

Additional support from specialist fire appliances adds to the cost of fire suppression

Greater Manchester F&RS

Introduction

There can be little doubt that the occurrence of fires in recycling centres is a significant problem for communities, the fire and rescue service, the environment and insurers. Casual monitoring of the national press suggests a serious fire in such locations is probably a daily occurrence. In fact in 2013, more than 230 fires in recycling centres were recorded - more than 4 per week - and of course, these are only the fires to which the fire and rescue services were called.

The problem is perhaps as much the scale of some of these fires as their frequency. A number have burnt for days and some for even weeks and have created significant logistical problems for communities. A fire at Smethwick, for example, in which 100,000 tonnes of recycled plastic was involved, required the attendance of 39 fire appliances and 200 firefighters over 200 hours of fire fighting activity. This same fire consumed 14 million litres of water simply to contain it and released an estimated 19,000 tonnes of carbon into the atmosphere.

One of the problems with current UK fire legislation - and more specifically, with the fire elements of building regulations in England & Wales is that these are solely concerned with matters relating to life safety. Thus, where there is no historic evidence of fire-related fatalities or injuries, there tends to be little requirement beyond ensuring that the occupants of a structure can escape safely and that neighbouring buildings are not put at risk from fire spread. This is the same legislation which allows single storey warehouses with a 20,000m² footprint (equivalent to approximately 4 x soccer pitches) to be constructed without any form of automatic fire suppression systems¹.

So, given that people do not die or suffer injury in fires in recycling centres it's clear that concerns about these fires can only be alleviated by the intervention of the Environment Agency or the fire authority for the area. There is

¹ By comparison, in the rest of Europe, warehouses without fire suppression are limited. Maximum sizes range from 1000m² in the Netherlands through to 5000m² in Belgium.

evidence that such intervention can be effective with a prosecution in Derbyshire which resulted in the facility being closed and the manager imprisoned and barred from future employment as a director.

Perhaps the only encouraging aspects of this litany of fire and destruction are the instances where enlightened operators have taken the decision to install automatic fire suppression systems and where such systems have successfully operated and significantly minimised both the damage, the need for fire service intervention and the downtime which follows so many fires.

Fire Safety Management & Guidance

At the time of writing, new guidance for the management of fire safety is being prepared by a consortium of owners, operators, insurers, regulators and the fire service. This will supplement the existing Environment Agency guidance given in TGN 7.01. Other useful sources of advice include insurers, many of whom provide guidance for their clients and from CFFPA Europe².



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As with all workplaces, it is essential for the operator or owner of a recycling site to manage fire safety in a structured manner:

- Develop and issue a written fire safety policy. Effective internal mechanisms should exist to ensure that the policy is properly implemented and covers not only the normal operating regime of the location but take into account special or occasional events.
- Undertake a fire risk assessment (FRA) and review it regularly and in the event that any material fact changes - for example, if you start accepting a different class of material.

2 Confederation of Fire Protection Associations - Europe: European Guideline: Treatment and storage of waste and combustible secondary raw materials: http://www.cffpa-e.eu/wp-content/uploads/2013/01/CFPA_E_Guideline_No_32_2014_F1.pdf



London Fire Brigade

- Take steps to eliminate or reduce any hazards disclosed by the FRA.
- Ensure that a single person is made responsible for all fire safety matters and that everyone on site knows whom this is.
- Each property should compile a fire safety manual setting out its strategy and detailing its plans in case of fire and as a basis for training. Locations should also maintain a logbook to record all fire-related events such as training, drills, inspections and equipment maintenance.
- Upgrade and maintain both passive (fire separation, construction etc) and active fire safety measures (detection and suppression) as necessary.
- A systematic and effective training programme should be introduced to ensure that all staff know how to minimise fire risks, how to raise the alarm in case of fire and to provide enough trained staff to tackle incipient fires quickly. 'Hands-on' training with portable fire equipment (including hose reels if fitted) should be provided for any staff member who is likely to encounter a fire.
- Put in place effective precautions to manage contractors and maintenance work and in particular, to control all hot work.
- Set up regular liaison meetings with the local fire and rescue service and, in the case of larger sites, consider inviting personnel from the nearest fire stations to visit the site and familiarise themselves with its access roads, layout and equipment. Ensure that, where available, a copy of the fire and rescue service's 'tactical plan' for the site is obtained and understood.



Fighting fires in waste management premises is often long drawn out

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- Ensure that the risk of arson (fire setting) is considered and appropriate security precautions are in place to prevent intrusion.
- Consider the need for a business continuity plan.

Fire Fighting

Fighting fires is acknowledged as a dirty and dangerous activity and fighting fires in recycling centres is no exception. Anything that facilitates a swift and effective response will provide significant benefits in terms of reducing the damage on site, reducing the environmental impact of a fire, reducing the volume of water consumed and, most importantly minimising the risk of injury to firefighters.

The most effective way of dealing with any fire is rapid intervention; to attack it in its earliest stages. Not only does this minimise the damage caused by heat and smoke but also the collateral damage caused by water. It is a well established fact that the application of water from a sprinkler system on to a developing fire two or three minutes after it starts uses up to 90% less water than will be applied by the fire service when they arrive. Another significant benefit from early suppression is a reduction in the volume of fire water run-off which in the quantities likely from fire and rescue service intervention is an environmental threat which the Environment Agency takes seriously.

The options for fire fighting equipment are:

Portable fire extinguishers: To be used by site operatives on small or incipient fires. Portables are most effective in trained hands. The type of extinguisher will depend on the primary fire hazard present, but water or

waterspray is most effective on normal combustibles such as paper, plastics and rubber.

Larger wheeled extinguishers: Common in power stations and refineries, these larger capacity (typically 120 litres/80kg) units can be very effective on fires in outdoor storage. Trolleys usually contain a foam/water mixture but powder units are available. More recent developments include wheeled watermist extinguishers which when used by trained staff are very effective in small - medium sized fires. Watermist back-packs are also available but should only be used by specially trained staff.

Fire hose reels: These used to be very common in most industrial and commercial properties and are available in 19mm or 25mm diameters. Hose reels should only be used by staff specifically trained in their use. Water applied through hoses in the form of a spray or fog will reduce the amount of fire-water run-off and hence minimise the risks of pollution and minimise the cost of water treatment.

Water supplies: Where the entrance to a site is more than 90m from an existing fire hydrant, additional private hydrants may be necessary. Alternatively, operators should consider installing a charged static water tank of at least 45,000 litres capacity with suitable connections for fire & rescue service equipment³. On large recycling sites it is worth considering the provision of an internal fire water supply with its own pumps feeding a fire main through which fire hydrants are supplied. The same fire main can be used to feed fire

3 See Approved Document B Vol 2 Section 15 particularly for buildings with a compartment more than 280m².



In the absence of automatic fire suppression, fire fighters have no alternative but to make a close approach

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suppression systems with the agreement of insurers. Sizing of the water supplies, pumps and the fire main is a specialist activity and advice from a competent source is essential.

Fixed manual systems: These consist of pipework supplying open deluge/waterspray projectors (nozzles) installed on the walls in (for example) the waste reception area supplied with water from a breeching inlet connection (fire service inlet). This type of installation would not need a fixed water supply such as a public fire hydrant and would enable the FRS to apply water/foam directly into the waste which is burning. For such an option to be viable, there would need to be an available water supply a public fire hydrant (on or off site) within 100 metres and suitable hardstanding for a fire appliance (see Water Supplies).

Deluge/waterspray system – as above, but directly connected to a suitable water supply (fire main, pumped water storage tank etc). Systems can either be manual or automatic (if automatic, the use of heat detection rather than smoke sensors will reduce the possibility of spurious or false activations). The primary difference between a deluge system and a sprinkler system is that in the former, water is applied from all heads simultaneously whereas in sprinkler systems only the heads in the immediate area of the fire will open. Deluge systems will be most useful for protecting specific items of plant and machinery rather than large areas.

Water monitors/cannon: Fixed or oscillating monitors can be located to cover outdoor storage and, when supplied with water from an internal fire main will provide extensive wetting of the outer surfaces of burning stacks. However, care should be taken when applying water at high pressure in a solid stream, as this may result in the waste on fire being spread. Foam concentrate may be injected into the fire water stream to provide enhanced penetration of stacks.

Sprinkler systems: Will probably provide the optimum level of protection inside buildings and structures, including covering storage areas, sorting areas and provide optimum levels of protection

over conveyors and hoppers. Foam additives which can be injected into sprinkler systems may also be considered for sites accepting high volumes of plastics or other higher risk wastes. The use of foam as a wetting agent will also reduce the volume of water needed to fight a fire.

Watermist systems: In the context of recycling plants, watermist is most likely to be effective when utilised to protect plant and machinery rather than open spaces.

Smoke ventilation: One potential problem with fighting fire in enclosed reception areas is smoke and experience suggests that most waste fires generate very large volumes of toxic smoke. This will obscure the seat of the fire and make it difficult for the fire service to direct water onto this. Subject to your FRA assessment, consideration could be given to the use of passive or automatic smoke vents in the roof over reception areas – possibly in conjunction with some form of smoke barrier such as a downstand or smoke curtain. However, such vents can cause interaction problems with some fire detection and suppression systems resulting in a delay in activation – specialist advice on this issue should be sought.



Protection of elevated conveyors is essential and provides enhanced business continuity provision

UEB

Special problems

There is increasing interest in waste-derived fuel for the generation of electricity and this effectively means that some recycling centres contain small power stations - with all the hazards that implies from steam or combustion turbines, large volumes of hot lubricating oil, oil-filled transformers and rotating machinery. It is BAFSA's views that the hazards of burning waste-derived fuels in generating plants can be countered by following the advice in this BIF.

There are no specific UK or European standards or regulations in respect of the fire protection which should be provided for power generation sites. The best sources of guidance for this will be from insurers or from the US National Fire Protection



Large and expensive mechanical handling plant can only be protected by an automatic fire suppression system

ULP

Association's Code of Practice NFPA 950:2010.⁴ FM Global, an international insurer also publishes useful data sheets on fire protection of turbines and related power generation equipment⁵.

For specialist storage systems, the selection of the optimum levels of fire suppression will depend on the specific situation. For example, in the case of silos storing wood chips or pellets great care should be taken that the way in which water applied does not generate a solid mass of material which could shelter a fire generating a very dangerous situation for firefighters. Watermist or a gas inerting system may be more appropriate in such case cases. This is one area where specialist advice from your insurer the fire service or other competent source of advice is essential.

Systems which generate or move large amounts of dust may need to be provided with explosion suppression systems - usually based on dry powder. Specialist advice should be sought in this case. Bag filtration systems and cooling towers and related plant should also be considered to be at high risk and a fire suppression provided as indicated by the FRA.

Standards and Third Party Certification

The utilisation of British and European (CEN) standards is essential when procuring fire protection systems. By purchasing equipment which is designed and installed in accordance with

such standards, the owner of a site can demonstrate that he or she has effectively discharged any statutory duty in this respect.

At the same time, utilising the services of an installer who is subject to a third party certification process and who will install equipment which has itself been tested independently and certificated will demonstrate the highest standards of care in complying with the responsibilities of a dutyholder. For more information on third party certification refer to BAFSA Information File No 20⁶.

Specific Standards

Portable extinguishers should be designed and manufactured to BS EN 3 and installed and maintained in accordance with BS 5306 Part 8.

Sprinkler systems where installed, should be designed, installed, commissioned and maintained in accordance with an appropriate standard. At present, in the UK this would be one of the following:

- BS EN 12845⁷
- FM Global Datasheets 2.0 Installation Guidelines for Automatic Sprinklers⁸
- NFPA 13⁹
- CEA 4001¹⁰

Note that systems being installed to satisfy UK insurers' conditions may also have to comply with the LPC Sprinkler Rules for Automatic Sprinkler Installations which incorporate the contents of BS EN 12845 together with additional Technical Bulletins¹¹.

Note that in certain circumstances, for example, where there is a very high roof and a dry sprinkler system, the design requirements set out in BS EN 12845 for non-storage hydraulic criteria and choice of sprinkler heads might not be adequate or appropriate. In such cases, specialised insurance input is essential.

Watermist systems should be installed to BS 8489 - note that Part 1 of this standard requires that all such systems should be designed in accordance with the tests specified in Parts 2-7 or subject to an independent test for the specific occupancy. Alternatively, systems designed to EN TS 14972 or FM Global data sheets may be called for.

6 <http://www.bafsa.org.uk/pdfs/publications/2/00000092.pdf>

7 Some insurers may request the use of other standards such as NFPA 13 or the FM Global datasheets.

8 <http://www.fmglobal.com/page.aspx?id=04010200>

9 <http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=13>

10 <http://www.insuranceurope.eu/publications/1276/75/Sprinkler-Systems-Planning-and-Installation-CEA-4001?cntnt01hideAllFilters=1>

11 <https://www.thefpa.co.uk/membersarea/shop/details.asp?id=47&Blue=True>

4 NFPA 850:2010 Recommended Practice for Fire Protection for Electric Generating Plants. Chapter 9 covers the use of WDF and biomass.

5 <http://www.fmglobal.com/FMGlobalRegistration/Register.aspx?action=new>



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Deluge/waterspray systems should be designed to NFPA 15 or EN DD TS 14816.

Other components and equipment: hydrants, hoses and fire service inlets should be fitted with instantaneous couplings to BS 336, but above ground hydrants used in the UK tend to be of US manufacture so will normally comply with ANSI C503 (wet barrel) or C502 (dry barrel). Hose reels should be manufactured to BS EN 671-1 but their design and installation should follow BS 5301 Part 1 - which also covers foam inlets and fire service connections. The standard for wet and dry risers is presently being revised. Where no specific BS or EN standard exists then equipment with a UL or FM approval should be specified.

The Proof

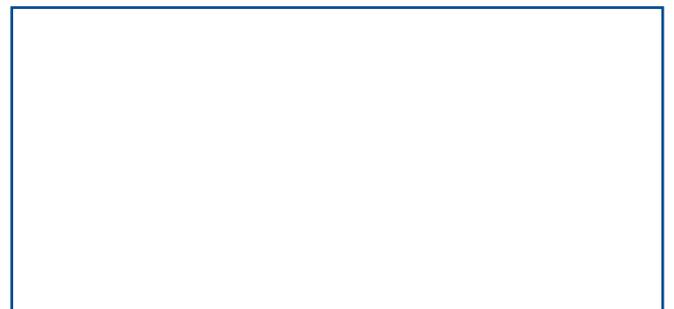
Some far sighted and enlightened operators of recycling operations have in fact installed fire suppression systems in their plants and in 2013, successful actuations of sprinkler systems prevented serious damage to a wood pellet plant in Bridgend, recycling plants in Stockport and Shropshire and a paper recycling plant on Deeside. A major fire was averted in March 2014 in a Westbury, Wiltshire, plant. In the latter case, the fire service said: "The sprinkler system saved the day - a number of sprinkler heads were operating, containing the fire to one area". All of these protected plants were back in business

almost immediately with little or no damage to the structures and equipment. Is it any wonder that some insurers now insist on fire suppression in recycling plants as a condition of providing insurance cover?

Conclusions

While recycling is an essential part of the UK's economy and critical in enabling the country to comply with its international obligations to reduce the volume of refuse going to landfill, proper management of centres receiving, processing and converting waste is essential. The number of serious fires in such premises over the past five years demonstrates the need for a re-think in the design, construction and operation of such centres and this must include the provision of modern automatic fire protection and suppression systems where necessary.

Presented by



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