered 'actions in an emergency to save or protect life'. As such, it's unlikely that any offence will be committed as outlined in pollution prevention legislation. But this isn't the case when decontaminating equipment, appliances or roadways.

Where people are being decontaminated, public drinking water supplies must be protected from the effects of run-off. For the majority of chemicals, environment agencies and the FRS have agreed that decontamination showers will dilute any chemicals present on protective suits so any run-off will have minimal or no measurable environmental impact. For more toxic products, this isn't the case and decontamination methods that either don't employ water, or restrict and contain the water, must be employed. These toxic products include:

- Pesticides
- Mercury and mercury-based products
- Radioactive materials

Figure 3.25

Photo courtesy of National Resilience Assurance Team

When decontaminating firefighters at incidents, a high dilution ratio will normally prevent environmental damage. But, for more eco-toxic substances such as pesticides or mercury components, containment is the correct strategy. No legal defence exists if pollution occurs when decontaminating equipment or appliances.

Notification to environment agencies on decontamination is detailed in Appendix 4. Incident commanders will normally have considered the need for decontamination and the methods available as crews are committed; this is when the environment agency should be notified.

Separate procedures have been agreed for the mass decontamination of casualties at CBRN (E) incidents. These are set out in the Water UK document *Protocol for the*

Disposal of Contaminated Water (see section 1.6.6)

Further guidance can be found on CBRN (E) incidents and firefighter and mass decontamination in FRS operational guidance: incidents involving hazardous materials in the publications section of the www.GOV.UK website.

3.3 Role of the hazardous materials and environmental protection officer

One of the pivotal roles within the command structure at hazmats and incidents with the potential to pollute the environment is the HMEPO or Hazmats Officer. At emergency incidents where there is a threat to the environment, the HMEPO is often key to the successful conclusion of the event. S/he will have attended the HMEP course at the Fire Service College or equivalent. The HMEP course includes an environment module (see

Section 2.10, Training) which provides officers with the knowledge and understanding to advise Incident commanders on tactics to protect the environment.

FRSs should consider mobilising or involving HMEPOs in any incident with the potential to pollute the environment, not only those incidents involving hazardous materials. Liaison between HMEPOs and environment agency officers is normally highly productive for the successful conclusion of these incidents. Incidents other than hazmats that HMPEOs might attend include:

- Spillages of organic materials, for example milk, beer above guideline quantities (see Appendix 4)
- All fires with more than four pumping appliances attending and/or the use of HV pumps
- Spillages or fires involving low-hazard materials such as paints, dyes above threshold quantities
- Leaks or spillages of fuel or oil, storage facilities including domestic properties or following RTCs; see Section 3.1 for guideline quantities
- On all occasions that two or more grab pack contents are deployed

Figure 3.26

Photo courtesy of the Fire Service College

HMEPOs can often be the first point of contact for advice on pollution

Environment agency officers should also be invited to training or HMEPO meetings.

Best practice is for each FRS to nominate a HMEPO who is responsible for day-to-day liaison with a nominated environment agency officer (see Section 2.1). Such liaison will facilitate effective working arrangements.

3.4 Operational environmental risk assessments

There are two methods available to assess the risk to the environment from FRS actions.

3.4.1 Method 1 – Environmental assessment as part of the DRA

As part of an initial dynamic risk assessment (DRA), incident commanders should include an assessment of the environmental risk. This will normally be confined to small (1 to 2 pump) incidents where the Incident commander is involved in making decisions using the DRA procedure. The environmental risk element of this assessment should be based on:

- Location of local watercourses
- Location of SSSI/sensitive habitats and their proximity to the incident
- Incident location in relation to sensitive groundwater.
- Type of media being used
- Quantity of firewater run-off being produced
- Volume/properties of any spilt materials

3.4.2 Environmental dynamic risk assessment (DRA) entries

Examples of how to record an environmental assessment as part of a DRA are in figures 3.27 and 3.28.

Figure 3.27

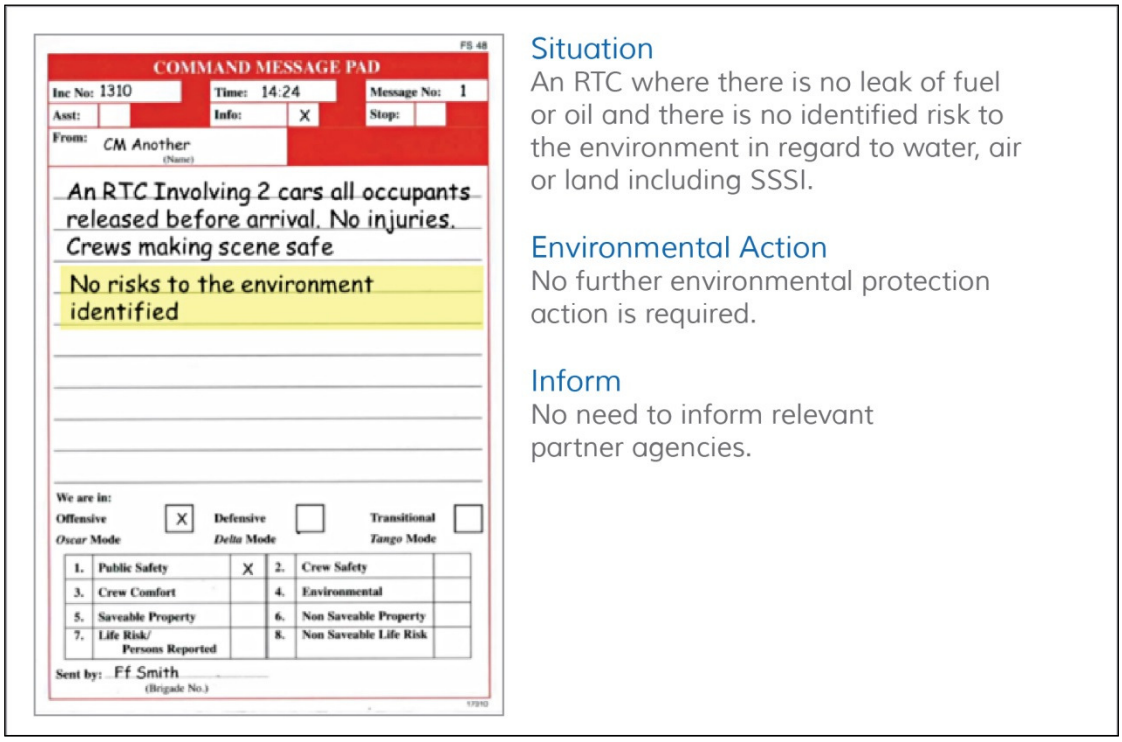


Diagram courtesy of Kent Fire and Rescue Service

An example of a DRA with no environmental protection action required.

Figure 3.28

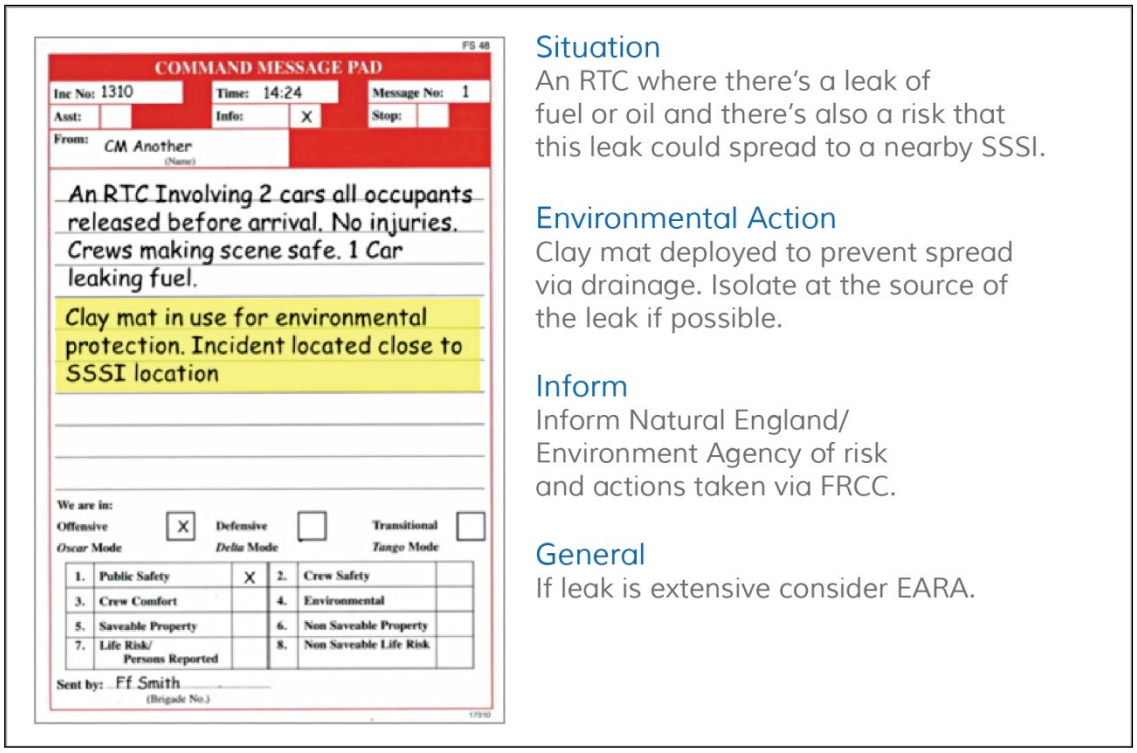


Diagram courtesy of Kent Fire and Rescue Service

An example of a DRA with an identified risk to a SSSI

3.4.3 Recording the Environmental DRA

Outcomes of the Environmental DRA should be formally recorded on a DRA pad and/or the decisions log. Any action taken to prevent or reduce environmental damage should be recorded on the decision log.

3.4.4 Method two – Environmental Analytical Risk Assessment (EARA)

This is a procedure which has been formulated in partnership with the Environment Agency and Natural England. It's mainly to be used for larger or prolonged incidents for example:

- Four pumps or more are in attendance
- A serious risk to the environment has been identified
- FRS operations have the potential to cause harm to the environment, for example the use of foam, decontamination of personnel and equipment, a large volume of firewater run-off has been generated

This assessment method follows the same principles of a Health and Safety Analytical Risk Assessment process. At larger incidents a command support unit may be able to provide the following information to assess the environmental risk:

- Surface and foul water plans
- Type of groundwater, proximity to a source protection zone
- Nearest SSSI or other vulnerable habitat and the category of the site

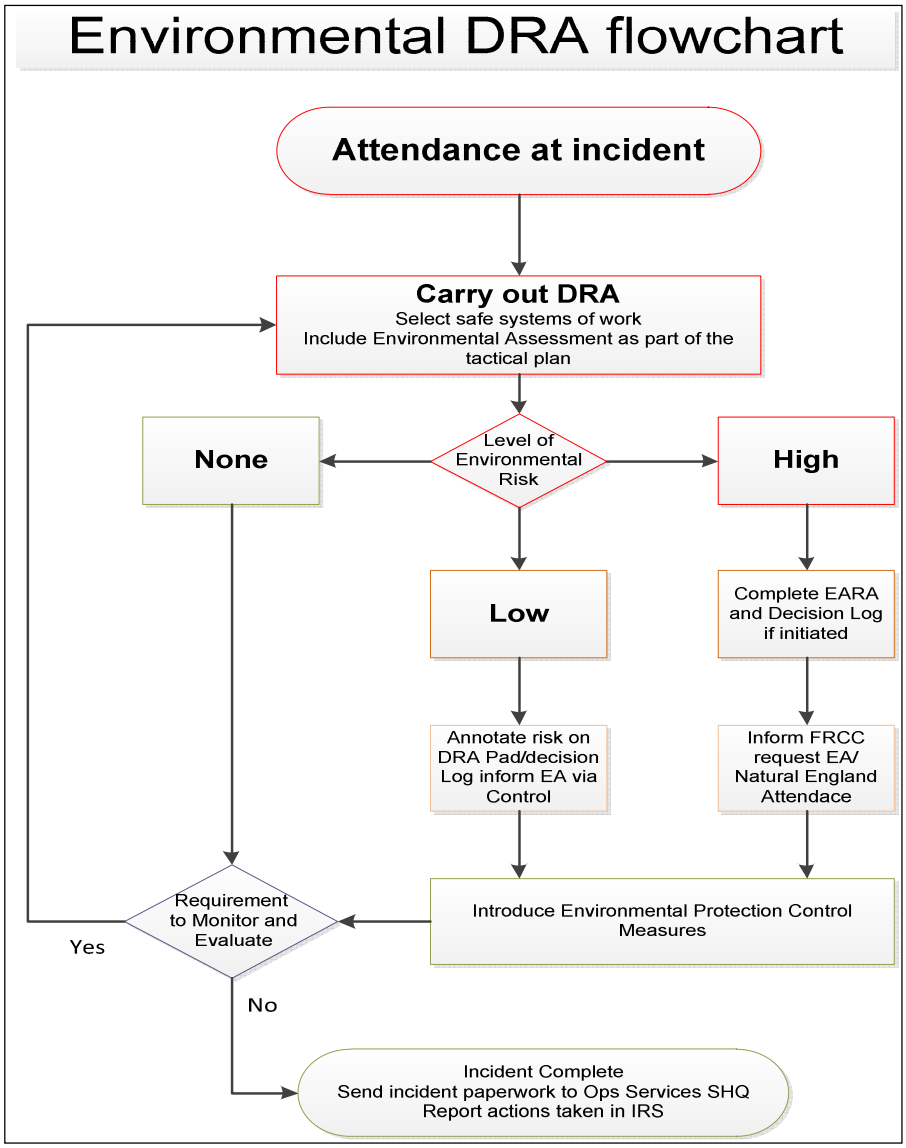
The EARA may be completed by any trained personnel but, where an HMEPO is in attendance, s/he should complete and maintain it. A sample EARA form is in Appendix 7. The form consists of two parts; in addition to the form to be completed, an information table helps assess the risk of environmental damage. When an environment agency officer is in attendance, use them to help complete the EARA; their knowledge will be invaluable.

3.4.5 Deciding on the risk assessment method

Unless there's a known or identified environmental risk, Incident commanders should initially assess the impact of their tactical plan on the environment during the DRA. As an incident develops or potential threats to the environment are identified, they should assess and record the environmental risk using the EARA method, preferably delegating the responsibility for environmental protection to the HMEPO at the incident.

The flowchart shown in figure 3.29 helps determine which environmental assessment method to use.

Figure 3.29



3.5 Environmental information sources

The primary source of environmental information for the FRS is environment agency officers, usually by phone. Environment agencies normally respond within 30 minutes and can advise incident commanders on environmental information. Apart from that:

- HMEPOs can provide general advice on these matters, especially where an Emergency Action Code is assigned to the product(s) involved.
- More detailed advice can be obtained from scientific advisers or from the CHEMSAFE service provided by the National Chemical Emergency Centre (NCEC) at Harwell, Oxfordshire.
- The product safety datasheet (SDS) can be a useful source of information; this is especially so where proprietary preparation(s) are involved and the SDS could be the only definitive source of information – section 12 of the SDS for example, contains ecological information on the product.
- For pure substances (not mixtures or preparations) electronic information sources of environmental information are available during an incident. These are detailed below.

3.5.1 Chemdata

The primary emergency chemical information retrieval system used within the FRS (and other emergency response agencies) is the 'Chemdata' database provided by NCEC. Within a range of product information sheets, NCEC has introduced an environmental priority section to help FRS personnel during planning and operational situations.

The environmental priority phases within Chemdata are split into separate groups:

- High priority – substances in this group have a high toxicity to the aquatic environment and/or pose a long-term hazard and/or cause irreversible effects on people.
- Moderate priority – substances in this group have a moderate toxicity to the aquatic environment but are not likely to be persistent and/or there is limited evidence of them posing the risk of irreversible effects on people.
- Low priority – substances in this group have a low toxicity to the aquatic environment and are not likely to be persistent.
- No priority – substances in this group have a very low toxicity to the aquatic environment and are not likely to be persistent.

If a substance hasn't had sufficient testing or this data isn't available to be placed into one of the groups, this is noted on the entry.

Other chemical information retrieval systems provide general advice on environmental issues associated with hazardous materials.

3.5.2 Internet resources

HazmasterG3 – integrated hazmat/CBRN decision support system **www.hazmatlink.com**

This software can be operated on a desktop, laptop or handheld computer with full reach-back capabilities to web-based resources from an internet connection. HazmasterG3 covers chemicals, biological and radioactive substances and contains chemical and physical data, reactivity information, advice on PPE, downwind protective distances and environmental hazard information.

Chemidplus

chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

A comprehensive meta-search site combining links to different websites with information on polluting substances. These include:

- Hazardous Substances Data Bank (HSDB)
- International Toxicity Estimates for Risk
- International Chemical Safety Cards (ICSC)
- European Inventory of Existing Commercial Chemical Substances

Hazardous substances data bank

http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

This data bank is organised by chemical record and covers the toxicity and biomedical effects of chemicals. The file is enhanced with data from emergency handling procedures, environmental fate, human exposure, detection methods, and regulatory requirements. HSDB contains complete references for all data sources used. The file is peer-reviewed by the Scientific Review Panel, a committee of expert toxicologists and other scientists. HSDB is built, maintained, reviewed and updated on the NLM's Toxicology Data Network (TOXNET). This database contains information for handling and clean-up.

European inventory of existing commercial chemical substances

ecb.jrc.it/esis/

This database is a registry of existing substances registered with the EU. It's useful for identifying risk and safety phrases as well as who the major substance producers are in Europe.

International chemical safety cards

http://www.ilo.org/dyn/icsc/showcard.home

These summarise health and safety information on chemicals for their use in the workplace and provide a useful one-page summary of the substance, containing some basic environmental data.

Pesticide register

secure.pesticides.gov.uk/pestreg/ProdSearch.asp

This identifies pesticides that are registered for use in the UK. Details are provided on the active ingredient and which company registered the product.

SIRI MSDS Index

hazard.com/msds/

The database is probably one of the largest publicly accessible collections of MSDS on the internet. The information tends to be for products manufactured by American companies but many of these products are also found in the UK so it's useful.

CEFIC ERICards database

www.ericards.net/

The CEFIC Emergency Response Intervention Cards (ERICards or ERICs) provide guidance on initial actions for FRSs when they arrive at the scene of a chemical transport accident without having product specific emergency information at hand.

ERICards are intended for fire crews, trained in chemical emergency response, and contain information and procedures that may require specialised equipment. ERICards deal with chemical accidents involving a substantial amount of product, occurring during land transport only, and may not be appropriate for accidents in other situations.

3.6 Environment agencies' response to incidents

Environment agencies' response to pollution incidents is one of the most important aspects of their work. This section outlines their response procedure when attending FRS incidents.

3.6.1 Assessment and attendance

The agencies operate 24-hour communications centres. Calls from the public and emergency services are directed to their communications centres where they're logged and passed to the appropriate office during office hours, or outside office hours to a standby officer from the relevant function. There are dedicated lines for the emergency services. Once a call has been passed to a competent agency officer, they will make a professional assessment on the seriousness of the incident and decide on the response. This will often require a return call to the FRS for more details.

Where immediate attendance is deemed necessary, for example a serious pollution risk or where the agency attendance is requested and is justified, the officer will aim to be on site within two hours during office hours and four hours outside office hours. In most cases, they attend the scene within an hour. But environment agencies are not 'blue light' services, so delays should be anticipated. When environment agency officers are en route, the FRS has access to telephone advice, although this should be confirmed before the officer begins the journey. In all cases, the officer should provide an estimated time of arrival.

If the incident is judged non-urgent or attendance is unnecessary, or FRS intervention has already contained the pollutant, removing the threat to the environment, the environment agency should always inform the FRS of its chosen course of action.

3.6.2 Environment agencies' scene protocols

On arrival at the scene where the FRS is in attendance, the environment agency officer's first task will be to make themselves known to the FRS incident commander. They will assess the scene and advise how to prevent or mitigate pollution.

In cases where the source of pollution is unknown, the environment agency officer's task will be to locate the source, as well as to prevent and/or mitigate further effects. In all cases, even if legal action isn't taken, detailed records of the resources expended will be kept, as the environment agency will usually seek to recover its costs. Environment agencies are also responsible for advising on and regulating the management of any waste arising at an incident, but not for its disposal (see Section 3.10).

3.6.3 Environment agency staff roles

Environment agencies' incident management procedures require their officers to assume roles such as site controller, base controller and competent officer. When dealing with non-

complex incidents these may be the same individual. In a major or more complex incident, different officers will undertake these roles. The roles are as follows.

Competent officer

The competent officer is the technical/functional officer who receives details of the incident from the communication centre. Their key role is to assess the information and determine the environment agency's response.

Site controller

The site controller, in liaison with the base controller, will be the environment agency officer responsible for coordinating the environmental response at the scene of the emergency. The site controller will be recognisable by a labelled tabard and will act as the primary point of contact for the Incident commander (see Figure 3.30).

Base controller

The base controller is normally an experienced member of staff who's responsible for the overall control of the incident. They commonly operate from the nearest environment agency office but will move to an area incident room if the event warrants it. They will be responsible for directing the environmental response and providing support services to the site controller and field staff at the incident. Other duties include mobilising external and internal resources at a regional and area level.

Figure 3.30

Photo courtesy of the Fire Service College

Environment agency officers will attend emergency incidents where there is a serious threat of pollution or at the request of the Incident commander

The competent officer, site controller and base controller system does not operate in Scotland.

3.6.4 Categories of pollution incident

The environment agencies deal with pollution incidents involving a wide variety of sources, pollutant types and size. They classify environmental impact into four incident categories. The most serious of these is a Category 1, the least a Category 4.

Category 1 incidents are rare and the numbers are decreasing, but their effects are significant and could involve:

- The contamination of important public drinking water sources
- Serious effects on human health
- Major fish kills
- Destruction of other aquatic fauna and flora
- Major media/public interest

3.6.5 Pollution prevention

Environment agencies are keen to prevent pollution rather than dealing with its result. They've pollution prevention initiatives to do this, one of the most successful being the FRS partnership. The agencies are particularly keen to work with FRS to reduce the likelihood and impact of fire as they consider fire prevention to be pollution prevention.

To support its pollution prevention work, the Environment Agency has also produced a range of national guidance setting out how industry, other bodies including the FRS and the public can prevent pollution and comply with the law. These can be found at (www.gov.uk/environment-agency). The environment agencies are also keen to work with industry and others to help them produce their own sector guidance. Recent work on preventing and mitigating the impacts of waste fires which has involved the Environment Agency, CFOA and waste trade bodies is an example of this.).

3.7 Controlled burn

A controlled burn is a defensive operational strategy to prohibit or restrict the use of extinguishing media on fires to minimise damage to the environment (see Figure 3.31). This strategy can sometimes act to protect public health, as an incident commander may choose to use it when there are significant risks to public drinking water supplies and people from a smoke plume

This section doesn't relate to the controlled burning of moorland, heathland, or the burning of agricultural or other waste where it is permitted to do so.

This operational strategy will normally be used to prevent water pollution but may also benefit air quality due to the improved combustion and dispersion of airborne pollutants. Conversely, it may have adverse impacts, such as allowing or increasing the formation of hazardous gaseous by-products and/or increasing exposure times. The balance of potential water and airborne impacts is one of the factors that must be taken into account before using the strategy. Ideally this decision should be made at the planning stage. The protection of people will always take precedence over environmental considerations. Incident commanders may also decide to adopt a controlled burn where significant risks to FRS personnel exist from offensive firefighting tactics.

This section provides guidance on determining the circumstances where controlled burn could be employed. Liaison with site operators, environment agency officers and other

stakeholders provides FRS managers with an opportunity to plan for the use of a controlled burn. Planning for a controlled burn is also considered in (Sections 1.2, Ecology and environmental science) and (Section 2.2, Pollution intervention planning).

Figure 3.31

Photo credit – Oxfordshire Fire and Rescue Service

Controlled burn can be employed by Incident commanders, although ideally the decision to adopt this strategy should be made at planning stage. Note the absence of firewater run-off.

Controlled burn strategies will principally apply to industrial or commercial premises processing or storing polluting substances but it can also be used to mitigate the effects of fires involving:

- Agricultural premises, for example barns or stores containing pesticides and fertilisers
- Transport by road, rail or sea of hazardous and/or environmentally damaging materials in significant quantities

3.7.1 Guidance on planning

For sites falling under the Control of Major Accident Hazard Regulations 1999 (as amended), Environmental Permitting Regulations 2010 and other relevant environmental legislation, this guidance should supplement but not replace any statutory requirements and guidance provided by this legislation.

Planning, with site occupiers and environment agencies, to employ a controlled burn may be required as part of:

- An industry inspection scheme such as the BASIS (Registration) Ltd scheme for agrochemical stores
- An incident response plan at a site regulated by environment agencies
- An environmental management system (e.g. ISO14001), or as an agreed environmentally best option as part of the integrated risk management process (IRMP) or equivalent

The plan should consider both the event and post-event phase of the incident and the actual arrangements for mitigating pollution and informing the local population. It should also cover air and water monitoring arrangements both on- and off-site.

Further guidance on preparing an incident response plan is in PPG 21

(www.gov.uk/environment-agency)

This guidance doesn't apply to fires involving sites storing radioactive materials/ wastes covered under the Radioactive Substances Act 1993; control of pollution from fires at such sites will be considered as a requirement of this legislation.

3.7.2 Operational considerations when determining the suitability of a controlled burn strategy

During the planning stage, or when an incident commander at a fire is considering a controlled burn, they need to consider:

- Saving or protecting people will override environmental and other considerations such as protecting property.
- Where an offensive firefighting strategy is required to prevent a fire escalating and significant environmental risks exist, resources should be allocated and techniques employed to reduce the environmental impact of the incident, for example by blocking drains and or using booms to contain or divert firewater.
- Where defensive firefighting techniques are required, account should be taken of the short- and long-term environmental impacts on air, land and water quality so that the least environmentally damaging option is selected. This might be a controlled burn.
- The stages of the fire when a controlled burn may or may not be appropriate in longer duration fires. For example a controlled burn in the early stages of an intense fire may result in lower concentrations and better dispersion of pollutants in smoke plumes as well as reduced run-off. However as the fire begins to smoulder, the pollutant levels in the smoke plume may increase at which point an extinguish strategy could be used. Such a strategy would also provide more time for firewater containment measures to be put in place. The use of an accelerated control burn to reduce combustion time and increase temperatures may also be an option.

Table 3.2 highlights the key stages in determining this relationship.

Table 3.2 Controlled burn considerations

Controlled burn will/may be inappropriate	Controlled burn considered
Life/health is at immediate risk or a controlled burn will increase the risk to people	Life/health is not at risk or a controlled burn will reduce the risk to people

Controlled burn will/may be inappropriate	Controlled burn considered
There's a high success forecast for extinguishing the fire with minimal impact on human health and/ or the environment	There's a low success forecast of extinguishing the fire.
There's a high probability of the fire spreading extensively or to high hazard areas.	Fighting the fire with other techniques would cause a significant risk to firefighters.
Important buildings are involved	Property is beyond salvage
Fire conditions, meteorological conditions and/ or local topography are inappropriate, for example plume grounding in populated areas.	Fire conditions, meteorological conditions and/or local topography are appropriate for minimising air quality impacts or that to the population.
Drainage from the site leads to an area of low environmental sensitivity or firewater is not polluting.	Firewater run-off would damage an area of high sensitivity.
Firewater can be contained on site, for example firewater ponds or off-site, for example local sewage treatment works.	Firewater run-off water would affect drinking water and other abstractions and/ or impair the operation of a sewage treatment works.

3.7.3 The legal consequence of allowing fires to burn

FRS legislation doesn't provide a duty for Incident commanders or crews to extinguish fires. A decision on how to conduct firefighting operations would be governed by the general principles in common law relating to reasonableness and foreseeability. In practice this means there are circumstances where the Incident commander could reasonably foresee the need to cease or limit firefighting operations because the consequences of continuing (whether they be environmental or some other) would be worse than the destruction of property.

For Scotland, the Fire (Scotland) Act 2005, defines 'extinguishing' in relation to a fire to include 'containing and controlling', providing Incident commanders in Scotland with an option in law of using a controlled burnable**.**

3.7.4 The importance of the building

Certain buildings have a particularly high value, not just in rebuilding costs but also because of their architectural, cultural, historical or strategic significance. Although it's unlikely that a building of this type would be used to store significant quantities of hazardous or polluting substances, where they do, the health and environmental benefits of a controlled burn must be weighed against the value of the building.

Any such decision will need to be taken case-by-case, seeking advice at planning stage from the appropriate conservation body, for example English Heritage. In cases where the building is considered to be of high value and poses a high risk to the environment, then other measures such as firewater containment must be employed during firefighting operations.

3.7.5 In the event of fire

Although controlled burn should ideally be formulated at the planning stage, the strategy chosen will depend on the circumstances that the Incident commander is faced with on arrival at the incident. The decision to allow a controlled burn will always rest with incident commanders, guided wherever possible by the advice of HMEPOs, environment agencies, public health officials and other stakeholders.

3.7.6 Communicating the decision

The decision to employ a controlled burn should be communicated by the Incident commander to the site operator, if present, and to the environment agency, local environmental health departments and, in appropriate cases, the public through the media (see Appendix 5: The Sandoz Fire, Basel, Switzerland).

3.8 Air quality

3.8.1 Air Quality Cell (AQC)

The Environment Agency, in consultation with Public Health England, will convene an Air Quality Cell in a major chemical air pollution incident. The Met Office, Health and Safety Laboratory and Food Standards Agency and a local authority representative will, where appropriate, join this AQC. The Environment Agency will chair the AQC which will meet virtually, unless the incident is sufficiently large or long that it needs to meet physically. The Met Office will provide modelled air quality information to the AQC.

The AQC will co-ordinate air modelling and monitoring, assess the uncertainties and limitations of the data, and provide interpreted air quality information to Public Health England, and the Science and Technical Advice Cell (STAC) of the Strategic Co-ordination Group.

Public Health England will use the air quality information to provide health advice to the emergency services and the public.

The AQC will be convened for:

- Major air pollution incidents which affect England
- Deliberate or hostile acts, not involving chemical warfare agents (e.g. explosion at a chemical plant)
- Emergency phase of an incident – at the end of this phase the AQC will be withdrawn and co-ordination of any ongoing environmental modelling and monitoring will be handed over to the Recovery Co-ordination Group (or similar) in recovery phase

3.8.2 Air quality in major incidents (AQinMI)

What the service provides

The AQinMI service provides clear, concise and timely advice to the emergency services managing an air quality incident to ensure a more effective response to the emergency phase of such an incident. The service is a partnership between Environment Agency staff and contractors who carry out the real time air quality monitoring along with the Duty Officer from the Centre for Radiation, Chemicals and Environmental Hazards. The service also works closely with the Food Standards Agency, The Health and Safety Laboratory of the HSE and the Met Office.

AQinMIs are serious incidents where people could be exposed to harmful substances released into the air. The majority will be due to fires at industrial premises but could also be caused by explosions or chemical releases. Some typical examples include:

- Major fire at an oil/fuel depot
- A release of significant quantities of chemicals following an accident during transportation – road, rail, ship
- Explosion at a fireworks factory
- Large fire at a waste recycling/treatment site

Incidents can include off-shore events where the smoke plume may reach the land.

How does it work?

The FRS routinely informs the Environment Agency's Incident Communication Service when they are dealing with a fire that may have affected the environment. This is passed to the local environment officer and when a fire is significant they will involve an Environment Agency National Air Quality Technical Advisor (NAQTA) who will give advice and inform Public Health England, if necessary.

The AQinMI service responds where a Silver or Gold Group (multi agency tactical and strategic co-ordination groups) is being chaired by the police or FRS and where there is a significant risk to public health. If the incident is being managed at Gold Group, the monitoring data will be fed directly into STAC (Science and Tactical Advice Cell). If the incident is being managed by Silver Group, a virtual group called an AQC is formed to discuss and analyse air quality data and information (see above).

There are seven monitoring teams based across England. Each team is equipped with a range of portable air quality monitoring equipment carried in a 'Transit' type vehicle (see figure 3.32). Two more mobile laboratories carry fixed monitoring equipment and these are deployed for large scale incidents.

The teams are on call 24/7 and the nearest team to the incident would aim to be on site within 3-4 hours. Once there, the equipment on the vehicle is able to monitor up to 25 different chemical species and sample a further 30 species (see figure 3.33).

Figure 3.32

An Environment Agency AQ inMI monitoring vehicle.

Figure 3.33

A selection of AQinMI equipment used for monitoring air quality.

The AQinMI Service doesn't:

- Provide a service for incidents involving unknown chemicals or those the agency can't monitor
- Respond to radiological, nuclear or biological incidents or acts of terrorism
- Carry out monitoring in the 'hot zone' or at any location where the public are not/will not be at large
- Provide any service during the recovery phase; the service typically operates for a maximum of 2-3 days or until the crisis management phase is over when responsibility is passed to the local authority
- Monitor in office buildings/confined spaces
- Provide air dispersion modelling; this is provided by the met office
- Respond to short-lived incidents for example under six hours, where it's unlikely that the agency could deploy monitoring and provide sufficient data before the incident has ended
- Monitor closer than 1km to the incident, unless there's a significant need to do so and concentrations of hazardous pollutants have already been established at 1km with trends indicating minimal risk in moving closer

More information is available from the Environment Agency's Incident Contingency Planning Team.

Similar arrangements exist in Scotland, where SEPA provides air quality monitoring through the Airborne Hazards Emergency Response (AHER) service. This enables SEPA, Health Protection Scotland and other agencies to carry out high quality public health and environmental risk assessments based on monitoring and modelling data from the scene of a significant incident. More information on the AHER service is at www.sepa.org.uk.

3.9 Firefighting foam and concentrates

It's now recognised that all fire fighting foams as well as other water-based fire fighting additives such as wetting agents can cause water pollution if they're discharged into surface or groundwater. This shouldn't deter Incident commanders from using foam at incidents where there's a justifiable need as there is sometimes an operational and environmental advantage compared with using water alone (see Figure 3.34) and preventative action, such as blocking drains, can often prevent or mitigate the impact of any foam run-off.

This section explores current understanding of firefighting foams as a pollutant and provides guidance on:

- The use of foam where protection of the water environment and/or sewage treatment works is a concern
- The provision and use of foam training facilities

Class A additives normally comprise only a blend of hydrocarbon surfactants but don't contain any fluorinated surfactants because they're not designed to film-form. Whilst still often called 'foams', these products are normally used at such low concentrations that they don't produce a foam blanket.

CAFS units typically employ Class A products although they can also be used with Class B foam on flammable liquid fires.

Film forming firefighting foam for class B fires typically comprises a blend of hydrocarbon and fluorinated surfactants (detergents) with or without soluble protein. These combinations give rise to fluoroprotein (FP) or film-forming fluoroprotein (FFFP) and aqueous film-forming foams (AFFF). Further ingredients are added to reduce fuel pick-up, stabilise the bubble structure, increase shelf life, depress the freezing point and give 'alcohol resistance' for dealing with polar solvent fires (e.g. alcohol, acetone). More recently, foam manufacturers have produced foam without fluorinated surfactants and BS EN and ICAO certified Class B foams which don't contain environmentally damaging fluorosurfactants

Figure 3.34

Photo courtesy of Oxfordshire Fire and Rescue Service

Firefighting foam can be an essential element of an operational strategy. This photograph shows the resulting run-off from a jet aircraft crash. Speedy intervention with drain blockers and soil prevented a serious pollution incident.

Whatever foam manufactures may claim, all firefighting foams are polluting. The polluting potential of individual foams can vary significantly due to their composition.

There are a number of environmental concerns associated with firefighting foams:

3.9.1 Biochemical oxygen demand

All foam concentrates (for Class A or Class B use, and including those without fluorosurfactants) have extremely high BOD, up to several hundred thousand mg/l as concentrates. A typical foam, even when diluted to 3-6 per cent solution for use, will still have a BOD of 50–100 times the strength of untreated sewage. This will de-oxygenate any receiving water body (see Section 1.2, Environmental science and ecology). The dilution ratio for Class A foam is typically between 0.1 and one per cent.

Fire fighting foams and concentrates can also contain high levels of plant nutrients, such as nitrates that may lead to the formation of algal blooms and other undesirable effects. If

discharged into a water body they can also lead to highly visual banks of foam that can result in significant levels of public complaint and amenity impacts**.**

3.9.2 Toxicity, persistence and bioaccumulation

General

As well as having a high BOD, surfactants, preservatives and other components in foams are often acutely toxic to aquatic life and represent a significant risk to the quality of drinking water supplies. This toxicity may be from the products in the foam itself or, in the case of protein-based foams, can result from their breakdown in the environment to ammonia; this is very toxic to aquatic life and highly polluting in groundwater. Some compounds in foams are also extremely persistent in the environment and can also bio-accumulate.

Litre for litre, AFFF and fluorosurfactant free Class B foams are more acutely polluting than protein-based foams since the basic bubble structure is based on synthetic detergent rather than hydrolysed protein.

Fluorosurfactants - PFOS

The ingredients which give film-forming properties are commonly referred to as 'fluorosurfactants'. One particular chemical from this group, perfluoro-octanyl sulphonate (PFOS), has been of particular concern due to its extreme persistence in the environment. PFOS is also bio-accumulative and has toxic properties. Due to these concerns, The manufacturer ceased using PFOS in firefighting foam in 2003.

A European Directive now restricts the marketing and use of PFOS containing foams; with effect from 27 June 2011, they can no longer be offered for sale, bought, held or used throughout the EU.

Other fluorosurfactant foams

Film-forming foams on the market contain non-PFOS-based fluorosurfactants which may be referred to as 'telomer based' (this term refers to the chemical process used to create the fluorosurfactant). The environmental effects of these fluorosurfactants are still broadly similar; manufacturers are studying them in great detail. The outcome of this research may or may not lead to similar controls being sought as those for PFOS-containing foams.

EU and UK legislation prohibits the discharge of any 'organohalogen' into groundwater either directly or indirectly. These are a whole group of so called 'organic' chemicals based on carbon and hydrogen ('organo-') also containing 'halogen' atom(s) for example fluorine, chlorine, bromine). Fluorosurfactant-containing foams definitely fall into this group.

Safety data sheets

Details of the ingredients, BOD and aquatic toxicities of foams should be presented in a product's safety data sheet. More help on understanding and interpreting this data is in Information Paper No 6, published by the UK Civil Aviation Authority, available at www.caa.co.uk

3.9.3 The future and procurement

Most foam formulators either have developed or are developing fluorosurfactant-free Class B foam products for both hydrocarbon only and hydrocarbon plus polar solvent use. They are increasingly available at one and three per cent strengths as well as the more traditional six per cent. Fluorosurfactant-free foams typically have BODs similar to the traditional film-forming products but acute aquatic toxicities more aligned with AFFF (greater/worse) than protein-based products but, crucially, no longer-term environmental concerns have yet been associated with them. FRSs should consider using them where they can satisfy themselves that the fire performance meets their needs. They should discuss the environmental properties of firefighting foams with manufacturers and their local environment agency representatives.

3.9.4 Compressed air foam systems

Compressed air foam systems (CAFS) were originally developed for Class A applications. They typically use much lower percentages of foam in water,for example0.1–0.5 per cent of a Class A additive for Class A applications and 0.5–1 per cent of a suitable Class B product for Class B applications.

In some circumstances the use of CAFs can be regarded as a tactical option where the potential environmental risk identifies that firewater run off or the use of traditional foams presents an unacceptable risk of damage to the environment. For instance, the use of CAFs to extinguish a car fire that is located on or near to a water source can potentially lessen to the risk of pollutants entering protected drinking water supplies. Traditionally the application of water on a car will be difficult to contain with in the vehicle and will enviably allow pollutants from the vehicle mixed within the firewater runoff to enter ground water. Provided that the application of the CAFs is both controlled and contained, the lower water and concentrate used in CAFs resulting lower level of residue. If the CAFs residue is captured within contained within the shell of the vehicle the risk of environmental damage is significantly reduced.

FRSs may wish to consider using CAFs systems where they can satisfy themselves that the fire performance meets their needs. The use of CAFs will not eliminate pollution risks as the concentrates used are still toxic and possess a high BOD. As with all foams, consideration should be give to an appropriate assessment of the risk of environment and suitable containment methods in place before foam is applied.

Environment agency protocols and the guidance in this section must be adhered to for CAFS systems as well as standard firefighting foams to ensure compliance with water pollution legislation (see Sections 1.4, Environmental legislation and Appendix 4, Suggested Notification Criteria) (see Figure 3.35).

3.9.5 Mitigating impact of firefighting foam

Due to the high BOD, potential toxicity and other polluting impacts of fire fighting foam, as well as other contaminants that maybe mixed in with the foam during an incident, every effort should be made to prevent firefighting foam entering surface and groundwater during an incident. When foam is used during training exercises or during testing it must **never** be allowed to enter surface and/or groundwater (see Section 3.9.8).

3.9.6 Sewage treatment

Discharging firefighting foam or firewater containing foam to a sewage treatment works during an incident can be a disposal option. But this will depend on the capacity of the drainage system, the size of the sewage treatment works, the type and volume of foam and the presence of any other pollutants within the firewater or foam solution. Before discharge, approval must be sought from the local sewerage undertaker as the introduction of foam into a treatment facility may disrupt the biological process and allow untreated sewage and foam into the receiving watercourse (see Section 1.6.3). The presence of significant amounts of detergent in the incoming flow can also present difficulties to treatment works due to excessive foaming, especially where pumping is necessary.

For the effects of firefighting foam on oil separators see Section 1.6.5.

Figure 3.35

CAFS in use at a refuse lorry fire, Note the run-off which can cause pollution if it's allowed to enter surface and/or groundwater. Protocols for notification and mitigation should be implemented at CAFS and other foam use incidents.

3.9.7 Use of firefighting foams – environmental considerations

Incident commanders must consider the possible effects of using foam on the environment and human health when evaluating:

- The need for using foam versus an alternative, for example water fog
- The use of a controlled burn
- The minimum quantities of foam required to extinguish the fire or maintain a foam blanket to suppress vapours
- The appropriate foam and concentration for the particular application (e.g. class a versus class b and hydrocarbon versus polar solvent fire)
- The need to prevent foam run-off entering drains including during make up activity following extinguishment and the availability of pollution control equipment and/or pollution containment facilities on site
- The need to work with local environment agencies and sewerage undertakers to ensure effective containment and treatment of run-off

For these reasons, the use of foam, including from CAFS systems, is a trigger for notifying environment agencies of an incident, as detailed in Appendix 4.

Advice on the procurement, provision and operational use of firefighting foam is in Fire Service Manual Volume 1 Fire Service Technology, Equipment and Media Firefighting Foam – Technical and Fire Service Manual and Volume 2 Fire Service Operations – Firefighting Foam.

3.9.8 Foam training

Foam used during training events must **never** be allowed to cause pollution as no defence exists under pollution control legislation (see Section 1.4, Environmental law). Both the foam type to be used and the design of the training facility drainage system need to be considered to ensure environmental good practice (see Figure 3.36). Foam training on open land (unmade ground) may lead to groundwater or surface water pollution and should be prohibited unless agreed with environment agencies.

FRSs should consider using purpose-made training foams for Class B fire training as they usually have lower BODs, don't contain fluorosurfactants and should be much cheaper than operational products. They are more likely to be acceptable for discharge to foul sewer, or will be cheaper to dispose of through a registered waste contractor.

But training foams are still polluting so run-off containing them or any other foam used during training exercises, including CAFS must never be allowed to enter surface or groundwater. To prevent this happening FRSs should assess the suitability of each fire station or training establishment as a foam training site. The training area must:

- Have an impervious surface to prevent groundwater contamination
- Be drained to a common point using one of the options set out below

If the ground surface is concrete, the expansion joints must all be fully sealed and care should be taken that no other surfaces, for example roof water drain into the area to minimise the amounts of rainwater run-off.

Some fire training grounds have an oil separator incorporated into the drainage system. These devices won't separate out foam products (see Section 1.6.5). Also, since many types of foam are a blend of detergents, they will emulsify oil already retained in the oil separator and allow it to discharge. Firefighting foam run-off must therefore not be allowed to enter oil separators that discharge into surface water systems

At a training venue (on FRS premises or not) these are the options:

- Discharge to a secure blind (no outlet) tank with the contents being removed by a **registered waste carrier.**
- Connection to the foul sewer for treatment at the local sewage treatment works, having obtained the written permission of the sewerage undertaker who may impose conditions. One option may be to have a diverter valve fitted, (see figure 3.37), so that drainage during training is passed to the foul sewer and at other times passed to the surface water sewer. This may help allay concerns from water companies about excess surface water entering the foul sewer.
- Provide full treatment on site and discharge direct to a watercourse or infiltration system (soakaway). This option is likely to need a permit from environment agencies and although expensive initially, may be suitable for larger training establishments.

The cost of using registered waste carriers is likely to rise over time and needs to be taken into account at the design stage.

Figure 3.36

Photo courtesy of the Fire Service College

Only approved training grounds should be used for firefighting foam training. An environmental risk assessment should be undertaken to prevent pollution of surface or groundwater.

Figure 3.37

Photo credit – Oxfordshire Fire and Rescue Service

These photographs show firefighting foam entering a drain at a fire station. For the training session, a diverter valve has been operated to route the foam to foul sewer. At all other times, drainage passes to the surface water sewer. Permission of the sewerage undertaker has been obtained.

- FRSs engaged in commercial fire training activities should not discharge foam extinguishers where the run-off may enter the surface or groundwaters either directly of via sewerage systems or oil separators.
- To ensure operational effectiveness and reduce any unnecessary environmental impact, firefighting foam equipment requires regular calibration to ensure the correct percentage of foam concentrate is used. Calibration should also take place if a FRS changes its foam equipment or concentrate type. Specifically calibrated foam training equipment may be required for training foams.
- Environment agencies recognise the value and importance of foam training and don't wish to prevent it but they can't allow it to cause pollution.

3.10 Hazardous waste

Emergency incidents sometimes produce hazardous waste (also known as special waste in Scotland), as defined by the Hazardous Waste (England and Wales) Regulations 2005 (as amended), the Special Waste Amendment (Scotland) Regulations 2004 and the Hazardous Waste Regulations (Northern Ireland) 2005. This can be as a result of spillage or leakage of products involved in the incident or as a consequence of FRS intervention (see Figure 3.38). Products involved that could be classified as hazardous waste might be UN-listed chemicals, oils, fuels, paints, dyes, fly-tipped materials, used pollution control equipment, contaminated protective clothing or other equipment, contained firefighting run-off water or contained/absorbed materials.

Hazardous waste needs to be treated carefully and within the requirements of the various regulations to avoid injury to firefighters or other people and damage to the environment. Examples of incidents where such waste is produced and that require strict control are detailed in Table 3.3. This table isn't exhaustive and, if in doubt, consult the relevant environment agency.

Figure 3.38

Contaminated oil absorbent materials such as those found in a grab pack may be classed as hazardous waste. Suitably marked bags or containers should ideally be handed over to a responsible person at the scene.

Table 3.3 Examples of incidents producing hazardous waste

Example of Incident	Waste produced
Road traffic collisions	Oils, fuel, coolants, or other liquids
Spillages of non-hazmats	Paints, dykes, inks
Spillages of hazmats	Corrosive, toxic, flammable materials
First aid equipment used	Clinical waste (see note 1 below) disposable gloves, pads, bandages.
Fires involving environmentally damaging materials	Contaminated firewater run-off, wastes/ residues created by the fire and fire fighting
Pollution incidents	Contaminated personal protective equipment and other operational equipment

1. Minor first aid waste won't normally be treated as clinical, unless there's a risk of infection. But Department of Health guidance advocates treating blood-contaminated material as infectious clinical waste in such circumstances. This will include dressings, sharps etc. If in doubt, seek advice from ambulance service personnel. Local working arrangements with ambulance trusts can also provide suitable disposal arrangements.
2. Organic materials such as foodstuffs, sewage and farm slurries (even if polluting) and inorganic materials such as sand aren't covered by the regulations on hazardous waste unless contaminated by other hazardous materials, for example sand used to mop up a fuel spillage. But, like any waste, including domestic waste, this has to be dealt with by a registered waste carrier, for example the local authority or private waste contractor.

3.10.1 The role of the FRS at incidents where hazardous wastes are produced or involved

The FRS has direct legal responsibility for any waste, hazardous or non-hazardous, that has been produced as a result of its activities, but not wastes produced by a third party. The definition of 'hazardous waste' can be complex as it can involve calculations of quantities and concentrations in relation to the nature of the product. Certain wastes will nearly always be classified by the regulations, such as mineral oils, acids and solvents and other substances covered by The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009. So FRS personnel should treat any potentially hazardous material as hazardous waste until the environment agency has informed them otherwise.

The FRS has a statutory duty of care for the waste it produces at incidents; this would normally be discharged by the FRS incident commander. The duty is to ensure that the waste is properly assessed, described, and classified on waste documentation, contained appropriately, and handed over to a responsible or competent person for transport to a suitably authorised waste facility. The protocols below must be followed.

Where hazardous waste not produced by the FRS is involved, the incident commander should try to identify who is responsible for its safe disposal. This will vary depending on the exact location of the materials but will usually be as shown in Table 3.4. The 'producer/holder' will normally be the person whose activities have caused it to be produced or the person in possession of the material – the polluter.

Table 3.4 Basic guide to responsibilities

Local authority	Responsible for materials on playing fields, public open spaces, beaches
Landowner or occupier	Responsible for materials on own private land or inside premises
Highways Agency (or equivalents in Scotland, NI and Wales) or their representatives	Responsible for materials on motorways and major trunk roads.
County, metropolitan, or unitary authorities	Responsible for materials on roads not covered by the Highways Agency

In cases where there is a risk of pollution and/or threat to public health and it's not possible to identify the responsible party, or they are unwilling to act, or the timescale of their response is unacceptable, the environment agency will either advise incident commanders what action to take or arrange for the safe and legal removal of the waste using a registered waste carrier.

This will be in accordance with current protocols or Memorandum of Understanding between local government and the environment agencies. On these occasions the environment agencies will, wherever possible, seek to recover their costs from the responsible parties in accordance with the 'polluter pays' principle.

The responsible person should be informed either by the incident commander, or preferably by the environment agency officer if present, of their responsibility to contain and organise the removal of the waste with appropriate documentation using a registered waste carrier. If the responsible party doesn't have their own arrangements to obtain such a contractor, they can obtain lists of registered waste carriers either from Chemdata (companies/waste) or similar database or from the environment agencies.

The FRS should avoid instructing waste carriers to attend incidents as this may result in costs being incurred. Given the potential complexities involved, FRSs should develop local procedures for dealing with waste with the relevant organisations and authorities. Local environment agency staff may attend such meetings on request and offer guidance.

In cases where the FRS produces its own hazardous waste at FRS premises, for instance following a fuel spillage at a fire station, it has a legal duty to ensure that the waste is transported and disposed of by a registered waste carrier. In these cases, the FRS is responsible for employing a registered waste carrier.

3.10.2 The role of environment agencies at emergency incidents where hazardous waste is produced or involved

An environment agency's role in waste management is regulatory and it has no responsibility for disposing of contaminated materials at any incident. So the environment agency will normally only provide advice to those with responsibility for removing the waste at emergency incidents and, if necessary, incident commanders and HMEPOs. This will normally be by phone unless an environment agency officer is already in attendance.

The only exception to this approach, when the environment agency may take direct action to remove the waste, will be where the waste poses an immediate threat to the public and/or environment. In such cases, as well as ensuring correct disposal of the waste, the environment agency will also pursue any criminal investigation and enforcement action if it suspects criminal or illegal activity.

3.10.3 The movement of hazardous waste by the FRS in emergencies

The environment agencies discourage FRSs from transporting hazardous waste; they prefer that such waste is stored securely at the incident scene pending collection by a registered waste carrier. But on occasions, the incident commander and environment agency may decide that this poses an unacceptable risk to the public or environment and the waste should be immediately removed to an alternative secure temporary site.

Waste legislation allows the FRS to take temporary responsibility for waste in such situations, providing that the waste can be moved safely without endangering the public and the environment. Preferably it should be transferred to a secure waste management facility, on the advice of the environment agency officer. If this isn't possible, identify the nearest location where the waste can be securely stored pending its collection.

The decision to move the waste should wherever possible be taken in consultation with an environment agency officer at the incident scene or by phone to ensure compliance with legislation. Protocols for notification should be agreed between the environment agency and the local FRS.

If a FRS moves hazardous waste only rarely, and as the waste is not being moved in the course of any business or with a view to profit, it won't need to register as a waste carrier. But this position may need to be reviewed if such movements take place more regularly or if it decides to charge for such a service.

FRSs that expect to move waste should ensure that appropriate stowage arrangements, risk assessments and safe systems of work are all in place. Where a FRS has decided not to move hazardous waste in any circumstances, a duty of care still exists and it still needs to implement appropriate procedures to protect the public and environment. So protocols with local authorities or other organisations should be considered to ensure waste doesn't injure people or damage the environment if it's left unattended.

3.10.4 The movement and storage of non-hazardous waste

Waste legislation allows the FRS to transport to fire stations and store pending disposal small quantities of non-hazardous waste such as disposable gloves or limited-life chemical protection suits used at incidents. The criteria to be met are that the waste must be:

- Non-liquid and non-hazardous
- Stored in a secure container or containers to a maximum of 50 cubic metres
- Kept for a maximum period of three months

Where possible, incident commanders should leave contaminated items with the responsible persons at the incident scene and clean-up responsibility with the relevant competent authority.

3.11 Wildfires

3.11.1 Introduction

Managed fire has traditionally played an important role in maintaining the landscape and biodiversity. For instance, rotational burning is used to maintain heather moors for grouse and grazing animals and contributes to floristic diversity. Managed fires can reduce wildfire risk by reducing fuel load and creating firebreaks but if poorly controlled can create wildfires

in themselves. Large uncontrolled wildfires can have a significant adverse impact on the environment and are likely to become more commonplace as a consequence of climate change. Plant damage during fire is determined by a combination of a number of factors including temperature and duration of the fire and the sensitivity and resilience of the affected plant. A slow-moving fire has greater environmental consequences, as it has a greater residency time and can pass heat down through the ground, burning the moss layer, impacting on the soil and killing roots and seeds.

Fires will cause vegetation to ignite, leading to losses of soil organic matter and nutrients and exposing it to erosion. The fire damaged peat can then be washed into surface and groundwaters, where it discolours and contaminates drinking water supplies and can threaten fisheries and aquatic ecosystems. Heavy metals from previous industrial processes deposited in the form of airborne pollution on vegetation and fertilisers used in agriculture and forestry are disturbed by burning and evidence exists of them leaching into water catchment areas following a wildfire. Wildfires may threaten critical infrastructure such as high-pressure oil pipelines which, if damaged by fire, have the potential to pollute the environment. Additional large wildfires can occur on nature conservation, heritage and landscape designations impacting on UK and EU protected areas (see Section 2.6 Areas of Nature Conservation).

Wildfires in the UK may not appear to be as significant as in other countries such as Australia or the USA but they are becoming increasingly prevalent; there were a large number across the UK in the spring of 2011. The most hi-profile and resource intensive occurred at Swinley Forest, Berkshire; it affected an area covering 110 hectares, of which 55 per cent was damaged a surface and crown fire. The fire was the largest ever dealt with by Royal Berkshire FRS and involved the support of another 11 FRS's, the Forestry Commission, Crown Estates, Local Authority and Police and also a significant number of FRS National Resilience assets.

Figure 3.39

Photo courtesy of Rob Gazzard, Forestry Commission

As well as being extremely resource intensive, wildfires can cause significant environmental damage to soil, vegetation, wildlife and surface and groundwaters.

3.11.2 Definition of wildfire

The Food and Agriculture Organisation of the United Nations (FAO) describe a wildfire as:

"Any unplanned and uncontrolled wildland fire that, regardless of ignition source, may require suppression response or other action according to agency policy"

One of the key elements of the FAO definition is the reference to *'wildland'*. The term refers to any part of the landscape in which human development or impact is essentially non-existent except for the presence of basic infrastructure such as roads, railways and power lines.

As the UK has a predominantly managed landscape, the reference to *'wildland'* within the FOA definition may prove to be misleading, therefore a more accurate description of wildfire within the UK is;

"Any uncontrolled vegetation fire which requires a decision, or action, regarding suppression".

Although all non-prescribed vegetation fires technically fall into the above definition, there is a requirement for FRS personnel, and other partner agencies, to use their professional judgment to differentiate between a small vegetation fire and a wildfire event. A wildfire may be defined as a fire occurring in combustible vegetation such as woodland, scrub, grassland or heaths, either of natural origin, or caused by human intervention.

For recording purposes, and to assist in drawing distinction between minor vegetation fires and those that can be logically referred to as wildfire incidents, a wildfire event can also be considered as meeting one or more of the following criteria;

- Involves a geographical area of more than one hectare
- Has a sustained flame length of more than 1.5 metres
- Requires a committed resource of more than four FRS appliances
- Requires resources to be committed for more than six hours
- Presents a *serious* threat to life, environment, property and infrastructure.

The criteria also allows a differential to be made between 'small' and 'large' wildfire events due to its inherent scalability.

3.11.3 The influence of variables on the environmental impact of wildfires

Fuel

Fuel factors that influence the environmental impact of a wildfire include fuel type and form, moisture content and fuel density. In a wildfire, the predominant fuel may be grass, scrub or trees, or the fire may progress from an area with one predominant form of fuel to an area with a different one. Many types of vegetation exist, with a high diversity of fuel types, moisture contents and fuel densities.

The FRS Operational Guidance: Wildfires classifies fuel types to enable FRS personnel to appreciate the different fuel types:

- Grassland
- Crops
- Coniferous woodland and forest
- Broadleaved and mixed woodland and forests
- Heath, bogs and moorland
- Scrub

Weather preceding and during a fire

Weather factors **preceding** a fire that influence its environmental impact include rainfall, air temperature and humidity. High temperatures, no rainfall and low humidity will result in a fire that produces different emissions from those produced by a fire occurring after a period of low temperatures, rainfall and high humidity: the former case will result in more efficient combustion.

Weather factors **during** a fire that influence its environmental impact include wind speed, air temperature and humidity. High winds, high temperatures and low humidity will result in a fire that produces different emissions from those produced by a fire occurring when there is little or no wind, low temperatures and high humidity: the former case will result in more efficient combustion.

Profile of the landscape

The shape of the landscape will influence wildfire behaviour and its environmental impact. The orientation and steepness of slopes plays a significant part, for example upslope conditions will result in a fire that produces different emissions from those produced by a fire occurring under no slope or downslope: the former case will result in more efficient combustion.

3.11.4 The environmental impact of wildfires

The environmental impact of wildfires can't be considered in isolation. The potential effect of these fires is an important factor when planning to deal with them. Wildfire has the potential to pollute air, water and land.

The water environment is the most vulnerable to pollution from emergency incidents in most circumstances, and the aspect of the environment that the FRS can protect most readily. In common with most incidents, pollution prevention and control measures at wildfire incidents concentrate primarily on protecting the water environment and, where feasible, the land and air quality.

3.11.5 Impact of wildfires on the aquatic environment

Impacts to be considered include:

- Pollution of surface and groundwater from firewater run-off containing firefighting foam and other chemical additives such as wetting agents and retardants and/or sediment pollution of surface and groundwater by combustion products of vegetation
- Contamination of drinking water supplies by firewater run-off
- Pollution due to vegetation removal, for example increased sediment run-off
- Use of sea water for fire suppression and its impact on fresh water dependent species and habitats and other sensitive flora and fauna.

Pollution of surface and groundwaters by firefighting foam/chemicals/sediment

Many firefighting chemicals such as foams are nutrients, and pollution of surface and groundwater by firefighting chemicals may lead to the formation of algal blooms, deoxygenation or other undesirable effects. Many fire-fighting chemicals are also toxic to fish, aquatic invertebrates and algae. Nutrients/sediments may be washed into surface or groundwaters following the application of firefighting water. Measures must be taken at wildfire incidents to mitigate the impact of such incidents on the water environment.

Pollution of surface and groundwaters by combustion products of vegetation

Pollutants may be solid or liquid. Solids may be soluble or insoluble in water. Soluble materials may be toxic to aquatic wildlife; insoluble materials may cause discolouration and cloudiness which can interfere with the ecology of the waterway.

Contamination of drinking water supplies by firewater run-off

Run-off from fires in water catchments can lead to contamination of water abstracted for human consumption.

Pollution due to vegetation removal

Vegetation removal can lead to erosion and soil loss by wind and rain for an extended period after the fire. If these sediments enter a nearby watercourse, pollution can result.

3.11.6 Impact of wildfires on the soil, vegetation and wildlife

The environmental impact of wildfires on soil includes the direct impact of fire – pollution of soil and soil loss due to vegetation removal. The direct impact of wildfires on soil can include the breakdown of surface structure and deposition of ash, but can also lead to non-adverse effects such as the recycling of nutrients. Pollution of soil can occur and pollutants may be solid or liquid and solids may be soluble or insoluble in water. Vegetation removal can lead to erosion and soil loss by wind and rain.

The environmental impact of wildfires on vegetation includes:

- Species loss directly due to fire
- Stress due to vegetation loss
- Species replacement
- Impact of firefighting chemicals

Remnant populations of endangered species can be extremely vulnerable to wildland fires. Plant communities can be very complex, and the loss, temporary or permanent, of one species can affect other species. Some species respond more rapidly than others after a fire. Fire can lead to a change in the dominant species in an area. Vegetation studies have identified concerns about the adverse impact of firefighting chemicals on vegetation, for example, annual grasslands have doubled their biomass following the application of diammonium phosphate retardant.

Similarly to vegetation, the loss of species of wildlife can occur directly as a result of fire, and also the stress caused by habitat loss. For example, the fire involving Thursley Common in 2006 posed a serious threat to rare birds such as Dartford Warblers that depend on heathland habitat for nesting and feeding, by destroying their habitat, eggs and chicks in the middle of the breeding season.

3.11.7 Planning for wildfire incidents

Operational risk information plans

Due to their potential complexity, scale and risk, wildfires can be managed much more effectively if there's a plan in place before the incident. The involvement of partner agencies such as the environment agencies, Forestry Commission and Natural England will result in more effective plans being drawn up which will prevent pollution. Planning should include the source, pathway, receptor principle and detail any relevant control measures in line with the hierarchy of pollution control (see Section 2.2 – Pollution intervention planning and Section 8.A of FRS Operational Guidance: Wildfires).

Partnership working and fire groups

The concept of partnership working is well established within the FRS and wildfire is an incident type which benefits from collaboration. Regional fire groups have been established involving stakeholders and practitioners to improve planning, prevention and response for wildfires. In line with the principles of Integrated Risk Management Planning, a key objective of these groups should be to protect the environment.

Two national groups, the England and Wales Wildfire Forum (EWWF) and Scottish Wildfire Forum (SWF) have been established to address national strategic wildfire issues and to create a forum between the FRS, national land management agencies, environment agencies, conservation groups and other stakeholders. The aim of both groups is to develop and communicate wildfire prevention and mitigation strategies to government, stakeholders and their wider communities.

More information on the EWWF and the SWF is at http://wildfireforum.ning.com and www.scotland.gov.uk respectively.

In recognition of the raised awareness of the risks posed by wildfires, the Chief Fire Officers' Association (CFOA) has established an Operational Wildfire Group with membership open to

all FRSs. More information on the group and CFOA's Position Statement on wildfires is at www.cfoa.org.uk

3.11.8 Mitigating the impact of wildfires on the environment

When undertaking environmental protection measures at a wildfire, the LACES protocol should be adopted as recommended in the FRS Operational Guidance: Wildfires (**LACES** – **L**ookouts; **A**wareness; **C**ommunications; **E**scape Routes; **S**afety Zones).

At wildfires which could pollute the environment, the Incident commander should consider:

- Appointing a Hazardous Materials and Environmental Protection Officer (HMEPO) to oversee the environmental protection element of the incident in liaison with partner agencies
- Requesting the attendance of partner agencies such as environment agencies, Natural England and the Forestry Commission at an early stage of the incident to offer specialist advice; the HMEPO should liaise with attending partner agencies to determine the most appropriate firefighting method and environmental protection strategy
- Asking the HMEPO to undertake an environmental analytical risk assessment (EARA) early on in collaboration with relevant partner agencies (see Section 3.4, Operational environmental risk assessments and appendix 7 – Example of an environmental analytical risk assessment form)
- Restricting, wherever possible, the use of foam or other firefighting chemicals (see Section 3.9, Firefighting foam) But it must be borne in mind that the use of foam may have environmental benefits in extinguishing a fire more quickly
- Exercising particular caution when using any firefighting foam in areas where water abstraction, fisheries/fish hatcheries, Areas of Nature Conservation consisting of sensitive habitats such as SSSI's are located (see section 2.6 – Areas of Nature Conversation)
- Using high pressure water fogging systems as opposed to foam or water jets (see figure 3.40)
- Using hand tools such as 'beaters' in particularly sensitive areas
- Putting in place pollution control measures such as containment to prevent pollution of surface and groundwaters (see section 3.2, Environmental protection operational strategies and techniques)
- Consulting the environment agency where High-volume pumps (HVPs) are used to avoid over abstracting from water sources
- Using fire such as a defensive or offensive burn; guidance on using operational burns as a tactic for wildfires is in FRS Operational Guidance: Wildfires
- How to avoid spreading plant and animal diseases and pests from one area to another through contaminated equipment and clothing (see Section 2.4.6, Bio-security and non-native species)

Figure 3.40

Photo courtesy of Lancashire Fire and Rescue Service

Tracked all-terrain vehicles are useful in dealing with wildfires. The one illustrated has a firefighting module which is fitted with a water tank, low and high pressure pumps and high pressure fogging hose reels.

Further guidance on operational procedures in relation to wildfires is in found in FRS Operational Guidance: Wildfires available at www.scotland.gov.uk

3.12 Notification and recording of FRS pollution control activities

To ensure the continuing success and development of the partnership, the effectiveness of FRS pollution control activity should be regularly reviewed and the benefits promoted. It's also important that the costs of pollution control equipment, whether provided by environment agencies or the FRS, are recovered from the polluter, unless there are overriding circumstances. These aims can only be achieved by systematic and accurate recording and reporting of operational environmental protection activities.

FRSs should ensure that attending crews complete a reporting and recording form each time they undertake pollution control activity. An example reporting form which may be modified to meet local needs is in Appendix 6.

Activities that should be recorded on the form include:

- Time spent on pollution control activity
- The quantities of product contained
- Materials, equipment techniques
- Improvised activities such as constructing an earth bund around a drain

Once completed, a copy of the reporting form should be emailed to the locally nominated environment agency contact. In England this must be within 21 days to allow the Environment Agency to generate an invoice within the timescales set out in its incident recharging procedures.

As well as providing the information environment agencies require for recharging submission of the reporting form will provide a clear audit trail on the use of the equipment they provide (not in Scotland). It will also provide both parties with a record of the effectiveness and value of the FRS response.

FRS should keep a record of the forms to help them record, monitor, report and demonstrate the value of the pollution control activity they undertake. It will also provide valuable data for planning and resource provision purposes as part of an IRMP or equivalent process.

As well as assisting operational staff, the information from the reporting forms may prove useful to FRS strategic management teams, fire authorities, environment agency planners and central government departments to inform decisions on issues such as resource allocation and location and emerging issues and trends to aid strategic as well as local planning processes. The form can also identify areas of training need.

Some FRSs now use the Incident Recording System (IRS) to record environmental protection action and equipment used (see figure 3.41). This can assist in generating electronic reporting to the Environment Agency. When completing the IRS, a simplified electronic version of the report form is automatically generated which details the nature of the incident, information relating to the polluter and details of the type and quantity of equipment used. This electronic form can then be emailed to the Environment Agency. Details of the equipment re-ordering process are included in Appendix 9.

Figure 3.41

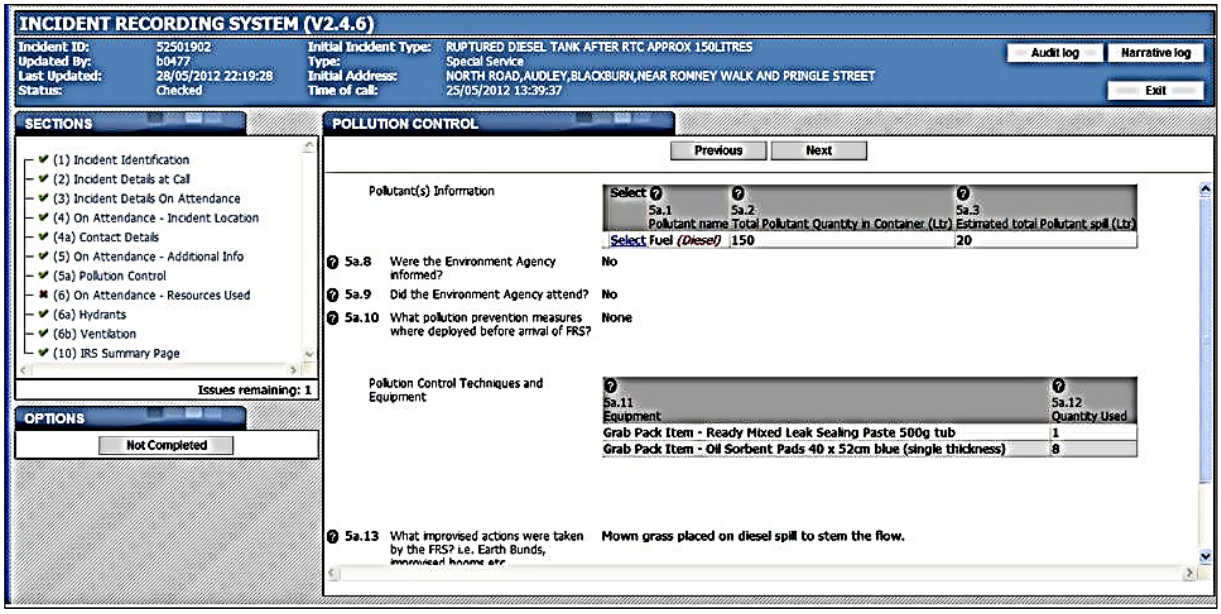


Image courtesy of 3tc Software

Some FRS units now use the Incident Recording System to generate electronic recording of equipment used for notification to the Environment Agency.

3.12.1 Equipment damage

When the FRS deploys pollution control equipment on site to prevent pollution, a notice providing guidance needs to be left with the owner of that premises/activity. This notice explains why the equipment has been deployed and that it should not be moved without the permission of the environment agency or FRS; incorrect removal can damage the equipment (see Appendix 8).

Damage caused to any equipment which has been deployed can be recovered under Section 161 of the Water Resources Act 1991. This is known as the 'Polluter Pays' principle whereby the Environment Agency/Natural Resources Wales can also recover the cost of investigating and dealing with incidents.

3.12.2 Equipment levels

To ensure continuity of supply, a stock of pollution control equipment should be held as a non-mobile resource at fire stations and other appropriate locations agreed locally with environment agency officers. A 100 per cent reserve of non-reusable equipment is recommended at each station with an additional 50 per cent of the FRS total held in reserve at one or more locations although this can be adjusted to meet local need. The FRS stock can also be used to replenish individual stations.

Chapter 4

Environmental management

4.1 Environmental management systems

An environmental management system (EMS) provides a structured and documented approach to managing an organisation's environmental performance and responsibilities. Introducing an EMS into any organisation will enable it to operate in a sustainable manner, benefiting the environment locally and globally. There may also be financial benefits, for a FRS these are most likely to be cost savings from improved performance or efficiency. But gaining a greener reputation within the community is also particularly beneficial to public sector organisations.

An EMS must have certain elements as outlined in the international standard ISO 14001 or the European Eco-Management and Audit Scheme (EMAS). FRSs can choose to be certified to the ISO standard or registered with EMAS and can demonstrate that they have met the requirements using either internal (in-house) mechanisms or external certification companies.

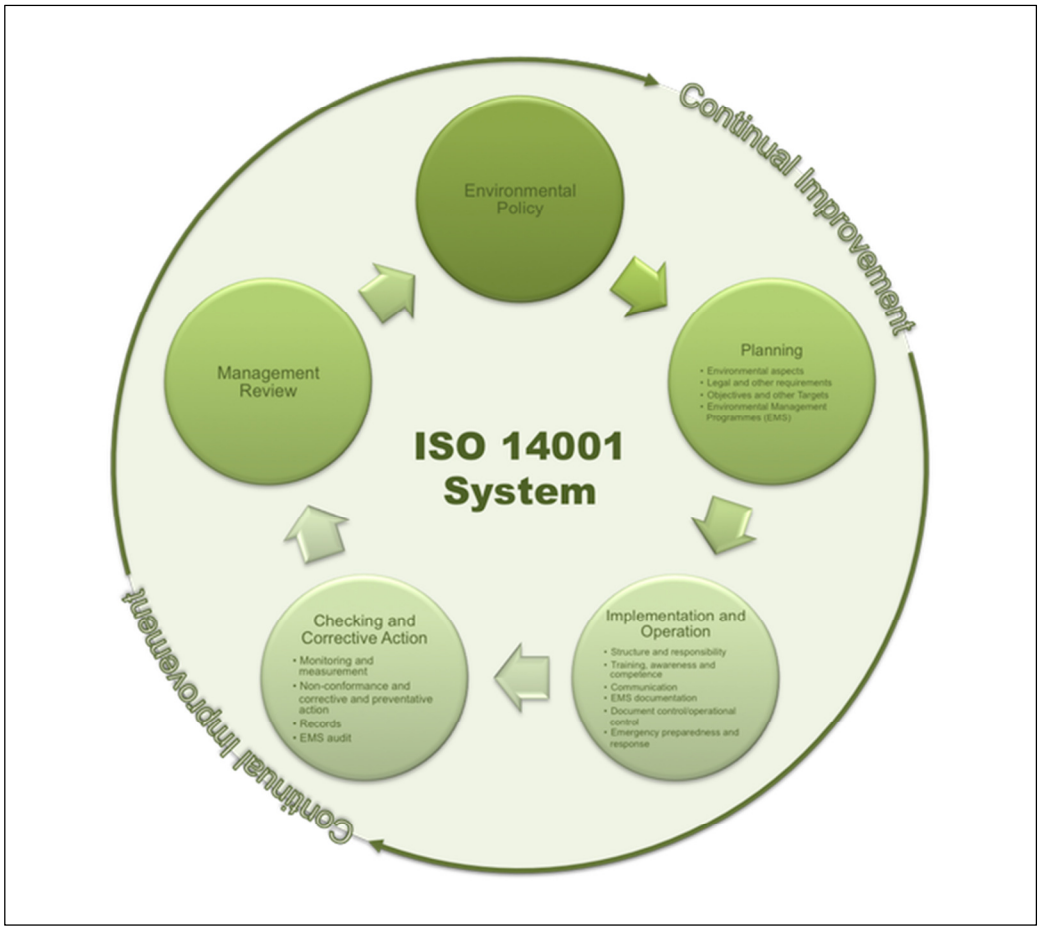
4.1.1 Steps to implement an EMS

FRSs that choose to implement an EMS that fulfils the requirements of ISO 14001 or EMAS will have to follow a number of steps towards compliance. FRSs will have to obtain senior management commitment to an environmental policy, which must contain a commitment to:

- Continual improvement
- Preventing pollution (including at operational incidents)
- Comply with environmental legislation
- Establish and maintain an up-to-date list of environmental legal and 'stakeholder' (e.g. local authority policies) requirements
- Identify and evaluate the environmental hazards
- Formulate environmental objectives and targets using the environmental policy, legal requirements and environmental aspects
- Make a plan that outlines how to achieve the objectives and targets
- Implement the plan by developing the capabilities and support mechanisms needed to achieve the objectives and targets; this includes responsibilities, competencies and resources
- Measure and evaluate outcomes by using internal and external auditors
- Review and continually improve the plan, procedures, targets and objectives

This is not an exhaustive account of the ISO 14001 or EMAS requirements and is only intended to provide a flavour of what's involved. Figure 4.2 illustrates the ISO 14001 system.

Figure 4.1



4.1.2 External certification

Many companies in the UK certify organisations to ISO 14001 or EMAS. Some of these are accredited by the UK Accreditation Service (UKAS) and FRSs seeking accreditation should use UKAS-accredited certifying bodies. A list of such companies is on the UKAS website (www.ukas.com).

4.1.3 Differences between ISO 14001 and EMAS

The two registration schemes offer a different depth of performance management.

ISO 14001 is the management element of EMAS and can stand alone, whereas registration under EMAS requires an ISO 14001 based management system as well as other elements such as an environmental statement, which is verified by a suitably competent person.

4.1.4 EMS and the law

EMSs are not currently part of UK environmental law or a requirement of any pollution prevention regulation but environment agencies recommend them in pollution prevention guidance as good practice for all organisations.

4.1.5 Further information

Many websites provide information about ISO 14001, EMAS and EMSs:

- British Standards Institution ISO 14001 information pages website (www.bsi-global.com) includes a new standard BS 8555 for small and medium sized enterprises. The standard takes the form of guidance towards achieving ISO 14001 or EMAS. It's not a certifiable specification itself but outlines an implementation process that has six separate phases (each certifiable) leading to full EMS implementation
- Environment Agency website (www.environment-agency.gov.uk); look for 'Environmental management systems'
- Institute of Environmental Management and Assessment (IEMA) website (www.iema.net) provides information about BS 8555 for phased implementation of ISO 14001
- DEFRA guidance on EMAS (www.gov.uk/defra).
- Envirowise website (www.webarchive.nationalarchives.gov.uk/20081231001025/envirowise.gov.uk) has a range of free of charge EMS-related guidance material and case studies.

4.2 Pollution from FRS premises

All FRS premises have the potential to damage our natural environment. Pollution incidents can result from spillages, fires, accidents, negligence or vandalism.

FRSs could face fines of up to £50,000 for water pollution and waste offences in a Magistrates Court. The responsible person could also be sent to prison for twelve months for such offences. If a case goes before the Crown Court (High Court in Scotland) there's no limit to the fine and the responsible person could go to prison for five years for water pollution and waste offences.

Even if a case isn't taken to court, the cost of repairing the damage to the environment (clean-up cost) has to be met – these can be substantial. For example, fish restocking can cost thousands of pounds and cleaning up serious groundwater pollution can cost over a million pounds. Insurance premiums will increase considerably if a claim for pollution clean-up is made. Reputational damage is also a consideration.

Following this guidance will not only reduce the chance of causing pollution, it also makes good business sense. Minimising waste, energy use and pollution risk saves money by reducing operating costs. FRSs that have a 'green' image are keeping up with today's social climate.

4.2.1 Waste management

Environment agencies monitor organisations such as the FRS that produce waste. Waste represents the loss of valuable resources, presents a risk to the environment if it's not treated carefully and costs money to dispose of. It's usually possible to reduce waste production and increase reuse and recycling without extra costs and, in many cases, save money.

4.2.2 Water quality

Most discharges to the water environment require the prior permission of environment agencies in the form of a discharge permit, consent or under an exemption. This is a legal requirement and the permit, consent or licence if issued will contain conditions that relate to the quality and quantity of the discharge. It's illegal to discharge trade or sewage effluent to the water environment without a permit, consent or an exemption.

4.2.3 Air quality

Emissions to the air can affect people's health, cause nuisance due to bad smells and damage the natural and built environment. The environment agencies regulate the release of pollutants, including odour, to the air from large or more complex industrial processes and waste management facilities, such as landfill sites. Local authorities are responsible for local air quality management and regulate emissions of pollutants to the air from smaller processes (SEPA, apart from Scotland where the role is undertaken by SEPA).

The FRS is exempt from provisions of the 1968 version of the Clean Air Act by the Clean Air (Emission of Dark Smoke) (Exemption) Regulations 1969. These regulations list as an exemption:

'Matter which is burnt in connection with: a) research into the cause or control of fire or b) training in fire fighting.'

For clarification, FRSs should contact the local authority for advice on whether emissions – for instance, from real fire training facilities – require authorisation. (See also Section 4.2.6 Waste management).

4.2.4 Noise and light

Noise and light pollution aren't covered in this guidance, but should be taken into account when assessing the environmental impact of a site. Advice on noise reduction can be obtained from local authorities and in Scotland from local SEPA offices.

4.2.5 Getting your site right with the *Pollution Prevention Pays* guide

This guidance is available from environment agencies and is designed to encourage organisations to put effective pollution prevention measures into practice. These can be identified by carrying out an environmental review (site audit), which should cover:

- Legal requirements
- Areas of risk
- Resource management
- Waste minimisation
- Community relations

An environmental review is the first step towards developing an EMS (see Section 4.1) which provides the framework for an organisation to deal with the immediate and long-term environmental impact of its products, services and processes. The environment agencies and other independent organisations can help.

4.2.6 Environmental protection – is your site right?

FRSs can make their site right and protect the environment by putting into practice the action points for the activities and areas listed below.

Site drainage

A good knowledge of all the drainage systems on the site is **fundamental** to prevent pollution:

- Produce a comprehensive and up-to-date **drainage plan** of the site, which accurately identifies all drains. If there's no in-house expertise to do this, a reputable drainage company should be used. Key staff need to be familiar with the plan, which should be readily available.
- Check drainage plans before carrying out any new building work to ensure connections are made to the right drainage system. Remember to update the drainage plan to reflect any changes to the drainage system.
- Colour code all manhole covers, drainage grills and gullies. Foul water drains should be painted red and surface water drains blue. Combined drainage systems could be colour-coded with a red letter C. Make everyone (including service personnel and contractors) aware of the significance of the colour-coding system.
- There should be no wrongly connected effluents, especially in areas that generate trade effluent, for example vehicle workshops. The following facilities are often overlooked and must be connected to the foul or combined drainage system (see Trade effluent in Section 4.6.7 for more information):
- Mess rooms
- Toilets
- Showers
- Sinks, dishwashers and washing machines
- Seal all ducted cableways so that they don't create uncontrolled drainage routes.
- Only discharge clean uncontaminated water (e.g. roof water) to the surface water system.
- If site foul drains are connected to a private sewage treatment system, such as a cesspool, septic tank or package plant, make someone responsible for its upkeep. Make sure it's maintained and emptied regularly (you may need a discharge consent, so check with your local environment agency office).
- Permanent drainage isolation facilities (such as penstocks, drain closure valves or emergency containment systems) may be needed on high-risk areas for example foam training or as part of the site's emergency procedures, to prevent spillage or run-off polluting the environment. Contact the local environment agency office for advice about isolating high-risk areas and sites
- To prevent oil pollution, provide oil separators on any surface water drain at risk – particularly fuelling and vehicle parking areas (a discharge consent may be required; the local environment agency office can advise). A pollution prevention guidance note PPG 3 on separators is available; see Section 1.6.5 for further information.
- Oil separators:
- Must be sized according to the area being drained
- Will not retain soluble oils
- Must be maintained and regularly emptied to remove trapped oil and silt
- Will not work if detergents, including firefighting foams, are present

Deliveries and handling

Delivery and handling of material such as oils, chemicals and foodstuffs around a site is always a high-risk activity. Good working practices are essential.

Take special care during delivery, loading, unloading and transfer of all materials, particularly hazardous substances including fuels. Identify any risks so they can be minimised wherever possible. Making someone responsible for supervising deliveries can help avoid spillages and prevent damage to the environment, save valuable raw materials and avoid legal action.

Action points

- Ensure all **loading and unloading** areas are designated, clearly marked and isolated from the surface water drainage system, for example, by using separators or sumps with isolating valves.
- Develop and implement procedures for supervising all deliveries.
- Minimise the quantity of material stored on-site. Storage containers and pipework must be well designed, 'fit for purpose' and comply with any relevant regulations. Check their condition and storage levels before receiving each delivery to prevent loss of product, for example, by overfilling or tank failure.
- Fit appropriately-sized drip trays to all delivery pipe inlets and remove any spilt material immediately.
- Fit an automatic cut-off valve or alarm to prevent spillages through overfilling. This may be a legal requirement for oil tanks if the vent pipe can't be seen from the delivery point.
- Pumped dispensing is preferable to gravity draw-off.
- Reducing the need for materials to be moved around the site lowers the risk of accidents or spillage. Identify transfer routes and keep them clear at all times, assess the potential for environmental damage and carry out measures to reduce the risk.
- Avoid manual handling wherever possible to reduce the risk of human error and accidents.
- Have a contingency plan and make sure everyone is aware of what to do if there's a spillage or other accident. Have a stock of emergency equipment or grab pack – for example, drain covers, absorbent materials and protective clothing available nearby to mop up small spillages (see figure 4.2). Dispose of all residues and contaminated materials correctly.

Figure 4.2

Photo courtesy of Lancashire Fire and Rescue Service

An example of an emergency spill kit at a fire station that has bulk storage of fuel. The kit includes drain covers, absorbent materials and protective clothing with clear instructions for use on the underside of the container lid.

Storage

Poor storage of oils, chemicals, firefighting foam and other materials is a major risk to the environment.

The potential for accidental spillage is greatest during deliveries and dispensing, but storage containers such as tanks, intermediate bulk containers (IBCs), drums, bowsers, are also a risk. They must be sited appropriately, and designed and maintained to take into account environmental protection. The use of secondary containment systems such as bunded areas or bunded pallets prevent materials escaping to the environment.

In England, above-ground oil storage containers (e.g. tanks, IBCs, drums and mobile bowsers) greater than 200 litres must comply with the Control of Pollution (Oil Storage) (England) Regulations 2001 (see Pollution Prevention Guidance Note 2 (PPG2) and the Environment Agency leaflet Keep your oil safe – The Control of Pollution (Oil Storage) (England) Regulation 2001 (www.gov.uk/environment-agency).

In Scotland the Water Environment (Oil Storage) Scotland Regulations 2006 apply. These differ slightly to the English Regulations and details are available on the SEPA website (www.sepa.org.uk). In Northern Ireland the Control of Oil Pollution Regulations (Northern Ireland) 2010 apply. (see www.doeni.gov.uk)

There are currently no oil storage regulations in Wales but it recommended FRSs in Wales follow the good practice guidance in PPG 2. FRSs should find out if oil storage legislation applies to their above ground oil stores as some of the action points below may be a legal requirement.

Action points

- Use an appropriate container for the material stored. Make sure it's fit for purpose and clearly labelled with product type, maximum capacity, health and safety and environment protection information
- Locate storage facilities away from watercourses, open drains, gullies, unsurfaced areas or porous surfaces
- Protect containers from impact damage where necessary
- Avoid roof storage; it's high-risk because any loss of the contents may drain to the surface water system via guttering and cause pollution
- Storage tanks, IBCs and bowsers for chemicals, oils and raw materials such as firefighting foam, must have a secondary containment system able to hold at least 110 per cent of the tank's maximum capacity. It must be impermeable to the material stored, enclose the ancillary equipment (e.g. local fill and draw-off facilities, vent pipes, sight gauges, taps, valves) and have no drain-down outlets or connection to the environment
- Provide secondary containment for drum storage by using a proprietary container store, bunded pallet, drip tray or kerb-bunded area preferably roofed. The capacity should be at least 25 per cent of the total volume of the drums being stored or 110 per cent of the largest drum, whichever is the greatest. Where access for vehicles is needed, provide a properly-designed ramp, but make sure its use doesn't cause spillages (see figure 4.3)
- Minimise loss from the container beyond the secondary containment system (known as jetting) by keeping the container as low as possible, providing deflection screens and directing any potential discharges into the containment system.
- Produce maintenance schedules for regular inspection of storage facilities, carry out any remedial work promptly and record it
- Regularly remove rainwater which may have collected within open containment systems. This waste water may be contaminated and must be disposed of in accordance with waste management legislation (see 'Waste management' below). In the long term it may be more cost-effective to roof the facility or even replace the tank with a proprietary enclosed bunded tank system
- Protect all pipework against corrosion and physical damage (e.g. collision, vibration, ground disturbance). Support above-ground pipes and check their condition frequently
- Avoid underground pipework; faults are very difficult to detect and can contaminate groundwater. If they must be underground, they should preferably be laid in an impermeable duct, with inspection chambers at all mechanical joints and be tested regularly to ensure they're not leaking. Mark their route clearly on the ground and on all site plans
- Provide security measures for the site and storage areas to prevent vandalism and theft. Fit storage system valves, taps, hatches or lids and delivery hoses with locks and lock them shut when not in use. Where possible, store materials in secure buildings
- Have emergency spill kits for dealing with accidental spillages of hazardous materials; such kits would typically contain absorbent booms, pads and drain mats (see figure 4.4)

Figure 4.3

Photo courtesy of Lancashire Fire and Rescue Service

Container store with containment facility for drums of firefighting foam. Note the spill kit to the left of the stored foam.

Underground storage

Underground storage of oils and chemicals is a significant pollution risk to groundwater. The Environmental Permitting Regulations 2010 or equivalent enable the environment agencies to issue pollution prevention notices to make sure precautions are taken to protect groundwater.

Statutory codes of practice made under the Environmental Permitting Regulations or in Scotland the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), contain specific requirements and advice for the underground storage of oil and chemicals. FRSs must find out if these Regulations apply to their underground storage.

Figure 4.4

Photo courtesy of Lancashire Fire and Rescue Service

Spill kits are invaluable in dealing with accidental spillages of oils, chemicals and firefighting foam.

Action points

- Avoid underground storage of oils unless absolutely necessary. Where unavoidable, contact the local environment agency office for advice.
- Reduce the risk to groundwater by good leak-detection facilities and management procedures.

Waste management

Minimise waste production to save money and resources. Storing and disposing of waste must be done legally to protect the environment.

Waste management and disposal is subject to strict legal controls. FRS must find out how these regulations affect them. Environment agency websites provides full details of waste legislation and FRS should contact the local environment agency office for advice.

Waste minimisation

A waste minimisation review will help to save money on raw materials and waste disposal costs. For example, work with suppliers and distributors to find ways to eliminate or reduce the amount of packaging. Your local environment agency office can give you more advice on how to reduce waste. Free independent information on waste minimisation is available from WRAP (Waste & Resources Action Programme) and includes publications, events, site visits and advice. Visit the WRAP website at www.wrap.org.uk, or call the Helpline on 0800 1002040.

Action points

- Carry out a waste minimisation review and consider how to reduce the volume of waste produced. Contact the Helpline for free advice on 0800 1002040. The Waste (England & Wales) Regulations 2011 place a legal responsibility on organisations to consider the waste hierarchy as part of their waste management processes. The waste hierarchy is:
    - prevention
    - preparing for reuse
    - recycling
    - other recovery for example re-use
    - disposal
- Reuse waste or buy in products that can be reused many times – it will save money in the long term
- Recycle as much waste as possible. Seek advice from local councils or waste contractors in your area
- Try to substitute materials for less hazardous ones, for example, biodegradable lubricants and solvent-free paints
- Have waste taken off-site frequently; don’t allow large quantities to accumulate. Under the duty of care, FRSs have a legal duty to ensure that any waste produced doesn’t escape from control, is transferred only to an authorised person (e.g. registered or exempt waste carrier or authorised waste manager), is accompanied by

a full description of the waste and a waste transfer note (which must be kept for two years), and is disposed of lawfully

- Waste must always be stored in appropriately designed containers that are fit for purpose and large enough to avoid loss, overflow or spillage
- Store all waste and waste containers in designated areas, isolated completely from surface water drains or direct discharge to the environment. The area should be able to contain spillages
- You must have separate storage for non-hazardous and hazardous waste. Separate and label both wastes for recycling and keep them away from general waste.
- Don't mix or dilute hazardous wastes
- Cover or enclose skips unless stored undercover or within a building
- Waste compactors can produce highly polluting run-off and must be isolated from surface water drainage systems. It's best to drain the area to the foul sewer, with prior permission of the local sewerage undertaker, and to provide a roof to minimise the discharge
- The disposal of certain hazardous wastes (e.g. electrical waste, waste batteries, oily wastes, acids, solvents and solvent-based products) have particular legal requirements and their movement must be accompanied by a consignment note. Copies must be kept by all those parties involved in the transfer of the waste for three years. Contact local environment agency offices or visit their websites for information on whether waste materials need to meet these requirements. Sites that produce 500kg or more of hazardous waste each year must register with the Environment Agency. For the FRS, this could include sites that have separators emptied, or sites that are used to temporarily store waste such as batteries or electrical equipment before collection. An example of 500kg of hazardous waste is 25 small televisions, computer monitors or 1,250 fluorescent tubes
- Burning material in the open air is an undesirable method of waste disposal and, in many cases, unlawful. Always try to find another way to dispose of waste that is less harmful to the environment. Contact your local environment agency office for advice or visit their website
- Burning waste or discarded items for fire fighting training is, in most case illegal under current waste legislation. Use only clean uncontaminated combustible material from reputable suppliers. Accepted material is limited to clean pallets, paper and cardboard. Unacceptable materials would include contaminated or treated pallets, old furniture or similar, carpets and many other wastes. It is however recognised FRS may wish to burn wastes such as ELV and waste electrical and electronic equipment occasionally in training exercises or for fire investigation purposes, FRS wishing to use such wastes can do so providing they follow the requirements of the Environment Agency's Regulatory Position Statement on FRS Training. See Section 2.11, The End-of-Life Vehicle (ELV) Regulations 2003 and use of other wastes during training

Trade effluent

Liquid effluents produced, for instance, from FRS workshops facilities, and foam training run-off are known as 'trade effluents' and require special consideration for their disposal. Most trade effluents are polluting and must not be discharged to the surface water system. Generally the best environmental option is to discharge trade effluent to the public foul sewerage system with the prior permission of the local sewerage undertaker. There may be conditions set on the quality and quantity of a discharge and pre-treatment may be needed.

If discharge to the public sewerage system isn't possible, a private treatment system may be considered; this must be designed to treat all effluents connected to it. FRSs will need prior

environment agency permission for any treated trade effluent discharge to the environment. It's unlikely that a permit would be given to discharge trade effluent to the ground.

If treatment or sewage disposal options aren't possible, storage and off-site disposal will be necessary and waste management legislation will apply.

Action points

- Check trade effluent drainage systems regularly for leaks. Isolate all treatment plants, including storage vessels and waste chemical or oil storage areas, from surface water drains
- Check discharge points for all trade effluent gullies and drains and include them on a site drainage plan
- Some effluents may be a small volume or considered 'clean', but the disposal route of all trade effluents must be considered. Examples of effluent sources on FRS premises could include:
    - Compressor blowdown
    - Cooling water
    - Steam condensates
    - Boiler blowdown
    - Air conditioning
    - Compactor run-off
    - Pressure testing liquids
    - Firefighting foam from training including fire extinguishers
    - Washwater, for example from vehicles, plant

Cleaning

Vehicles, components, plant and equipment, floors, surfaces and containers are often cleaned on FRS sites. All these activities generate dirty water and the disposal of this effluent, as with all trade effluents, must be considered carefully. All cleaning agents are potential pollutants, as are the materials they are intended to remove. These include detergents (even the biodegradable ones), disinfectants, degreasers, dirt and oil.

Action points

- Carry out all washing and/or cleaning operations in a clearly marked, designated area. This includes cleaning vehicles or plant
- Isolate all cleaning or wash-down areas from the surface water system and unmade ground or porous surfaces by using drainage grids, gullies or kerbs. Wash water should drain or be disposed of only to the foul sewer; check with the local sewerage undertaker before making a disposal to ensure they are aware of this discharge. Ensure all contractors and/or cleaners know where they can dispose of waste waters properly
- Cleaning agents including detergents aren't suitable for discharge to surface water drains, even those described as biodegradable. Don't allow detergents to enter oil separators as the oil will be washed through. If yard areas are cleaned, don't allow the run-off to enter surface water drains
- Think carefully about site drainage before using a mobile steam or pressure cleaner, especially if using detergents or degreasers. Operate them only in an area isolated from the surface water system and oil separators. Detailed guidance for the use of

steam and pressure cleaners is in *PPG13 Vehicle washing and cleaning* (www.gov.uk/environment-agency)

Dewatering

Take care when removing excess water from a site, or dewatering generally, especially in areas that may be, or are known to be, contaminated. It's often necessary to dewater underground ducts or chambers for inspection and maintenance. This results in a relatively small volume of liquid to dispose of. Larger volumes may be produced as a result of groundworks or construction projects in which excavations extend into groundwater sources or collect rainwater and other run-off.

Action points

- Before any dewatering takes place, test the collected water to determine its quality and the most appropriate disposal option. The disposal of polluted water requires careful consideration and must be discussed with the local environment agency office before any discharge
- Never pump silty water directly to a river, stream, road or yard gullies or surface water drains, for example in a roadway
- Silt is generally a non-toxic pollutant and, in the absence of any other contaminants, can be disposed of by pumping to a settlement tank or over a large grassed area. If there's **any risk** that the silty water is contaminated with any other pollutant, consult your environment agency office before its disposal

A pollution prevention guidance note (PPG20) deals with dewatering underground ducts or chambers and from construction and demolition sites (www.gov.uk/environment-agency).

Groundwater protection

Groundwater is out of sight, but must not be out of mind; as a valuable resource, it must be protected from pollution.

Spillage and unsuitable disposal of oils, solvents, chemicals or waste materials causes serious damage to groundwater. Pollution can occur from discharges onto open ground and other porous surfaces or from drainage systems that soak into the ground (soakaways). Chlorinated solvents (e.g. trichoroethylene and perchloroethylene) are among the most serious causes of groundwater pollution. Once groundwater has become contaminated, it's difficult and expensive to clean up.

Find out if your site is in a sensitive groundwater area (e.g. within the catchment of a drinking water supply borehole); if it is, you may have to take additional pollution prevention measures to minimise the risk of causing groundwater pollution. Groundwater source protection zones are shown on the Environment Agency website.

Statutory codes of practice made under Environmental Permitting Regulations or equivalent on specific high-risk activities such as the underground storage of fuel, the use of solvents and non-mains drainage, are available from environment agencies.

The environment agencies have powers to require action to be taken on the storage, handling, use or disposal of certain dangerous substances (e.g. hydrocarbons, solvents, biocides, metals and ammonia) that can contaminate groundwater. Environmental Permitting

Regulations require their authorisation before disposal of waste that contains these substances into or onto land. Seek the advice of your local environment agency office.

Action points

- Find out if your site is in a sensitive groundwater area; contact your local environment agency office for information and advice about additional pollution prevention measures and about arrangements for the storage and disposal of chemicals or waste
- Only allow clean uncontaminated rainwater to discharge to soakaways
- Never dispose of wastes or chemicals onto the ground
- Deal promptly with any spillage of oils, chemicals or wastes. Remove any contaminated soil and dispose of it according to emergency plans and waste management procedures. Seek specialist advice if necessary on remedial action for spillages of certain substances

Training and emergency planning

Training plays a crucial role in protecting the environment. Trained and knowledgeable staff can help prevent or lessen the effects of a pollution incident – saving both money and time.

Occasional accidents are inevitable so plans must be in place to deal with pollution emergencies and to make sure everyone knows what to do in the event of an incident. Tell your local environment agency about any environmental incident as soon as possible.

Training should cover environmental awareness, correct procedures and pollution incident response.

Action points – training

- Make sure everyone is aware of how important it is to protect the environment and how they can prevent pollution. Include environmental training for new starters
- Reinforce training with a regular refresher programme
- People (and their deputies) who have responsibilities for procedures or plant with a potential environmental impact should receive regular and adequate training in their role. They must have an awareness of the potential for harm to personnel and the environment from materials and equipment for which they are responsible
- Contractors should be trained in relevant environmental management and emergency procedures before starting work

Action points – emergencies

- FRS should develop pollution incident response plans for their own premises to prevent harm to human health and minimise damage to the environment caused by accidents, fires or spillages. Further guidance and a template are in *Pollution Prevention Guidance Note 21*
- Test incident response plans by carrying out simulations and exercises for all those involved. Amend the plan to account for any deficiencies
- Always have adequate emergency pollution-control equipment available to deal with spillages, accidents or firewater, such as absorbent materials, drain blockers or incident grab packs. Don’t forget to provide personal protective clothing. More information on dealing with spillages and firewater is in *PPG18 and PPG22*

- Make someone personally responsible to regularly check and maintain routine and emergency pollution control and prevention equipment, devices and procedures. Carry out any remedial work as soon as possible
- Devise procedures for recovering, handling and disposing of all waste material that arises from incidents or emergencies
- If you have an incident that has or is likely to damage the environment, inform the local environment agency

4.2.7 Pollution facts

- Most pollution incidents are the result of ignorance, apathy or the neglect of basic procedures
- Just 250 grams of pesticide could be enough to exceed the permitted limit in the whole of London's water supply for one day
- Just one litre of solvent is enough to contaminate 100,000,000 litres of drinking water; that's equivalent to 50 Olympic-sized swimming pools
- Vandalism, arson and theft cause an increasing number of pollution incidents. Keep one step ahead of potential intruders
- Oil is a particularly harmful pollutant; a small amount of oil causes a large problem. Five litres of oil can cover an area of water the size of two football pitches
- Litter is a pollutant too, and must not be allowed to enter a watercourse

4.2.8 Further information

The environment agencies have produced a series of free pollution prevention literature. These are of particular relevance to FRS premises.

Pollution Prevention Guidance

PPG1 General Guide for the Prevention of Pollution

PPG2 Above Ground Oil Storage Tanks

PPG3 The Use and Design of Oil Separators in Surface Water Drainage Systems

PPG6 Working at Demolition and Construction Sites

PPG13 Vehicle Washing and Cleaning

PPG18 Managing Firewater and Major Spillages

PPG20 Dewatering Underground Ducts and Chambers

PPG21 Pollution Incident Response Planning

PPG22 Dealing with spills

PPG26 Drums and Intermediate Bulk Containers

PPG28 Controlled Burn

PP Pays Guidance

Pollution Prevention Pays Guidance is available online from UK.GOV website (www.gov.uk/environment-agency).

WRAP

Offers free, independent practical environmental advice for all businesses; this includes free publications, events, site visits and waste reviews. More information is available from www.wrap.org.uk or by calling the Helpline on 0800 1002040.

Groundwork Wales

Is an independent organisation that works in partnership with the main Welsh agencies (National Assembly for Wales, Welsh Development Agency, and Natural Resources Wales) and provides practical support to businesses and other organisations in Wales on environmental management and training. For more information visit www.wales.groundwork.org.uk.

Department for Environment, Food and Rural Affairs (Defra) publications (Telephone 08459 335577)

Guidance Note for the Control of Pollution (Oil Storage) (England) Regulations 2001

Appendix 1

Local agreement template between a FRS and the Environment Agency

1.Introduction

1.1 Purpose and aims

This local agreement sets out how co-operation between XXXXX Fire and Rescue Service, hereby called 'the Service' and the Environment Agency, hereby called 'the Agency', can implement the principles of shared working agreed and signed by the Local Government Association and the Environment Agency in the shared agreement 'Working Better Together 2003'.

It aims to:

- Minimise the hazard to the environment from Fire and Rescue Service activities, including fire fighting, and from incidents involving environmentally harmful substances caused by a third party.
- Encourage liaison between the Fire and Rescue Service and the Environment Agency, particularly at the planning stage to make sure they co-ordinate their efforts to prevent and respond to incidents with the potential to pollute the environment.
- Promote liaison to improve the planning and co-ordination of responses to flooding incidents by the Environment Agency and the Fire and Rescue Service.

1.2 Area of mutual interest

To achieve these outcomes, the Service and the Agency agree to the following local interpretation of the areas of mutual interest set out in the Annexes of the Working Better Together Protocol on Fire and Rescue Service Issues. These are:

- Emergency Planning and Integrated Risk Management Plans
- Pollution Incident Management
- Training, Exercising and Pollution Prevention
- Information Exchange and Contact Arrangements
- Flood Risk Management

This is the first version of this document, or this xth revision of this document *(delete as appropriate*).

2. Emergency planning and integrated risk management plans

2.1 Emergency planning

The Civil Contingencies Act 2004 (the Act), defines an *emergency* as an event or situation which threatens serious damage to human welfare, to the environment or to security. The Act places formal duties on Category 1 responders including:

- Assessing local risks and using this to inform emergency planning activities
- Putting in place business continuity management arrangements
- Putting in place planning arrangements to exercise their functions to prevent and respond to emergencies
- Sharing information and co-operating with other category 1 responders
- Undertaking joint training and exercising with other responder organisations

The Service and the Agency will work closely together and with other Category 1 responders to ensure effective emergency planning and exercising at Local Resilience forums and their sub-groups, particularly for contingency arrangements for flooding and pollution incidents.

2.2 Integrated risk management plans

The Service is required to produce an Integrated Risk Management Plan (IRMP) annually. This plan is designed to improve the safety of communities from risks which may include those posed to them from flooding, the contamination of public water supplies from a pollution incident and to use Fire and Rescue Service resources to their best potential. The Service will also consider the protection of the natural environment within its plan or produce a separate statement setting out how it will do so.

The Agency and the Service will work together to identify sites and areas of risk and determine appropriate options and response measures. The following principles should be applied when doing so.

2.2.1 Flooding

The Agency and the Service will meet regularly via the Local Resilience Forum to share information on flood risk in the form of a regularly updated flood map. As this does not take into account the effects of climate change and only refers to fluvial and coastal flooding, the Service should work with the Local Resilience Forum in the preparation of Flood Risk Assessments. This will allow the Service to make informed decisions on where to site equipment and facilities and inform the development of Integrated Risk Management Plans. Where multi-agency meetings take place to analyse the response to flooding at a particular location, the Agency and the Service will attend and contribute.

2.2.2 Pollution and environmental risk planning

The Service has/will provide the Agency with a list of high risk sites for which it has produced an Operational Risk Information Plan as required by the Fire & Rescue Services Act 2004. Many of these sites also pose a high risk to the environment. Where they do an environmental protection section will be included in the plan.

The Agency will collect the information for the Plans in two ways:

- For those sites which also have an Environmental Permit (see also 2.4) the Agency will require these site operators to complete the environmental protection information as part of their duty to prepare an Accident Plan for their site. A standard template has been devised to help with this.
- For those sites without an Environmental Permit, but which still pose a high risk to the environment, the Agency will target these where resources allow by carrying out a joint inspection with the local fire station when the annual re-inspection is due (the local fire crew will need to inform the local Agency contact when these visits are due).

Priority should be given to those sites posing the greatest risk to people and the environment.

The information collected will be returned to the Service to enable an agreed response strategy to be drawn up to deal with any fire or spillage which will then be included in the plan. This may require a joint site visit between the Service, the Agency and the Site Operator.

The Service will bring to the attention of the Agency any additional sites it has identified that pose a significant environmental risk.

The Agency will bring to the attention of the Service any site it becomes aware of which is high risk but does not have an Operational Risk Information plan

The Agency will also share its information with the Service on:

- Environmentally sensitive areas such as those where an incident would affect a water supply abstraction point
- Drainage information or site plans

Further guidance on Environmental Risk Planning and Operational Risk Plans can be found in the Fire & Rescue Service National Operational Guidance, Environment Handbook, Section 2.2 and 2.3 and the Agency's Pollution Prevention Guidance note PPG21.

2.3 Intelligence sharing and support for enforcement action

Intelligence obtained on high risk and/or illegal sites and activities identified by the parties should be shared at least monthly or ASAP if there is an immediate risk to people and the environment.

Information collected by the Agency should be sent to (*Insert local FRS contact point details*)

Information collected by the service should be sent to the Agency's Environmental Crime Team via the email address (*insert local EA crime team details*).

Where enforcement action is deemed necessary at such site to reduce risk the parties should work together. . Such support can include provision of:

- Witness statement
- Extracts of relevant fire/pollution reports

The parties will provide the information at no cost to each other, but may seek to recover the other parties' costs as part of the prosecution costs.

2.4 Sites with environmental permits

The Environment Agency is responsible for regulating and permitting sites which hold an Environmental Permit under the Environmental Permitting Regulations 2010 and The Environmental Permitting (England and Wales) (Amendment) Regulations 2013.

Many of these sites pose a risk to people and the environment if there's a fire, spillage of environmentally hazardous substances or flooding.

To reduce this risk both parties will work together and with the site operator where practical to agree and include in the Operators Accident Plan for the site:

- Appropriate fire safety measures, for example fire detection and suppression systems and maximum stack sizes and minimum separation distances between them and other features on the site
- A response plan for the site, which should include fire fighting tactics and how firewater /spillages will be managed.

Such liaison may take place during the permitting process for new sites or revisions of permits for existing sites where additional preventative measures are needed, for example following a fire or a change in the activities carried out on site.

Joint visits to support such work are encouraged.

In the event that the operators is uncooperative and/or there's a fire and enforcement action is considered under the Environmental Permitting Regulations, the service will consider requests from the Agency for support to assist the Agency's enforcement actions. See also Section 2.3

2.5 Control of Major Accident Hazards Regulations

The Agency is the joint competent body with the Health and Safety Executive for sites falling under the requirements of the Control of Major Accident Hazard Regulations 1999 and will consult the Service on matters relating to these sites following agreed guidance and procedures.

2.6 Radioactive Substances Act 1993

Anyone who uses radioactive material or disposes of radioactive waste must, with a few exceptions, be registered or authorised under the Radioactive Substances Act 1993. The Agency is responsible for issuing and enforcing such registrations and authorisations.

For sealed radioactive sources, the Agency will supply the Service with copies of the 'front and back sheets' of each registration at the time of issue. This will include details of the user, the address of the premises where the source is held, and maximum source holdings in terms of numbers and radioactivity levels.

3.Pollution incident management

3.1 Pollution incidents and incidents with pollution potential attended by the Service

Environmental pollution can occur at fires, spillages or accidents that the Service attends, or as the result of urgent and necessary firefighting actions.

3.1.1 The Environment Agency's Role

The Agency's role at these incidents will be to co-ordinate and manage the environmental response. Its key priorities will be to:

- Mitigate the impact on people, the environment and property from pollution where appropriate: stop, contain, control, warn
- Investigate the cause of the pollution, collect evidence and consider enforcement action
- Seek remediation, clean up or restoration of the environment.

To meet its objective of minimising environmental damage at such incidents, the Agency will need to work closely with the Service. The Agency will:

- Provide advice to the Incident commander on pollution control strategies, including modification of Fire and Rescue Service actions, such as "contain" rather than "dilute" or, if appropriate, "controlled burn".
- Provide information on the environmental sensitivity of an incident location to the Incident commander or designated Hazardous Materials and Environmental Protection Officer or equivalent.
- Liaise with xxxx sewerage provider on behalf of the Service if the discharge of contaminated water to foul sewer is being considered.
- Regulate any waste management activities arising during the incident, providing advice to the Incident commander as required.
- Liaise to make sure its actions are undertaken in co-operation, and co-ordinated, with Fire and Rescue Service activities.
- Work with partners to coordinate the provision of air quality data to public health officials and the emergency services during a major air quality incident.

Further details on the Agency's role and response arrangements during an incident can be found in the Fire and Rescue Service National Operational Guidance on Environmental Protection.

3.1.2 The Fire and Rescue Service Role

The Service will:

- Take all practical precautions to minimise the effect on the environment of their activities. The incident commander will consider advice from the agency in the context of other specialist advice and legal and moral responsibilities
- Identify where the environment might be at risk and be mindful of such risk when determining operational priorities and tactics
- Take all practical precautions to minimise any threat to the environment resulting from third party activities through the emergency deployment of pollution control equipment where operational priorities and resources permit
- In situations where it is not possible to avoid pollution because of higher operational priorities for example The need to protect people, take all reasonably practical steps to mitigate the effects of such pollution
- Inform the agency where pollution has occurred or could occur as soon as reasonably practicable in accordance with agreed reporting criteria. See appendix 1 for guideline notification criteria.

3.2 Attendance or not of the Agency at an incident

When notified by the Service. The Agency will assess the report and determine whether attendance is required or not. The Agency will attend all incidents involving pollution where there is a risk of significant damage to the environment, or where the Service reasonably requests its attendance.

When the Agency is requested to attend an incident by the Service, and the request is justified, it will make all efforts to do so as soon as reasonably practicable, giving an estimated time of arrival.

If the Agency decides not to attend an incident, then that decision and the reasoning behind it must be provided to the Service.

In the event of the Agency not attending an incident, technical advice from the Agency will be made available over the telephone if needed. A contact telephone number for such information will be given at the time of the original response

3.3 Access to the incident site

The role and numbers of Agency staff at incidents will depend on the circumstances and scale of each incident. All communications with the Service will be co-ordinated through the Agency's Site Controller, who will advise on environmental issues. On arrival, the Site Controller will make him/herself known to the Incident commander. If the Site Controller or Incident commander changes during the incident, the Service/Agency will be told immediately.

All Agency officers responding to an incident will report to the Incident Command Point. They will be identified by a tabard bearing the Environment Agency initials and logo and will carry identity cards. If the mobile fire station has been mobilised they will be issued with an arm band. They will only work within the incident ground with the permission of the Incident commander. When working in the incident ground, the Agency staff will be responsible for their own personal protective equipment and at all times will keep the Incident commander informed of their proposed actions and movements.

3.4 Command and control

When a major environmental incident is declared and the Service convene strategic (Gold), tactical (Silver) and/or operational (Bronze) Co-ordination Centres, the Agency will be invited to attend and be provided with suitable facilities.

The Agency will supply liaison officers, where resources permit, to the Co-ordination Centres to advise on environmental issues and provide the link to its incident response.

3.5 Pollution control strategies

The principle of containment whenever practicable and safe to do so is the Agency's preferred approach to managing incidents where polluting liquids or materials have been released or generated by on-site activities, including firefighting. Detailed guidance on containment techniques, including those for firewater, the use of pollution control equipment and other pollution control strategies including the use of a controlled burn is provided in the Fire and Rescue Service National Operational Guidance, Environment Handbook. Further guidance on firewater containment systems is also available in the Environment Agency's Pollution Prevention Guideline 18 and on the use of a controlled burn in its Pollution Prevention Guideline 28. The subsequent disposal of contaminated firewater and other wastes at incidents, such as to foul sewer for treatment at a sewage treatment works, should follow the procedures as set out in the protocol for the disposal of contaminated water.

3.6 Provision of pollution control equipment

The Agency will consider providing pollution control equipment to the Service. Both parties have identified and agreed the equipment that can be supplied to ensure consistency. The emphasis is on first aid containment equipment and materials, rather than materials used for clean up.

The Service will endeavour to assist the Agency by carrying any new and modified pollution equipment. However, such requests will be subject to the operational requirements of the Service.

3.6.1 Equipment supplied by the Agency

Grab packs

The Agency will endeavour to provide and subsequently maintain the standard national Grab Pack for each front line appliance within the Service. The Details of the equipment held in the Grab Pack and the procedures for obtaining it are contained in Appendix x.

Specialist equipment

The Agency may also supply a quantity of specialist equipment within national guidelines, which will be provided for the Environment Protection Unit(s) (EPU). The details of the additional and specialist equipment held in the EPUs the procedures for obtaining, and the location of the EPU's are contained in Appendix x.

3.6.2 New Dimension equipment held by the service

Detection, identification, monitoring equipment (DIM)

The Service operates a vehicle containing detection, identification, and monitoring (DIM) equipment. The Agency can request its deployment to help identify substances that could be a significant risk to human health or the environment. The Service can also request specialist scientific advice from the xxxxx for the purpose of identifying such substances. The Service will consider such requests where appropriate.

High volume pumps (HVP)

The Service has a high volume pump which can be used to move large volumes of water in the management of floodwater or contaminated water or to move large quantities of water for the extinguishing of fires. The agency can request its deployment to help with both flooding and pollution incidents. The Service will consider such requests where appropriate.

3.6.3 Risk assessment and testing of equipment

The Service, in consultation with the Agency, will complete risk assessments where deemed necessary prior to any equipment being used operationally, in training or for evaluation purposes. In addition the Agency will assist when requested, in the provision of its own staff for training on new equipment to those appropriate personnel. The use of Agency staff for training will be at no cost to the Service and will be with the agreement of the Service's Head of Training. Where training is required on new equipment and neither the Agency or Service feel competent to undertake this, then training will be sought from the supplier/manufacturers as part of the initial purchase agreement.

The Service will be responsible for the routine testing and maintenance of all environment protection equipment supplied by the Agency (with the exception of the peristaltic pumps), in line with the manufacturer's instructions. Any repairs that are required to environment protection equipment following their use in an environmental protection incident will be referred to the Agency in the first instance, who will make the necessary arrangements for any repair work being undertaken.

3.6.4 Notification of equipment used to enable cost recovery

The Agency has a policy (the 'Polluter Pays Principle') to recover the costs for time and materials used in investigating and mitigating incidents where pollution has or could have occurred. To enable the Agency to re-charge the polluter (so long as a polluter has been identified), it is essential that the Service notifies the Agency of the use of any equipment used during an incident, even if only part of the contents of one standard grab-pack have been used. This includes materials deployed by the Service for pollution alleviation during both the emergency phase and recovery phase of an incident

– and on occasions for their time. So if any equipment has been used from the EPU to prevent pollution or if any of the contents of a standard grab-pack carried on fire appliances have been used then the Notification Form should always be completed.

Fire service actions:

The Notification Form to be used can be found in Appendix x of this document. This form will be completed by the fire incident commander or delegated officer, and passed to the Operational Risk Management Department, who will collate the information and forward the form to the local Agency contact as soon as possible, (and ideally within 21 working days of the incident taking place to enable the Agency to meet its deadlines for cost recovery).

Whenever possible the Agency would assist the Service in the recovery of costs from a polluter for damage to equipment owned by the Service whilst being used for environment protection purposes.

Environment Agency actions:

Upon receipt of the Notification Form for Equipment Used, the Agency will use its powers under the Water Resources Act 1991 to recharge the polluter if pollution occurs, or the potential polluter if deployment by the Service of pollution prevention equipment prevents pollution from occurring. The procedure to follow will depend on whether the Agency attended the incident or not, and the value of the equipment used.

3.6.5 Re-supply of equipment used

The Service will hold a minimum stock of equipment supplied and agreed with the Agency. Notification of equipment used is a prerequisite for the re-supply of equipment (see 3.5.4). Replacement equipment will be ordered by The Fire Service Procurement Department using the re-order forms provided (Appendices 2 & 3). Delivery of equipment will normally be to Service Headquarters unless otherwise stipulated on the order form.

Where the Service uses a significant amount of Agency supplied equipment for non-environment protection purposes the Agency will invoice the Service for equipment used and re-supply as normal.

3.7 Charging protocols

3.7.1 When the Agency request the Service for non-statutory call out

When the Service is called out for non-statutory emergency work at the request of the Agency, it has been agreed that all reasonable costs will be met by the Agency, in line with the Service's current scale of charges in force at that time. The Service's initial response will be to despatch one Officer to determine the scope and nature of further resources, which in their opinion will be required. All charges will be calculated to include all the Service's equipment, personnel and associated costs. These costs will be calculated from time of call until all personnel and appliances have been returned to their respective locations.

3.7.2 When the Agency request the Service to supply equipment

Any specific requests for the attendance of appliances or environment protection equipment held by the service such as additional grab packs, clay mats or overdrums, at incidents, where the Service may not be attending as part of an emergency response will be given due consideration. This request will be subject to the operational demands at that time and all reasonable costs will be met by the Agency.

3.7.3 When the Agency uses the Service as contractors

When the Service attends an incident, at which environmental protection forms a substantial part, the Service may deploy its resources free of charge whilst an emergency exists , such as. while an imminent threat to life, property or the environment continues. Following this period, costs according to the current scale of charges could be levied. Before any chargeable phase or activities are entered into, approval must be obtained from the Agency and the scope of activities defined. This authorisation will normally be in the form of an official order number and contact should be made via Fire Service Control to record the call on the incident log. In some instances, an Agency Officer can give approval either remotely, or at the scene of an incident, and an order number would be provided at a later date.

3.7.4 Invoicing procedures

Invoices generated as a result of situations described in 3.6.1, 3.6.2 and 3.6.3 should be sent as soon as practicable to the local Agency area office for the attention of the Area Liaison Officer and quoting the Agency's official order number. Invoices will include the Service's itemised costs associated only with environment protection work, which have been outlined in the Protocol and will not include the cost of any Agency supplied equipment used. The Service's standard payment terms should apply. Payment due to the Service should be forwarded by the Agency, within 30 days of receipt, and should be sent to the Finance Department at Service Headquarters.

3.8 Waste management

Waste is likely to be generated at incidents where pollution control measures have been employed. This includes: the contained pollutant, soiled materials such as absorbents, damaged containers and contaminated equipment and clothing. This waste will need to be moved and disposed of.

The Agency regulates this activity and will provide advice and guidance to the responsible party especially if the emergency movement of hazardous waste is necessary.

The Service will normally not have direct responsibility for disposing of waste generated at the incident it attends.

The following organisations are usually responsible for removal and proper disposal of waste from incidents:

- The Polluter – when known and when they have the capability.
- Local Authorities – on the street, in a public place, on public land, on a public beach, etc (but see 3.7.1 below)
- Landowner – for private land and beaches.
- Highways Agency or their representative – Motorways and major trunk roads.
- Environment Agency – but see 3.7.1 below.

3.8.1 Fly-tipped hazardous waste.

There may be some occasions when the Service will be called to the scene of an incident of fly-tipped and potentially hazardous waste. Guidance on identifying those who will be responsible for clean-up and disposal of such waste is provided in the Fly-tipping Matrix of Protocol No 6 on 'Flytipping and Illegal Waste Activities'. The sections relevant to the Service are included as Appendix 5.The Environment Agency would **not** normally arrange for the collection and disposal of the waste unless:

- There is an immediate risk of serious pollution of the environment and / or harm to human health, **and**
- The polluter / landowner is not identified or has not taken adequate action, **and**
- Another responsible body cannot take responsibility.

The Agency will seek to recover its costs from the responsible parties in such cases.

3.9 Decontamination procedures

Decontamination of Fire Service personnel and/or casualties to protect life and health must take precedence over all other considerations at the scene of an incident; but it is still important to take all reasonable practicable measures to protect the environment when such procedures are being used.

The Service will attempt to contain any contaminated run-off in accordance with procedures in the FRS National Operational Guidance and the Protocol for the Disposal of Contaminated Water issued by Water UK, and will inform the Agency as soon as possible when decontamination procedures are being employed. The Agency will then provide advice on how to minimise environmental pollution.

Further guidance on decontamination, including procedures relating to CBRN (E) type incidents and the decontamination of equipment are contained in the Fire and Rescue Service National Operational Guidance on Hazardous Materials.

3.10 Fire fighting foam

All fire fighting foams are polluting and some types are of particular concern. The Incident commander should think carefully about the environmental impacts before using it, particularly at incidents in identified environmentally sensitive locations and if used attempts should be made to contain run-off.

The Fire and Rescue Service will also work with the Environment Agency to:

- Identify foams that have a lesser impact on the environment and methods of application/containment which should be used wherever possible
- Develop a better understanding of the potential environmental impacts of foam when used at operational incidents
- Provide information on the current foam types held the stock levels of such foam and the location/s where this is held. See Appendix 7.

The Fire & Rescue Service National Operational Guidance on Environmental Protection provides further guidance.

Separate guidance exists on the use of foam for training; see section 4.2.1 of this protocol and the Fire & Rescue Service National Operational Guidance, Environment Handbook.

3.11 National arrangement for incidents involving radiation (NAIR) and the RADSAFE Responders Scheme

The Environment Agency's involvement in NAIR (run by the Health Protection Agency - Radiological Protection Division) and RADSAFE (run by a consortium of industries involved in the nuclear fuel cycle), is to assess the environmental impact of any release of radioactivity and advise the emergency services on actions to protect the environment. The Environment Agency will advise on the disposal of waste contaminated with radioactivity after consultation with water companies,

where necessary. The Environment Agency will also pursue regulatory investigations in accordance with its statutory duties.

If there is an incident involving radioactive materials, the Fire and Rescue Service will always notify the Environment Agency directly. In addition, when NAIR or RADSAFE responders are contacted by emergency services, the Environment Agency will be notified by the United Kingdom Atomic Energy Authority Constabulary - Force Communications Centre (Harwell) via the Environment Agency's Incident Communications Service.

3.12 Chemical, biological, radiological, nuclear and high yield explosive incidents (CBRNE)

The Environment Agency's role is to support and advice as part of the multi-agency response, through Liaison Officers at Strategic/Tactical Command Centres, including:

- Assessing the environmental risk by helping to identify how materials might disperse and what might be at risk
- Advising on the disposal and treatment of wastes
- Advising on temporary storage sites for waste removed for forensic analysis
- Identifying contractors and decontamination locations
- Notifying interested parties
- Regulating - issuing permits and taking enforcement action where needed

Both parties will work together to improve/develop procedures for dealing with such incidents. Further details will be available in Department for Communities and Local Government, Environment Agency and/or other CBRN (E) guidance.

3.13 Air quality during major incidents

The Service will use CHEMET to help predict the direction of the products of combustion. FIREMET will also provide information on current and predicted future plume movements. Advice from these systems will be provided to the Environment Agency on request.

The Environment Agency will co-ordinate the provision of air quality information to public health officials and incident command by managing an Air Quality Cell during major chemical air pollution incidents, defined as:

"A release of a hazardous substance to air which causes or has the potential to cause significant harm to the public and / or significant impact on the environment."

The AQC is a virtual group, chaired by the Environment Agency, with technical expertise from a number of agencies. See section 3.8 of the Fire and Rescue Service National Operational Guidance, Environment Handbook.

4. Training, exercising and pollution prevention

4.1. Training

The Environment Agency will offer training to Fire and Rescue Service staff locally and centrally at the Fire Service College at Moreton-in-Marsh. This training might include planning and running exercises.

Fire and Rescue Service staff will also train Environment Agency staff on their role and priorities at an incident where resources permit.

Both parties will make sure that any training programmes, resources and materials developed in support of their partnership will reflect the content of this protocol.

Both parties will seek opportunities for joint exercising.

4.2 Training exercises at fire stations and other locations

4.2.1 Use of fire fighting foam

Fire fighting foam, which is an essential part of fire fighter training, is extremely polluting if released into the aquatic environment. There is no defence for causing pollution by the use of foam made during training and the Service will take all necessary steps to avoid pollution during training exercises. Section 3.9 of the Fire and Rescue Service National Operational Guidance, Environment Handbook explains how to do this.

4.2.2 Use of end of life vehicles

A Regulatory Position Statement exists which provides information covering the secure storage, cutting and burning of de-polluted end of life vehicles:

- At Fire and Rescue Training facilities for the purpose of testing new fire fighting equipment and products.
- At fire stations for the purpose of fire rescue training.

The specific conditions of this position can be found in Appendix 11 of the Fire and Rescue Service National Operational Guidance Environment Handbook.

4.2.3 Pollution prevention

Apart from training, pollution can also result from other Fire and Rescue Service activities. These include cleaning vehicles and equipment, storing oil and other polluting liquids, refuelling vehicles and the temporary storage of controlled and hazardous wastes at Fire and Rescue Service premises.

The Environment Agency has published a series of Pollution Prevention Guidelines and leaflets, which help to identify these risks and measures to reduce them. It will also, where possible, provide pollution prevention guidance to the Service to identify risks and remedial measures. Further Guidance can also be found in Section 4.1 of the Fire and Rescue Service National Operational Guidance Environment Handbook.

5. Information exchange and contact arrangements

5.1 Incident notification

The Environment Agency has an Incident Communications Service (ICS), which operates 24/7. The ICS can be contacted in an emergency using the Environment Agency's 0800 807060 incident reporting hotline number.

Rapid notification of incidents which might affect the environment has been a valuable aspect of the partnership. The Service will build into their procedures a system for notifying the Agency of incidents that have the potential to pollute the environment. A guide to these occasions is in Appendix 1. If there is any doubt, the Agency should always be contacted.

The Agency will offer advice and assistance, initially on the telephone. It will attend all incidents involving a potentially significant environmental impact, where safe to do so. It will also consider

attendance at other incidents when requested to do so by the Service. Agency staff will give an estimated time of arrival at the incident, if appropriate.

5.2 Local liaison group

A local fire and rescue service / Environment Agency Liaison Group has been established.

The Environment Agency lead local contact should arrange a local liaison meeting of their Fire and Rescue Services at least once a year. Details of the Terms of Reference of the Group are included in Appendix 6.

These meetings should develop and implement local working arrangements, which will set out how the National protocol will be implemented locally.

Issues raised locally which require consideration by the national working groups will be directed to the local lead Environment Agency fire and rescue service contact and the Chief Fire Officers Association National Environmental Operational Group representative.

5.3 National liaison

The partnership between the Environment Agency and the Fire and Rescue Service is co-ordinated by the National Environmental Strategy Group (FRS and Environment Agencies), which meets two times per year. This is supported by the National Environmental Strategy Group (FRS and Environment Agencies) which also meets,

5.4 Data

5.4.1 GIS data

As well as providing environmental information for incorporation into Operational Risk Information Plans, the Agency can also provide the Service with a range of national data sets in digital format, for example flood zones, water abstraction areas, groundwater vulnerability maps. Agency representatives on the Local Resilience Forum will be able to advice on the data available and the procedures that should be followed to obtain it.

5.4.2 Radioactive Substances Act 1993

Anyone who uses radioactive material or disposes of radioactive waste must, with a few exceptions, be registered or authorised under the Radioactive Substances Act 1993. The Environment Agency is responsible for issuing and enforcing such registrations and authorisations.

For **sealed** radioactive sources, the Environment Agency will supply the Chief Fire Officer with copies of the 'front and back sheets' of each registration at the time of issue. This will include details of the user, the address of the premises where the source is held, and maximum source holdings in terms of numbers and radioactivity.

Fire and Rescue Services should continue to obtain details of registrations for unsealed radioactive materials and authorisations for radioactive waste from the relevant local authority.

6. Flood risk management

The Agency and the Service are committed to developing joint working practices with other Category 1 responders under the Civil Contingencies Act to meet the needs of the public, and the duties set out in the Fire and Rescue Services Act. We will seek to:

- Develop procedures for joint use of New Dimensions High Volume Pumps
- Share information on flood risk
- Provide timely warnings of flooding to the Fire and Rescue Service where possible
- Develop joint working practices to ensure the optimum use of shared skills and resources during a flooding incident where appropriate

6.1 Flood warning

The Agency operates a flood warning service in areas at risk of flooding from rivers or the sea, and maintains and operates flood defences. Using data supplied by radars, together with other technology, the Agency monitors rainfall, river levels and sea conditions and then issue flood warnings where necessary.

Information and advice about flood risk and early warning systems can be found at www.environment-agency.gov.uk/floodline or by calling Floodline 0845 988 1188, available 24 hours a day.

6.2 Flood codes

If flooding is forecast, warnings are issued through the media or direct to people at home or work using a set of 3 easily recognisable codes:

	This means **"Flooding is possible. Be prepared"**. Flood Alerts are for targeted specific locations that are at risk of flooding. It will indicate that flooding is possible and that people should make some low impact preparations (e.g. move small valuable items upstairs, check travel plans) and remain vigilant.
	This means that **"Flooding is expected. Immediate action required"**. Flood Warnings are mainly targeted at specific communities that are at risk from flooding. Some Flood Warnings may apply to stretches of coast and river. It will indicate that flooding is expected and that people should take more direct impact actions for example move belongings upstairs.
	This means "**Severe Flooding. Danger to life**". All customers who receive a Flood Warning will receive a Severe Flood Warning if conditions are met. It will be used in extreme circumstances to tell people that flooding is posing significant risk to life or significant disruption to communities which could also cause risk to life.

 SEVERE FLOOD WARNING	Depending on the circumstances it would indicate that people should evacuate the area or take shelter within safe buildings.
Warning No Longer In Force	This message is to tell people that the flood threat has passed and includes useful advice on what to do next.

6.3 Flood forecasting

The Agency and the Met Office jointly operate a flood forecasting centre which provides an Extreme Rainfall Alert service and flood guidance statements for certain emergency responders who are signed up to the service.

More information can be found on the Flood Forecasting Centre website www.ffc-environment-agency.metoffice.gov.uk or by calling 0300 12345 01.

7. Sign-Off and review arrangements

The Environment Agency and XXXXX Fire & Rescue Service will support this local working agreement and work together to develop and implement it.

Regular liaison will be maintained between the Agency and the Service to review day to day practices and procedural issues. Furthermore, the Local Working Arrangements should be reviewed not more than 12 months from the date of this agreement, and annually thereafter.

Signed on behalf of the Environment Agency:

Name

……

Title ……..

Date ……..

Signed on behalf of XXXXX Fire & Rescue Service:

Name

…… ……

Title ……..

Date. ……

Example appendix

Notification criteria – Can be varied to meet local need

XXXX Fire & Rescue Service Control will automatically inform the Environment Agency when notified of incidents involving:

- All Hazardous materials excluding gases except where water spray/fog is used to contain or disperse a gas cloud (e.g. Chlorine or Ammonia).
- Pesticides or fertilisers.
- A major incident for example Operation MERLIN is declared.
- 4 pumps and/or 2 or more jets in use.
- Fire-fighting foam is used.
- A 'controlled burn' is being undertaken or considered.
- All incidents where decontamination procedures are in use.
- Radioactive materials.
- Hazardous fly-tipped waste
- Illegal burning of waste or fires involving burning of waste (above domestic quantities).
- Environment Agency regulated sites or identified risk sites (e.g. COMAH, industrial sites, landfills, waste sites such as scrap yards, oil storage depots).
- Large quantities of organic substances such as blood, farm slurry, etc.
- All incidents involving open water, where the High Volume Pump is in use.

Additionally the Agency should be notified whenever above normal domestic quantities of the following are involved:

- More than 25 litres of oil or fuel.
- More than 25 litres of detergents for example washing powder or liquid, shampoos, soaps, car cleaning products, etc.
- More than 25 litres of disinfectants for example household bleach, Dettol, etc.
- More than 25 litres of all types of paints and dyes.
- More than 25 litres of cooking oils, glycerine, alcohols.
- More than 25 litres of cutting lube or water soluble polymers.
- More than 250 litres of food products. Of particular concern are sauces, sugars, milk, salt, syrups, cream, yoghurt and vinegar.
- More than 250 litres of any beverage, including all soft drinks, beers, lagers, wines and spirits.

- More than 250 litres of other organic liquids including blood, offal, farm slurry, sewage sludge, anti-freeze.
- More than 500 kg of sand, silt, cement, chalk, gypsum/plaster.

Other appendices on issues such as the ordering of pollution equipment, equipment sharing and cost recovery can be added as required.

Appendix 2

Terms of reference for FRS and environment agencies liaison groups

The National Environmental Strategy Group

(FRS and environment agencies) (NESG)

Terms of reference

The group will:

Review and where necessary identify issues requiring update or inclusion within:

    - The protocol between the Environment Agency, LGA and on FRS issues
    - The MoU between the Scottish FRS and SEPA
    - The MoU relating to emergency response to incidents involving environmental damage between the Northern Ireland FRS (NIFRS) and the Northern Ireland Environment Agency.
2. Promote liaison between the environment agencies and FRS at all levels. Make recommendations on how liaison can improve the effectiveness of the organisations involved.
3. Identify good practice within the UK. Make recommendations for implementation and promotion of identified areas, including, where necessary, production of an implementation plan and/or joint research. This work should include consideration of current working practices and key issues identified from incident reviews.
4. Determine future strategy options for the provision of pollution control equipment for FRS use and identify costs. This should include consideration of alternative sources of funding and links with other associated initiatives such as CBRN (E), where the equipment may have mutual benefits.
5. Provide direction on environment agencies' input into FRS training programmes including courses at the Fire Service College, Moreton-in-Marsh, Scottish FRS College, Gullane, other training courses and training materials such as FRS National Operational Guidance.
6. Provide direction to the National (FRS and environment agencies) Environmental Operations Group (NEOG).
7. Provide and if necessary seek clarification on the requirements/implications of relevant legislation.
8. Act as the review group for relevant guidance materials, any such review should include the identification of appropriate staff and resources needed to undertake any work required.

Group membership

- Chair, Environment Agency Environment Management Process Manager
- Technical Secretary, Environment Agency Pollution Prevention Technical Advisor
- Environment Agency
- Natural Resources Wales
- Northern Ireland Environment Agency
- Scottish Environment Protection Agency
- CFOA (England and Wales)
- Chief Fire and Rescue Advisors Unit
- Fire Service College (HMEP)
- Northern Ireland Fire and Rescue Service
- Scottish Fire and Rescue Service
- Other parties as appropriate

The Group meets every six months and more regularly if issues dictate.

The National Environmental Operations Group

(FRS and environment agencies) (NEOG)

Terms of reference

1. Provide technical support and operational guidance to the NESG.
2. Identify issues requiring updating, amending or for inclusion within the Protocol or MoUs.
3. Identify and promote good operational practice on environmental issues within the UK FRS. Make recommendations for implementation and promotion of identified areas to the NESG. This work should include consideration of current working practices and key issues identified from incident reviews.
4. Co-ordinate FRS liaison at a local operational level. Promote the development of Local Agreements within a common national framework.
5. Maintain details of the current levels and location of pollution control equipment held by FRSs.
6. Identify future equipment requirements and consequent budgetary needs. Ensure that allocated funds are spent within the current financial year and areas where coverage is inadequate are identified and prioritised so that spending can be targeted, should funds become available (not Scotland).
7. Review the use and effectiveness of pollution equipment held/supplied by the FRS. Coordinate the evaluation of new items of equipment and recommend placement onto the nationally agreed equipment list (not Scotland).
8. Ensure that the agreed procedures for the recovery of costs associated with the use and replacement of equipment provided by the environment agencies, and the services provided by the FRS, are implemented in a consistent manner (not Scotland).
9. Provide input into the environment agencies' FRS Training Strategy including courses at the National FRS College, Moreton-in-Marsh, Scottish FRS College, Gullane, other training courses and training materials such as FRS National Operational Guidance.
10. Provide comment on relevant guidance materials

Group membership

- Chair, Environment Agency Pollution Prevention Technical Advisor
- Technical Secretary, Environment Agency
- Scottish Environment Protection Agency
- Northern Ireland Environment Agency
- Natural Resources Wales
- Environment Agency Area Representatives
- Environment Agency – Procurement
- Fire Service College
- Chief Fire & Rescue Advisers Unit (England & Wales)
- CFOA England & Wales (3)
- Northern Ireland FRS
- Scottish FRS.

The Group meets every six months and more regularly if issues dictate. In Scotland SEPA and the Scottish FRS meet on an annual basis to review the MoU and keep each other informed of new and emerging developments.

Local liaison groups

England

In England it has been agreed that each FRS will appoint an environment agency liaison officer. This officer will normally be the nominated lead officer on Hazardous Materials and Environmental Protection (HMEP Officer). Similarly each Environment Agency Area will appoint a FRS liaison officer. Each Environment Agency (England) Area will hold at least six-monthly meetings with representatives from each FRS covered by that Area to discuss local and national issues. For efficiency representatives from several EA Areas and FRS may wish to amalgamate their meetings

A key purpose of the local meetings will be to ensure that effective Local Working Arrangements are produced for each FRS, signed and then implemented. Such agreements are actively promoted in the National Protocols/MoUs. The arrangements should deal with day-to-day matters associated with a particular FRS to meet local needs. A template for producing Local Working Arrangements can be found in Appendix 1.

Where one FRS is served by more than one Environment Area, the Area forming the larger part of the FRS area will jointly produce, sign and implement the local agreement. Where necessary more than one agreement can be made with two or Areas; however, this should be considered the exception rather than the rule.

- Areas for liaison and inclusion in such agreements include:
- Non-standard equipment provision
- Notification and recording of incidents
- Operational incident protocols
- Incident debriefs
- Training of fire service and environment agency personnel
- Operational procedures and safe systems of work
- Risk assessments.

Terms of reference for local groups

1. Provide support to the NEOG.
2. Identify issues requiring update or inclusion within Local Working Arrangements between FRS and the Environment Agency Area) within a common national framework.
3. Consider good operational environmental practice within the Area and make recommendations for implementation and promotion of identified areas to the NEOG. This should include consideration of current local working practices and key issues identified from local incident reviews.
4. Maintain details of the current levels of pollution control equipment supplied to
5. FRSs and its location within the Area. Provide details to the NEOG. Ensure that allocated Area budget is spent.
6. Identify future equipment requirements and consequent budgetary needs within the Area. Ensure that areas where specialist equipment coverage is inadequate are identified and passed to the NEOG so that spending can be targeted to highest priorities as funds become available.
7. Continually review the use and effectiveness of pollution equipment supplied to FRSs and evaluate new items or changed requirements as requested by the NEOG.
8. 7 Ensure that the agreed procedures for the recovery of costs associated with the use and replacement of equipment provided by the Environment Agency and the services provided by the FRS are implemented locally. Report to the NEOG as necessary.
9. Provide feedback to the NEOG regarding the Environment Agency's Training Strategy including courses at the National FRS College, Moreton-in-Marsh, other training courses and training materials such as FRS National Operational Guidance.
10. Provide comment on relevant guidance materials.

Group membership

- Chair, Environment Agency Area Fire and Service Liaison lead officer
- Technical Secretary Environment Agency
- FRS representative from each FRS.

Scotland

In Scotland there is regular liaison between the Scottish FRS and SEPA. Regional groups liaison at local level is encouraged within in the Scottish MoU.

Northern Ireland

In Northern Ireland there is regular liaison between the Northern Ireland FRS and the NIEA. Working partnerships have been established between NIFRS Hazmat Officers and regional and headquarters operational staff.

Wales

In Wales there is regular liaison between the three Welsh FRSs and NRW.

Appendix 3

Operational Risk Information Plan template

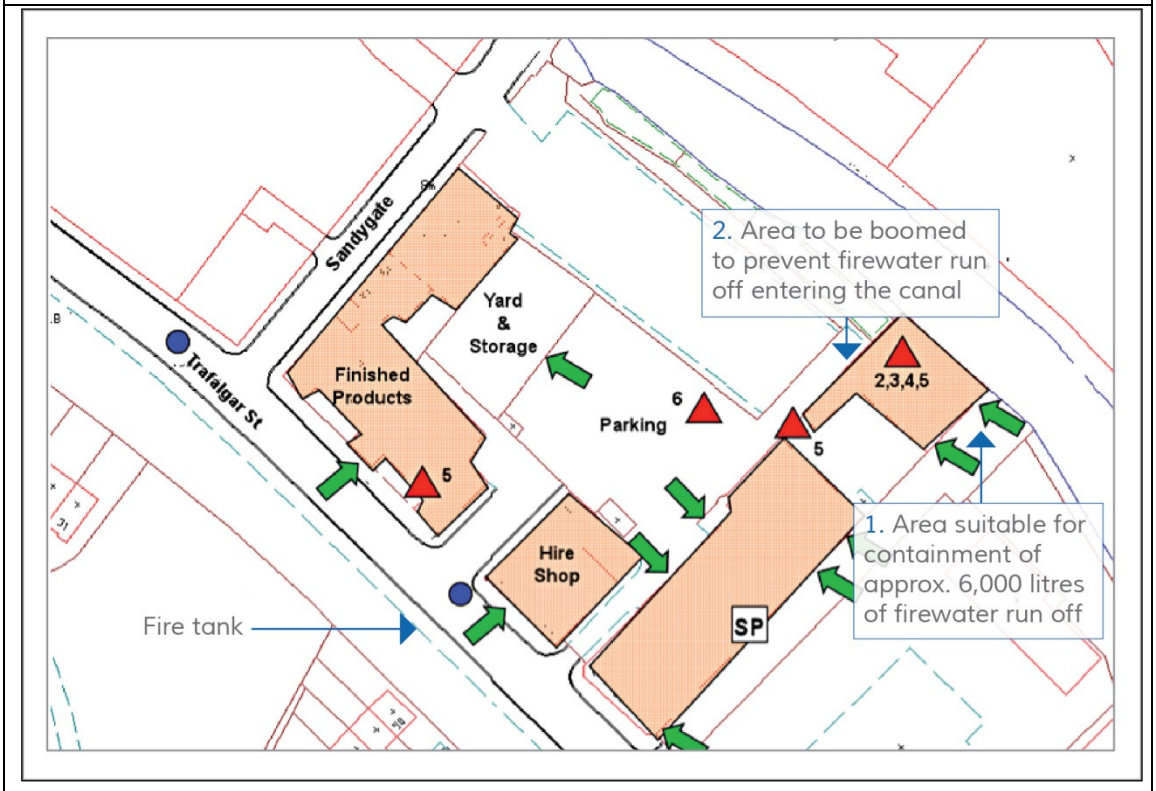
Document Ref: 01/12/12 14:20

62 - Gibson Paints, Albion Works, Trafalgar St, Newton

OPERATIONAL RISK INFORMATION PLAN			
Lancashire Fire and Rescue Service Operational Risk Information Plan – Fire and Rescue Services Act 2004			Ref No 62007
Name:	Gibson Paints		Informative Message
Address:	Albion Works Trafalgar Street Newton Street BB65 4JX		Use: Paint distribution and biodiesel manufacture Floors: 3
FSIS No:	M0399		Basement: - N/A
Grid Ref:	(6 figure) 654786		Length: 60m
PDA:	2P		Width: 20m
Route from nearest main junction. Grid Ref of junction 676789			
From Jct 18 M68 follow Westway turn right into Trafalgar St. Premises are on left before Petrol station.			
Action on arrival (O.I.C. 1st Attendance)			

- Main entrance to building at front
- Contact Site Manager
- Old design and layout of building could possibly lead to rapid fire spread
- Large quantities of paint stored in premises
- Unlimited water supply from canal off Sandygate

SITE LOCATION PLAN



PRIMARY HAZARD INFORMATION				
HAZARD NO.	TYPE & AMOUNT	LOCATION	FURTHER INFORMATION	HAZARD
1	Petroleum mixes and paints	All Floors	Hazchem 3YE	Flammable & Toxic
2	Methylisobutyl ketone	Underground Tank	2500 Litres 3YE FDP 21°C	Flammable Liquid
3	Methyl Ethyl ketone	Underground Tank	4500 Litres, FP – 5°C	Flammable Liquid
4	Toluene	Underground Tank	4500 Litres, FP – 5°C	Flammable Toxic Liquid
5	Xylene	Underground Tank	4500 Litres, FP –24°C	Flammable Toxic Liquid
6	White Spirit	Ground Floor	5000 Litres	Flammable
7	Biodiesel	Ground Floor	10000 Litres	Combustible at raised temperatures & Toxic
8	Ethanol	Tank adjacent to Biodiesel Plant	Hazchem 2YE 5000 Litres	Flammable Toxic Liquid

ADDITIONAL INFORMATION

- Electric cut off, ground floor works side entrance
- Gas cut off, ground floor works side entrance adjacent to inner yard
- Water cut off, adjacent to gas cut off
- Sprinkler stop valve, main corner entrance works, off Trafalgar Street

ENVIRONMENTAL PROTECTION

- Sources of pollution on site:

  Various oils and toxic chemicals and waste solvents = HIGH RISK

- Pathways for run-off:
  - Most run-off direct to Leeds/Liverpool Canal at rear.
  - Surface-water sewer along Trafalgar Street and Sandygate Lane, drains to River

Calder under St James's Street

- Groundwater – minor aquifer, vulnerability unknown.
- Foul sewer runs along Trafalgar Street and Sandygate Lane, leads to Newton WwTW.

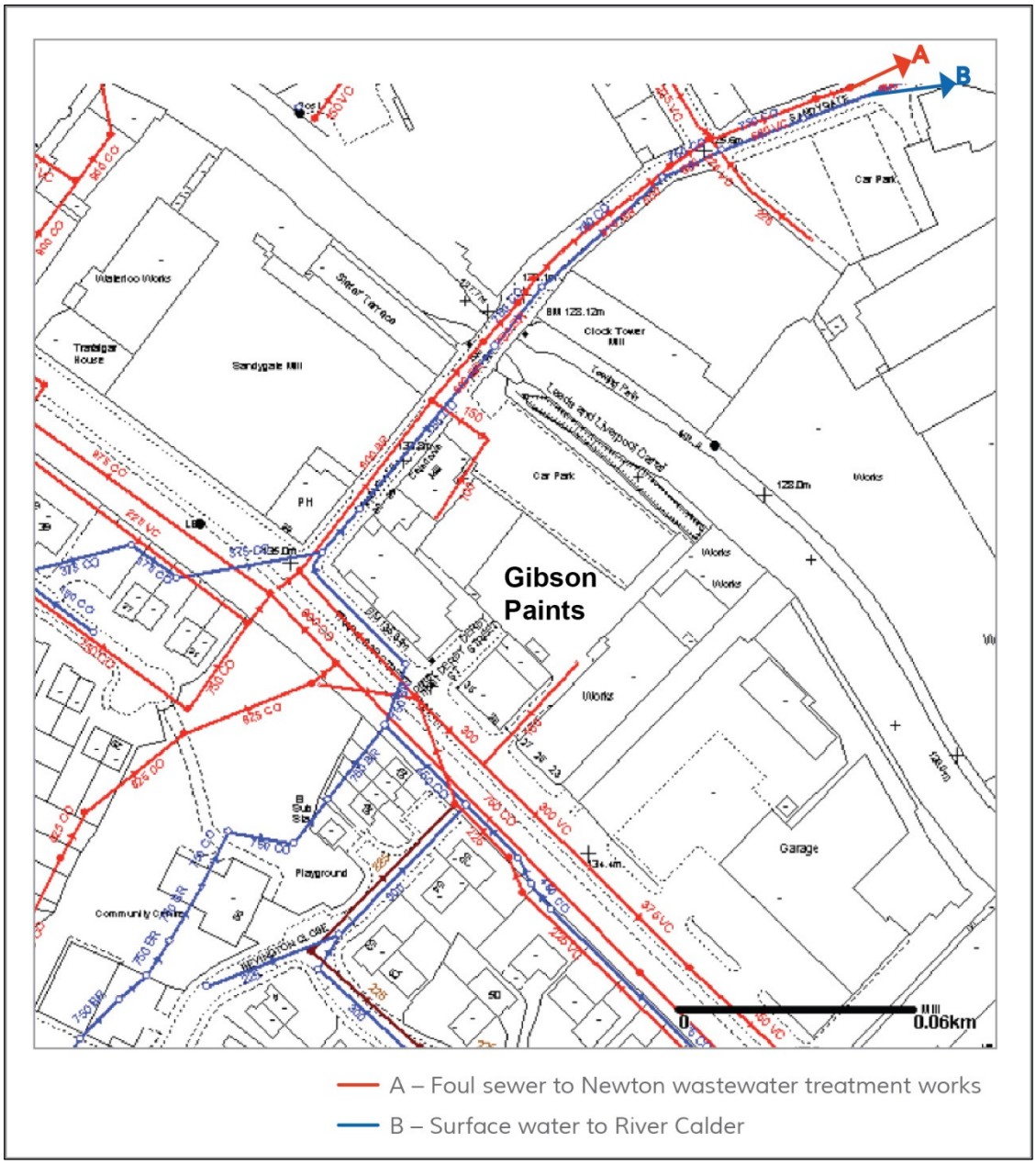
- Receptor sensitivity:
  - River Calder = MEDIUM
  - Leeds/Liverpool Canal = HIGH
  - Groundwater = MEDIUM
  - Newton Waste-water Treatment Works = LOW

ACTIONS:

- Prevent firewater entering Canal at rear from two Points: Point 1 adjacent to Biodiesel Plant – ensure air valve in drain to canal is CLOSED, use bunded area to contain fire water. Point 2 from parking area, will require booming to contain firewater.
- Consider mobilising the Hazardous Materials & Environmental Protection Unit.
- Contain firewater.
- Contact Environment Agency for advice on firewater disposal.
- Fire water may be unsuitable for re-use due to flammable nature of on-site chemicals.
- Divert firewater to sewer only if it does not contain flammable liquids. Contact United Utilities first.
- Do not allow firewater to enter road drains at front on Trafalgar Street, these drain to River Calder.

POLLUTION PREVENTION SITE SPECIFICS:

- Most run-off is over yards direct to Canal. The only drain is adjacent to Biodiesel Plant, which has an air valve which should normally be CLOSED. This bunded area can store approx 6,000 litres of fire water.
- Biodiesel Plant is regulated by Environment Agency (PPC) and an emergency plan for this area is in place.
- No drains in storage yard or parking area, run-off direct to Canal.
- Spill kits available on site.
- Foul sewer connection to front of buildings only.


A
B
Gibson
Paints
Waterloo Works
Sandygate Mill
Trafalgar House
Clock Tower Mill
Car Park
Works
Garage
Playground
Community Centre
PH
0
0.06km
A – Foul sewer to Newton wastewater treatment works
B – Surface water to River Calder

Appendix 4

Guideline notification criteria

Fire control room officers should automatically inform environment agencies when notified of incidents involving:

- All hazardous materials, excluding gases, except where a water spray/fog is used to contain or disperse a gas cloud for example chlorine or ammonia
- Major incident is declared
- Four pumps and/or two or more jets in use and/or HVPs in use
- Firefighting foam is used, excluding domestic and small car fires
- A 'controlled burn' is being undertaken or considered
- Flooding of property from watercourses
- CBRN and/or the use of mass decontamination procedures
- Radioactive materials
- Hazardous fly-tipped waste
- Hazardous waste absorbed by one grab pack or more
- Illegal burning of waste or fires involving burning of waste (above domestic quantities) (notification may originate from member of the public and not involve attendance of FRS)
- Environment agency-regulated sites (e.g. COMAH, landfills, scrap yards)
- An identified high-risk unregulated site agreed between the FRS and the local Environment Agency (e.g. timber treatment sites).
- Illegal sites or activity, for example fuel laundering, used tyre storage

Threshold quantities

Additionally environment agencies should be notified when it is confirmed that quantities of products involved reach the following thresholds:

- 25 litres of oil or fuel
- 25 litres or more of detergents for example washing powder, washing-up liquid, shampoos, soaps, car cleaning products, etc
- 25 litres of disinfectants including household bleach, Dettol, etc
- 25 litres of all types of paints and dyes
- More than 25 litres of cooking oils, glycerine, alcohols
- More than 25 litres of cutting lube or water-soluble polymers
- 250 litres of food products. Of particular concern are sauces, sugars, salt, syrups, milk, cream, yogurt and vinegar
- More than 250 litres of any beverage, including all soft drinks, beers, lagers, wines, spirits
- More than 250 litres of other organic liquids, including blood, offal, farmyard slurries, fire-fighting foam, sewerage sludge, anti-freeze
- More than 500 kg of sand, silt, cement, chalk, gypsum/plaster.

These threshold quantities are provided as a guideline. During an incident involving a spillage of these substances environment agencies should always be contacted if more information is required about their potential impact or pollution has actually occurred.

The criteria may also be varied to meet local requirements. For example in environmental sensitive areas and/or times of low water flows, notification to environment agencies maybe required below these thresholds.

Operational notification considerations

It is often difficult to decide what quantities of polluting product are likely to result in damage to the environment. As a general rule, Incident commanders should inform environment agencies when '**above normal domestic quantities**' of products are involved in incidents or enter drainage systems. Ideally, notification that a pollutant or polluting activity is about to impact the environment should take place as early as possible. The following are examples of situations when notification should be initiated by Incident commanders:

- Polluting materials are likely to, or have entered drains or a watercourse
- Decontamination of personnel is about to take place
- Before or when firefighting foam is deployed, excluding small car fires
- Incidents are on or adjacent to watercourses
- Stacked waste material such as tyres, fridges, etc are involved in fire
- Before decontamination of operational equipment, unless in previously agreed areas.

This is not a definitive list and at times there may be incidents that do not fall into any precise category and if any doubt exists the environment agencies should be contacted.

Environment agencies also request the Term for 'Information Only' is not used when reporting incidents, as this has resulted in several cases in a delayed response to major incidents.

Appendix 5

Case studies

Extracts from incident case study: The Sandoz warehouse fire, 1986

By Ian S. Hill, MIFireE North Yorkshire Fire & Rescue Service

The fire

The city of Basle in Switzerland is located on the banks of the river Rhine, which flows on through Germany and France to the Netherlands, where it discharges to the North Sea.

At midnight on the 1st of November 1986, a fire occurred at the Muttenz works, in Basle, close to the river. The fire was confined to a single-storey warehouse, numbered 956, which was erected in 1967. This was an asbestos cement-clad, light steel framework building of 90 by 25 metres in dimension. The roof was of pitched construction with a 13 metre ridge height. The warehouse was separated from adjacent buildings by roadways of 15 metres width.

On the day before the fire, the building was fully stacked, four pallets high with mainly finished chemicals, including flammable materials, pesticides, fungicides and other toxic products. The pesticides inventory included organophosphorus and mercury compounds. In total, the warehouse contained 34 chemical substances with a total inventory of 245 tonnes. Products were not segregated.

On the afternoon prior to the fire, routine work including shrink-wrapping of 20kg paper sacks of ferric ferrocyanide was being carried out. This process involved heating the plastic film using an LPG powered heat gun. At 1600 hours work in the warehouse finished and staff left for the weekend.

At 2205, the watchman made his round; all appeared quiet. At 0019, a policeman patrolling the highway which bisects the site noticed flames coming from the roof of building 956. Simultaneously, the night watchman observed the same thing. Both individuals raised the alarm.

A few minutes later, the Incident commander of the works fire service arrived with three firefighters and their equipment. Attempting to enter the warehouse via a service door, the officer found conditions untenable and was forced to withdraw, but not before he had observed the fire was well alight in one section of the warehouse

Assessing the situation, he raised a full alarm at 0025 hours. At 0030 hours, further fire appliances arrived with 15 firefighters. Soon appliances from adjacent chemical plants and the local and municipal fire service arrived. By 0045, there were a total of 200 firefighters on site.

Despite a spirited initial attack, firefighting operations were soon impeded by the ferocity of the blaze and combustible liquids stored externally along the outside walls which were igniting and spreading fire. It was therefore decided to initiate a controlled burn strategy. However, the building was subject to progressive collapse during the next four hours. Eventually, drums of materials began being ejected high into the air landing on adjacent buildings that contained combustible and water reactive chemicals. The Incident commander

then decided to change tactics to offensive with the aim of preventing the fire from spreading to these buildings.

In order to supply the high volume of water necessary to extinguish the fire, the Rhine Harbour fire boat was got to work pumping many thousands of litres from the river onto the fire. The firefighting action was successful, as the fire was prevented from spreading to other buildings and no serious injuries were sustained. It is estimated that at the height of the incident some 40,000 litres/min of water was being supplied to the fireground. A significant proportion of the firewater ran unimpeded from the site directly or through drainage systems that discharge into the river.

Over the next few days it became apparent that the Rhine had been seriously polluted by the contaminated firewater. Almost all life in the river had been destroyed for a distance of over 400 km downstream of the fire. The incident also led to the closure of public drinking water abstractions in several countries and warnings to farmers not to use water for stock watering or irrigation.

Many local people were affected with symptoms of headaches, dizziness, sneezing and running noses and eyes. A ban on the consumption of locally grown foodstuffs was eventually imposed, to be lifted only after extensive tests had been carried out.

The Basle incident has, with some justification, been described as one of the worst man-made ecological disasters.

The pollution

The pesticides and other chemicals that had been stored in building 956, and entered the river Rhine, had been designed specifically for the destruction of microscopic organisms, plants and animals. In the river, this purpose was fulfilled to devastating effect. The run-off contained approximately 30 tonnes of chemicals either in solution or suspension. The silt on the bed of the river was sampled and shown to be contaminated to a point at least 15 km downstream of the fire. It is estimated that at least 200 kg of mercuric compounds settled into the silt layer.

Of the chemicals that were left in solution, a ‘plume’ at least 1 km in length slowly progressed along the river to the North Sea. The first indication that anything was amiss was the sighting of small numbers of dead fish. From this, it was assumed that the ecological damage inflicted by the fire was relatively small. However, as the days after incident passed, it became evident that the damage was greater than was first thought.

In the Swiss and German Rhine, virtually the entire eel population was wiped out. Certain reaches of the river were officially declared dead, with all life having been obliterated.

Water abstraction from the river was also badly affected, both for drinking, livestock watering, irrigation of crops, recreation and industrial purposes. As the plume progressed into the Dutch Rhine the authorities were able to take some measures such as the closing of sluices.

It was estimated that the river was not back to its former condition for around 10 years, owing to the disruption of ecosystems down to the lowest tropic levels. It would have been of little use restocking the river with animals such as fish if there was nothing for them to live on. The microbiological life of the river must first be re-established before higher level animals can return.

The investigation 1 – the fire

The Zurich City Police, who were the incident investigators, eventually decided that there were two likely causes for the fire – malicious ignition or spontaneous combustion of the palleted chemicals.

The workers in Building 956 were engaged in the shrink-wrapping of pallets of ferric ferrocyanide. During the investigation, it was found that this product could undergo exothermic decomposition if it was heated. Once the decomposition was initiated, it was found to progressively 'tunnel' into the sacks without the evolution of noticeable smoke or odour, until sufficient heat was generated to initiate an outbreak of fire. This would explain why the night watchman did not notice any untoward signs when he inspected the warehouse some hours before the fire was noticed.

The arson theory was supported by the fact that Sandoz had recently instituted a redundancy programme which made it a likely arson target. Furthermore, it is not inconceivable that the company was attacked by ecological or animal rights groups concerned about company policy in areas connected with their campaigns.

Eventually the exothermic reaction theory was identified as the most likely cause.

The investigation 2 – the pollution

The topography and construction of the site, coupled with the hazardous chemicals stored and the lack of pollution control facilities, made a major pollution incident inevitable in the event of a large fire. The problem was one of perception prior to this incident; in the early 1980s, firefighting arrangements and environmental protection shared little in common.

The disaster was caused when large volumes of contaminated run-off from the fireground entering the site's surface water drainage system from where it flowed directly into the River Rhine. This was able to happen due to lack of:

- Water or foam sprinklers
- Bunding of the warehouse area
- Containment system fitted to the site drainage system
- Procedures/equipment in place to ensure firefighters could manage/contain firewater.

Had such systems/procedures been present, the run-off of firewater could have been minimised or contained. Without the measures, there was little chance that the volume of water used to extinguish the fire could be contained.

If a sprinkler system had been installed, the amount of water which would have secured extinction has been estimated to be 2–3 per cent of that applied by the firefighters. Such a volume would have been easy to contain if the environmental protection measures described above had been in place (see PPG 18, found on www.environment-agency.gov.uk

A policy of the controlled burning of agrochemical stores and warehouses has been advocated if the containment of all or a significant proportion of the firewater is not possible, although before doing so consideration of the likely toxic emissions to air and the risk of the fire spreading should be considered (see PPG 28, Controlled Burn, found on www.environment-agency.gov.uk

Since the fire, the owners of the site have invested heavily in state-of-the-art fire prevention and pollution control systems, making the likelihood of such an incident ever occurring again remote.

Extracts from incident case study: Area of nature conservation site

In 2007 fire crews from a Fire and Rescue Service in Southern England attended a serious fire at recycled oil storage site. The fire had started during maintenance work on a 250,000 litre bunded oil storage tank. Ignition followed an industrial accident which caused the tank top to fall into the tank which punctured the tank shell allowing a steady flow of burning oil to flow from a 100mm diameter hole into the bund. The site was located at the edge of an industrial estate surrounded by a category 4 Area of Nature Conservation (ANC) (see section 2.6 - Areas of Nature Conservation).

The ANC The Site

The ANC follows the northern banks of a river estuary for approximately nine miles. Where the oil storage site is located, the ANC stretches one mile inland from the river bank.

The site consisted of three 250,000 litre concrete block bunded oil storage tanks and a number of smaller similarly bunded storage tanks. The main yard was a purpose built concrete design surrounded by a series of drainage ditches. A fall from the edge of the yard to the centre channelled any spillage or contaminated run off into a number of centrally positioned interceptor drains and then into a containment tank.

In addition to the bunded tanks, there where approximately 30 x 1000 litre portable intermediate bulk containers (IBC) storage tanks positioned in front of the bund tank. These contained a variety of chemicals in varying volumes. Oxy Acetylene had been used prior to the fire occurring on the tank (in the yard) and initially it was unclear as to whether or not these cylinders had been exposed to fire.

Learning from the past

This incident occurred after the Buncefield Incident report had been published. Officers attending this incident were aware of the reports findings with regarded to failures of concrete bunds and the lessons learned in fighting oil tank fires. Some of the incident command team that attended had also been involved in a major oil tank exercise held eight months before this incident occurred.

Initial attendance

The first attendance established that significant resources would be required to successfully deal with the incident. These included water monitors to protect surrounding buildings and to facilitate boundary cooling, and large amounts of foam to mount a successful foam strike to extinguish the tank fire and a flowing oil fire that had developed in the bund surrounding the tank.

Due to the size and nature of the fire, its proximity to the ANC, and the volume of water and foam required to deal with the incident, a number of partner agencies including the Environment Agency (EA) attended the incident. From an early stage, the command team recognised the potential environmental impact of the firewater and foam run-off on the adjacent ANC, freshwater pools and the river, even though the river was some distance from the site.

Working with the EA and other partner agencies, the command team assessed the type and quantity of the foam concentrate required to extinguish the fire, including a significant reserve, and the potential environmental impact of the different foams in an effort to minimise the impact. The quantity of FFFP and AFFF concentrate held by the host FRS was not sufficient to mount the level of foam strike required to extinguish the fire. Neighbouring FRSs were therefore asked if they could provide supplies of concentrate to support the incident and those that could respond accordingly.

Operational tactics

Tactically, using a separate water supply from that of the foam strike, the decision was made to boundary cool the storage tanks using only water. The water supply for this and water firefighting was supplied independently from hydrants and a fresh water pool located behind the site.

A small amount of foam was used to extinguish the fire in the bund until there was enough concentrate on site to support a sustainable attack on the main tank fire. This tactic was not only intended to preserve the foam stocks for the main foam strike but also to mitigate environmental damage.

When the supplies of foam arrived on site, they were assessed by both the nominated Foam Officer and an EA Inspector. This action was taken to ensure each batch of concentrate was compatible with the next and that it was suitable for application at this incident. During this assessment process, one batch of foam raised concern. As the type of concentrate could not be clearly identified, it was decided that the potential risk of environmental damage to the area was deemed to be unacceptable. This concentrate was therefore not used and was returned once alternative supplies arrived on site.

The main foam strike quickly extinguished the tank fire. However a risk still remained from the oil mixed with foam escaping from the ruptured tank. This quickly raised liquid levels within the bund. The command team realised that without prompt action there was a real possibility that the oil/foam mixture would over flow the bund and, via the sites intercepted drainage system, enter the ANC fresh water pools and the estuary.

To reduce bund levels the command team got fire crews to pump the oil/foam mixture to a 32,000 litre road tanker belonging to the owners of the site. Despite this one of the bund walls still failed after the fire had been extinguished and whilst the incident was being scaled down, allowing a mixture of oil and foam to flow out into the yard.

Environmental protection booms, supplied by the EA and carried by the FRS, were strategically placed around the site earlier in the incident which ensured that this escaped liquid did not leave the site and pollute the environment.

Summary

Protecting the area surrounding the site played a major role in determining the tactics used when dealing with this incident. It was clear that training for this type of incident had significantly improved the outcome not only in extinguishing the fire but also preventing damage to the environmentally sensitive areas surrounding the site.

This incident proved that establishing a proactive relationship on a local basis allows each organisation to understand each others priorities when it comes to protecting the environment without compromising the FRSs actions in extinguishing the fire.

Appendix 6

Example fire and rescue service pollution prevention and control reporting form

Polluter Details	**Incident Details**
Date of incident:	Incident No:
Owner/Occupier/Vehicle Registration:	Incident Commander:
Address:	Incident Location:
Telephone:	Spillage Quantity:
Company Contact:	Spill Type: for example RTC, ruptured tank, overturned tanker etc

EA/NRW/SEPA or NIEA informed	YES		NO	
EA/NRW/SEPA or NIEA attended	YES		NO	
Name of agency officer informed or attended (please specify)				

Equipment Details

Quantity	Product Code	Equipment Type

Fire Officer Details

Name:		Signature:
FS No & Role:	Station:	Date:

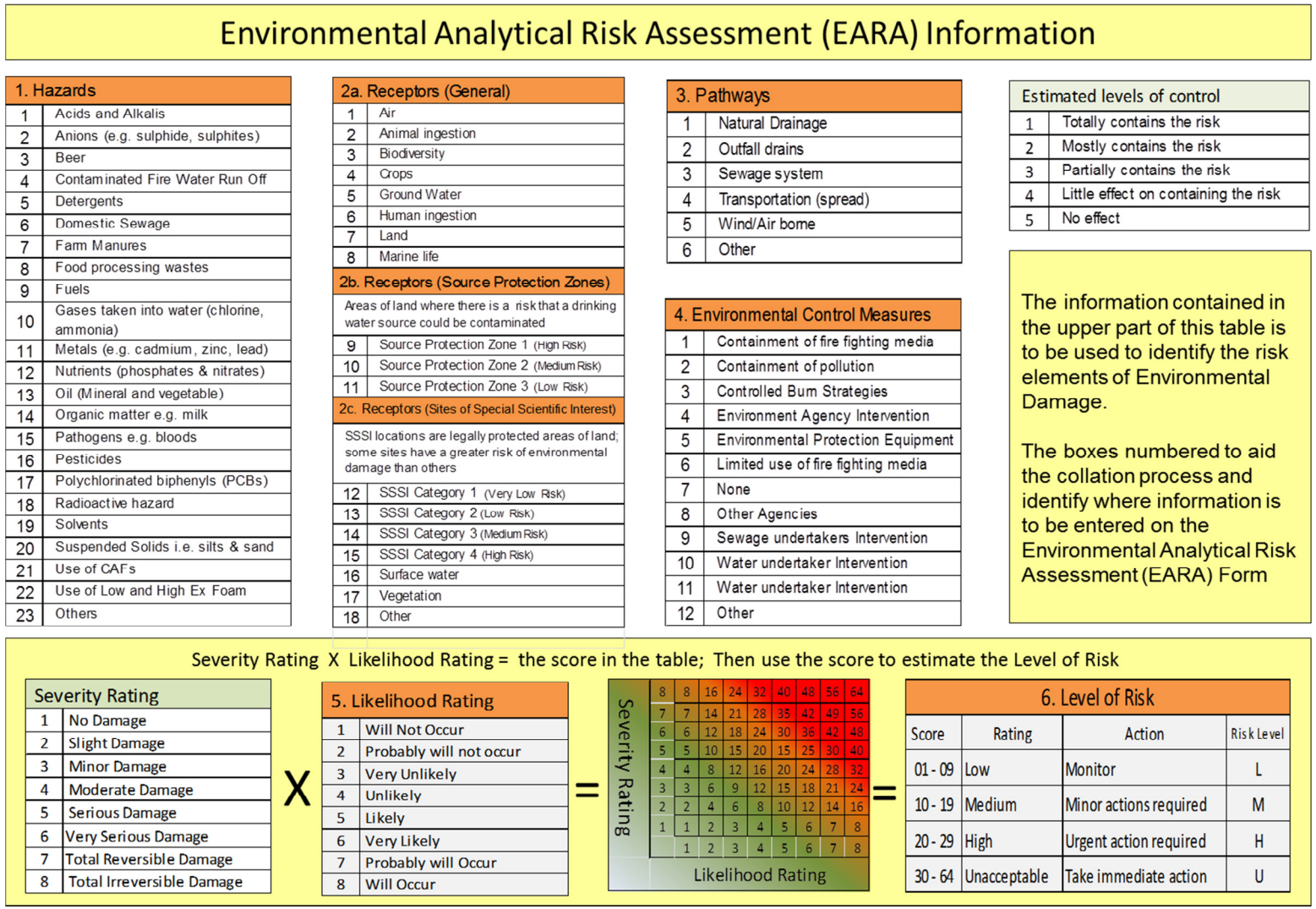
Environment agency Use Only	Equipment Evaluation:
NIRS Number:	

Please email this form to: _____

Note: This form has been produced as a guide and may be amended to suit local needs, as necessary.

Appendix 7

Example environmental analytical risk assessment form



Environmental Analytical Risk Assessment (EARA)

Incident No.		Time of Assessment		Incident address	
Date		Time of next Assessment			

Has the Environment Agency been informed?	Yes/No	Has the Environment Agency been requested to attend?	Yes/No

Water Source Information	
Protection Zone Level	Information

Sites of Special Scientific Information (SSSI)		
Distance	Description	Level of risk
		High/Medium/Low

Surface Water Sewage	
Is the location and runoff of surface water drainage...?	Known / Not known

Foul Water Sewage	
Is the location and runoff of Foul Water drainage...?	Known /Not known

What are the risks to the environment as a result of Fire Service actions in relation to this incident?

No.	**1.** Hazard	**2.** Receptor	**3.** Pathway	**4.** Control Measure	**5.** Probability of exposure (Likelihood Rating)	Consequence	**6.** What is the overall level of risk?
	What has the potential to cause Environmental Damage?	*What is at risk / What are we trying to protect?*	*How can the hazard get into the receptor?*	*What measures will you take to reduce the risk if it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains? The balance of probability and consequence*
	e.g. Leak from the waste oil storage tank escaping the containment	Local water course	The surface water drainage system	Oil spill equipment is located nearby. Watch/Crew Managers are responsible for and trained in its use.	Very unlikely	Contamination of local water course	Not significant

Name of Assessing Officer	Signature

Name of EA Officer	Signature

Incident Commander	Signature

All completed Assessment forms are to be sent to Operational Services, SHQ with all other incident related paper work

Appendix 8

Pollution prevention form

Pollution Prevention

Environment Agency/Natural Resources Wales Incident Response

Water Resources Act 1991

Equipment has been used, and left in situ by the Fire & Rescue Service to prevent pollution from your premises/activities. This equipment must be left in place to protect the environment, and should only be removed in agreement with the Environment Agency/Natural Resources Wales.

The Environment Agency/Natural Resources Wales will be in touch with you shortly to arrange for the removal of the pollution prevention equipment used. In the meantime, if you have any questions please contact us on 03708 506 506** (Mon-Fri, 8am - 6pm) or on 0800 807060 in the case of an emergency.

What does this mean for me?

Please note that the law allows us to recover the cost of investigating and dealing with incidents from the person(s) responsible. This is known as the 'Polluter Pays' principle. The Environment Agency/ Natural Resources Wales can still recover costs when an incident does not result in pollution of water.

You will be liable for any damage caused to equipment left in situ by the fire service, if you attempt to remove it.

If we believe that an offence was committed in relation to the incident, this will be dealt with separately.

Further information

More information on pollution incident cost recovery can be found on the Environment Agency website www.environment-agency.gov.uk, by searching under "PICR". Environment Officers are able to offer free pollution prevention advice and assistance, but we must consider recovery of our costs when responding to incidents.

**Calls to 03 numbers - Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls. These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone.

environment-agency.gov.uk

Appendix 9

Equipment re-ordering process

Except in Scotland, procedures for the reordering of environment agency supplied pollution control equipment have been agreed by the various environment agencies and FRS's.

Procedure for England

In England all requests should be submitted by email to the Environment Agency at frs.orders@environment-agency.gov.uk on the appropriate form. Requests can only be made by nominated contacts for each FRS.

There are four different request forms available from the Environment Agency which cover the agreed list of standard grab pack and specialist environmental protection kit the Environment Agency provides. See Section 3.2.2

These are:

- Grab Pack items
- Inflatable, sorbent & drain blocker items
- Specialist equipment
- Peristaltic pump servicing & spares

All the sections on the form, including full delivery address, contact details at the delivery address and the type and numbers of each item being requested must be completed. New forms will be supplied to the FRS nominated contact point for the equipment supply scheme should the list of equipment be modified.

Alternatively a FRS may use its own electronic ordering system.

If such a system is used the Environment Agency will not process the request without the following details:

- The Fire & Rescue Service making the request
- Delivery contact name, phone number & address
- Item description & product code
- Number of items being requested (bearing in mind minimum quantities)

Requests should again be sent to frs.orders@environment-agency.gov.uk

FRS's should note that submitting a request for equipment does not guarantee it will be provided, as this will depend on availability of funds, particularly at the end of the financial year.

Non-standard equipment

If a FRS would like any item of equipment that isn't included on the standard list they should contact their local EA FRS Representative to discuss their request and seek their support for the item. If supportive, the request including a detailed description of the equipment required, the supplier, cost and confirmation that the request is supported by the local EA FRS Representative should be sent to frs.orders@environment-agency.gov.uk.

Pending approval of the Environment Agency National Lead for the partnership and sufficient funding the order will then be progressed. If the item has not been previously supplied FRS will also be asked to feedback how effective the equipment is and any issues there are with it.

Signing for delivered equipment

It is important that any equipment requested by a FRS is signed for when it is delivered. The Environment Agency will therefore only supply equipment to fire stations that are fully staffed during the day. If FRS require equipment to be delivered to stations that aren't fully staffed, this should be made clear on the equipment request e-mail. This information will be passed onto the equipment suppliers, who will be asked to liaise with the station about delivery options.

Confirmation of delivery of items

To meet its financial obligations the Environment Agency requires confirmation from the Fire stations that receive the items that the items they requested have arrived. Without this information the Environment Agency cannot pay the supplier.

Confirmation of delivery should be sent by to frs.orders@environment-agency.gov.uk including:

- The Fire & Rescue Service that has made the request
- The date the request was made
- Details of the equipment received

This should be sent within 5 calendar days of the equipment being delivered.

FRS contacts

FRS should ensure they inform the Environment Agency as soon possible of any changes to their nominated contacts for the equipment supply scheme. .

Feedback

Environment Agencies are keen to receive feedback on the equipment provided; particularly non standard items as well the running of the ordering service. Any comments, issues, suggestions or other information they think would be useful should be sent to frs.orders@environment-agency.gov.uk

Equipment levels

To ensure continuity of supply it is recommended that a stock of pollution control equipment is held as a non-mobile resource. FRSs should seek agreements locally with their environment agency offices on appropriate stock levels and locations. It is advised that a 100 per cent reserve of non-reusable equipment is held at each station with an additional 50 per cent of the FRS total held at one or more locations. The FRS stock can also be used to replenish individual stations as necessary.

Procedure for Northern Ireland

In Northern Ireland all requests should be submitted by email to NIEA Regional Operations at emergency-pollution@doeni.gov.uk on the appropriate form (ROF1). Requests can only be made by nominated contacts. Where pollution prevention equipment supplied by NIEA is used by NIFRS during an incident, Form ROF2, 'NIFRS Incident Pollution Prevention & Control Equipment Utilisation', should be forwarded to the above email address within 28 days.

The request form available from NIEA covers the agreed list of standard grab pack and specialist environmental protection kit that may be provided. See Section 3.2.2

All the sections on the form, including full delivery address, contact details at the delivery address and the type and numbers of each item being requested must be filled in.

New forms will be supplied to the NIFRS nominated contact point for the equipment supply scheme should the list of equipment be modified.

NIFRS should note that submitting a request for equipment does not guarantee it will be provided, as this will depend on availability of funds, particularly at the end of the financial year.

4.1.3 Non-standard equipment

If NIFRS would like any item of equipment that isn't included on the standard list they should contact their local NIEA representative to discuss their request and seek their support for the item. If supportive, the request including a detailed description of the equipment required, the supplier, cost and confirmation that the request is supported by the NIEA representative should be sent to emergency-pollution@doeni.gov.uk

Pending approval of the NIEA lead for the partnership and sufficient funding the order will then be progressed.

If the item has not been previously supplied, NIFRS will be asked to feedback how effective the equipment is and any issues there are with it.

Signing for delivered equipment

It's important that any equipment requested by NIFRS is signed for when it's delivered. NIEA will therefore only supply equipment to the agreed premises. If, in an emergency, NIFRS require equipment to be delivered to stations that aren't fully staffed, this should be made clear on the equipment request e-mail.

Confirmation of delivery of items

To meet its financial obligations NIEA requires signature confirmation from NIFRS that the items that the items they requested have arrived. Without this information NIEA cannot comply with its internal audit procedures.

NIFRS contacts

NIFRS should ensure they inform NIEA as soon as possible of any changes to their nominated contacts for the equipment supply scheme.

Feedback

NIEA is keen to receive feedback on the equipment provided to NIFRS, particularly non-standard items, as well the running of the ordering/restocking service. Any comments, issues, suggestions or other information they think would be useful should be sent to emergency-pollution@doeni.gov.uk

Appendix 10

Example Operational Risk Information Plan – SSSI Environmental Risk Note

Kent Fire & Rescue Service – Environmental Risk Note 5

Technical Bulletin F25 Appendix A
Issued May 2012

River South Thames (Category 4 ANC)

Natural England's South Thames Site of Special Scientific Interest (SSSI) stretches from Gravesend south Thames bank around the Isle of Grain to Grain Power Station on the Medway Estuary which forms part of the Greater Thames Estuary.

There are a number of fleets dykes and form quays located within the protected area. The former Conoco fuel storage depot also falls within this area.

Bordering part of the south west boundary of area is the railway line running from Grain which is used to convey fuel to and from various locations on the island.

There is an extensive mosaic of grazing marsh, saltmarsh, mudflats, and shingle characteristic of the estuarine habitats of the North Kent marshes.

Freshwater pools provide additional variety and complement the estuarine habitats.

The site supports outstanding numbers of waterfowl with total counts exceeding 20,000. Many species regularly occur in nationally important numbers and some species regularly use the site in internationally important numbers.

The breeding bird community is also of particular interest. The diverse habitats within the site support a number of nationally rare and scarce invertebrate species and an assemblage of nationally scarce plants.

Type of Environmental Damage

- Pollution of water/habitat from firewater run-off
- Chemical contamination
- Ground compression
- Ground disturbance
- Foam/chemical damage

Operational procedures

On Site

- Inform Natural England and Environment Agency and request their attendance.
- Carry out an Environmental Assessment as part of the DRA. An EARA must also be completed at the first available opportunity
- Controlled use of firefighting media
- Limit fire water run-off/discharge
- Block drains
- Use only water where possible
- Use Foam as a last resort (assessment must be carried out in conjunction with the Environment Agency and this must be counter signed by an EA officer)
- Keep to designated tracks and paths
- Try to keep to a single vehicle path
- Carry out an Environmental Analytical Risk Assessment (EARA)

Proximity of site

- Incorporate site as part of an Environmental Assessment included within the DRA. If necessary carry out an EARA Risk Assessment
- Ensure any control measures highlighted as a result of this assessment are put in place.

Chemical Incidents

- *Where there is a risk that the SSSI could be effected:*
- Incorporate site as part of an Environmental Assessment included within the DRA. If necessary carry out an EARA Risk Assessment
- Inform Natural England and Environment Agency.

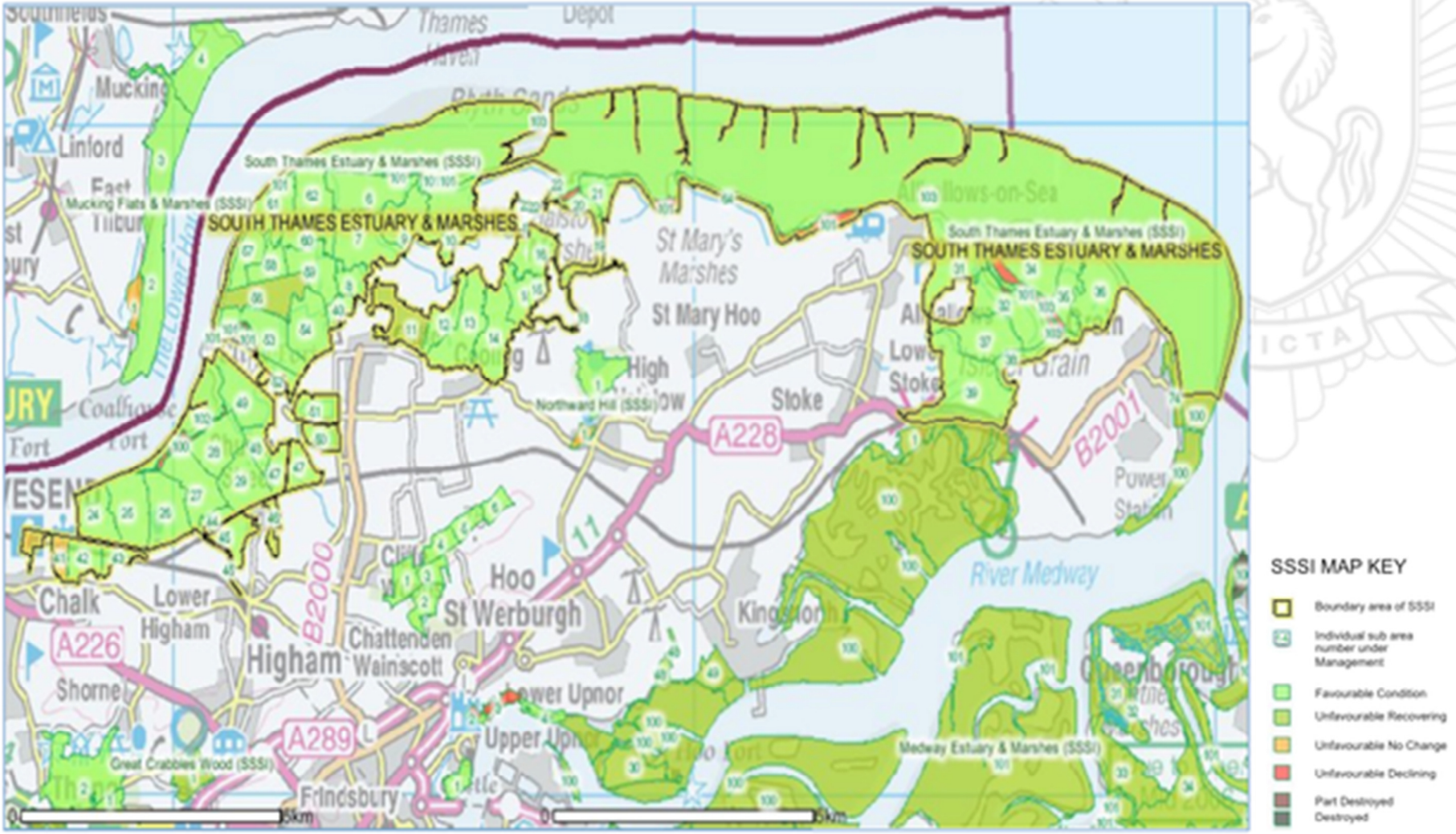
Failure to take correct actions to prevent or limit environmental damage may result in legal prosecution.

Kent Fire & Rescue Service
Operational Development

Kent Fire & Rescue Service – Environmental Risk Note 5

Technical Bulletin F25 Appendix A
Issued May 2012

Map of the River South Thames (Category 4 ANC)



Illustrations courtesy of Kent Fire and Rescue Service

The information contained on the first illustration is designed to include specific data relating to the environmental risk. This information includes the type of fire service action, which can affect SSSI and how the risk of damage can be reduced.

The second illustration above is designed to show a map/plan of the SSSI location and specific risk areas. Individual SSSI location maps are taken with permission from the Natural England website.

Appendix 11

Environment Agency regulatory position statement

The use of end of life vehicles and other controlled wastes for training purposes and in demonstrations by the emergency services and armed forces

If you comply with the requirements below, we will allow controlled wastes to be used by the emergency services, armed forces and third party training providers in training exercises and for demonstrations without an environmental permit.

Background

The emergency services and armed forces frequently use end of life vehicles (all vehicle types, not just cars) and other wastes in training exercises. This training is essential for the protection of these services and of the public and may include:

- Cutting and/or burning of ELVS
- Locating and disarming hidden explosives in ELVS
- Live fire scenarios in buildings due to be demolished
- Creation of fire investigation scenes
- Controlled explosions of ELVS

Wastes may also be used in demonstrations to specific groups or the general public for education or awareness raising purposes.

These activities all require an environmental permit. However, as the activities take place under controlled circumstances and, in many cases, on an infrequent basis, we believe that the requirement for a permit would be disproportionate to the risk.

Our approach

We will not pursue an application for an environmental permit for the use of ELVs and other controlled wastes by the emergency services or armed forces in training exercises where:

- Any waste electrical and electronic equipment or ELVs that are used are obtained from Authorised Treatment Facilities or local authorities.
- ELVs that have not been depolluted are stored and used on an impermeable[1] surface that has a sealed drainage[2] sy[3]stem. These vehicles must not be used in any scenario that involves the burning of the vehicle or release of any fluids. This does not include vehicles that only retain shock absorbers, air-bags or batteries where essential for the training, but are otherwise fully depolluted.
- No wastes containing ozone depleting substances or fluorinated gases are used.
- Wastes are returned to an authorised facility once they are finished with.
- ELVs that are not fully depolluted and any other hazardous wastes being moved to and from the place of training are accompanied by a consignment note.
- When more than 10 vehicles are being stored or used at one location, an environmental risk assessment is undertaken and permission is obtained from the local environment agency office before the training exercise proceeds.
- You meet the relevant objectives of the Waste Framework Directive;'… ensuring that waste management is carried out without endangering human health, without harming the environment and in particular: (i) without risk to water, air, soil, plants or animals; (ii) without causing a nuisance through noise or odours; and (iii) without adversely affecting the countryside or places of special interest.'

Enforcement

In not pursuing an application for a permit, we will not normally take enforcement action unless the activity has caused, or is likely to cause, pollution or harm to health. For a more detailed explanation of this enforcement position, please see our Enforcement and Sanctions statement.

This regulatory position will be reviewed by 28 February 2016.

1."Impermeable surface" means a surface or pavement constructed and maintained to a standard sufficient to prevent the transmission of liquids beyond the surface.

.2"Sealed drainage" means a drainage system with an impermeable surface which ensures that (a) no liquid will run off the surface otherwise than via the system, and (b) except where they may be lawfully discharged, all liquids entering the system are collected in a sealed sump.

3