Hazard

Smoke plumes

Contents

⚠️ Hazard - Smoke plumes

Hazard Knowledge

Incident commanders should take advice from environment agencies, public health bodies and the police at fires that produce large amounts of toxic smoke. This will help them decide whether or not to extinguish the fire based on the environmental and public health implications. If they decide to extinguish the fire then pollution control measures should be used to protect bodies of water from fire water run-off.

🛡️ Control measure - Controlled burning

Control measure knowledge

Controlled burning is a defensive operational tactic to prohibit or restrict the use of extinguishing media on fires to allow the combustion process to continue uninhibited. UK law does not require fire and rescue services to extinguish fires. A controlled burning strategy may warrant consideration in certain circumstances, including protecting the environment, where the benefit from offensive firefighting does not outweigh the risks, or where available resources and media are insufficient to successfully resolve the incident.

This operational strategy can be employed to limit damage to the environment when it is not possible to contain polluted fire water, as it can minimise the risk to public drinking water supplies from fire water runoff. It may also benefit air quality through improved combustion and dispersion of airborne pollutants. It can be employed in conjunction with firebreaks as a firefighting technique when responding to fires in areas such as moorlands or heathlands.

It is essential to understand that this strategy may have adverse effects, such as hazardous gaseous by-products to form or increase. The balance of potential water and airborne impacts is one of the factors that should be taken into account before implementing the strategy. See Section 3.7, [Environmental Protection Handbook](#).

Controlled burn considered   Controlled burn likely to be inappropriate

Life or health is not at risk or a controlled burn will reduce risk to people

Life or health is at immediate risk or a controlled burn will increase risk to people

There is little chance of extinguishing the fire

There is a high chance of extinguishing the fire with minimal health or environmental impacts

Fighting the fire with other techniques could cause a significant risk to firefighters

The fire is likely to spread widely or to high-hazard areas

Property is beyond salvage

Important or valuable buildings are involved

Fire conditions, weather conditions and/or the local landscape are appropriate for minimising air quality impacts

Fire conditions, weather conditions and/or the local landscape are inappropriate

Fire water run-off could damage an area of high environmental sensitivity or value

Drainage from the site leads to an area of low environmental sensitivity or fire water is not polluting

Fire water run-off could affect drinking water sources or sewage treatment works

Fire water can be contained on-site or off-site

Incident commanders will decide whether to allow a controlled burn. Wherever possible, they should take specialist advice from hazardous materials advisers (HMA), environment agency staff, owners/occupiers and public health bodies. The decision should be communicated as appropriate, including to the public via the media if necessary.

A controlled burn strategy may be considered at any time during an incident. At incidents where it is expected that the fire will burn for some time it may be appropriate to use both controlled burn and extinguishing tactics. For example, using a controlled burn in the initial stages of an intense fire may result in lower concentrations and better dispersion of pollutants because of the high combustion temperatures as well as reduced run-off.

The technique of introducing an accelerated control burn, which may include the use of fire service positive pressure ventilation fans (PPV), can help to increase temperature and therefore decrease the combustion time.

However, with both controlled burn and an accelerated controlled burn, as the fire dies back and begins to smoulder, the pollutant levels in the smoke plume may increase, resulting in reduced dispersion of pollutants and lowering of the smoke plume and contents in the atmosphere. At this

point an extinguish strategy could be used. Such a strategy would also give more time for fire water containment measures to be put in place.

Controlled burn strategies may apply to industrial or commercial premises processing or storing polluting substances but can also be useful to limit the effects of fires involving:

- Agricultural premises, for example barns or [BASIS (Registration) Ltd](#) stores
- Transport by road, rail, air or sea or hazardous and/or environmentally damaging materials in significant quantities

For sites falling under the [Control of Major Accident Hazard Regulations 1999](#) (COMAH), [The Environmental Permitting (England and Wales) Regulations 2010](#) and other relevant environmental legislation, fire and rescue services should liaise with site occupiers and environment agencies to establish situations where considering a controlled burn may be required as part of:

- An industry protection 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 or as part of the risk management plan as an agreed environmentally best option

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 is unlikely that a building of this type would be used to store significant quantities of hazardous or polluting substances, the health and environmental benefits of a controlled burn must be weighed against the value of the building when they do.

The decision to adopt a controlled burn strategy should be made following consultation with relevant agencies, for example:

- Environmental agencies
- Nature conservation bodies
- Public health organisations
- Local authority
- Highway agencies

See also: National Operational Guidance: [Environmental protection](#)

Strategic actions

Fire and rescue services should:

- Develop tactical guidance and support arrangements for the hazards that may be

encountered and the actions to be taken for controlled burning

- Ensure that a controlled burn strategy takes into account both the event and post-event phase of an incident
- Make appropriate arrangements for mitigating pollution and informing the relevant environmental agency and, where necessary, the local population. Liaise with the appropriate agencies to establish air and water monitoring arrangements, both on and off site where necessary
- Identify pre-determined sites where a controlled burn strategy may be appropriate

Tactical actions

Incident commanders should:

- Consider a controlled burn strategy and communicate this to personnel and relevant authorities

Control measure - Extinguish

Control measure knowledge

Fire service high volume pumps, fixed installation pumps or pumps secured from a third party supplier can be used to provide water for firefighting. When using this type of equipment or when large volumes of water are being pumped, the appropriate environment agency must be informed. As well as containing run-off, care should be taken not to draw too much water because this can threaten water supplies and damage ecosystems.

Strategic actions

Fire and rescue services should:

- Develop procedures that incorporate the use of high volume pumps for incidents that will require large volumes of water to extinguish

- Liaise with local environment agencies, local authorities' statutory resilience forums to identify and formulate plans for sites that are likely to produce significant smoke plumes/require large amounts of water to extinguish if involved in fire. See National

- Have procedures in place for the safe decontamination of high volume pumping equipment after use. See the following sections of the [Environmental Protection Handbook](#):

  - 1.6.6 Protocol for disposing of contaminated water and associated wastes at incidents
  - 2.12.1 High volume pump decontamination

Tactical actions

Incident commanders should:

- Seek technical advice - for instance, from a Hazardous Materials Advisor (HMA) or product specialist before deploying a high volume pump

- Complete an [environmental risk assessment](#) before deploying a high volume pump

- Notify the local environment agency each time a high volume pump is used or where large volumes of water are being pumped
- Consider the use of local environment agency pumps for incidents that are likely to be significantly protracted
- Consider the decontamination of high volume pumping equipment after use

Control measure - Removal or separation

Control measure knowledge

Fires at open-air storage sites, particularly those storing combustible waste can create large volumes of smoke and fire water containing a wide range of pollutants. The direct application of water with or without firefighting additives to stacks of burning material is often ineffective and may generate large volumes of smoke and contaminated fire water.

For specific guidance on fires involving waste sites see National Operational Guidance: [Fires in waste sites](#) (including renewable energy facilities).

Strategic actions

Fire and rescue services should:

- Develop operational procedure for incidents involving fires at waste sites

Tactical actions

Incident commanders should:

- Consider the use of firefighting additives such as foam for small waste fires and prevent fire spread. (Note: For larger waste fires, foam may provide rapid 'knock down' but often has minimal long term effects on larger waste fires)

- Consider separating burning material from the fire using heavy plant and extinguishing it with:

    - Water jets
    - In bunded pools
    - Tanks of water
    - Controlled burn
    - Burial with approval of the appropriate environment agency

- Make use of specialist fire and rescue service or on-site environmental protection equipment

- Where possible, recycle the fire water run-off. See Recycling fire water run-off.

Control measure - Air quality cell function

Control measure knowledge

If major chemical air pollution occurs at an incident, the environment agencies and public health bodies will set up an air quality cell. This will include other organisations including the Meteorological Office, the Health and Safety Laboratory and local authorities.

The air quality cell will co-ordinate air monitoring and will provide air quality information. Public health bodies use this information to provide health advice to responders and the public. See Section 3.8, Environmental Protection Handbook.

Similar arrangements exist in Wales, Northern Ireland and in Scotland, where Scottish Environment Protection Agency (SEPA) provides air quality monitoring through the Airborne Hazards Emergency Response (AHER) service.

Strategic actions

Fire and rescue services should:

- Ensure that lines of communication are in place to disseminate information provided by the air quality cell to incident commanders and other specialist advisers during major incidents or other significant events

Tactical actions

Incident commanders should:

- Implement appropriate control measures on the receipt of air quality information

- Consider requesting an air quality cell

- Monitor and review the potential impact on public health with the assistance of the public health agency

Control measure - Operational risk information plan

Control measure knowledge

Operational risk information plans are prepared in accordance with the Fire and Rescue Services Act 2004 and focus on firefighter safety. The plans should also include information on pollution, prevention and control where a risk to the environment is identified at an incident.

For further information see:

- [DCLG operational risk information guidance](#)
- Section 2.2 and 2.3, [Environmental Protection Handbook](#)
- National Operational Guidance: Operations [Identify foreseeable risk](#)
- National Operational Guidance: [Incident Command](#)

Strategic actions

Fire and rescue services should:

- Include environmental risk information within operational risk plans

Tactical actions

Incident commanders should:

- Consider pollution prevention information contained within site specific risk plans

- Carry out an [environmental risk assessment](#)

- Implement the environmental protection measures identified in operational risk information

- Monitor the impact of fire and rescue service tactics on the identified environmental risk

- Identify operation and effectiveness of fixed installations and pollution prevention measures