Guidance

Utilities and fuel

Developed and maintained by the NFCC
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Introduction

This 'context guidance' has been developed to assist fire and rescue services in identifying hazards and implementing control measures at operational incidents where utility or fuel supplies might need to be managed or controlled.

The guidance deals with utility or fuel supplies at operational incidents, from the point of generation or production through to the point of supply to the customer.

Because of similarities in the production, storage and distribution of utilities, this guidance also covers generic hazards for the fuel industry. However, in accordance with the structure of the National Operational Guidance framework, any hazards relating to specific fuel types will be dealt with in the guidance for hazardous materials.

This guidance does not deal with fire and rescue service operations such as incident command, fires and firefighting, performing rescues or environmental protection; other National Operational Guidance deals with those activities.

This guidance is supported by supplementary information that provides further detail on individual subject areas.

Risk management plan

Each fire and rescue authority must develop their strategic direction through their risk management plan. To determine the extent of their firefighting capability, strategic managers will consider their statutory duties and the foreseeable risk within their area.

Work to identify risk and prepare operational plans should consider all stakeholders, including local emergency planning groups and the fire and rescue service risk management plan.

Responsibility of fire and rescue services
Fire and rescue services are responsible, under legislation and regulations, for developing policies and procedures and to provide information, instruction, training and supervision to their personnel about foreseeable hazards and the control measures used to reduce the risks arising from those hazards.

This guidance sets out to provide fire and rescue services with sufficient knowledge about the potential hazards their personnel could encounter when attending incidents. Fire and rescue services should ensure their policies, procedures and training cover all of the hazards and control measures contained within this guidance.

Hazard - Dealing with utility or fuel supplies at an incident

Hazard Knowledge

The generic control measures for this hazard should be considered when dealing with any incident where gas, electricity, water or fuel are present and may require safe management by the fire and rescue service.

Failure to control or manage utilities and fuel supplies at operational incidents could result in a significant increase in risk for responding fire and rescue service personnel, other responding emergency services, the public and the environment.

This guidance is supported by 'all incident' National Operational Guidance; Incident command, Operations and Environmental protection.

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.
Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:
• Gather information to gain situational awareness about utility and fuel supplies and storage facilities

• Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

• Consider if leaving specific power systems on could be beneficial for resolving the incident

• Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

• Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:
Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).
It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)
Strategic actions

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant
information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

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**Control measure - Isolate utility or fuel supply to the premises**

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**Control measure knowledge**

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies
Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Gas isolation valve - photograph courtesy of Janet Guthrie

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Hazard - Radiation (nuclear power generation)

Hazard Knowledge

A nuclear power site is a thermal power station in which the heat source is a nuclear reactor. As is typical in conventional thermal power stations, the heat is used to generate steam, which drives a steam turbine connected to an electric generator, which produces electricity.

These sites are very secure and have detailed emergency procedures that any responding fire and rescue service will be aware of and will have exercised on a regular basis.

All generating nuclear power stations (and those in the first stages of decommissioning) will be patrolled by armed officers from the Civil Nuclear Constabulary and will have a wide range of protective security systems. All fire and rescue service activity on these sites will be carried out under escort and in accordance with predetermined arrangements.

The radioactive source, such as uranium rods, will be an additional hazard at these sites, and will require additional consideration for fire and rescue service personnel when attending incidents on site.

Refer to the Industry supplementary information about Decommissioning of nuclear power stations.
Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.
Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

Tactical actions

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.
The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry
Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

### Strategic actions

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

### Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

### Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: [Incident](#)
command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises
Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Gas isolation valve - photograph courtesy of Janet Guthrie

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

![Sluice gate](image)

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
**Strategic actions**

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

**Tactical actions**

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
Maintain a directory of emergency contact details for local utility and fuel supply companies

Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

- Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
- Consider the consequences of isolating utility or fuel supplies

**Control measure - Implement hazardous materials procedures**

**Control measure knowledge**

See National Operational Guidance: [Hazardous materials](#) for guidance about dealing with any release of hazardous substances.

**Strategic actions**

**Tactical actions**

There are no tactical actions associated with this control measure.

**Hazard - Electricity**
## Hazard Knowledge

Fire and rescue service personnel are at risk of coming into contact with electrical equipment and components at operational incidents, which can result in electrocution. Contact with electricity can cause serious physical injury or prove fatal.

Electrocution can occur in a number of ways:

<table>
<thead>
<tr>
<th><strong>Direct contact</strong></th>
<th>Direct contact with live electricity is potentially lethal. This can be from direct or alternating current, as well as static discharge from domestic or industrial supplies.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arcing</strong></td>
<td>Electricity can 'jump' through air, smoke or a column of water. The higher the voltage the more likely, and the further, the electricity may 'jump'. Arcing can also generate intense heat and ignite flammable substances in the vicinity.</td>
</tr>
<tr>
<td><strong>Flash down</strong></td>
<td>High-voltage electricity has the potential to cause death or serious injury to a person in the vicinity through 'flash down'. This is also referred to as 'flashover' in the electricity industry. For more information refer to the content on <a href="#">Firefighting activities near to high-voltage transmission towers or overhead line equipment</a>.</td>
</tr>
<tr>
<td><strong>Carbon tracking</strong></td>
<td>Thick smoke with a high carbon content may be generated by fires including rubber tyres or plastics or by wildfires. High-voltage electricity can find a path to earth through this type of thick smoke.</td>
</tr>
<tr>
<td><strong>Re-energising circuits and equipment</strong></td>
<td>Substations generally have automatic switches, which are programmed to attempt to re-energise circuits that have been broken. Some re-energising may also be caused by human error. Therefore, it should not be assumed that a circuit is isolated.</td>
</tr>
<tr>
<td><strong>Residual current (or stored electrical energy)</strong></td>
<td>Electrical equipment may not be made entirely safe by isolating the supply, as it may hold a residual current. In high-voltage equipment, the residual current could be sufficient to cause a fatal injury, and may remain a hazard until the equipment is made safe, usually by the electricity supplier.</td>
</tr>
</tbody>
</table>
Electrical feedback is a relatively new phenomenon that can occur when electricity supplies in the road or on an industrial estate, are thought to have been made safe and have been disconnected by the electricity supplier. However, domestic and commercial premises producing their own electricity can feed it back into the national grid, thereby re-energising the dead cable.

Refer to the supplementary information for:

- Electricity basics
- Domestic power supply
- Electricity generation in the UK
- High-voltage networks (national grid)
- Sealing end compounds
- Substations
- The difference between a single-phase and a three-phase power system
- Three-phase high-voltage systems
- Three-phase low-voltage systems
- Transmission towers (pylons) and wooden poles

National grid

Power stations produce electricity at 25kV. Electricity is sent through the national grid network at 400kV, 275kV and 132kV.

Step-up transformers are used at power stations to produce the very high voltage needed to transmit electricity through the national grid power lines. These high voltages are too dangerous for use in homes and businesses and therefore step-down transformers are used locally to reduce the voltages to a safe level, resulting in the following supplies:

Large industrial consumers - 33kV

Rail network - 25kV to 33kV

Small industrial consumers - 415V to 11kV

Residential and small commercial - 240V
Overhead power lines and transmission towers

Overhead lines carry various voltages and are usually uninsulated.

Low-voltage (up to 1000V) lines are suspended by wooden poles and arranged into either:

- Vertical arrays of up to six lines (with the lowest cable being the neutral)
- Single lines with live and neutral cores (known as concentric cables)

Some high-voltage (greater than 1000V) lines may also be suspended by wooden poles. These can be identified as they are:

- Usually in either a horizontal array of two or three lines, or in a six cable array with three lines on each side of the pole
• Separated from the wooden pole by circular insulators

Transmission towers (often referred to as pylons) have an array of three cables (or sets of cables) to each side of the tower. Each side of the transmission tower represents three phases of electricity; however, each side of the transmission tower may have a different origin and may be operated by a different distribution network operator (DNO).

Overhead lines are normally uninsulated; if an object gets too close, it is possible that electricity will jump over a distance to reach earth via the object.

It should be assumed that an overhead power line can be fatal. Equipment, appliances and personnel should be kept away from the power lines at all times. Undulating surfaces cause the distance between overhead power lines and the ground to vary; this can result in personnel inadvertently coming too close to lines.

High-pressure jets coming into contact with an overhead line with horizontal conductors may cause them to clash together, resulting in arcing. This could lead to conductor breakage, resulting in live conductors falling to the ground. Water can also cause heated porcelain insulators to shatter,
creating needlestick or projectile hazards.

High-pressure jets contacting overhead conductors may also result in earth leakage through the water stream to ground. This may cause the branch to become live, with potentially fatal consequences.

The National Grid has produced Guidance for UK Fire and Rescue Services for dealing with incidents on or near National Grid high voltage overhead lines.

**Firefighting activities near to high-voltage transmission towers or overhead line equipment**

When firefighting activities are taking place there will be large volumes of smoke, steam, water particles and debris in the air. Water and smoke will always pose a risk of flashover. Consideration should be given to the likelihood of a flashover through the smoke to the tower or ground which may introduce the dangers of touch and transfer potentials.

- **Touch potential** – In the event of flashover to the tower or any metal object, such as a lamppost, the current will flow to earth via the metal structure. If a person is standing close by, or touching the structure, some electrical energy may flow through their body.
- **Transfer potential** – In the event of a flashover, electrical energy could flow through any conductive object connected to the tower. For example, if a flashover occurred to a tower and a farmer had connected barbed wire to the tower leg, electrical energy could flow to earth through the length of barbed wire, resulting in touch potential hazards. It is very unlikely that a flashover would occur mid-span, as the smoke is more likely to cause a phase-to-phase flashover between one conductor and another of the same circuit, which would not result in any voltage rise at ground level. However, the risk is slightly increased if smoke is affecting the tower and contaminating the insulators.

**Fires under or near to high-voltage overhead lines**

In the event of a significant fire under or near to the high-voltage overhead line, or where the conductors are subjected to severe heat stresses, there is a risk that part or all of the overhead line may fail and fall to the ground. The conductor may also fall into other spans between the transmission towers.

If overhead lines or conductors were to fall, there may be hazards to the surrounding area including to:

- Road or rail crossings
- Navigable waterways
- Housing or industrial buildings
- Public footpaths
- Other power crossings – conductors may fall onto other live power lines which could present
Further dangers by re-energising the fallen conductors

**Health and Safety Executive – electrical definitions**

It is important that personnel understand electrical terminology when discussing isolation of electricity supplies with electricity distributors or any attending electrical engineers. Failing to understand this terminology may increase the risks encountered.

The definitions in the table below support the terms used in this guidance. Further information is provided in [The Electricity at Work Regulations](#).

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charged</td>
<td>Means that the item has acquired a charge either because it is live or because it has become charged by other means such as by static or induction charging, or has retained or regained a charge due to capacitance effects even though it may be disconnected from the rest of the system.</td>
</tr>
<tr>
<td>Dead</td>
<td>Not electrically 'live' or 'charged'</td>
</tr>
<tr>
<td>Designated competent person (also known in some industries as 'authorised person' or 'senior authorised person')</td>
<td>A competent person appointed by the employer, preferably in writing, to undertake certain specific responsibilities and duties, which may include issuing and receiving safety documents such as permits-to-work. The person must be competent by way of training, qualifications and/or experience and knowledge of the system to be worked on. Note: On a nuclear site, the designated competent person would be referred to as the 'duly authorised person'.</td>
</tr>
<tr>
<td>Disconnected</td>
<td>Equipment (or a part of an electrical system) that is not connected to any source of electrical energy</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>Includes anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electrical energy</td>
</tr>
<tr>
<td>High voltage</td>
<td>Voltages greater than 1000V AC or 1500V DC. Voltages below these values are low voltage.</td>
</tr>
</tbody>
</table>
Isolated

Equipment (or part of an electrical system) that is disconnected and separated by a safe distance (the isolating gap) from all sources of electrical energy in such a way that the disconnection is secure, so that it cannot be re-energised accidentally or inadvertently.

Live

Equipment that is at a voltage by being connected to a source of electricity. Live parts that are insulated and exposed so they can be touched either directly or indirectly by a conducting object are hazardous if the voltage exceeds 50V AC or 120V DC in dry conditions.

Live work

Work on or near conductors that are accessible and live or charged. Live work includes live testing, such as using a test instrument to measure voltage on a live power distribution or control system.

Low voltage

Voltages up to 1000V AC or 1500V DC. Voltages above these values are high voltage.

Buildings under construction and demolition

Personnel attending fires in buildings under construction or demolition may be presented with electrical hazards that differ depending on the type of construction or demolition site, such as:

- Electrical systems that have been partially or completely isolated
- Temporary electrical supplies
- Portable generators
- Uninterruptible power supplies (UPS), which could range from small units to large rooms containing lead acid or lithium-ion batteries
Live cabling during construction phase; labels may be destroyed in fire - photograph courtesy of Nick Lacey

Unsecured electrical cables during refurbishment - photograph courtesy of Robert Bacon

**Dangerous wiring**

This hazard may exist where the wiring has:

- Been damaged
- Been carried out incorrectly
- Deteriorated with age
If power cables are damaged or inappropriately repaired and they come into contact with unprotected steel framing, scaffolding, water run-off or equipment, personnel may be at risk of electrocution.

**Performing rescues of casualties**

If there is a casualty who is affected by electricity at ground level, it may be necessary to consider performing a rescue.

However, working within the 5m exclusion zone for high-voltage electricity presents a significant risk of electrocution to personnel.

**Control measure - Safe system of work: Low-voltage electricity**

**Control measure knowledge**

The implications of isolating the electricity supply should be considered before taking this action. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Low-voltage electricity should be isolated and earthed, or otherwise made safe where it is appropriate to do so. Electrical isolation to small premises can be achieved by isolating electricity at the consumer unit or fuse board.

It may not be possible for personnel to isolate and make safe the electricity supply using normal methods. In this situation, assistance will be required from the relevant electricity supplier or competent person to make the electricity supply safe. Until this is confirmed, personnel should operate at a safe distance.

It should always be assumed that the low-voltage system is live or that there may be a residual current hazard present, until the relevant electricity supplier or competent person confirms otherwise.

If there is threat to life and it has not been possible for personnel to isolate the electricity at the consumer unit, the following steps should be taken:

1. Contact the electricity distribution network operator (DNO) to request urgent assistance, such as remote isolation of the power; the DNO can be contacted by dialling 105 in Great Britain or
2. If the DNO cannot be contacted, or if there would be a delay in them being able to isolate the power, a risk versus benefit assessment should be carried out to determine what life-saving actions need to be taken.

3. If there are no alternative actions available, consider removing the supplier’s main fuse, found on the supply side of the meter, with caution and preferably with the permission of the DNO.

As there is the possibility of small quantities of asbestos being present in older fuses, appropriate personal protective equipment (PPE) and respiratory protective equipment (RPE) should be worn if the supplier’s main fuse is being removed.

All commercial premises should have electricity isolation points at the electrical intake. At larger sites, there may be isolation points that control areas of the site or separate pieces of machinery and equipment. Isolating any electrical supplies should be considered as soon as possible, taking into account any wider impact on other essential systems, installations or work processes.

If personnel need to deal with three-phase power supplies, they may need to request assistance from the electricity supplier, unless there are on-site engineers competent in dealing with, and controlling, this hazard.

If the electricity supply has been isolated, a robust system should be implemented to ensure it is not reconnected. This may involve the use of locks, signs or supervision.

**Performing rescue of a casualty**

If it can be determined that a casualty is in direct contact with low-voltage electricity:

- Carry out a risk assessment
- Pull the casualty clear, using electrical gloves or other dry insulating material

**Strategic actions**

Fire and rescue services should:

- Ensure fire control room records include emergency 24-hour contact details for support in isolating electricity

**Tactical actions**

Incident commanders should:
• Use approved methods to isolate the electrical supply if appropriate

• Seek specialist advice if the electrical supply cannot be isolated

• Ensure personnel operate at a safe distance until the electricity supply has been isolated and made safe

• Assume that the low-voltage system is live or that there may be a residual current hazard present, until the electricity supplier or competent person confirms otherwise

• Only consider removal of the supplier's main fuse if approved isolation methods cannot be used, the electricity distribution network operator (DNO) is unable to remotely isolate the power and there is a threat to life for which this is the only available action

• Consider removing the supplier's main fuse with caution in an emergency situation, following a risk versus benefit assessment and preferably with the permission of the electricity distribution network operator (DNO)

• Identify on-site electrical installations and their isolation points

• Implement a robust system to prevent the electricity supply being inadvertently reconnected

• Consider rescuing a casualty who is in direct contact with low-voltage electricity, using electrical gloves or dry insulating material

Control measure - Personal protective equipment: Electrical gloves

Control measure knowledge

The decision to use electrical gloves should be made with extreme caution; they should only be used when dealing with low-voltage electricity supplies. Low voltage is defined as voltage up to
1000V AC or 1500V DC.

Where it is necessary to come into contact with low-voltage electricity, electrical gloves should be worn, for example, when removing people from contact with electricity.

Where there is high-voltage electricity (greater than 1000V AC or 1500V DC), or it is not possible to verify the actual voltage, the only safe course of action is to ensure that the supply is cut off and declared safe by a competent person.

**Strategic actions**

Fire and rescue services should:

- Consider making electrical gloves available to personnel for use at incidents involving a live electricity supply

**Tactical actions**

Incident commanders should:

- Consider the appropriate use of electrical gloves, in line with service procedures
- Ensure that PPE is worn in accordance with service risk assessment for live utilities

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**Control measure - Safe system of work: High-voltage electricity**

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**Control measure knowledge**

This control measure should be read in conjunction with the National Grid publication, *Guidance for UK Fire and Rescue Services for dealing with incidents on or near National Grid high voltage overhead lines*.

The National Grid's Transmission Network Control Centre (TNCC) manages the high voltage transmission system in Great Britain 24/7, 365 days a year. All incidents near overhead electrical assets must be reported by phone on 0800 404090. It is important to give as much information as
possible in a clear and concise manner and always follow any warning issued. Details of the information required are provided in the National Grid publication.

This function is provided in Northern Ireland by Northern Ireland Electricity Networks. All incidents near overhead electrical assets should be reported by phone on 03457 643643.

The decision to isolate high-voltage electricity supplies will need to be made in close consultation with the supplier. This will take into consideration the consequences of this action to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate high-voltage electricity supplies. This can only be achieved by asking the supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

If there are high-voltage lines, carrying 132 kV, 275 kV and 400 kV (kilovolts), additional safe distances need to be implemented over and above the normal cordonning requirements of an incident.

It should always be assumed that the high-voltage system is live or that there may be a residual current hazard present, until the electricity supplier confirms otherwise, for example, through a permit-to-work certificate.

Personnel will benefit from having access to risk information about equipment and its location such as:

- Substations
- Transformers
- Switchgear

Personnel should not enter any enclosure surrounding electrical assets, or climb any steel tower, structure or pole supporting overhead lines, unless permission has been received from the electricity supplier.

Precautions should be taken when carrying metal ladders or other operational equipment; these should be carried horizontally and as low to the ground as possible to avoid any contact with high-voltage equipment.

Columns or jets of water should not be applied to transmission towers and their components, as solid jets of water coming into contact with any electrical equipment creates a risk of electrocution.

When firefighting in the close proximity of high-voltage assets, branches with spray, fog or mist can be used at ground level, as electricity is less able to conduct through droplets of water.

**Risk assessments**
Any operational activity under or near to high-voltage equipment, including transmission towers and overhead lines, should be subject to a risk assessment, taking into account:

- The conditions, such as fire or dense smoke
- Wind direction
- Weather conditions, especially lightning
- The equipment being used, such as ground monitors or aerial ladder platforms

**Exclusion zones**

If there are high-voltage assets, including transmission tower or overhead lines, additional safe distances need to be implemented over and above the normal cordonning requirements of an incident.

Exclusion zones vary depending on the incident:

- Exclusion zones for overhead lines
- Exclusion and safety corridors for major asset failure
- Exclusion zones to minimise touch and transfer potentials

**Exclusion zones for overhead lines**

If the decision is made to isolate the overhead line, the National Grid TNCC or Northern Ireland Electricity Networks will operate circuit breakers at all ends of the circuit and open isolators (large switches) to disconnect the circuit from any sources of supply. When a circuit is in this condition it is still not safe to allow people within a specified exclusion zone, as it is still possible for the overhead line to be at a high voltage.

It is important to understand that any immediate action taken by the electricity supplier does not totally remove electrical dangers from the overhead line. It is recommended that the following minimum exclusion zones for personnel, equipment and vehicles are maintained.

<table>
<thead>
<tr>
<th>Overhead line condition</th>
<th>Minimum exclusion zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>5m</td>
</tr>
</tbody>
</table>

Confirmation by the National Grid or Northern Ireland Electricity Networks standby engineer that circuits are isolated, and a national grid safety document is in place to manage safety from the system.
Exclusion and safety corridors for major asset failure

Additional precautions should be taken if there is a risk of all or part of the overhead line failing. This may happen as a result of a significant fire under or near to the high-voltage overhead line, or where the conductors are subjected to severe heat stresses. In all cases advice should be obtained from the National Grid or Northern Ireland Electricity Networks standby engineer.

The power lines that span the distance between transmission towers should be thought of as a corridor. If there is a risk of all or part of the overhead line failing, which could lead to power lines falling, a distance of 5m from the outermost conductors or power lines should become an exclusion corridor.

A further 5m from the outermost conductors or power lines should become a safety corridor. Together they form a 10m hazard area that extends either side of the conductors or power lines and for the whole span between affected transmission towers.

For a diagram showing the exclusion and safety corridors, refer to the National Grid publication, Guidance for UK Fire and Rescue Services for dealing with incidents on or near National Grid high voltage overhead lines.

Until otherwise verified by the correct distribution network operator (DNO), transmission operator (TO), National Grid engineer or Northern Ireland Electricity Networks engineer:

- Rescue and firefighting activities in the exclusion and safety corridor should be strictly controlled
- Personnel, equipment and vehicles should not enter the exclusion corridor
- People should be evacuated from the exclusion corridor; a risk assessment may also determine that people should be evacuated from the safety corridor as well

However, if a transmission tower is at risk of failure or collapse, the height of the tower should be added to the exclusion and safety corridor distances.

Exclusion zones to minimise touch and transfer potentials

Exclusion zones should be established and monitored to minimise the hazard of touch and transfer potentials, based on the situation and whether the circuit is live or confirmed as isolated.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Live circuits</th>
<th>If the National Grid or Northern Ireland Electricity Networks standby engineer has confirmed that the circuits are isolated</th>
</tr>
</thead>
</table>
Areas of dense smoke & 10m & No restriction  
Towers or metal structures that carry high voltage electricity & 10m & No restriction  
Tall conductive objects in span, such as lampposts & 10m & No restriction  
Towers and metal structures during a lightning storm & 10m & 10m  
Conductive objects directly connected to towers, such as fencing & 10m & No restriction

**Rescuing a casualty**

If it is necessary to rescue a casualty who is within 5m of high-voltage electricity, the following steps should be taken:

- Request permission from the electricity supplier to rescue a casualty, providing information such as:
  - The condition of the casualty
  - The distance and position of the casualty in relation to the point of contact of the high-voltage electricity
  - Whether the casualty is at, above or below ground level
  - Weather conditions
  - Transmission tower markings and signs
- Record permission when received
- Carry out a risk assessment
- Proceed with caution

**Strategic actions**

Fire and rescue services should:

- Liaise with local distribution network operators (DNOs) and transmission operators (TOs) to maintain up-to-date emergency contact details in their fire control rooms
Tactical actions

Incident commanders must:

- Report all incidents near overhead electrical assets to the National Grid (in Great Britain) or Northern Ireland Electricity Networks

Incident commanders should:

- Consult with the electricity supplier to decide if the high-voltage electricity supply needs to be isolated, taking into account the consequences of this action
- Assume that the high-voltage system is live or that there may be a residual current hazard present, until the electricity supplier confirms otherwise
- Ensure personnel do not enter any enclosure surrounding electrical assets, or climb any steel tower, structure or pole supporting overhead lines, unless permission has been received from the electricity supplier
- Take precautions when carrying metal ladders or other operational equipment; these should be carried horizontally and as low to the ground as possible
- Avoid using columns or jets of water when dealing with fires near to high-voltage assets
- Consider using branches with spray, fog or mist at ground level when dealing with fires near to high-voltage assets
- Carry out a risk assessment before carrying out any operational activity under or near to high-voltage equipment
- Establish and monitor a 5m exclusion corridor that extends either side of the conductors or power lines and for the whole span between affected transmission towers for live overhead lines
- Establish and monitor a further 5m safety corridor that extends either side of the conductors or power lines and for the whole span between affected transmission towers for major asset
failure of high-voltage equipment

- Extend the exclusion and safety corridors by the height of the transmission tower if there is a risk of it failing or collapsing

- Use a risk assessment to determine if people should be evacuated from the safety corridor established for high-voltage equipment

- Establish and monitor appropriate exclusion zones to minimise touch and transfer potentials for live or isolated overhead lines

- Request permission from the electricity supplier before rescuing a casualty near to high-voltage equipment

Control measure - Contact distribution network operator or transmission operator

Control measure knowledge

Identification number plates

Transmission towers or poles have a unique identification number plate. In instances where each side of the transmission tower or pole is supplied by a different distribution network operator (DNO), there will be two identification number plates.
Identification number plate on transmission tower - photograph courtesy of Peter Martin

Figure 3: Identification number plate on transmission tower – photograph courtesy of Peter Martin

**Colour bands**

There is a colour-coding scheme for transmission towers.

Example of a colour band for a 132kV tower - diagram courtesy of UK Power Networks
Contacting the electricity company

If a transmission tower is operated by two companies, details from both plates should be passed to the fire control room. Contacting the wrong company may result in delays, as some work can only be carried out once the correct designated competent person has issued a permit-to-work.

The following information should be given to fire control rooms and passed to the correct distribution network operator(s) (DNO) or transmission operator(s) (TO):

- Exact address
- Identification numbers and colour band information
- Physical description of the site
- Distances from live equipment
- Whether the incident is at ground level, above or below ground level
- Weather conditions on site
- Current plan of action required
- Any time limits or other operational pressures
- Any other relevant information

Yellow 'danger of death' signs should be present on all high-voltage transmission towers or poles. They may sometimes be displayed on low-voltage poles.

Strategic actions

Fire and rescue services should:

- Liaise with local distribution network operators (DNOs) and transmission operators (TOs) to maintain up-to-date emergency contact details in their fire control rooms

- Consider adopting memoranda of understanding with their electricity suppliers, to improve joint working at emergency incidents

Tactical actions

Incident commanders should:
• Communicate the identification number(s) of any transmission tower or pole to the relevant distribution network operator (DNO) or transmission operator (TO)

• Implement high-voltage safe system of work if a yellow 'danger of death' sign present

**Control measure - Adopt defensive tactics until the utility system is isolated**

**Control measure knowledge**

If utility systems have been tampered with it may not be possible, or it may be too hazardous, for personnel to isolate them. Assistance will be required from the relevant utility supplier or competent person to make the system safe.

If the gas supply system may have been subject to illegal activity, cordons and controls appropriate for explosive atmospheres should be applied.

In the interim, personnel should adopt defensive tactics and ensure all emergency responders are made aware of the presence of a potentially hazardous utility system.

**Strategic actions**

Fire and rescue services should:

• Establish arrangements with local utility suppliers and maintain up-to-date emergency contact details in their fire control rooms

• Consider making electrical gloves available to personnel for use at incidents involving live electricity

**Tactical actions**

Incident commanders should:
• Adopt defensive tactics until the utility system is isolated

• Inform emergency responders about the presence of a potentially hazardous utility system

• Seek specialist assistance to make the utility system safe

• Consider the appropriate use of electrical gloves, in line with service procedures

• Consider applying appropriate controls for explosive atmospheres if a gas supply system may be affected

Hazard - Photovoltaic (PV) systems

Hazard Knowledge

At any incident involving photovoltaic (solar) systems, there is a potential electrical hazard from energy produced by these units. Panels or tiles may be mounted onto building roofs or walls and may not be easily identifiable. Panels can also be located at ground level, for example in solar farms. Even when isolated at the consumer unit or inverter, the system may remain live between the panels and the isolation point.

For more information see Fires in Buildings Building Research Establishment supplementary information Microgeneration renewable energy

The potential for the system to continually produce electricity presents a hazard for fire and rescue service personnel. The generation of electricity will not only happen in direct sunlight but also in cloudy conditions. Moonlight will generate negligible current. However, artificial scene lighting may be sufficiently bright to generate electricity.

Damaged photovoltaic panels can cause arcing and subsequent fire, with the potential for firespread via molten glass dropping underneath the panels.

The security of the panels may be compromised by fire or building collapse, with the potential for them to fall from the roof.

It may be necessary to isolate power at the inverter, however it may be difficult to locate the isolation switches, or there may be restricted access to the isolation switches.
Other methods have been used to deactivate photovoltaic systems, for example, in the United States they have investigated covering the panels with a light-blocking material, such as certain types of tarpaulin. However, this is a difficult tactic to implement because many tarpaulins are not completely light-blocking and the panels are often too large for this to be successfully achieved. Additionally, wind, fire or other external influences may make it difficult to maintain coverage.

With the growth of photovoltaic systems, emerging technology is looking at ways to deactivate production of DC power from photovoltaic systems.

For further information, refer to the BRE knowledge sheet: Photovoltaic (PV) systems and the supplementary information for solar panel (photovoltaic) systems.

**Battery storage for domestic and commercial solar photovoltaic (PV) systems**

With advancements in solar-powered domestic and commercial photovoltaic systems, battery storage is becoming an economically viable option for some households and businesses.

The two types of batteries most commonly offered for solar photovoltaic storage in the home are lithium-ion and lead-acid batteries. These units will usually be located near the system’s inverter and often found in a utility room, garage or similar location.

There are two main ways of linking a battery storage system into a PV system:

- **DC coupled**: the batteries are installed on the same side of the solar inverter as the PV panels, they charge from the panels, and their DC is only converted to AC when it is used.
- **AC coupled**: the batteries are installed on the grid side, where the DC from the PV panels has already been converted to AC. A separate inverter converts the AC back to DC for storing in the battery. When the battery discharges, the same separate inverter converts the DC back to AC.

For illustrations of, and further information about, battery storage, refer to BRE and RECC (2016) Batteries and Solar Power: Guidance for domestic and small commercial consumers.

Also refer to the Utilities and fuel supplementary information, Solar panels (photovoltaic) systems.

**Control measure - Isolate photovoltaic (PV) systems**
Control measure knowledge

Isolation of a photovoltaic (PV) system should include the following actions:

- Isolation between the PV panels and the inverter
- Isolation of batteries if present
- Isolation of the consumer unit

There may be more than one DC isolation switch between the panels and the inverter; isolation should be carried out at the point closest to the panels. Anywhere between the panels and the isolated DC switch will remain live.

If there is photovoltaic (PV) system battery storage, there should be a cut-off switch for the batteries near to their location. Caution should be exercised as DC power may still be going to or from the batteries.

For further information about the components of photovoltaic systems, refer to BRE's Fire safety and solar electric/photovoltaic systems.

Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) includes details of PV systems, including battery storage, such as details of isolation switches
- Consider making electrical gloves available to personnel for use at incidents involving live electricity supply

Tactical actions

Incident commanders should:

- Consider the appropriate use of electrical gloves, in line with service procedures
- Isolate any photovoltaic system as close to the panels as possible
- Ensure there is no unprotected direct contact by personnel or equipment with any part of the
Hazard - Rechargeable batteries

Hazard Knowledge

Rechargeable batteries are used in a wide range of contexts. Newer-style high energy density batteries, such as the lithium ion (Li-ion) type, are very common and a growing risk. Services should be aware that traditional types, such as nickel metal hydride and older style lead acid, are still in use and that future developments could see the introduction of newer kinds, like lithium iron phosphate (LFP). Uses include:

- Domestic energy storage systems can be charged by renewables, such as solar cells, and then used either by the consumer or for feeding into the National Grid
- Industrial scale energy storage systems are now being used commercially; such systems may consist of many modular units constructed from ISO containers housing thousands of rechargeable batteries
- Portable devices such as:
  - Smartphones
  - Game consoles
  - Torches
  - E-cigarettes
  - Video or digital cameras
  - Laptops and tablets
- Power tools such as:
  - Cordless drills
  - Sanders
- Gardening tools such as:
  - Strimmers
  - Hedge cutters
  - Lawn mowers
- Uninterruptible power supplies (UPS)
- Leisure and mobility scooters
Hover boards
A wide range of transport uses (refer to Hazard: Roadways alternative fuel vehicles)

All battery types have a hazard of stored chemical energy. This can cause an increased risk of:

- Release of electrical energy without warning as large electrical currents, which can cause injury, ignition, or localised high temperatures
- Sparking, arcing, or flashing if terminals are short circuited or touch other conductors

Traditional rechargeable batteries can be heavier and have lower energy densities. Most are made from tough non-reactive plastics that contain a water based electrolyte. Only a small number have an open design. Some rechargeable batteries allow user access to inner parts for electrolyte inspection.

Hazards associated with lower energy density rechargeable batteries include:

- Toxic or irritating water based liquid electrolytes, such as copper sulphate
- Corrosive acidic electrolytes, such as sulphuric acid
- Poisonous alkaline electrolytes, such as potassium hydroxide
- Very high discharge or surge currents, for example in a road vehicle battery
- Non-precious metals like lead or copper; elevated temperatures and fires can cause these metals, when in the presence of electrolytes, to react or release vapours
- Release of hydrogen gas or oxygen gas during charging, which can ignite or explode

Newer style, high energy density rechargeable batteries are made from precious metals and organic electrolytes. The metals used often react very readily with water or air and the electrolytes can be highly flammable. These batteries are often carefully sealed so that water cannot enter making it difficult to cool or extinguish fires.

Sensitivity to charging and discharging regimes, mechanical shock, and localised temperature gradients can lead to thermal runaway, rapid unexpected release of flammable gases and liquids under pressure, release of toxic and corrosive materials.

Thermal runaway, an accelerating increase in temperature caused by chemical reactions, can lead to fire, explosion, release of highly combustible organic electrolyte under pressure and unpredictable fire behaviour. This can be the result of temperature variations limited to only one or a small number of damaged cells, and can cause ignition that occurs spontaneously over varying time frames.

Hazards associated with higher energy density rechargeable batteries include:

- Explosive gases produced by reactive metals, such as lithium. Possible chemical reduction of water by a highly reactive metal can produce an alkaline solution and an explosive gas, for
example lithium hydroxide (LiOH) and hydrogen (H2)

- Rapid unexpected release of flammable gases and liquids under pressure
- Release of toxic and corrosive materials
- Fire water run-off containing poisonous metals, such as nickel or cadmium, which can release hazardous materials to their surroundings.
- Toxic and explosive gases released can have the appearance of steam

Refer to the 'Health and Safety Executive publication 'Using electric storage batteries safely' for further information.

Control measure - Identify presence and type of rechargeable batteries

Control measure knowledge

The presence of rechargeable batteries may not always be clear. Personnel should look for signs, labels or other indicators, such as heavy duty orange cabling or sources of renewable energy including solar panels, electric motors or wind turbines.

Personnel should gather information from responsible persons or Site-Specific Risk Information (SSRI) about the type, location and quantity of rechargeable batteries present, fixed installation systems and isolation points.

Early identification can reduce the risks associated with rechargeable batteries. For information about the identification of batteries in vehicles refer to Hazard – Roadways: Alternative Fuel Vehicles

Strategic actions

Fire and rescue services should:

- Carry out pre-planning and site inspections to identify and record the type, location and quantity of rechargeable batteries

- Consider recording the location rechargeable battery isolation points or other controls in risk information
• Identify and communicate the presence of rechargeable batteries in domestic properties

**Tactical actions**

Incident commanders should:

• Gather information about the type, location and quantity of any rechargeable batteries

• Communicate hazard information to personnel if rechargeable batteries being involved

• Identify the presence of isolation points to enable safe isolation of batteries and voltages

• Identify the presence of fixed installations to reduce effects of hazards from rechargeable batteries, such as extraction vents to remove unsafe gases

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**Control measure - Isolate rechargeable batteries**

**Control measure knowledge**

Incidents involving rechargeable batteries may involve the spillage or release of hazardous materials; refer to:

• [Release or spill of corrosive material](#)
• [Estimate quantity of release or spill](#)
• [Assess impact of release or spill](#)

Isolating batteries can reduce the immediate risks of electrical shock or other form of injury. Guidance on the isolation of separate battery types is not given here. Personnel should consider the need for consent if, for example, a battery is linked to a critical system.

Rechargeable batteries, even in a domestic context, can be hazardous. Personnel should only isolate batteries themselves if absolutely necessary and if unsure should refer to other sources of information such as responsible person or a manufacturer's handbook and consider requesting specialist advice.
Rechargeable batteries found on an industrial scale are more hazardous because of their size. Isolation where possible should be performed by an on-site engineer or trained competent person.

**Strategic actions**

Fire and rescue services should:

- Consider making electrical gloves available to personnel for use at incidents involving live electricity supply

**Tactical actions**

Incident commanders should:

- Ensure personnel wear appropriate PPE, such as electrical gloves, to mitigate against hazards of chemicals and voltages
- Consider the use of detection, identification and monitoring (DIM) equipment to monitor the release of gases
- Consider isolating the batteries, taking into account the impact on any critical systems
- Consider the appropriate use of electrical gloves, in line with service procedures
- Seek specialist advice where the batteries cannot be isolated

**Control measure - Safe system of work:**

**Rechargeable batteries**

**Control measure knowledge**

Because batteries and their terminals are often sealed, extinguishing agents may be ineffective.
However, water may be applied directly to the battery or its surroundings, in order to cool the battery and limit fire spread.

Water should not be applied directly to the exposed terminals of a battery if it has not been isolated or if there is a risk of electric shock. Firefighting operations can be hindered by the construction of some batteries that are designed to make them water resistant or waterproof. If personnel are in doubt about the correct firefighting techniques, they should seek specialist advice or consider manufacturer’s guidance.

Because of the difficulties associated with attempting to use extinguishing media on these batteries, internally they may become subject to thermal runaway. This reaction cannot be stopped by fire and rescue service actions and can lead to fires, explosions or sudden releases of flammable gases or hazardous materials.

**Strategic actions**

Fire and rescue services should:

- Consider establishing arrangements to remove rechargeable batteries if necessary to prevent reignition

**Tactical actions**

Incident commanders should:

- Consider the use of thermal imaging to monitor battery temperatures and look for signs of thermal runaway

- Ensure that firefighters implement the appropriate procedures if rechargeable batteries are known or suspected to be involved

- Consider the additional resources required to apply firefighting media to batteries that may require cooling for an extended period of time

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**Hazard - Renewable energy turbines**
Hazard Knowledge

Water turbines

Hydroelectricity is produced when the kinetic energy of flowing water is converted into electricity by a turbine connected to an electricity generator. There are large-scale and small-scale schemes. Refer to the supplementary information for further detail.

Due to the volume of water required for a hydroelectricity system, there may be a risk of flooding or a need to work near water.

Wind turbines

Wind turbines range from micro (used for signposts and caravans, for example) through to large wind farms. Refer to the supplementary information for further detail.

Turbines have both a brake and gearbox mechanism behind the blades, which allows for greater control of the system and for the generator to be shut down in case of a fault.

Large-scale wind farms will have on-site transformers that increase the voltage of the generated electricity before being fed into the national grid.

Fire and rescue services will not be expected to attend incidents at offshore wind turbine sites. Those sites are required to be self-sufficient for dealing with fires and performing rescues.

At an incident involving a wind turbine, electrical hazards include those typical of any other equipment producing electricity. Short circuits, overheated alternators or generators and gearbox oils are all known to have caused fires in wind farms.

Because of the height of these units, there is a possibility that any item falling from the upper part of the wind turbine could 'plane' and travel a considerable distance from the base of the turbine.

Control measure knowledge

Whenever turbines rotate they produce electricity which, because of their location and size, may be difficult to isolate and control. However, monitoring stations may be able to remotely provide information and remotely control the turbines.
Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) includes details of turbines and information on emergency procedures for isolating the turbine
- Consider making electrical gloves available to personnel for use at incidents involving live electricity supply

Tactical actions

Incident commanders should:

- Identify how to isolate the turbine; this could be remotely or on-site
- Isolate the turbine- this may require specialist advice or assistance
- Ensure personnel and equipment avoid contact with any part of the electrical system
- Consider the appropriate use of electrical gloves, in line with service procedures

Hazard - Uninterruptible power supplies (UPS) and standby generators

Hazard Knowledge

An uninterruptible power supply (UPS) is electrical equipment that provides emergency power when the input power source, typically the mains, fails. UPS can range from small units to large rooms containing batteries.

Uninterruptible power supplies provide immediate protection from input power interruptions; this is done by supplying energy stored in batteries, super capacitors or flywheels.

The operating time of most uninterruptible power supply systems is relatively short, usually only a few minutes. This is sufficient to start a standby power source or to properly shut down and protect the equipment, such as:

- Computers
- Data centres
- Telecommunication equipment
- Other electrical equipment where an unexpected power disruption could cause injuries,
fatalities or serious business disruption

**Standby generators**

Personnel attending incidents may need to manage electrical standby generators and associated fuel supplies.

In the event of the electricity supply to the facility being interrupted, the standby generator will automatically start to operate, resulting in the re-energising of power supplies.

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**Control measure - Isolation of uninterruptible power supply systems or standby generators**

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**Control measure knowledge**

If an uninterruptible power supply system is providing back-up to a whole building, there should be a cut-off point, usually located near to the isolation point for the mains power.

If a standby generator is providing back-up to the facility, it will need to be isolated to prevent the automatic re-energising of power supplies.

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**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) includes details of uninterruptible power supply systems or standby generators, such as emergency cut-off points or switches

- Consider making electrical gloves available to personnel for use at incidents involving live electricity supply

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**Tactical actions**

Incident commanders should:
• Consider isolating the uninterruptible power supply system or standby generator, taking into account the impact on any critical systems

• Consider the appropriate use of electrical gloves, in line with service procedures

Hazard - Overheating transformers and cooling systems

Hazard Knowledge

Transformers generate significant heat and are generally cooled by the circulation of mineral oils. If a transformer overheats, it may rupture; this could result in very hot mineral oil and toxic and/or flammable gases being released.

Some switchgear is also oil-cooled and can rupture in a similar manner to transformers.

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

• What utility or fuel supplies or storage facilities are involved
• Which utility or fuel needs to be managed and controlled
• The consequences of isolating and controlling utility or fuel supplies
• Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
• Any sources of renewable energy generation, such as photovoltaic panels or turbines
• The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

• Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

• Gather information to gain situational awareness about utility and fuel supplies and storage facilities

• Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

• Consider if leaving specific power systems on could be beneficial for resolving the incident
• Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

• Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

• Gas distributor for the area
• Gas supplier to the premises
• Gas industry helpline
• On-site personnel and management team
• Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation
can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person
Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance
Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.
Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

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Control measure - Isolate utility or fuel supply within the national grid

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Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

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Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

**Control measure - Implement hazardous materials procedures**

**Control measure knowledge**

See National Operational Guidance: [Hazardous materials](#) for guidance about dealing with any release of hazardous substances.

**Strategic actions**

**Tactical actions**

There are no tactical actions associated with this control measure.

**Hazard - Presence of chemicals**
Hazard Knowledge

Throughout the utility and fuel industries, chemicals play a key part in the processes of production, transportation and supply to the customer.

Fire and rescue service personnel, at any incidents in these industries, need to be aware of the presence of chemicals and the possibility that they may need to be managed and controlled.

While gathering information for Site-Specific Risk Information (SSRI) and emergency response plans, a list of chemicals and quantities of those chemicals needs to be recorded.

Below are some examples of chemicals that could be found in different utility and fuel industries.

Water industry

- Algaecides (copper sulphate, iron salts, rosin amine salts and benzalkonium chloride)
- Disinfectants (chlorine, chlorine oxide, ozone)
- Boiler water chemicals (scale inhibitors, corrosion inhibitors, etc.)
- Coagulants (aluminium and iron)
- Neutralising agents (sodium hydroxide solution, calcium carbonate and lime suspension)
- Oxidants (hydrogen peroxide, ozone, combination ozone and peroxide and oxygen)
- Resin cleaners (sodium chloride, potassium chloride citric acid and chlorine oxide)

Electricity industry

- Boiler water chemicals (scale inhibitors, corrosion inhibitors, etc.)
- Sulphur hexafluoride (SF6) - refer to the hazard for Sulphur hexafluoride (SF6)
- Polychlorinated biphenyls (found in older electrical equipment) - refer to the hazard for Polychlorinated biphenyls
- Dielectric fluid (mineral oils used to cool or insulate underground transmission feeders)
- Transformer oil (generic term for oil used to cool and insulate transformers)
- Sulphuric acid (contained in lead-acid batteries)
- Lithium (component of lithium-ion battery systems)

Gas industry

- Mercaptan (chemical added to natural gas to give it an odour similar to rotten eggs)

Petrochemical industry

There will be numerous refined petroleum products and chemicals in a facility. Examples include:

- Corrosion inhibitors
- Sulphuric acid (contained in lead-acid batteries)
Resin cleaners (sodium chloride, potassium chloride, citric acid and chlorine oxide)

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.
Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

Tactical actions

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.
The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry
Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

⚠️ Control measure - Apply cordons and control for utilities or fuel

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident](#)
command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises
Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

**Control measure - Implement hazardous materials procedures**

**Control measure knowledge**

See National Operational Guidance: [Hazardous materials](#) for guidance about dealing with any release of hazardous substances.

**Strategic actions**

**Tactical actions**

There are no tactical actions associated with this control measure.

**Hazard - High-security features**
Hazard Knowledge

Utility and fuel sites across the UK form a part of the critical national infrastructure (CNI) and as such they are protected to a very high level. All CNI sites will have a risk-assessed level of intruder detection and protection.

Security features may make entry to a site problematic or hazardous; close liaison with the site operator will be required.

Active nuclear and first-stage decommissioning sites will have armed Civil Nuclear Constabulary protection and a wide range of personnel and vehicle mitigation measures; entry will be escorted at all times.

Site-Specific Risk Information (SSRI) may contain details of security features such as:

- High fencing with barbed wire or razor wire
- Electrified fencing
- Anti-climbing guards on transmission towers and poles
- High walls
- Armed on-site protection

Entry to an electrical installation, such as a substation, can only be achieved following confirmation from the relevant distribution network operator (DNO) that the area is safe to enter.

Electrical installations will have signage detailing hazards and contact details on access points to the sites, as well as danger of death signs around their perimeters.
Figure 9: Substation access door (also showing SF6 warning sign) - photograph courtesy of Peter Martin

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
• The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

• Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

• Gather information to gain situational awareness about utility and fuel supplies and storage facilities

• Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

• Consider if leaving specific power systems on could be beneficial for resolving the incident
• Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

• Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

• Gas distributor for the area
• Gas supplier to the premises
• Gas industry helpline
• On-site personnel and management team
• Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation
can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - **Isolate utility or fuel supply to the premises**, and control measure - **Isolate utility or fuel supply within the national grid**.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

**Water industry**

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person
Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance
Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident

- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)

- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - ARCHIVED - Site-Specific Risk Information (SSRI)

Control measure knowledge

ARCHIVED -

Fire and rescue authorities must make arrangements to obtain necessary information for the purposes of:

- Extinguishing fires and protecting lives and properties from fires in its area (relevant fire and rescue service legislation for England, Scotland, Wales and Northern Ireland)

- Rescuing and protecting people from harm at road traffic collisions in its area (relevant fire and rescue service legislation for England, Scotland, Wales and Northern Ireland)

- Dealing with any other emergency function other than fires and road traffic collisions in its area (relevant fire and rescue service legislation for England, Scotland, Wales and Northern Ireland)

UK legislation sets the requirement for site-specific assessment. Collating and disseminating SSRI involves a number of tasks:

- Selecting premises to be inspected
- Assessing the nature and magnitude of the risk
- Considering a proportionate response
- Recording significant findings
• Making sure information is available in a useable form

A site-specific assessment takes account of current legislation on inspection information and includes information on preplanning firefighting tactics.

**Tunnels and underground structures**

The planned operational response to underground incidents should be sufficient to allow relevant safe systems of work to be implemented.

During any construction process, it will be necessary to review the Site-Specific Risk Information (SSRI) and emergency response plans so that any changes that will affect the existing risk information and guidance can be reflected throughout the project.

Pre-planning should be carried out jointly with other responder agencies that have knowledge of the environment, including volunteer rescue and leisure groups.

**Hazardous materials and environmental protection**

Fire and rescue services should assess the hazards and risks in their area relating to hazardous materials. This may be site-specific, for example, a factory using acid baths, or it may be generic, for example the local road network carrying hazardous materials.

The plans should also include information on pollution, prevention and control where a risk to the environment is identified at an incident. Although each nature conservation site will have its own environmental damage risks which can be captured with individual operational risk plans, a set of generic action plans will also help to identify generic environmental protection action to be taken in the early stages of an incident. Refer to the [Environmental Protection Handbook](#).

In addition to general site-specific information, the following should be considered:

- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)
- Manufacture and Storage of Explosives Regulations (MSER), enforcement notices, prohibition notices etc.
- Notification and Marking of Sites (NAMOS) inspections and information
- British Agrochemicals Safety Inspection Scheme (BASIS) inspections and pre-plans
- The asbestos register
- Significant Control of Substances Hazardous to Health (COSHH) assessments
- Control of Major Accident Hazards (COMAH) plans and information
- CBRN(E) site-specific plans
Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Control measure - ARCHIVED - Emergency response plans

Control measure knowledge

ARCHIVED - The Civil Contingencies Act (CCA) places a responsibility on Category 1 responders to produce and have in place emergency plans, which may include procedures for determining whether an emergency has occurred.

There is a generic national framework for managing emergency response and recovery, irrespective of the size, nature and cause of an emergency. It also identifies the various tiers of single and multi-agency management, defining the relationship between them and a common framework within which individual agencies can develop their own plans and procedures.

For further information see Emergency Response and Recovery Guidance (England and Wales), Responding to Emergencies in Scotland and Emergency Planning, Northern Ireland Fire and Rescue Service.

Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.
Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances
for the utilities or fuel present

- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.

Electricity supplies
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Hazard - Sulphur hexafluoride (SF6)

Hazard Knowledge

Sulphur hexafluoride gas is used at low pressures to insulate certain areas of power stations and substations, and for arc extinction in switchgear. Sulphur hexafluoride gas in its pure form is inert, colourless, non-flammable, non-toxic and five times heavier than air.

In substations it is sealed in compartments that should have a warning sign denoting SF6 presence. It can only escape in fault conditions, which include fires, when it can generate toxic and corrosive gases or powder that can cause skin burns and severe damage to eyes.

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:
• What utility or fuel supplies or storage facilities are involved
• Which utility or fuel needs to be managed and controlled
• The consequences of isolating and controlling utility or fuel supplies
• Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
• Any sources of renewable energy generation, such as photovoltaic panels or turbines
• The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

• Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

• Gather information to gain situational awareness about utility and fuel supplies and storage facilities
Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

Consider if leaving specific power systems on could be beneficial for resolving the incident

Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

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Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:
Water distributor for the area
Water supplier to the premises
Sewerage company
On-site personnel and management team
Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or
assistance for dealing with utility or fuel incidents

- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

**Control measure - Apply cordons and control for utilities or fuel**

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident command](#) - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - [Safe System of work: High-voltage electricity](#).

Cordon distances for gas and fuel are given in National Operational Guidance: [Hazardous materials](#).

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.
In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises

**Control measure knowledge**

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

**Gas supplies**

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.
In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Control measure - Implement hazardous materials procedures

Control measure knowledge


Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Hazard - Polychlorinated biphenyls (PCBs)
Hazard Knowledge

Polychlorinated biphenyls (PCBs) were used as dielectric filler liquids in some types of electrical equipment such as transformers, switchgear, capacitors and in the starter units of fluorescent lights and fractional horsepower motors. If manufactured before 1986, these may contain PCBs.

Some equipment is labelled as containing PCBs, but signs may be missing because of age or as a result of the incident.

PCBs are highly toxic, and can lead to chronic illnesses including liver damage and skin rashes. They pollute the environment, accumulate in the food chain and are not biodegradable.

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible
power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel
Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.
Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:
• Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
• Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

• Transporting crude oil and gas by:
  ○ Pumping systems
  ○ Pipeline networks
  ○ Rail
  ○ Ship
  ○ Road
• Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

• Fuel distributor or supplier to the premises
• Owners of the pipelines or infrastructure
• On-site personnel and management team
• On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

• Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
• Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

• Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
• Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
• Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

Strategic actions

Fire and rescue services should:

• Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover
**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

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**Control measure - Isolate utility or fuel supply to the premises**

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**Control measure knowledge**

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

**Gas supplies**

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident

Fuel oil tank - photograph courtesy of Peter Martin
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
- Maintain a directory of emergency contact details for local utility and fuel supply companies
- Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

- Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
- Consider the consequences of isolating utility or fuel supplies

**Control measure - Implement hazardous materials procedures**

**Control measure knowledge**

See National Operational Guidance: [Hazardous materials](#) for guidance about dealing with any release of hazardous substances.

**Strategic actions**

**Tactical actions**

There are no tactical actions associated with this control measure.

**Hazard - Atmospheric conditions in sewers**

**Hazard Knowledge**

The waste carried in sewers may result in the atmosphere being:
• Toxic (e.g. presence of hydrogen sulphide $H_2S$)
• Explosive/flammable (e.g. presence of methane $CH_4$)
• Oxygen deficient (caused by certain micro-organisms)

If there has been a pumping failure, there may also be a considerable amount of organic material that will have been there for some time, which may lead to significant amounts of hydrogen sulphide being produced if disturbed.

**Oxygen-deficient atmosphere**

A reduced through-flow of fresh air due to a lack of natural ventilation or insufficient air currents from sewerage movement (blockage or pump failure) can lead to higher concentrations of other gases (asphyxiants), resulting in an oxygen-deficient atmosphere.

The operation of equipment, such as internal combustion engines, in or near the opening may not only use up oxygen from the air but also produce exhaust gases, such as carbon monoxide, which can accumulate in low areas.

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**Control measure - Safe system of work: Atmospheric conditions**

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**Control measure knowledge**

The working atmosphere of some incidents may not be safe to operate in without appropriate respiratory equipment (RPE), even if the atmosphere is initially found to be respirable. Portable or fixed on-site equipment can be used to test the atmosphere, to establish if there is sufficient oxygen to support life or if there is a risk of irrespirable gases.

Atmospheric testing and monitoring should be carried out at incidents where there is potential for the atmosphere to be explosive (due to flammable gas), toxic, asphyxiating or hypoxic. Environments can include:

• Confined spaces
• Areas where hazardous materials are present
• Areas surrounding a fire
• Post-fire operations, such as damping down
• Fire investigation sites
Testing should also be carried out if it is known that the atmosphere was previously contaminated and subsequently ventilated, such as an underground petrochemical tank.

Fire and rescue services should consider using atmospheric testing and monitoring equipment that will test and display the:

- Oxygen level in the atmosphere
- Presence of flammable gases
- Presence of toxic gases

**Exposure limits**

Atmospheric monitoring equipment takes into account workplace exposure limits (WEL) that are produced by the Health and Safety Executive (HSE). WEL is the exposure of employees to hazardous conditions such as gases, dust and noise. The aim is to ensure that levels in the workplace are below the statutory limits. For further information refer to the Health and Safety Executive (HSE) publication, *EH40/2005 Workplace exposure limits*

**Testing and monitoring the atmosphere**

Before operations commence, the atmosphere should be tested. However, if there is a threat to life and it is not possible to carry out atmospheric testing in the timeframe required, immediate life-saving actions can be carried out with the use of breathing apparatus and entry control procedures.

If possible, testing should be carried out while limiting exposure to personnel. Incident commanders should consider using on-site testing equipment or using extendable equipment or lines to lower portable testing equipment inside the hazard area and withdrawing personnel. It may be necessary to request specialist advice or assistance for testing and monitoring atmospheric conditions.

Ideally the atmosphere of every hazard area should be tested prior to entering. To ensure the test is effective personnel should consider:

- Remaining still, as this can assist with:
  - Allowing adequate time for equipment to sample, test and display the results
  - Preventing slips, trips and falls if personnel are on uneven or unstable ground, especially when reading the equipment
  - Sampling at various levels due to various densities of gases

Regular monitoring is necessary to identify any changes in the atmosphere; this can be achieved actively or passively. Active monitoring is where personnel use portable detectors, often attached to themselves to monitor the atmosphere they are currently exposed to. Passive monitoring is used
to monitor a specific area, such as portable detectors positioned temporarily in one place or fixed on-site equipment.

Atmospheric testing should be carried out by competent personnel who are aware of the limitations of the equipment in use, ensuring the results are regularly recorded.

**Ventilation**

Ventilation may help to improve conditions for personnel and increase the potential for casualty survival.

The hazard area should be assessed to determine if ventilation would be appropriate and successful. The surrounding infrastructure and what will be released should be taken into consideration, as flammable gases may ignite if there is an ignition source near to the outlet vent.

Ventilation can be achieved naturally, such as by opening windows or inspection holes, or through forced ventilation, such as the use of mechanical fans. The use of fans with combustion engines should take into account their exhaust gases. For further information refer to Consider employing tactical ventilation.

Gas purging of spaces using inert gases is a ventilation technique performed in industry, often within confined spaces, to mitigate the risk of explosive atmospheres. This would be inappropriate if casualties are inside the confined space.

**Removal of residues or materials**

The removal of residues or materials, such as sludge or chemicals, may reduce the quantity of toxic or asphyxiate gases being released. However, this activity should be subject to a risk assessment as it may release more gases.

**Monitoring equipment alarm actuation**

Atmospheric monitoring equipment may detect different gases and levels of gases. Personnel should understand how the monitoring equipment functions and take appropriate action if it actuates. This can include the need for all personnel within the hazard area to withdraw to a safe area and review why the alarm actuated. Personnel should brief the incident commander, providing details of time, location and the actions being carried out when the alarm actuated.

**Limited capability of atmospheric monitoring equipment**

Most atmospheric monitoring equipment is calibrated to detect specific gases, as detailed in the manufacturer's specification. This means that the equipment has limitations for detecting other gases that may be in the area. Some detectors can be changed; however, doing so requires trained personnel and specialist equipment.
If the substance is unknown, the use of a regional detection, identification and monitoring (DIM) officer or other specialist advisers can be requested through National Resilience Fire Control (NRFC). Due to the limited number of DIM suites and their geographical location, incident commanders should be aware that their attendance may be delayed.

**Strategic actions**

Fire and rescue services should:

- Enable access to suitable atmospheric monitoring equipment that can be used for multiple applications
- Consider providing equipment to ventilate confined spaces

**Tactical actions**

Incident commanders should:

- Carry out testing and monitoring of the atmosphere and use the results to inform the incident plan
- Consider requesting specialist advice or assistance for atmospheric detection, identification and monitoring
- Consider ventilation to improve internal conditions
- Isolate or limit all ignition sources before ventilating if flammable gases may be present
- Identify the presence of materials that may release gases in a confined space, especially if disturbed
- Consider the controlled removal of materials, to reduce the quantity of gases being released
Control measure knowledge

When operating in a confined space, the ingress of gas, liquids or flowing materials will affect the environment, which may become hazardous to those inside the confined space.

Personnel must be aware of the environment and any associated processes that may affect the confined space and take all appropriate actions to prevent the ingress of substances.

The removal of materials, such as sludge, may reduce the quantity of toxic or asphyxiate gases being released into the confined space. However, this activity should be subject to a risk assessment as it may release more gases.

Strategic actions

Fire and rescue services should:

- Capture information about the storage or use of gases, liquids or flowing materials in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Refer to information provided by SSRI site working plan or the responsible person, about the storage or use of gases, liquids or flowing materials in confined spaces

- Investigate the possibility of ingress from gas, liquids or flowing materials into the confined space, including surface water

- Isolate the confined space or sources to prevent the ingress of gas, liquids or flowing materials
• Identify the presence of materials, such as sludge, that may release gases, especially if disturbed

• Consider the controlled removal of materials, to reduce the quantity of gases being released

Control measure - Provide ventilation

Control measure knowledge

Ventilation may help to improve a toxic or asphyxiating atmosphere. Ventilating a confined space can dramatically affect working conditions and increase the potential for survival.

The confined space environment should be assessed to establish the appropriateness and potential success of the available means of ventilation.

Strategic actions

Fire and rescue services should:

• Consider providing equipment to ventilate confined spaces

Tactical actions

Incident commanders should:

• Consider ventilation to improve internal conditions

• Isolate or limit all ignition sources before ventilating if flammable gases may be present

Control measure - Respiratory protective
Control measure knowledge

Respiratory protective equipment (RPE) is a type of personal protective equipment designed to protect the wearer from breathing in harmful substances, or from oxygen-deficient atmospheres, when other controls are either not possible or are insufficient on their own.

The use of RPE allows efficient, effective and safe working practices to be adopted at incidents of all sizes and type where an irrespirable atmosphere presents a hazard to personnel. There are two main types of RPE; respirators and breathing apparatus (BA).

Further information about the use of RPE can be found in the British Standards Institution (BSI) publication, ISO/TS 16975-1:2016 Respiratory protective devices – Selection, use and maintenance: Establishing and implementing a respiratory protective device programme.

Respirators

Respirators are filtering devices that remove contaminants from the air being breathed in; non-powered respirators rely on the wearer breathing to draw air through the filter. Respirators are not suitable for use in oxygen-deficient atmospheres.

Breathing apparatus

Breathing apparatus (BA) requires a supply of breathing-quality air from an independent source such as an air cylinder. Breathing apparatus (BA) enables firefighters to breathe safely in otherwise irrespirable atmospheres. The use of BA as a control measures is likely to be applied as part of the incident plan for any incident involving:

- Smoke and fire gases
- Working in confined spaces
- Hazardous materials including:
  - Asphyxiants
  - Dusts
  - Toxic, flammable or explosive substances

Airlines

Airline equipment supplies air to the wearer from a cylinder that is located remotely from them. The technical procedures for the specific airline equipment in use should be followed. Airline
equipment should only be used by trained and competent personnel. It be appropriately used and maintained, to avoid the air supply to BA wearers being compromised.

Following an appropriate risk assessment, it may be decided to use airline equipment to provide breathing apparatus capability. Its use may be appropriate:

- If an extended air supply to self-contained BA wearers is required
- If use of self-contained BA is unsuitable
- At incidents in the open, where airlines are used to provide a breathable atmosphere without the weight of a self-contained BA set
- For specialist operations that involve restricted access

Although the use of airline equipment reduces the overall weight carried by a BA wearer and can provide a limitless supply of air, the physiological limitations of the BA wearer should be considered when airline equipment is used.

**Face mask fit testing**

If RPE is used, it must be able to provide adequate protection for individual wearers; RPE cannot protect the wearer if it leaks.

Face mask fit testing is a method of checking that a tight-fitting face piece matches the wearer's facial features and seals adequately to their face. A face mask fit test should be carried out as part of the initial selection of the RPE and it is good practice to ensure testing is repeated on a regular basis. Further detail on face mask fit testing is provided in the [Breathing apparatus foundation material](#).

Further information is contained in the Health and Safety Executive's publications:

- [Respiratory protective equipment at work: A practical guide (HSG53)](#)
- [Guidance on respiratory protective equipment (RPE) fit testing (INDG479)](#)

**Maintenance**

Maintenance is a requirement for all RPE, except for disposable (single use) RPE, and should be carried out by properly trained personnel. Thorough maintenance, examination and tests should be carried out at regular intervals in accordance with the manufacturer's instructions.

**Breathing apparatus foundation material**

The breathing apparatus foundation material provides the procedures underpinning the planning, use, and command and control of BA. It should also assist fire and rescue services with:

- Developing safe systems of work when deploying BA
• Managing BA operations
• Testing and maintenance of BA equipment
• Defining roles and responsibilities for BA
• Developing BA training
• Readiness of BA wearers
• Pre-planning for intraoperability and interoperability

For more information refer to The Foundation for breathing apparatus.

**Strategic actions**

Fire and rescue services must:

• Provide personnel with suitable and appropriate RPE that fits and protects the wearer

• Ensure that personal RPE worn simultaneously is compatible and does not negatively impact other safety measures

Fire and rescue services should:

• Specify the type of RPE required for hazards identified through risk assessments and communicate this information to personnel

• Have suitable arrangements for the provision, testing and maintenance of respiratory protective equipment

• Ensure personnel regularly undertake face mask fit testing of RPE

**Tactical actions**

Incident commanders should:

• Carry out a risk assessment before deploying personnel wearing RPE

• Ensure personnel wear the appropriate type of RPE
Consider the use of airline equipment

Hazard - Underground utility incidents

Hazard Knowledge

Underground utility incidents may be indicated by damaged or displaced covers (for example manhole or inspection covers) or paving slabs, resulting in:

- Open pits or cavities
- Exposed utilities
- Projectile hazards

Electricity

High-voltage underground cables are insulated with oil or gas under pressure. Overheating can lead to fire and an increase in the oil or gas pressure. This pressure can result in covers or paving slabs at ground level being damaged or displaced (blown-off).

These incidents may present additional hazards, such as toxic fumes spreading along cable ducting, potentially into nearby properties.

Bituminous insulation may also be damaged, resulting in exposed electrical cables and equipment. This could create a risk of electrocution to the public, responding fire and rescue service personnel or other agencies.

Gas

Gas leaks underground may also result in an explosion or fire, if ignited by an electrical fault or an above ground ignition source.

Water

Storm rain covers may be displaced due to storms, flooding or burst water mains.

Control measure - Apply situational awareness:
Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.
Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

Tactical actions

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.
The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry
Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
• Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

• Fuel distributor or supplier to the premises
• Owners of the pipelines or infrastructure
• On-site personnel and management team
• On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

• Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
• Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

• Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident

• Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)

• Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

**Control measure - Apply cordons and control for utilities or fuel**

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident](#)
command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises
Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

Sluice gate

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
**Strategic actions**

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

**Tactical actions**

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies
• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Hazard - Person entrapped by high-voltage electricity

Hazard Knowledge

The Energy Networks Association has produced Safety Information for the Fire Service. This contains information on emergency situations, including rescues, involving electricity.

A person may be entrapped by being:

• In contact with the ground, within 5m of a source of high-voltage electricity
• In a vehicle that is in contact with or surrounded by high-voltage-electricity; the vehicle’s tyres may insulate it from the ground
• On an insulated structure, such as a raised wooden platform, that is surrounded by high-voltage electricity

When a source of high-voltage electricity is in contact with the ground, there is a risk of the ground itself becoming live and conducting electricity to people and objects in the vicinity.

Electrocution may also occur if a person attempts to move from a position of safety, as, any contact with the insulated or protected position and ground at the same time will offer the electricity a path to the ground.

The highest voltage is on the ground closest to the point of contact. It gradually reduces, in concentric rings away from the point of contact. This is known as potential gradient or voltage gradient.
When walking towards or away from the point of contact, each foot can have a difference in electrical potential, resulting in one foot touching one voltage while the other is touching another voltage. The two voltages will try to equalise by flowing up one leg, through the body and down the other leg, which may be indicated by a tingling sensation.

If the ground has become live, a similar situation can occur when standing with a charged hose. The voltage differential will be between where personnel are standing and where the hose is in contact with the ground.

Control measure - Remain in place: Electricity

Control measure knowledge

If a person is within 5m of high-voltage electricity, but is insulated or protected, for example in a vehicle or on a non-conductive platform, they should be instructed to remain in place if it safe for them to do so. They should remain there until the power supply has been isolated, unless it becomes hazardous for them to do so.

Until the high-voltage supply can be isolated by the distribution network operator (DNO) or transmission operator (TO), personnel should adhere to a 10m exclusion zone from the source of high-voltage electricity.

Strategic actions

Fire and rescue services should:

- Establish arrangements with local distribution network operators (DNOs) and transmission operators (TOs), and maintain up-to-date emergency contact details in their fire control rooms

Tactical actions

Incident commanders should:

- Instruct a person who is insulated or protected from high-voltage electricity to remain
in place if it is safe for them to do so

- Request isolation of high-voltage electricity from the relevant distribution network operator (DNO) or transmission operator (TO)

- Adhere to a 10m exclusion zone until isolation has been confirmed by the relevant distribution network operator (DNO) or transmission operator (TO)

**Control measure - Instruct people to evacuate safely from high-voltage electricity**

**Control measure knowledge**

A person that is in an insulated or protected position may be forced to leave it if it becomes too hazardous for them to remain. When leaving their position, they should be instructed to jump away, ensuring they break all contact before touching the ground.

To assist people with their safe evacuation, non-conductive equipment such as rubber airbags may be provided for them to jump or step onto as they leave.

Evacuate an exclusion zone

If a person has to move within the hazard area to reach a position of safety, one of the following methods should be used to minimise the effects of the equalisation of voltages:

- Shuffle, keeping both feet close together, maintaining contact with the ground at all times
- Hop, making sure that both feet hit the ground at the same time
- Make leaping strides, so that one foot is off the ground at all times

**Strategic actions**

Fire and rescue services should:

- Establish arrangements with local distribution network operators (DNOs) and transmission operators (TOs), and maintain up-to-date emergency contact details in their fire control rooms
• Identify equipment that is constructed of a non-conductive material and communicate to relevant personnel

**Tactical actions**

Incident commanders should:

• Implement an exclusion zone of at least 10m, subject to risk assessment

• Consider providing equipment, such as rubber airbags, to assist people evacuating

• Instruct people about the safe method for evacuating an insulated or protected position

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Hazard - Luminous discharge tube (neon) signs

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**Hazard Knowledge**

These signs work using high-voltage electricity to excite a gas in the tubes. This gas will not always be neon; the tubes will more commonly contain argon gas with a small amount of mercury, which is a toxic substance. When energised, this creates a mercury vapour that can be released if the tube fails.
Figure 11: Luminous discharge tube ('neon') sign - photograph courtesy of Janet Guthrie

Typically, a luminous discharge tube sign will require a high voltage (such as 3kV) to start up, but the voltage is reduced once the light is working. If a luminous discharge tube breaks or goes out, this does not necessarily mean the electrical circuit is broken. Connections and 'jumper wires' between the tubes may still be live.

Also refer to the BRE knowledge sheets, Luminous discharge tube ('neon') signs.

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
• Any sources of renewable energy generation, such as photovoltaic panels or turbines
• The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

• Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

• Gather information to gain situational awareness about utility and fuel supplies and storage facilities

• Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity
Consider if leaving specific power systems on could be beneficial for resolving the incident.

Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders.

Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel.

**Control measure - Seek specialist advice or assistance for dealing with utilities or fuel**

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**Control measure knowledge**

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

**Gas industry**

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

**Electricity industry**
Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance
Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.
Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.

Electricity supplies
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

**Control measure - Isolate power supply to luminous discharge tube signs**

**Control measure knowledge**

Fire switch for luminous discharge tube sign - photograph courtesy of Janet Guthrie

Larger displays should have a fire switch in a prominent position; this may be located inside or
outside a building depending on the location of the luminous discharge tube sign.

**Strategic actions**

**Tactical actions**

Incident commanders should:

- Isolate the sign using the fire switch if available and accessible
- Always assume there is a high voltage (3kV)
- Request attendance of the electricity supplier or competent person where isolation is not possible
- Ensure that care is taken if any signs need to be removed, and if so consider the use of respiratory protective equipment (RPE)
- In the event of a tube failing, implement hazardous materials procedures; refer to National Operational Guidance: Hazardous materials

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Hazard - Illegal activity involving utility systems

**Hazard Knowledge**

This hazard may exist where:

- Pipes, cables or meters have been tampered with:
  - To fraudulently obtain supplies
  - For malicious purposes
- There is direct electrical wiring to doors or windows to create a booby trap
- Complex wiring is providing heat and illumination for drug laboratories or cannabis cultivation
- There has been attempted or actual theft of pipes, cables or meters

The impact of illegal activity involving utility systems may extend far wider than a single building; it could, for example,

- Affect utility systems to other buildings or surrounding infrastructure
- Disrupt train or tram services
• Cause failures in telecommunications
• Create a risk of explosion
• Cause flooding from water or sewage

**Electricity**

Control switches can indicate that the supply has been switched off, when actually it remains live. Therefore all electrical systems that may have been subject to illegal activity need to be treated with caution, until made safe by a competent person.

**Gas**

In normal situations it may be possible to isolate a domestic gas supply. However, this action should not be relied on if there is any indication that the supply system has been tampered with. Therefore all gas systems that may have been subject to illegal activity need to be treated with caution, until made safe by a competent person.

**Telecommunications**

Although illegal activity involving telecommunications cables is less likely to result in direct hazards, the impact may be far-reaching on the community.

**Water and sewerage**

In normal situations it may be possible to isolate an incoming domestic water supply. However, this may not be feasible if the water supply system or sewerage system has been tampered with; any resultant flooding may impact on other utility supplies or present a biological hazard. All water supply systems or sewerage systems that have been subject to illegal activity need to be treated with caution, until made safe by a competent person.

Control measure - Adopt defensive tactics until the utility system is isolated

Control measure knowledge

If utility systems have been tampered with it may not be possible, or it may be too hazardous, for personnel to isolate them. Assistance will be required from the relevant utility supplier or competent person to make the system safe.
If the gas supply system may have been subject to illegal activity, cordons and controls appropriate for explosive atmospheres should be applied.

In the interim, personnel should adopt defensive tactics and ensure all emergency responders are made aware of the presence of a potentially hazardous utility system.

**Strategic actions**

Fire and rescue services should:

- Establish arrangements with local utility suppliers and maintain up-to-date emergency contact details in their fire control rooms
- Consider making electrical gloves available to personnel for use at incidents involving live electricity

**Tactical actions**

Incident commanders should:

- Adopt defensive tactics until the utility system is isolated
- Inform emergency responders about the presence of a potentially hazardous utility system
- Seek specialist assistance to make the utility system safe
- Consider the appropriate use of electrical gloves, in line with service procedures
- Consider applying appropriate controls for explosive atmospheres if a gas supply system may be affected

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**Control measure - Share intelligence about illegal activity involving utility systems**
Control measure knowledge

Fire and rescue services engage in a wide range of intelligence-sharing opportunities through normal activities. They should use these to build a picture of possible properties or locations where illegal activity involving utility systems may occur.

Local intelligence can come from a number of sources, including:

- Police
- Local authorities
- Utility suppliers
- Community leaders
- Local knowledge of operational personnel
- Members of the public

During normal fire and rescue service activities, personnel may come across situations where there has been suspected illegal activity involving utility systems. These instances will need to be reported to the United Kingdom Revenue Protection Association and the police.

Strategic actions

Fire and rescue services should:

- Record and communicate risk information for sites where intelligence has been received about illegal activity involving electricity
- Consider establishing appropriate arrangements, such as memoranda of understanding, with utility suppliers for illegal activity involving utility systems

Tactical actions

Incident commanders should:

- Use local intelligence and risk information to anticipate the possibility of illegal activity involving utility systems
- Request the attendance of the police and the utility supplier if illegal activity involving utility systems is identified or suspected
Preserve evidence of illegal activity and pass this information to the police and the utility supplier

Notify the United Kingdom Revenue Protection Association if electric or gas meters have been tampered with

Hazard - Exposure to extremes of temperature

Hazard Knowledge

Extreme heat

Fire and rescue service personnel may encounter extreme heat when attending petrochemical sites and may be at risk of burns or scalds from steam and other hot pipes. The hazard increases near tanks of bitumen and heavy oils, as steam coils are used to keep these substances fluid enough to be pumped.

For information about working in environments where industrial processes produce heat, refer to National Operational Guidance: Industry.

Extreme cold

When attending incidents involving cryogenic liquids, fire and rescue service personnel may encounter extreme cold that could cause burns. Refer to the supplementary information on liquefied natural gas (LNG) and liquefied petroleum gas (LPG).

For further information on dealing with cryogenic hazards, refer to National Operational Guidance: Hazardous materials.

Control measure - Apply situational awareness: Utilities and fuel
Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities
Tactical actions

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary
information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage
companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
On-site personnel and management team
On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

**Control measure - Apply cordons and control for utilities or fuel**

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident command](#) - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - [Safe System of work: High-voltage electricity](#).

Cordon distances for gas and fuel are given in National Operational Guidance: [Hazardous](#).
Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel,
but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

![Sluice gate](image)

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Hazard - Superheated steam and hot pipes

Hazard Knowledge

Some electrical turbines that rely on steam to generate electricity have complex pipelines that may contain superheated steam as part of the power generation process.

These pipelines will be hot and present a significant burn hazard to fire and rescue service personnel.

Pipes are likely to be lagged; lagging can obscure leaks and can expose firefighters to sudden high pressures when disturbed.

Superheated steam leaks are potentially very dangerous because they are:

• Colourless
• Not visible to the naked eye (no vapour cloud visible)
• At temperatures from 200°C to 1200°C
• Capable of igniting material in close proximity to the leak
• Released at high pressure

Control measure - Apply situational awareness: Utilities and fuel
Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities
**Tactical actions**

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities
- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity
- Consider if leaving specific power systems on could be beneficial for resolving the incident
- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders
- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

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**Control measure knowledge**

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

**Gas industry**

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary
information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage
companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
• On-site personnel and management team
• On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

• Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
• Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

• Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
• Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
• Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident command - Structuring an incident](#). Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - [Safe System of work: High-voltage electricity](#).

Cordon distances for gas and fuel are given in National Operational Guidance: [Hazardous](#).
Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

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**Control measure - Isolate utility or fuel supply to the premises**

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**Control measure knowledge**

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel,
but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Gas isolation valve - photograph courtesy of Janet Guthrie

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

![Sluice gate](image)

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Control measure - Consider using thermal imaging or scanning

Control measure knowledge

Due to superheated steam not being visible to the naked eye, the use of thermal imaging cameras or scanners can help to identify the location of leaks.

For further information on their use refer to National Operational Guidance: Fires and firefighting - Consider using thermal imaging or scanning.

Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Hazard - Flammable or explosive atmospheres
Hazard Knowledge

When attending incidents within the petrochemical industry and fuel distribution network, fire and rescue service personnel may need to manage flammable or explosive atmospheres.

Some examples of these are:

Unconfined vapour cloud explosions (UVCE)

Large quantities of flammable gases or vapours in open air that are ignited and may cause deflagration with pressure waves or, less commonly, supersonic (detonation) advancement of flame fronts (e.g. ethylene vapour cloud).

Confined vapour cloud explosions (CVCE)

Flammable substances igniting in a container (e.g. process vessel) that generate pressure build-up and detonation velocities (e.g. natural gas explosions).

Boiling liquid expanding vapour explosions (BLEVE)

Caused by the failure of pressure vessels containing volatile flammable liquid and/or gases involved in fire.

Oil storage tank fire phenomena

- Steam explosions
- Boil over
- Froth over
- Slop over

For further information, refer to National Operational Guidance: Fires and firefighting.

Demolition or repair of tanks

Fire and rescue service personnel may encounter an explosion hazard from 'empty' tanks, which may contain an explosive mixture in the tank. This is because flammable vapours may be emitted when the sludge or residual contents are heated, e.g. from repair work, demolition, or radiated heat from a nearby fire.

Control measure - Apply situational awareness:
Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.
Strategic actions

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

Tactical actions

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.
The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry
Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

**Control measure - Apply cordons and control for utilities or fuel**

**Control measure knowledge**

For generic information on cordons and control, refer to National Operational Guidance: [Incident](#)
command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

**Strategic actions**

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

**Tactical actions**

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

**Control measure - Isolate utility or fuel supply to the premises**
Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.

Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
Electricity supplies

For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.
Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.

Fuel oil

Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - [Seek specialist advice or assistance for dealing with utilities or fuel](#).

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log

• Inform all personnel and other responders which utilities have been isolated and if any remain operative

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Control measure - Isolate utility or fuel supply within the national grid

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Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

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Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Control measure - Use intrinsically safe equipment

Control measure knowledge

Any equipment that is not intrinsically safe can provide an ignition source for a gas within its flammable or explosive limits. This may cause combustion or explosion. The use of intrinsically safe equipment will preclude this.

In most confined spaces, it is impossible to classify the atmosphere present. For fire and rescue service operations, intrinsically safe equipment must meet the appropriate ATEX classification for more information on ATEX see HSE guidance.

For further information on fireground radios see: Fireground radios guidance: ATEX-approved radios

Strategic actions

Fire and rescue services should:

• Ensure that communication equipment that meets the appropriate ATEX classification is available to personnel who are competent to work in confined spaces
Tactical actions

Incident commanders should:

- Use only ATEX approved equipment in confined spaces if there is a risk of an explosive atmosphere
- Use only ATEX approved equipment in flammable or explosive atmospheres
- Use only ATEX approved communications equipment when crews enter any potentially explosive atmosphere
- Use only ATEX approved equipment when crews enter any potentially flammable atmosphere

Control measure - Safe system of work: Atmospheric conditions

Control measure knowledge

The working atmosphere of some incidents may not be safe to operate in without appropriate respiratory equipment (RPE), even if the atmosphere is initially found to be respirable. Portable or fixed on-site equipment can be used to test the atmosphere, to establish if there is sufficient oxygen to support life or if there is a risk of irrespirable gases.

Atmospheric testing and monitoring should be carried out at incidents where there is potential for the atmosphere to be explosive (due to flammable gas), toxic, asphyxiating or hypoxic.

Environments can include:

- Confined spaces
- Areas where hazardous materials are present
- Areas surrounding a fire
- Post-fire operations, such as damping down
- Fire investigation sites

Testing should also be carried out if it is known that the atmosphere was previously contaminated
and subsequently ventilated, such as an underground petrochemical tank.

Fire and rescue services should consider using atmospheric testing and monitoring equipment that will test and display the:

- Oxygen level in the atmosphere
- Presence of flammable gases
- Presence of toxic gases

**Exposure limits**

Atmospheric monitoring equipment takes into account workplace exposure limits (WEL) that are produced by the Health and Safety Executive (HSE). WEL is the exposure of employees to hazardous conditions such as gases, dust and noise. The aim is to ensure that levels in the workplace are below the statutory limits. For further information refer to the Health and Safety Executive (HSE) publication, [EH40/2005 Workplace exposure limits](#).

**Testing and monitoring the atmosphere**

Before operations commence, the atmosphere should be tested. However, if there is a threat to life and it is not possible to carry out atmospheric testing in the timeframe required, immediate life-saving actions can be carried out with the use of breathing apparatus and entry control procedures.

If possible, testing should be carried out while limiting exposure to personnel. Incident commanders should consider using on-site testing equipment or using extendable equipment or lines to lower portable testing equipment inside the hazard area and withdrawing personnel. It may be necessary to request specialist advice or assistance for testing and monitoring atmospheric conditions.

Ideally the atmosphere of every hazard area should be tested prior to entering. To ensure the test is effective personnel should consider:

- Remaining still, as this can assist with:
  - Allowing adequate time for equipment to sample, test and display the results
  - Preventing slips, trips and falls if personnel are on uneven or unstable ground, especially when reading the equipment
  - Sampling at various levels due to various densities of gases

Regular monitoring is necessary to identify any changes in the atmosphere; this can be achieved actively or passively. Active monitoring is where personnel use portable detectors, often attached to themselves to monitor the atmosphere they are currently exposed to. Passive monitoring is used to monitor a specific area, such as portable detectors positioned temporarily in one place or fixed...
on-site equipment.

Atmospheric testing should be carried out by competent personnel who are aware of the limitations of the equipment in use, ensuring the results are regularly recorded.

**Ventilation**

Ventilation may help to improve conditions for personnel and increase the potential for casualty survival.

The hazard area should be assessed to determine if ventilation would be appropriate and successful. The surrounding infrastructure and what will be released should be taken into consideration, as flammable gases may ignite if there is an ignition source near to the outlet vent.

Ventilation can be achieved naturally, such as by opening windows or inspection holes, or through forced ventilation, such as the use of mechanical fans. The use of fans with combustion engines should take into account their exhaust gases. For further information refer to Consider employing tactical ventilation.

Gas purging of spaces using inert gases is a ventilation technique performed in industry, often within confined spaces, to mitigate the risk of explosive atmospheres. This would be inappropriate if casualties are inside the confined space.

**Removal of residues or materials**

The removal of residues or materials, such as sludge or chemicals, may reduce the quantity of toxic or asphyxiate gases being released. However, this activity should be subject to a risk assessment as it may release more gases.

**Monitoring equipment alarm actuation**

Atmospheric monitoring equipment may detect different gases and levels of gases. Personnel should understand how the monitoring equipment functions and take appropriate action if it actuates. This can include the need for all personnel within the hazard area to withdraw to a safe area and review why the alarm actuated. Personnel should brief the incident commander, providing details of time, location and the actions being carried out when the alarm actuated.

**Limited capability of atmospheric monitoring equipment**

Most atmospheric monitoring equipment is calibrated to detect specific gases, as detailed in the manufacturer's specification. This means that the equipment has limitations for detecting other gases that may be in the area. Some detectors can be changed; however, doing so requires trained personnel and specialist equipment.
If the substance is unknown, the use of a regional detection, identification and monitoring (DIM) officer or other specialist advisers can be requested through National Resilience Fire Control (NRFC). Due to the limited number of DIM suites and their geographical location, incident commanders should be aware that their attendance may be delayed.

**Strategic actions**

Fire and rescue services should:

- Enable access to suitable atmospheric monitoring equipment that can be used for multiple applications
- Consider providing equipment to ventilate confined spaces

**Tactical actions**

Incident commanders should:

- Carry out testing and monitoring of the atmosphere and use the results to inform the incident plan
- Consider requesting specialist advice or assistance for atmospheric detection, identification and monitoring
- Consider ventilation to improve internal conditions
- Isolate or limit all ignition sources before ventilating if flammable gases may be present
- Identify the presence of materials that may release gases in a confined space, especially if disturbed
- Consider the controlled removal of materials, to reduce the quantity of gases being released
Control measure - Control ignition sources

Control measure knowledge

Refer to National Operational Guidance: Hazardous materials.

Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Hazard - Pipeline failure

Hazard Knowledge

General

The utility industry uses pipelines extensively to transport products around their sites and for distribution around the UK. Pipelines are considered a safe mode of transport for conveying hazardous substances and are often safer than alternative methods, for example by road or rail. Refer to Health and Safety Executive’s Further guidance on emergency plans for major accident hazard pipelines.

Fire and rescue service personnel may need to work in close proximity to pipelines while attending incidents at utility and fuel sites.

Other pipelines transport fuels, chemicals, other industrial products and water; these include over 1,000km of Major Accident Hazard Pipelines (MAHPs). Special duties apply to MAHP operators, including a notification regime, production of a major accident prevention document and emergency plan arrangements.
Pipelines buried underground have marker posts and indicators wherever they pass under roads or rail lines. These can be seen in all rural areas and are visible from the air by way of aerial marker posts. See the Linewatch website for typical pipeline markers and examples of marker posts and signs.

While it may be possible to identify the routes of buried pipelines, there is likely to be some delay in the arrival of a pipeline specialist or other specialist at remote rural locations.

Natural gas pipelines

Natural gas distribution in the UK consists of high-pressure gas mains. More than 95% of these are underground, or underwater to supply Northern Ireland.

Pipeline networks make up the UK gas transmission and distribution system for industrial and domestic consumers. These include:

- 278,000km of distribution mains
- 7,500km of high-pressure National Transmission System (NTS) pipelines operating at up to 85 bar
- 14,500km of high-pressure Local Transmission System (LTS) pipelines operating at up to 38 bar

For further information see the Health and Safety Executive's Onshore gas and pipelines sector strategy 2014-17.

High-pressure gas leaks will need to be dealt with by the appropriate gas utility; isolating leaks is not a straightforward task. Gas supplies cannot be isolated quickly and close liaison with the gas supplier will be required.

High-pressure gas is supplied at above 7 bar, and in the UK pressures can be up to 85 bar. This type of pressure can result in significant surface disruption when a leak occurs, and a resulting gas cloud will need to be mapped and monitored.

If there is a serious gas leak in close proximity to an airport, the airport and the Civil Aviation Authority need to be informed of the gas cloud because of the potential effect on aircraft.

Typical causes of pipeline failure

There are occasions when pipeline failure results in loss of containment or accidental release of the pipeline contents, including:

- Impact on the pipelines by construction workers
- Failure of the pipes through stress fractures and corrosion
- Unauthorised drilling into the pipelines for fuel theft
Impact from external sources such as:
- Aircraft accidents
- Pressure waves caused by explosions
- Structural collapse

Consequences of pipeline failure

Damaged pipelines can result in:
- Fire or explosion hazards
- Release of gases and liquids under high pressure
- Excessive noise
- Impact hazards
- Environmental damage - fuel entering watercourses, etc.
- Flooding

Undamaged pipelines also create problems such as:
- Difficult access and egress
- Extremes of temperature
- Working at height

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:
- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
• The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to [Isolation of uninterruptible power supply systems or standby generators](#).

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

• Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

• Gather information to gain situational awareness about utility and fuel supplies and storage facilities

• Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

• Consider if leaving specific power systems on could be beneficial for resolving the incident
• Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

• Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

Control measure - Seek specialist advice or assistance for dealing with utilities or fuel

Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

• Gas distributor for the area
• Gas supplier to the premises
• Gas industry helpline
• On-site personnel and management team
• Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation
can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - **Isolate utility or fuel supply to the premises**, and control measure - **Isolate utility or fuel supply within the national grid**.

Seek specialist advice or assistance from:

- Distribution network operator
- Electricity supplier to the premises
- Relevant high-voltage electricity network
- On-site personnel and management team
- Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

- Water distributor for the area
- Water supplier to the premises
- Sewerage company
- On-site personnel and management team
- Responsible person
Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

- Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
- Development of oil or gas fields, including constructing the well head and production facilities

Downstream

This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance
Tactical actions

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems

Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.
Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances for the utilities or fuel present
- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

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Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit.
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

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Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection.

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - [Seek specialist advice or assistance for dealing with utilities or fuel](#).

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals.

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible.

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log.

• Inform all personnel and other responders which utilities have been isolated and if any remain operative.

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**Control measure - Isolate utility or fuel supply within the national grid**

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**Control measure knowledge**

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

**Strategic actions**

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

**Tactical actions**

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

**Control measure - Isolate pipelines**

**Control measure knowledge**

Isolating the pipeline is an action that will need to be carried out by, or under the close supervision of, pipeline specialists with a full understanding of the consequences of those actions. For example:

• It may be better to keep pipelines flowing to prevent their contents overheating
• Shutting down the supply in pipelines could have a major effect on processes and equipment, both downstream and upstream of the incident
• It may be better not to extinguish fires because an unignited gas or vapour cloud may be a greater hazard
• Depressurisation of pipelines can take some considerable time
• The edges of a vapour cloud are more prone to ignition because of the gas and air mix

Refer to the control measure of Isolate utility or fuel supply within the national grid.

**Strategic actions**

Fire and rescue services should:

• Consider recording locations of pipelines that are located in their area
Tactical actions

Incident commanders should:

- Request specialist advice on an urgent basis

Control measure - Implement hazardous materials procedures

Control measure knowledge


Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Hazard - Pressurised storage vessels

Hazard Knowledge

Fire and rescue service personnel attending incidents at utility or fuel sites may need to manage pressurised storage vessels.

The utility industries will have, as part of their processes, a number of different types and sizes of pressurised containers holding liquids and gases under pressure.

Examples of vessels will be:
Liquefied petroleum gas (LPG) bulk storage and small vessels
Liquefied natural gas (LNG) cryogenic storage
Oil
Petroleum spirit, including numerous products within the petrochemical industry

Control measure - Apply situational awareness: Utilities and fuel

Control measure knowledge

Situational awareness concerns the perception and understanding of a situation, along with anticipating how the situation may develop in the near future. It should assist the fire and rescue service in making safe and informed decisions.

Situational awareness should be gained by gathering information about:

- What utility or fuel supplies or storage facilities are involved
- Which utility or fuel needs to be managed and controlled
- The consequences of isolating and controlling utility or fuel supplies
- Isolation points, which may require obtaining information about utilities or fuel from the responsible person for the site
- Any sources of renewable energy generation, such as photovoltaic panels or turbines
- The presence of any uninterruptible power supplies (UPS) or standby generators and what they are used to power

Any decision to isolate utility or fuel supplies should consider the implications on critical systems and business continuity. In some circumstances, leaving specific power systems on could be beneficial for resolving the incident.

Even if a site has the benefits of an uninterruptible power supply (UPS) or standby generator, these facilities have limitations in their use. For more information refer to Isolation of uninterruptible power supply systems or standby generators.

If any utility or fuel supplies cannot be isolated, or a decision has been made not to isolate them, this should be communicated to personnel and other emergency responders.

Depending on the size and complexity of the incident, other agencies and utility response teams may attend, with effective joint decision-making and response being critical for safety on the
incident ground.

Situational awareness may be supported by joint training and exercises, to improve familiarisation relating to utility and fuel supplies and storage facilities.

**Strategic actions**

Fire and rescue services should:

- Participate in joint training and exercises to improve the familiarisation of personnel with utility and fuel supplies and storage facilities

**Tactical actions**

Incident commanders should:

- Gather information to gain situational awareness about utility and fuel supplies and storage facilities

- Before isolating the utility or fuel supplies, consider the impact on any critical systems or business continuity

- Consider if leaving specific power systems on could be beneficial for resolving the incident

- Communicate the details of any utility or fuel supplies that are not isolated to personnel and other emergency responders

- Work with other agencies and response teams if required for effective joint decision-making and response to an incident involving utilities or fuel

**Control measure - Seek specialist advice or assistance for dealing with utilities or fuel**
Control measure knowledge

Specialist advice or assistance, in-service or external, may be needed to deal with an incident involving utilities or fuel. This will give the fire and rescue service access to a range of information sources and expertise.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of incident.

Gas industry

In the UK, gas leaves the transmission system and enters the distribution networks at high pressure. It is then transported through a number of reducing pressure tiers until it is finally delivered to consumers. There are regional distribution networks - refer to the supplementary information for the gas industry, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

Seek specialist advice or assistance from:

- Gas distributor for the area
- Gas supplier to the premises
- Gas industry helpline
- On-site personnel and management team
- Responsible person

Electricity industry

Electricity, in the main, is generated by large power stations. It is also produced by renewable energy facilities such as hydroelectricity sites, wind turbines and solar panels. Electricity generation can be described as microgeneration or mass generation.

Microgeneration refers to small wind turbines, solar panels, etc., whereas mass generation refers to large generating sites, such as power stations using fossil fuels or nuclear power.

Distribution network operators (DNOs) own and operate the towers and cables that deliver electricity from the national transmission network to homes and businesses. Electricity suppliers sell electricity to consumers.

Specialist advice or assistance may be required to isolate equipment; this should only be carried out by a trained and competent person. See control measure - Isolate utility or fuel supply to the premises, and control measure - Isolate utility or fuel supply within the national grid.

Seek specialist advice or assistance from:
• Distribution network operator
• Electricity supplier to the premises
• Relevant high-voltage electricity network
• On-site personnel and management team
• Responsible person

Water industry

Water supplies and sanitation in the UK are provided by a number of water and sewerage companies. Refer to the supplementary information for further detail.

Some consumers are supplied with water from private reservoirs or water supplies, such as springs.

Water and wastewater services can be supplied by water-only companies and water and sewerage companies. Where water-only companies are the clean water supplier, sewerage services will be provided by a different service supplier (for example, water may be provided by Affinity and sewerage by Thames Water).

It is important to make contact with both companies if both services are at risk of being affected.

Seek specialist advice or assistance from:

• Water distributor for the area
• Water supplier to the premises
• Sewerage company
• On-site personnel and management team
• Responsible person

Petrochemical industry and fuel

Each year, many millions of tonnes of petroleum products are moved around the UK. The oil, gas, refining and petrochemical industries fall into either the upstream or downstream category.

Upstream

This relates to obtaining crude oil and gas from natural resources and includes:

• Exploration of potential new oil and gas reserves using seismic and geophysical surveys and prospective drilling
• Development of oil or gas fields, including constructing the well head and production facilities

Downstream
This relates to processing, marketing and distributing crude oil into consumer products. It includes:

- Transporting crude oil and gas by:
  - Pumping systems
  - Pipeline networks
  - Rail
  - Ship
  - Road
- Liquefied natural gas systems, including liquefaction and regasification sites, oil refineries, petrochemical sites and gas processing

Seek specialist advice or assistance from:

- Fuel distributor or supplier to the premises
- Owners of the pipelines or infrastructure
- On-site personnel and management team
- On-site firefighting teams (if available)

**Strategic actions**

Fire and rescue services should:

- Develop arrangements and procedures with identified sources of specialist advice or assistance for dealing with utility or fuel incidents
- Maintain the details of any tactical adviser (TacAd) or subject matter expert (SME) for utility or fuel incidents and know how to request their attendance

**Tactical actions**

Incident commanders should:

- Consider requesting specialist advice or assistance based on the extent and urgency of the utility or fuel incident
- Consider the timely attendance of a tactical adviser (TacAd) or subject matter expert (SME)
- Liaise with the owner or occupier, on-site engineers or maintenance engineers regarding power systems
Control measure - Apply cordons and control for utilities or fuel

Control measure knowledge

For generic information on cordons and control, refer to National Operational Guidance: Incident command - Structuring an incident.

Numerous cordon distances are appropriate for electricity, gas and fuel. Guidance about distances relevant to electrical sources are included in the control measure - Safe System of work: High-voltage electricity.

Cordon distances for gas and fuel are given in National Operational Guidance: Hazardous materials.

Pre-planning is a key part of determining safe distances for different scenarios involving utility or fuel supplies, providing responding fire and rescue service personnel with accurate and relevant information. Depending on the nature of the utility or fuel incident, specialist advice from utility suppliers and ongoing liaison with on-site specialists, where available, will be required to ensure cordons are suitable and adequate.

In the petrochemical industry, cordon distances can be assessed by calculating the heat flux for different petrochemical products and storage facilities. These calculations are normally undertaken by consultants and experts in the field as part of pre-planning risk assessments and to identify suitable rendezvous points (RVPs), holding points, etc.

Strategic actions

Fire and rescue services should:

- Ensure that Site-Specific Risk Information (SSRI) identifies locations at utility and fuel sites that are likely to provide suitable cover from on-site hazards; this may be a combination of distance and/or substantial cover

Tactical actions

Incident commanders should:

- Implement cordon control to maintain the appropriate cordons or safe approach distances
for the utilities or fuel present

- Identify suitable cover from hazards at utility and fuel sites

Control measure - Isolate utility or fuel supply to the premises

Control measure knowledge

Domestic and commercial gas, electricity, water and oil supplies to premises can ordinarily be isolated at the intake point in the building or in meter boxes outside the building.

This level of isolation can usually be carried out by responding fire and rescue service personnel, but assistance from the utility company may be required if supplies need to be isolated in the street.

Gas supplies

Gas supplies into small premises will be controlled by a clockwise quarter-turn on a gas supply pipe, which will be located on the supply side of the meter.

In commercial kitchens, there may be an emergency isolator, located near the kitchen exit..
Liquefied petroleum gas (LPG)

Where no mains gas is available, small gas tanks can be provided above or below ground level; the supply line to the premises will be fitted with an isolation control facility, as above. LPG in smaller cylinders can also be used; these are isolated by a control valve on top of each cylinder.
For more information on the safe management of electricity supplies, refer to the hazard - Electricity and the supplementary information for domestic supply.

Water supplies

Stopcocks in the property, or control valves in the street, can isolate a water main for domestic or commercial premises.

Fire and rescue service personnel can usually isolate water supplies but may need to request assistance from the water supplier.

Sewerage systems

Fire and rescue service personnel may need to enter sewerage systems to deal with operational incidents.

'Sewer' is a generic term for pipework, usually subsurface, that carries foul water, i.e. domestic, industrial and other waste. The size of sewers can range from a small, household 150mm pipe to a tunnel large enough for a person to stand in.

Many sewers also carry surface water from roads; more recently a twin-pipe system has been used to ensure sewerage works are not overloaded during periods of heavy rain.

Normally, sewerage systems cannot be isolated as they are open vented and gravity fed systems; supply cannot therefore be easily diverted or shut down. However, there may be sluice gates that can be closed to assist with controlling or altering sewage flows.

Sluice gates are physical barriers that are usually operated automatically by fluid pressure or controlled remotely for flood control to prevent backwash. They are intended to direct or divert flow, usually at tunnel intersections, and will be under the direct control of the sewage or wastewater undertaker.
Domestic and commercial premises may use fuel oil for boiler systems and heating. These fuel storage facilities will have an isolating control valve between the tank and the premises.
Strategic actions

Fire and rescue services should:

- Liaise with local utility supply companies and maintain up-to-date emergency contact details in their fire control rooms
- Ensure that Site-Specific Risk Information (SSRI) contains details of utility shut-off facilities in commercial premises

Tactical actions

Incident commanders should:

- Determine which utilities are involved in the incident
• Isolate any utilities that may affect the incident or crew safety, and secure against reconnection.

• Consider seeking specialist advice or assistance for managing and controlling utility supplies to larger premises, or where isolating supply is problematic. Refer to control measure - Seek specialist advice or assistance for dealing with utilities or fuel.

• Consider the consequence and impact of shutting off utility supplies for larger premises, such as schools or hospitals.

• Request the attendance of utility providers to isolate incoming supplies if local isolation is not possible.

• Record and time stamp the decision to isolate utilities in the analytical risk assessment and decision log.

• Inform all personnel and other responders which utilities have been isolated and if any remain operative.

Control measure - Isolate utility or fuel supply within the national grid

Control measure knowledge

The decision to isolate high-voltage electricity supplies, high-pressure gas mains, large trunk mains water supplies and fuel or other pipelines will need to be made in close consultation with the supplier. This will take into consideration the consequences of such actions to the community both downstream and upstream of the incident.

Fire and rescue services cannot isolate these types of utility or fuel supplies. This can only be achieved by asking the appropriate utility or fuel supplier to isolate the supply. However, the request may take a considerable amount of time to achieve.

Strategic actions

Fire and rescue services should:
• Maintain a directory of emergency contact details for local utility and fuel supply companies

• Consider adopting memoranda of understanding (MoU) with their utility and fuel suppliers to improve joint working at emergency incidents

Tactical actions

Incident commanders should:

• Request assistance from the service supplier to isolate the utility or fuel supply from the national grid
• Consider the consequences of isolating utility or fuel supplies

Control measure - Implement hazardous materials procedures

Control measure knowledge


Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.

Hazard - Water holding facilities
Hazard Knowledge

Personnel attending incidents may need to work near to water holding facilities including:

- Open vats
- Tanks
- Pits
- Bunds
- Rivers
- Reservoirs

Working near water holding facilities presents similar hazards to working near water. Therefore, the guidance contained in National Operational Guidance: Water rescue and flooding may need to be applied.

Control measure - Identify and control the hazard area around a water holding facility

Control measure knowledge

An appropriate hazard area around a water holding facility should be identified and controlled. Access into the hazard area should be prevented, or limited to essential tasks with only the minimum number of personnel.

For further information, including strategic actions and tactical actions, refer to National Operational Guidance: Incident command - Structuring an incident.

Strategic actions

Tactical actions

There are no tactical actions associated with this control measure.
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