
Fires in Waste Management Facilities
Peter Buckley (GMFRS)

Overview

- Summary of the problem.
- Fire risks associated with waste industry
- Experiences of GMFRS and UK FRS.
- Regulatory powers, legislation and guidance.
- Partnership working.
- Ongoing work

Summary of the problem

- Over 300 fires a year
- 60% chance of fire in any waste facility
- What are the costs?

  - Societal
  - Local Authorities
  - Business interruption
  - Environment
  - Fire and Rescue Service

Failing business model

Poor EMS

Waste accumulation

Regulatory limitations

Market forces

External sources

Self-heating

Plant/machinery

Human factors

Chemical reaction

Inaccurate/unavailable site plans

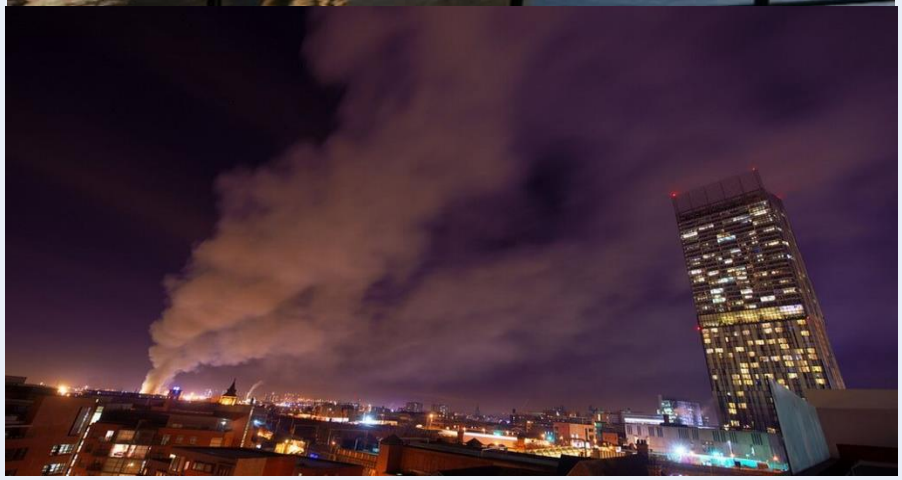
Delayed / ineffective response

Inadequate waste segregation / separation

Inadequate fire detection / suppress

Junction 25, Bredbury

Duncan Street, Salford



- 2nd March 2014
- 30,000 bales of RDF
- 100m x 70m x 20m
- 200 appliances
- Site constraint
- Tactics

Jayplas Recycling, Smethwick

- 100,000 tonnes waste
- 200 Firefighters
- 39 Fire Engines
- 14 million gallons of water
- 19,000 tonnes Carbon Dioxide released
- 10 Firefighters injured

Regulatory powers and guidance

- Local enactments (GM Act 1981)
- Prevention and Pollution Guideline (PPG29)
- Industry led approach.
- Training Guidance Note (TNG7.01)
- Fire futures forum.
- WISH guidance.
- The Regulatory Reform (Fire Safety) Order 2005
- Case law – Arcwood Recycling?

Arcwood Recycling, Derbyshire

- 90m wide x 70m deep x 10m high (6,300 square metres, 63,000 cubic metres)
- 22,800 tons of wood waste.
- Comparable to football stadium.
- Fire September 2012
- M1 motorway had to be closed due to poor visibility and nearby business evacuated.
- 118 fire appliances, incurring a cost in excess of £100,000.

Did the Fire Safety Order Apply?

The Regulatory Reform (Fire Safety) Order 2005: Applies to premises **2 Interpretation**: “Premises” includes any place and, in particular, includes-

- (a)any workplace.
- “Workplace” means any premises or parts of premises used for the purposes of an employers undertaking and which are made available to an employee as a place of work.

The Evidence

- **Fire Risk Assessment:** found to be an Environmental assessment with little reference to fire safety.

- **Extinguisher Maintenance:** enquiries found no contract in place.

- **Staff Training:** employee wrote statement denying this was done.

- **General Fire Precautions:** measures to reduce the risk of fire on the premises and the risk of spread of fire on the premises were thought inadequate due to the lack of fire breaks and the size of stack and proximity to neighbouring premises 4(1)(a), This included a lack of measures taken to mitigate the effects of such a fire4(1)(f) (ii)

The Offences

- 32(1)(a): failure to comply with 8-22
- Where that failure places one or more **relevant** persons at risk of death or serious injury in case of fire.

Outcomes

- The fines imposed were £8000 per offence reduced from £12000 for an early plea, resulting in a total fine of £32000 on the company with £7500 costs.
- Luke Barker, the Director, was sentenced to 10 months imprisonment.
- The Environment Agency (EA) also prosecuted for offences relating to environmental pollution resulting from the incident and the company were fined a further £8000 with £7500 costs, the director sentenced to 10 months imprisonment served concurrently.

WISH Guidance

- Introduction and risks
- Scope of guidance
- Assessments, plans and technical standards
- Whole site considerations
- Waste reception
- Waste treatment and processing
- Waste storage

DRAFT FIRE CONTROL GUIDANCE
27 JUNE 2014 CONSULTATION DRAFT

REDUCING FIRE RISK AT WASTE MANAGEMENT SITES

This guidance has been prepared by safety professionals and ESA (Environmental Services Association), with input from the Environment Agency (EA), The Health and Safety Executive (HSE), the Health and Safety Laboratories, the Chief Fire Officers Association (CFOA) and other bodies. It is endorsed by the EA, HSE, CFOA, ESA and WISH (Waste Industry Safety and Health) Forum. In addition, the main insurance companies involved in waste management have been consulted for their views on some aspects.

For ease of reading this guidance is split: The first part covers general issues such as scope and fire risks. The second part covers specific fire control guidance for sites in four areas: whole site issues, issues in reception, during treatment and for the storage of wastes. Finally, a series of appendices is included on issues such as maximum stack sizes in external storage, producing an accident/emergency plan and checklists to help you assess whether your fire control is adequate.

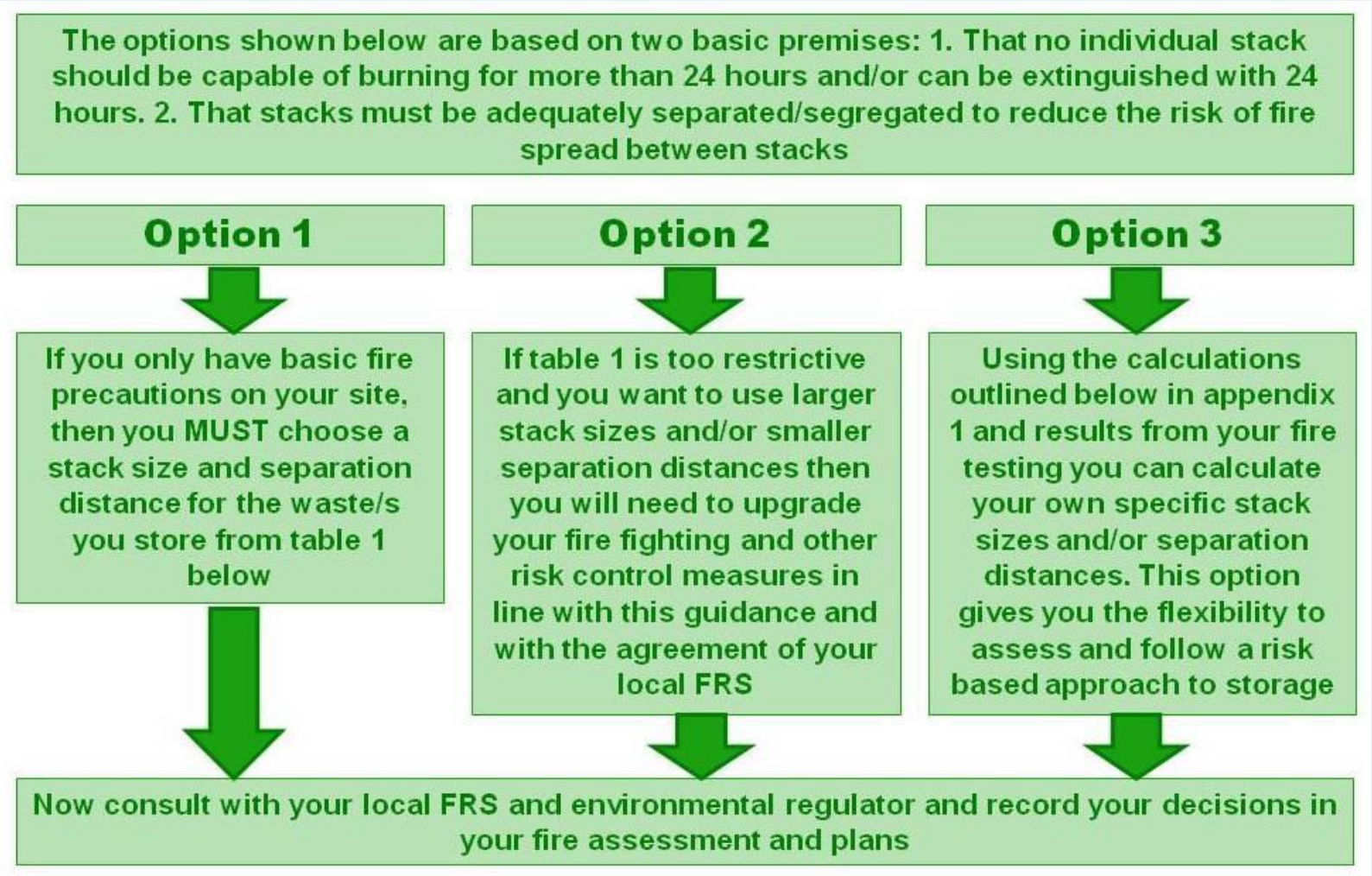
This guidance is intended as an umbrella: it gives general advice which will be applicable to a wide range of waste management and similar sites which handle wastes, but it cannot cover every specific aspect of all forms of waste management type operation. Future guidance produced by sector specific bodies or on specific waste management technologies will sit under this guidance to add detail to the general considerations provided below.

It is not the intent of this guidance to be inflexible, and options and considerations have been given throughout the guidance to allow operators to tailor it to their circumstances. Nor is it the intent to provide a one-stop-shop for waste management and similar sites on fire risk – existing guidance and standards on general fire management and control should be read in conjunction with this guidance. However, it is the intent of this guidance to provide a framework through which operators can reduce the risk of fire on their sites.

Does not apply to

- **Landfill sites** (but, it would apply to, for example, a recycling plant at the entrance to a landfill site)
- Some specific aspects of **ELV** (end of life vehicles).
- Waste management sites which fall under the **COMAH** (Control Of Major Accidents Hazards) Regulations.
- **Composting sites**, including in-vessel composting and anaerobic digestion plants
- **Hazardous/special waste** treatment and transfer facilities
- **Waste to energy plants**, incinerators and other similar thermal treatments to the extent of the thermal treatment being applied.

General Principles



Option 1

- Stack height should be taken as the greatest measurement between the base of the stack and the top. This may not be the highest point if the ground is uneven
- Stack width/length is the maximum width, including for open stacks
- Judging the height of stacks of loose waste, where waste may slump resulting in a „hill" of waste may be difficult – but, you should measure height to the highest point in such stacks of loose waste

Waste material	Max individual stack height (metres)	Max individual stack length / width (metres)	Max individual stack volume (metres^3)	Max individual stack area (metres^2)	Min separation distance between individual open stacks (metres)[1]
Baled paper	5	20	750	235	6
Loose paper	Stacks should not exceed 50 tonnes weight. This may be exceeded for short periods of time, such as over a bank holiday, provided waste is removed thereafter and additional precautions such as a fire watch are in place				6
Shredded paper (such as security shred)	Stacks should be bunkered/enclosed and not exceed 50 tonnes weight unless this has been agreed with your environmental regulator				
Baled paper and card	5	20	750	235	6
Baled card	5	20	750	235	6
Baled plastic bottle	5	20	450	235	6
Loose plastic bottles	Stacks should not exceed 50 tonnes weight. This may be exceeded for short periods of time, such as over a bank holiday, provided waste is removed thereafter and additional precautions such as a fire watch are in place				6
Baled plastic film	5	20	450	235	6

Option 2

If you have more extensive fire systems in place, such as drench or sprinkler systems, at your external storage area then you may be able to reduce the separation distances quoted and/or increase stack size.

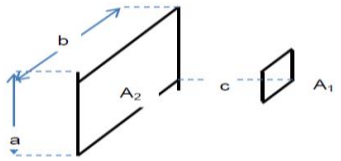
- You should seek competent advice on this
- Your reasons must be based on sound fire science
- You must discuss the issue with your environmental regulator and local FRS in advance and be prepared to provide your reasoning for varying from table 1
- You should not vary from table 1 without gaining the permission of your environmental regulator in advance

Option 3

The testing of your wastes is very likely to require specialist input. If you do decide to conduct your own testing:

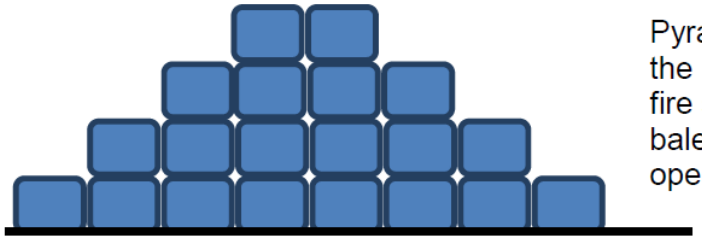
- You are likely to need to have multiple tests conducted on your wastes.
- If you do have multiple tests conducted, do not simply take the best result and use this to calculate stack sizes and separation distances
- Issues such as density may affect test results.
- Likely to need competent advice in the interpretation of test results

Material and FRS response time	Heat flux
Shredded materials with fire service attendance time of 10 mins or less	7 $kW.m^{-2}$
Shredded materials with fire service attendance time of up to 30 mins	4$kW.m^{-2}$
Solid materials with fire service attendance time of 10 mins or less	12.6 $kW.m^{-2}$
Solid materials with fire service attendance time of up to 30 mins	5.04 $kW.m^{-2}$

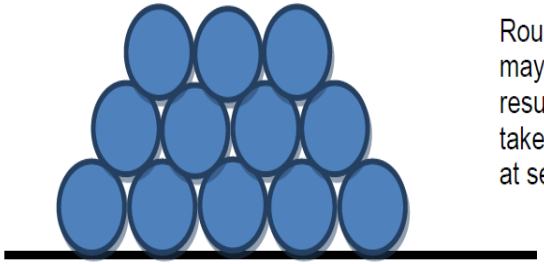


$$F_{D1-2} = \frac{1}{2\pi}\left[\frac{a/c}{\sqrt{1+a/c^2}}\tan^{-1}\left(\frac{b/c}{\sqrt{1+a/c^2}}\right)+\frac{b/c}{\sqrt{1+b/c^2}}\tan^{-1}\left(\frac{a/c}{\sqrt{1+b/c^2}}\right)\right]$$

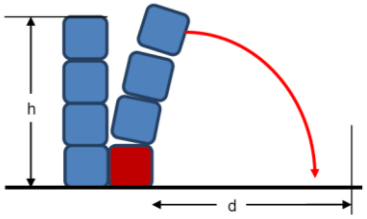
Stack stability



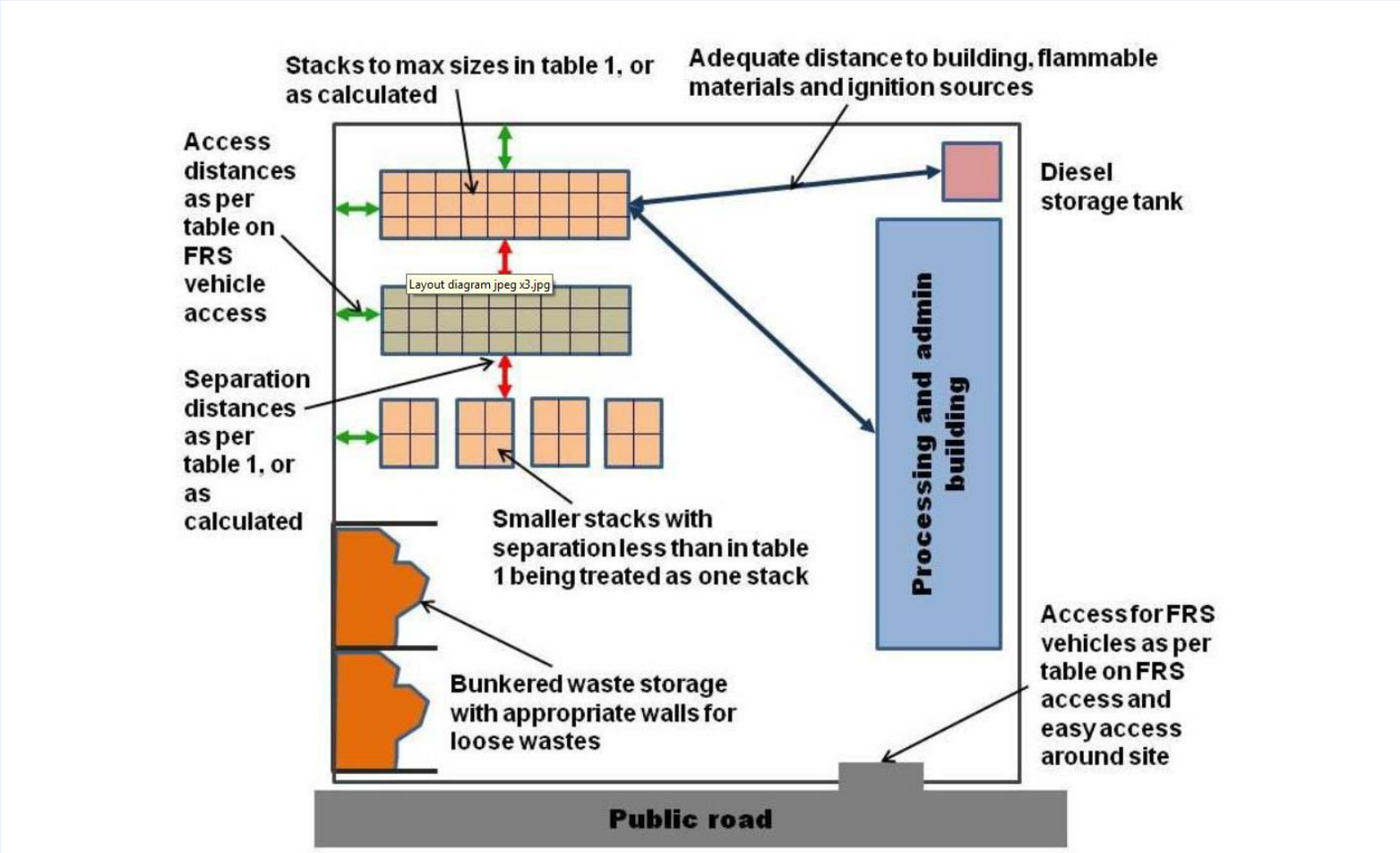
Pyramid/terraced storage of bales may lessen the risk of a bale falling during a fire resulting in fire spread. However, this method may increase bale footprint relative to volume and may cause operational handling issues



Round/tubular bales and loose materials which may roll should a stack collapse during a fire may result in fire spread – such factors need to be taken into account in your calculations to arrive at separation distances

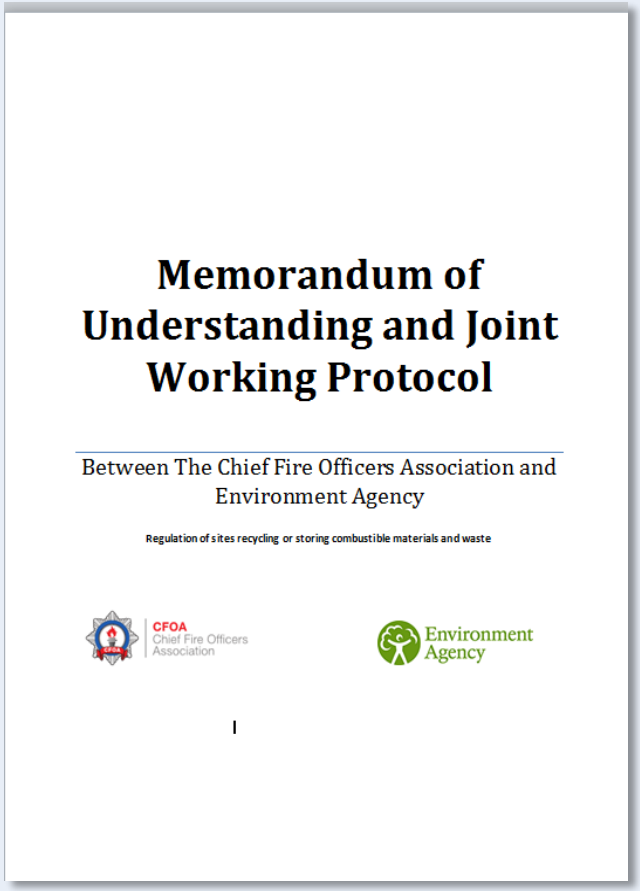


Example of layout



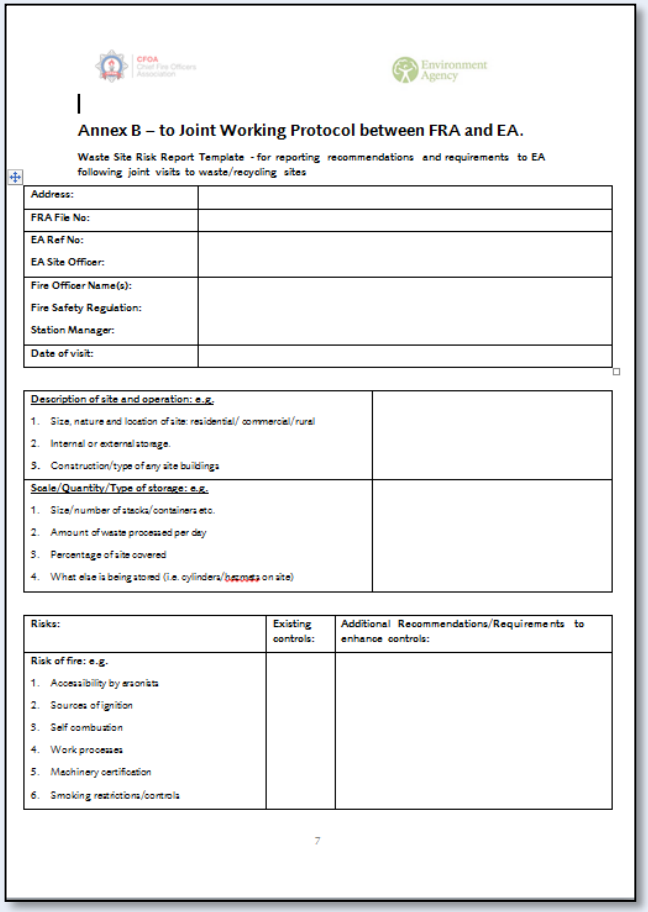
MOU & Joint Working Protocol

- Supports established Local Working Agreements
- Outlines common interests of EA and FRS
- Principles of collaboration
  - Sharing relevant data & intelligence on waste sites
  - Support for regulatory and enforcement actions
  - Joint Visits - reduce fire risks and pre incident planning.



Joint Visit Reporting Template

- Risks of ignition, fire spread and development
- FRS access and facilities
- Risks to Firefighters
- Risks of pollution from fire and firefighting
- Recommendations to reduce risks and/or enhance control measures



Annex B – to Joint Working Protocol between FRA and EA.

Waste Site Risk Report Template - for reporting recommendations and requirements to EA following joint visits to waste/recycling sites

Address:	
FRA File No:	
EA Ref No: EA Site Officer:	
Fire Officer Name(s): Fire Safety Regulation: Station Manager:	
Date of visit:	

Description of site and operation: e.g. 1. Size, nature and location of site: residential/ commercial/ rural 2. Internal or external storage. 3. Construction/type of any site buildings	
Scale/Quantity/Type of storage: e.g. 1. Size/number of stacks/containers etc. 2. Amount of waste processed per day 3. Percentage of site covered 4. What else is being stored (i.e. cylinders/~~hazmat~~ on site)	

Risks:	Existing controls:	Additional Recommendations/Requirements to enhance controls:
Risk of fire: e.g. 1. Accessibility by ersonists 2. Sources of ignition 3. Self combustion 4. Work processes 5. Machinery certification 6. Smoking restrictions/controls		

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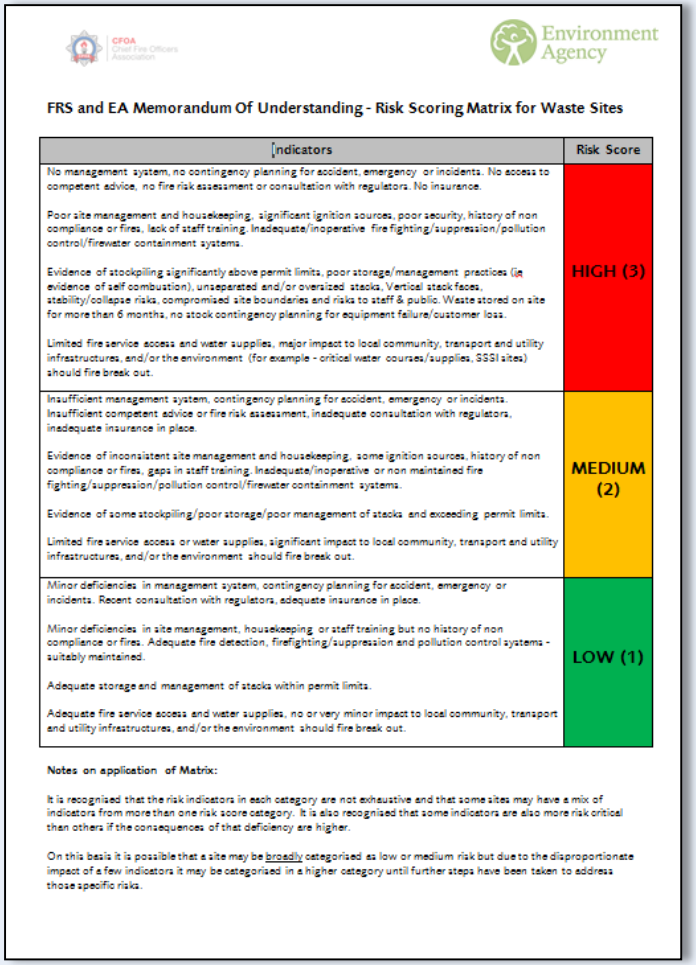
Joint Visit - Risk Scoring Matrix

- Management systems & contingency planning
- Site management, security, maintenance
- Stack sizes, stability and controls
- FRS access/facilities
- Pollution impact should fire break out



CFOA Chief Fire Officers Association

Environment Agency

FRS and EA Memorandum Of Understanding - Risk Scoring Matrix for Waste Sites

Indicators	Risk Score
No management system, no contingency planning for accident, emergency or incidents. No access to competent advice, no fire risk assessment or consultation with regulators. No insurance. Poor site management and housekeeping, significant ignition sources, poor security, history of non compliance or fires, lack of staff training. Inadequate/inoperative fire fighting/suppression/pollution control/firewater containment systems. Evidence of stockpiling significantly above permit limits, poor storage/management practices (ie evidence of self combustion), unseparated and/or oversized stacks, Vertical stack faces, stability/collapse risks, compromised site boundaries and risks to staff & public. Waste stored on site for more than 6 months, no stock contingency planning for equipment failure/customer loss. Limited fire service access and water supplies, major impact to local community, transport and utility infrastructures, and/or the environment (for example - critical water courses/supplies, SSSI sites) should fire break out.	HIGH (3)
Insufficient management system, contingency planning for accident, emergency or incidents. Insufficient competent advice or fire risk assessment, inadequate consultation with regulators, inadequate insurance in place. Evidence of inconsistent site management and housekeeping, some ignition sources, history of non compliance or fires, gaps in staff training. Inadequate/inoperative or non maintained fire fighting/suppression/pollution control/firewater containment systems. Evidence of some stockpiling/poor storage/poor management of stacks and exceeding permit limits. Limited fire service access or water supplies, significant impact to local community, transport and utility infrastructures, and/or the environment should fire break out.	MEDIUM (2)
Minor deficiencies in management system, contingency planning for accident, emergency or incidents. Recent consultation with regulators, adequate insurance in place. Minor deficiencies in site management, housekeeping or staff training but no history of non compliance or fires. Adequate fire detection, firefighting/suppression and pollution control systems - suitably maintained. Adequate storage and management of stocks within permit limits. Adequate fire service access and water supplies, no or very minor impact to local community, transport and utility infrastructures, and/or the environment should fire break out.	LOW (1)

Notes on application of Matrix:

It is recognised that the risk indicators in each category are not exhaustive and that some sites may have a mix of indicators from more than one risk score category. It is also recognised that some indicators are also more risk critical than others if the consequences of that deficiency are higher.

On this basis it is possible that a site may be broadly categorised as low or medium risk but due to the disproportionate impact of a few indicators it may be categorised in a higher category until further steps have been taken to address those specific risks.

Ongoing work

- Define the mass burn rates of common materials.
- Examining burning mechanisms.
- Large scale validation – 6 hours burns
- Review firefighting tactics

Any Questions?