ENVIRONMENT AND HERITAGE SERVICE
SEPA Scottish Environment Protection Agency
Environment Agency

Environment Alliance - working together

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pollution prevention guidelines

Controlled Burn: PPG28

These guidelines are jointly produced by the Environment Agency for England and Wales, the Environment and Heritage Service for Northern Ireland, and, the Scottish Environment Protection Agency, referred to here as we, or us.

This guidance will help you decide when and how to use a controlled burn as part of a fire fighting strategy to prevent or reduce damage to the environment. You should consider this guidance on a site by site basis when developing an incident response plan for your site. Contact us if you need further advice.

Following these guidelines doesn't remove your responsibility to comply with the law and prevent pollution from your activities. Causing or allowing pollution is a criminal offence: compliance with this or any guidance isn't a defence You should make sure that the references to other sources of guidance are still current; use updated guidance if it exists.

1. Introduction

a) Our Pollution Prevention Pays - Getting your site right – good practice guidance; (Reference 1) gives basic advice on pollution prevention. Further information on how to manage run-off generated in a fire ('firewater') and major spillages is available in PPG18 (Reference 2) and CIRIA Report 164 (Reference 3). Guidance on how to plan a response to a pollution incident is in PPG21 (Reference 4).

b) This document deals with using a 'controlled burn' to prevent or reduce water and air pollution from firefighting activities at industrial and commercial sites.

It provides guidance on:

i) identifying sites where there is a risk of pollution following a fire
ii) circumstances where a controlled burn could be used as part of an on-site plan for dealing with pollution incidents or during an actual incident to minimise impact on public health and the environment
iii) points to consider when deciding whether such a strategy is appropriate

c) In this guidance, a controlled burn is an operational strategy where the application of fire fighting media such as water or foam is restricted or avoided, to minimise damage to public health and the environment. The strategy would normally be used to try and prevent water pollution by contaminated firewater. It can also reduce air pollution due to the better combustion and dispersion of pollutants. But it may also have adverse impacts such as allowing or increasing the formation of hazardous gaseous by-products.

d) When applying this guidance the protection of people must always take precedence over environmental concerns.

2. Who should read this?

a) The guidance is aimed at:

i) site operators to help them determine if their premises pose a risk to the environment in the event of a fire and if they do whether they should include a controlled burn within an agreed pollution emergency response plan for their site
ii) the Fire and Rescue Service
iii) other parties who may be involved in planning for or dealing with such incidents, for example local authorities, the Health and Safety Executive, public health officials and insurers/ underwriters

b) This guidance also contains information that might be of use to those dealing with fires at agricultural premises or fires occurring during the transport of dangerous goods (Reference 5 & Reference 6).

c) This guidance supplements, but does not replace, any statutory requirements for sites controlled under the Control of Major Accident Hazards Regulations, the Pollution Prevention and Control Regulations or the Environmental Protection Act 1990. Further guidance for the operators of such sites on the circumstances where a controlled burn should be considered, should be sought from the appropriate regulator.

d) The risk assessment procedures recommended in this guidance should be applied in a proportionate manner to the risks involved.

e) This guidance does not apply if you are involved with:

i) storing radioactive materials/wastes covered under the Radioactive Substances Act 1993
ii) fire fighting using:
- wholly non-aqueous agents, e.g. dry chemicals, vaporising liquids, gases
- aqueous agents such as water and foam when used in a portable extinguisher

iii) fires that are deliberately set and controlled to manage vegetation such as muirburns
iv) fire fighting for fire research and for testing fire extinguishing agents

3. Impacts of fire

a) The risks

Many industrial and commercial sites have the potential to cause significant environmental harm and to threaten water supplies and public health in the event of a fire. This includes sites that:

i) store, use or process toxic and/or polluting substances such as many chemicals, oils, food and beverage products
ii) contain hazardous materials such as asbestos within the fabric of the building
iii) contain or store materials which would give rise to hazardous breakdown products in the event of a fire, e.g. toxic smoke from burning plastic

Appendix 1 gives examples of the types of sites and activities which are likely to pose a hazard.

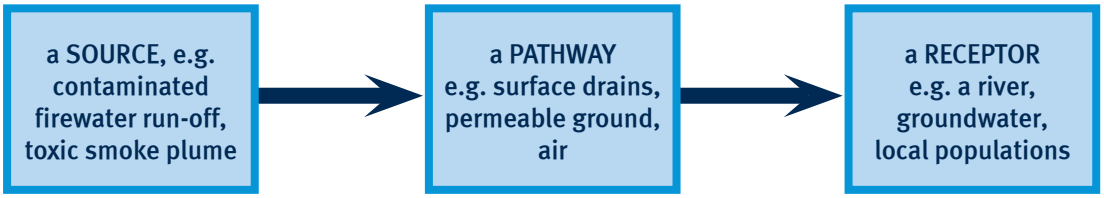
A fire at sites like these can give rise to severe pollution due to:

i) firewater run-off: which can transport pollutants into drainage systems, rivers, groundwaters and soil
ii) toxic smoke plumes and other airborne pollutants: which can cause both short and long term-term adverse effects on health and the environment
iii) thermal radiation: which can harm people and the environment

The impacts of contaminated firewater run-off may be immediate and long-term. If groundwater is polluted, the effects may last for decades. The legal consequences and clean up-operations can also be very costly. We therefore encourage operators to develop incident response plans that prevent and mitigate pollution.

b) Identifying 'At Risk Sites'

Sites and activities will only pose a risk to people and the environment if the three components shown below are present.



Site operators should undertake an assessment of the risk that their site poses by using a simple risk screening assessment, as illustrated in Appendix 2.

c) How to reduce risk?

Where the risk screening assessment shows a high or medium risk of pollution from firefighting, site operators, in liaison with the Fire and Rescue Service, other stakeholders and us, need to consider ways of reducing the risk to an acceptable level.

There are four main ways to reduce risk and one or more of these may be employed at any given site:

i) **Prevention** Give the highest priority to preventing the fire in the first place, for example by segregating or controlling sources of ignition

ii) **Detection** Make sure that if a fire does start, it is detected and tackled as quickly as possible. The fitting of automatic detection and protection systems such as sprinklers is one way of doing this. Site operators should seek advice on such systems from their insurers and the Fire and Rescue Service

iii) **Containment** By installing facilities for containing firewater such as bunds, storage lagoons or chambers, shut-off valves and isolation tanks or areas. More information on firewater containment is available in Reference 2 and Reference 3

iv) **Mitigation** Plan with the Fire and Rescue Service suitable fire fighting strategies, such as:

- reducing the amount of firewater generated: using sprays rather then jets
- recycling firewater where this is not hazardous
- a controlled burn where it is safe to do so. In cases where action is required to prevent the fire spreading, for example the application of cooling water to the areas around the storage tanks, care should be taken to ensure 1) this water does not become a pollutant or 2) the cooling process does not cause significant increases in air pollution

4. Deciding how to reduce risk

The decision on which strategy or combination of strategies to adopt can be made either as part of an agreed pollution incident response plan guided by a full risk assessment or during an incident, based on a dynamic risk assessment.

a) Planned and agreed

This is our preferred option, as it is based on a full assessment with all the facts available and the agreement of all interested parties. Such an assessment should take into account:

i) the scale and nature of the environmental hazards presented by the site and the activities that take place on it
ii) the risks posed to people and the environment and the extent of the possible damage
iii) the difficulty in deciding and justifying the adequacy of the risk management measures adopted
iv) the local topography and different meteorological conditions and fire scenarios that could be reasonably expected at the site

References 3 and 7 give examples of risk assessment methodologies that might be suitable and reference 8 gives information on our approach to risk assessment.

However you carry out the risk assessment, it should be tiered and proportionate. You should select the most appropriate response by seeking guidance from one of our local offices, the Fire and Rescue Service, the Health and Safety Executive, public health authorities and insurers.

b) During an incident

Where a fire has taken hold, no emergency plan exists and there is no, or inadequate, secondary containment then the only options to protect people and the environment are to extinguish the fire and deploy emergency containment measures to control run-off or use a controlled burn to reduce run-off and/or air pollution.

The decision on which of these options to use will need to be taken quickly by the Fire and Rescue Service Incident Commander, based on a dynamic risk assessment. The first step will be to assess the impacts of firefighting on air quality and the ability/capacity to contain any firewater. Where firefighting is likely to exacerbate air pollution and/or it is not possible to contain firewater, then a controlled burn should be considered.

5. Is Controlled Burn appropriate?

The decision to employ a controlled burn will rest with the Fire and Rescue Service's Incident Commander who will need to consider the factors below before deciding whether it can be safely employed. When doing so, wherever possible, this should be in consultation with other stakeholders and us.

a) Life and health

Preventing fatalities, injuries and adverse health effects to people will always override environmental and other considerations such as the protection of property.

b) Spread of fire

Where offensive fire fighting is required to stop a fire escalating, a controlled burn will not initially be appropriate and efforts should instead be made to contain firewater. Once the risk of escalation has been minimised, there are no risks to people and it is not possible to contain firewater and/or this is the best option to minimise air pollution, then a controlled burn might be considered.

c) Is a controlled burn the best environmental option?

You will need to consider the short and long term effects on air, land and water quality. There are several environmental risk assessment tools to help with this. Most contain common features and are based on the relationship between the source, pathway and receptor.

Appendix 3 gives a table highlighting the key stages of an environmental risk assessment. The amount of information needed and the potential complexity of any decision reinforces the advantages of planning.

d) The legal consequence of allowing fires to burn

In England and Wales, the Fire and Rescue Service Act 2004 (Reference 9) and, in Scotland, the Fire `(Scotland) Act 2005 (Reference 10) place no legal duty on Fire and Rescue Authorities to extinguish fires. Their duty is only to provide for extinguishing fires and protecting life and property in the event of a fire.

For Scotland, the 'Fire (Scotland) Act 2005', "extinguishing", in relation to a fire, includes "containing and controlling", giving Incident Commanders the option of using a controlled burn.

The decision on how to conduct fire fighting operations is governed by the principles of common law relating to reasonableness. In practice, this means there are likely to be circumstances such as the protection of public water supplies, where it would be reasonable for the Fire and Rescue Service Incident Commander to decide to cease - or limit - firefighting operations because the consequences of continuing would be worse than the destruction of property.

e) The importance of the building

Certain buildings have a particularly high architectural, cultural, historical or strategic significance. It is unlikely that such a building would be used to store significant quantities of polluting substances and pose a high risk in the event of a fire. Where they do, the health and environmental benefit of a controlled burn, if this is considered to be the least damaging option, must be weighed against the value of the building. The decision will need to be taken individually, with advice from the appropriate conservation body.

Where the building is considered to be of high value and fire fighting poses a high risk to the environment, then firewater containment should be employed.

f) The requirements of the site operator and insurer

The requirements of the site owners, tenants and sub-tenants and their insurers should be considered. When doing so, remember that clean-up costs might exceed the value of the building and lost product and production. And, in the event of pollution, prosecution of the operator is more likely if appropriate pollution prevention measures have not been taken. The decision to employ a controlled burn might also be considered a material fact by the site insurer and consequently influence whether or not they provide insurance cover.

The decision making process will be far easier if these parties have taken an active role in developing the emergency response plan. In a fire, where no plan exists, decisions will have to be taken quickly by the Fire and Rescue Service Incident Commander and our officers, based on operational priorities. This situation will be exacerbated if it proves difficult to contact the site operator, **so we strongly recommend that site operators provide a readily available 24 hour contact number.**

g) Public perception

Although the general public should not be involved in dealing with the fire, the emergency services should keep them informed. This should include an explanation of why a controlled burn is being employed.

h) When to use a controlled burn

Below is a summary of the likely situations where a controlled burn might or might not be appropriate.

Controlled burn is inappropriate	Controlled burn might be appropriate
A controlled burn will increase the risk to people	People are not at risk, or a controlled burn will reduce the risk to people
There is a high success forecast for extinguishing the fire with minimal impact on human health and/or the environment	There is a low success forecast of extinguishing the fire
There is a high probability of the fire spreading extensively or to high hazard areas (*)	Fighting the fire with other techniques would pose a significant risk to fire fighters (*)
Important buildings are involved (**)	Property is beyond salvage
Fire conditions, meteorological conditions and/or local topography are inappropriate e.g. plume grounding in a populated area	Fire conditions, meteorological conditions and the local topography are appropriate for minimising the air quality impacts
Firewater run-off will drain to an area of low environmental sensitivity or firewater is not polluting (***)	Firewater run-off would damage an area of high environmental sensitivity (***)
Firewater can be contained	Firewater run-off would affect potable supply intakes and other abstractions
	Firewater run-off could impair the operation of a Sewage Treatment Works

(*) In such a situation it may be possible to employ a controlled burn once the fire is under control, or alternatively employ other methods to contain the firewater.

(**) See section 5e.

(***) See Appendix 4 for further guidance on identifying environmental sensitivity.

6. Actual response strategy

a) Production of Pollution Incident Response Plan

If the risk assessment has shown that a controlled burn can safely be employed, is the least damaging health and environmental option and the Fire and Rescue Service is agreeable, the strategy should be incorporated into a pollution incident response plan for the site.

This response plan should be developed with stakeholders and cover both the event and post event phase. As well as the actual arrangements for mitigating pollution it should also cover monitoring arrangements both on and off site.

The response plan may be part of a formal plan required as:

- part of regulations such as the Control of Major Accident Hazards and Pollution Prevention and Control
- an industry inspection scheme such as the British Agrochemical Standards Inspection scheme (reference 11)
- an environmental management system (e.g. ISO14001)

Reference 4 gives further guidance on preparing such plans

b) In the event of fire

The actual response will depend on the circumstances that face the Fire and Rescue Service's Incident Commander. The final decision will always rest with that Commander.

7. Communicating the decision

The decision to employ a controlled burn, whenever practicable, must be conveyed to all the interested parties: the site operator and insurers, health officials, us and, in many cases, the press and public.

8. References

1. Pollution Prevention Pays. Getting Your Site Right – industrial and commercial pollution prevention
2. PPG18 : Managing firewater and major spillages
3. Design of Containment Systems for the Prevention of Water Pollution from Industrial Incidents. CIRIA Report 164. ISBN 0 86017476 X Construction Industry Research and Information Association. (CIRIA)
4. PPG21 : Pollution incident response planning
5. PPG 22 : Dealing with spillages on highways
6. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2004. TSO. ISBN 0110490630. http://www.tsoshop.co.uk/bookstore.asp?AF=A10075
7. Environmental Impact of Controlled Burns, Technical Report P388. ISBN 1, 85705 4148. Environment Agency. http://publications.environmentagency.gov.uk/epages/eapublications.storefront/424004cc02b39aec273fc0a802960680/Product/View/GEHO1004BIFU&2DE&2DP
8. Guidelines for Environmental Risk Assessment and Management. http://www.defra.gov.uk/environment/risk/eramguide/index.htm
9. The Fire & Rescue Service Act 2004. TSO. ISBN 0 10 542104 9. http://www.tsoshop.co.uk/bookstore.asp?AF=A10075
10. The Fire (Scotland) Act. 2005.TSO. ISBN 0 10 590078 8. http://www.tsoshop.co.uk/bookstore.asp?AF=A10075
11. Inspection and Approval of Agrochemical Stores by Environmental Protection Officers and Fire Officers in connection with BASIS Registration LTD. BASIS (Registrations) Limited, 2000, telephone 01335 343945

Reference 1,2,4 & 5 are available free of charge from our offices or on our web sites

i) www.environment-agency.gov.uk/ppg
ii) www.sepa.org.uk/guidance/ppg/
iii) www.ehsni.gov.uk/environment/waterManage/waterPollution/publications.shtml

9. Other useful sources of information

1. Model Code of Safe Practice in the Petroleum Industry : Part 19. Fire Precautions at Petroleum Refineries and Bulk Storage Installations. ISBN 0471943282

2. Waste Management The Duty of Care: A Code of Practice. ISBN 0 11 753210 X. HMSO. http://www.defra.gov.uk/environment/waste/management/doc/pdf/waste_man_duty_code.pdf

3. A Guide to the Control of Major Accident Hazard Regulations (COMAH) 1999 (as amended), L 111. ISBN 071766175X . HSE Books, telephone 01787 881165

4. Guidance on the Environmental Risk Assessment Aspects of COMAH Saftey Reports: COMAH Competent Authority. (http://www.environment-agency.gov.uk/commondata/acrobat/Comah.pdf#search='4. Gui dance on the Environmental Risk Assessment Aspects of COMAH reports')

5. Storage of flammable liquids in containers, HSG 51. HSE Books, ISBN 07176 14719, telephone 01787 881165

6. Chemical Warehousing – the storage of packaged dangerous substances, HSG 71. HSE Books, ISBN 07176 14840, telephone 01787 881165

7. Storage of flammable liquids in tanks, HSG 176. HSE Books, ISBN 07176 14700, telephone 01787 881165

8. Timber Treatment Installations 2003: Code for Safe Design and Operation. The Environment Agencies and British Wood Preserving and Damp Proofing Association, 2003. Telephone 01332 225100. http://www.environment-agency.gov.uk/commondata/acrobat/timber_code_2003.pdf

9. Guidance on assessing the environmental effects of fire effluents. Working Document ISO/TC 92/SC 3N7

10. The ecotoxicity of firewater runoff. New Zealand Fire Commission, 2001. ISBN 0-908920-61-1 http://www.fire.org.nz/research/reports/reports/Report_18.PDF

11. The Fire and Rescue Service Manual – Environmental Protection. TSO To be published 2007.

Appendices:

Appendix 1

Sites/activities of particular concern

These include, but are not limited to:

Sites regulated under the Pollution Prevention and Control Regulations 2000, as amended and Environmental Protection Act 1990

Establishments regulated under the Control of Major Accident Hazards Regulations 1999

Sites storing/processing hazardous waste as defined in the Hazardous Waste Regulations 2005 in England, Wales and Northern Ireland, or 'special waste' in Scotland - as defined in the Special Waste Regulations 1996 and in the Special Waste Amendment (Scotland) Regulations 2004

Timber treatment plants and timber stores

Metal platers and surface finishers

Large DIY superstores and garden centres

Agrochemical stores – at end user premises, sale and supply premises and third party warehouses

Pesticide manufacture/storage premises

Regulated waste movement and disposal

Plastic manufacturing and recycling sites

Chemical, petrochemical, pharmaceutical and veterinary product manufacture, distribution and storage facilities

Petrochemical refineries, petroleum import, distribution and storage facilities

Paint, coatings and ink manufacture, distribution and storage facilities

Paper and pulp sites

Used tyre and waste fridge storage facilities

Farm buildings

Composting facilities

Landfill sites

The transport of materials covered by The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2004

Sites where hazardous materials may be formed in the event of a fire, e.g. from burning plastic

Sites producing and storing substances not hazardous to human health but with high oxygen demand.

Examples include:

- Dairies
- Soft drink manufacturers
- Distilleries and breweries
- Cereals and grain producers
- Sugar/molasses producers
- Cold stores and food processing (human and pet) facilities
- Associated bulk storage warehouses

Appendix 2

Risk screening assessment process

The process typically involves:

1. identifying and assessing potential links between the sources, pathways and receptors

2. assessing the likelihood and magnitude of any potential harmful effects

   Examples of the criteria to consider in such an assessment include:

   - type of site/activity
   - type and quantity of environmentally hazardous substances
   - incident history
   - potential effects on air, land and water under both controlled burn and extinguish conditions
   - whether adequate containment and/or other control mechanisms exist
   - potential for dilution, dispersion and attenuation from release to reaching receptor
   - location of receptors (see Appendix 4)
   - sensitivity of receptors (see Appendix 4)

This initial assessment will usually be qualitative. It should be based on the operator's experience and judgement of the risks posed by the facility, supported if required by our advice on the environmental sensitivity of the site. See Appendix 4 for further guidance. The table below using a pesticide store in a remote rural location shows how to carry out such an assessment.

Once the initial screening exercise has been undertaken, the site operator should prioritise the risks so that any more detailed risk assessment can focus on the areas of highest risk, followed by those of medium and then low significance.

We recommend site operators discuss with us which priority areas require more sophisticated assessment.

Site operators must be wary of dismissing a risk too easily because it appears that one of the Source - Pathway-Receptor components is missing. For example, the inclusion of secondary containment systems such as a bund (preventing a pathway) may reduce the risk. But it will not eliminate it because the bund might fail. Such a failure could occur if adding the firewater exceeded the capacity of the bund or the bund cracks in the heat or the jointing material fails. In the case of hydrocarbon fires, this could even escalate the fire as firewater may fill a bund and displace a flammable liquid. This situation could be overcome by:

- a controlled burn
- an increase in the capacity of the bund to allow for firewater
- a design of bund that allows firewater to escape whilst the flammable liquid remains contained. This should not include the installation of any valves in the bund

Similarly, site operators might exclude the air pathway because the pesticide store is in a remote area. But certain fire, meteorological and topographical conditions may cause the plume to ground in a populated area and have a significant impact on health. And the deposition of the combustion products in rural areas might contaminate the food chains.

Please refer to following table on next page.

Example of rapid risk screening assessment – pesticide store in a rural location

Data and information					Judgement				Action	
What is at risk? What do I wish to protect? **Receptor**	The substance, agent or process with potential to cause harm **Source of Hazard**	What might go wrong or what harmful consequences might follow? **Harm**	How might the source of the hazard reach the receptor? **Transport mechanism**	How might the receptor come into contact with the source of the hazard? **Pathway**	How likely is this contact or exposure? **Probability of exposure**	How severe are the consequences of harm if exposure occurs? **Consequences**	What is the magnitude of the risk? **Magnitude of the risk**	On what did I base my judgement about the magnitude of the risk? **Justification for magnitude**	How can I best manage the risk? **Risk management**	Risk significance once risk management measures are in place **Residual risk**
Residents/ bystanders in areas where smoke plume could ground	Generation of toxic smoke plume	Respiratory irritation, asthma, lung and other diseases.	Grounding of smoke plume	Inhalation of airborne smoke, particulates, and toxic chemicals	Low/Medium	High	Medium/High - High	The likelihood of people being exposed is low/medium because the site is situated in remote rural location away from centres of population. However certain fire and meteorological conditions (about 40% of the year) will lead to plume grounding in Towns A, B and C, which are about 4km away. The consequence is high because the predicted concentrations of pollutants can exceed the health limits.	Enhanced fire prevention systems. Use of controlled burn restricted if meteorological conditions are unfavourable. In such cases consider issuing warning to residents of Towns A, B and C to close doors and windows and stay inside.	Very Low
Agricultural lands	Consumption of food that is contaminated with carcinogenic air pollutants	Pollutants such as dioxins, furans, PCBs enter the food chain	Deposition of air pollutants	Deposition of air pollutants. Crops may become contaminated. Animals may graze on contaminated land.	High/Medium	Low	Low/Medium	The likelihood of contaminating agricultural lands is high/medium because there are four farms within 1.5km of the pesticide store. The consequence is low because the predicted deposited flux is low, the consumption of food contaminated with the combustion products does not cause significant acute or chronic health impact.	Enhanced fire prevention and secondary containment. Use of controlled burn if containment capacity exceeded. Consider restrictions on crops including animal feeds in the event of any fire.	Very Low
Receiving river, groundwater	Run-off likely to contain toxic and persistent pesticides. A high BoD likely if foam is used	Closure of local groundwater drinking water source. Degradation of water quality in watercourse. Death of aquatic fauna and flora	Contaminated firewater run-off draining to site surface water drain and soakaways	Direct discharge from drain to river and infiltration of firewater to groundwater below site	High	High	High	Limited secondary containment. Site situated in groundwater Source Protection Zone and adjacent to high quality watercourse	Enhanced fire prevention and secondary containment. Use of controlled burn if containment capability exceeded and metreological conditions are favourable	Low

This table is only an example. In similar sites, other receptors could include important wildlife sites, fisheries, businesses and amenity areas

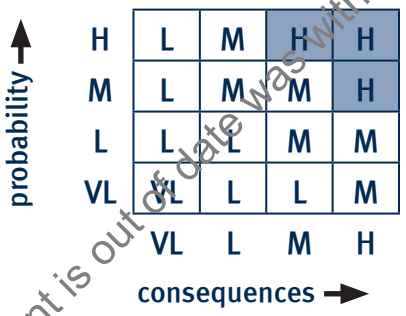
Probability of exposure is the likelihood of the receptors being exposed to the hazard. Example definitions:

High exposure is probable: direct exposure likely with no/ few barriers between hazard source and receptor;
Medium exposure is fairly probable: feasible exposure possible - barriers to exposure less controllable;
Low exposure is unlikely: several barriers exist between hazards source and receptors to mitigate against exposure:
Very Low exposure is very unlikely: effective, multiple barriers in place to mitigate against exposure.

The consequences of a hazard being realised may be actual or potential harm. Example definitions:

High the consequences are severe: sufficient evidence that short- or long-term exposure may result in serious harm e.g. Category 1 pollution incident
Medium consequences are significant: sufficient evidence that exposure to hazard may result in damage that is not severe in nature and reversible once exposure ceases (e.g. irritant);
Low consequences are minor: damage not apparent though reversible adverse changes may occur;
Very Low consequences are negligible: no evidence of adverse changes following exposure.

Magnitude of the risk is determined by combining the probability with the potential consequences. Use the designations alongside this column and the matrix below to categorise as high, medium, low or very low.



High risks require additional assessment and active management; medium risks require additional assessment and may require active management/monitoring; low and very low risks require periodic review.

Appendix 3

Common features of an Environmental Risk Assessment

Although there are a number of environmental risk assessment techniques, most will contain certain common features and will be based on the relationship:

Impact is proportional to dose x sensitivity

The dose is determined by the concentration of the pollutant, mass flow rate and exposure period. The sensitivity depends on the location of the site and the characteristics of the receptors.

The assessments should include impacts on: human health, the water environment, air pollution and the ground, including deposition from the air.

The key stages in a full risk assessment of an accidental release of contaminants are summarised in the following Table:

Step	Stage	Information
1	Identify the environmental hazard	The inherent hazards of the released substance, taking into account its chemical and physical properties.
2	Estimate the potential scale of the release of pollutant(s)	The amount and rate of release of each substance in the fire
3	Estimate the scale of the hazard	This is a function of the previous two factors
4	Estimate the likely rate of transfer to the receptor(s)	Predict the dispersion and deposition of the release (sometimes by modelling). This must take into account: • Duration of the release • Flow rate through this pathway, e.g. is there a pathway through fissured rocks to an underlying aquifer? • Distance and direction to receptor e.g. is smoke blowing towards or away from residential area? • Differences in meteorological conditions (e.g. atmospheric stability) and nature of the fire. • Mitigating effects of dilution or dispersion, e.g. will a river's flow rate or meteorological conditions sufficiently dilute contaminants?
5	Estimate the potential dose	The amount of pollutant the receptors receive. The dose is a function of the amount and the exposure period.
6	Estimate the sensitivity of the receptors	The degree of sensitivity of the receptors to the released substances.
7	Estimate the impact	What are the consequences on human health and the environment? The impacts of the incident will be a function of dose and sensitivity.

- Appendix 4 gives examples of some of the features that we would consider when determining the environmental sensitivity of the site. Our local offices may be able to provide more site specific guidance.

- It also recognises that some of the information required may be difficult to obtain, for example the amounts and rates of releases of each substance in the fire and the dispersion and deposition of the releases. Where information is not available, estimates will need to be made.

Appendix 4

4.1 Features to help determine the sensitivity of the receiving water environment

The sensitivity of the receiving environment for any contaminated firewater run-off is highlighted as one of the factors that should be considered when carrying out the Rapid Risk Screening Assessment process and, if necessary, a full environmental risk assessment.

Listed below are examples of what we would consider when determining the sensitivity of the site:

High sensitivity

- situated over a major aquifer
- within a designated Groundwater Source Protection Zone
- within 250m* of any other well, spring or borehole used for potable abstraction
- situated above a shallow water table (<2m) and with free draining ground
- situated above a fissured rock, e.g. chalk, posing risk of rapid flow to groundwater or surface water
- less than 5km upstream of a surface water potable or private drinking water abstraction point
- less than 5km upstream of an important surface water industrial or agricultural abstraction point
- firewater would affect a salmonid fishery and/or a national or internationally important conservation site
- firewater would affect a site of high amenity value

* *This figure is useful in an emergency but should really be refined, based on more detailed risk assessment as part of the planning process.*

Medium sensitivity

- situated over a minor aquifer
- between 5km-20km upstream of a surface water potable or private drinking water abstraction point
- between 5km-20km upstream of an important surface water industrial or agricultural abstraction point
- firewater would affect a coarse fishery or locally important conservation site
- firewater would affect a site of moderate amenity value

Low sensitivity

- situated over a non aquifer
- outside any designated Groundwater Source Protection Zones
- situated above deep water tables
- situated on low permeability ground such as clay
- more than 20km upstream of a surface potable or private drinking water abstraction point
- more than 20km upstream of an important surface water industrial or agricultural abstraction point
- firewater would have limited impact on fish populations or wildlife
- firewater would affect a site of limited amenity value

4.2 Features to help determine the sensitivity of the receiving air environment

The sensitivity of the receiving environment for the combustion products of a fire is highlighted as one of the factors that should be considered when carrying out the Rapid Risk Screening Assessment process and, if necessary, a full environmental risk assessment. The sensitivity depends on the scale and nature of the combustion products (e.g. hazardous substances) of the fire.

Listed below are examples of what we would consider in a small fire (e.g. a road tanker) when determining the sensitivity of the site:

High sensitivity

- situated less than 1km from schools, hospitals, built-up areas of more than 500 people over a non aquifer

Medium sensitivity

- situated 1km to 2km from schools, hospitals, built-up areas of more than 500 people

Low sensitivity

- situated more than 2km from schools, hospitals, built-up areas of more than 500 people

Would you like to find out more about us, or about your environment?

Then call us on
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incident hotline
0800 80 70 60 (24hrs)

Scottish Environment Protection Agency
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0845 988 1188

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