Appendices

Module 1 – Appendix 1A

Where our waste ends up – handout
MRFs

A materials recovery facility, materials reclamation facility, materials recycling facility or Multi re-use facility (**MRF** - pronounced "murf") is a specialised plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers. Generally, there are two different types: clean and dirty MRFs.

A clean MRF accepts recyclable commingled materials that have already been separated at the source from municipal solid waste generated by either residential or commercial sources. There are a variety of clean MRFs. The most common are single stream where all recyclable material is mixed, or dual stream MRFs, where source-separated recyclables are delivered in a mixed container stream (typically glass, ferrous metal, aluminium and other non-ferrous metals, plastics and a mixed paper stream including corrugated cardboard boxes, newspapers, magazines, office paper and junk mail). Material is sorted according to specification, then baled, shredded, crushed, compacted, or otherwise prepared for shipment to market.

A Mixed Waste Processing System, sometimes referred to as a dirty MRF, accepts a mixed solid waste stream and then proceeds to separate out designated recyclable materials through a combination of manual and mechanical sorting. The sorted recyclable materials may undergo further processing required to meet technical specifications established by end-markets, while the balance of the mixed waste stream is sent to a disposal facility such as landfill. Today, mixed waste processing facilities (MWPFs) are attracting renewed interest as a way to address low participation rates for source-separated recycling collection systems and prepare fuel products and/or feedstocks for conversion technologies. MWPFs can give communities the opportunity to recycle at much higher rates than has been demonstrated by curb side or other waste collection systems.

HWRC – Household waste and recycling centre

An HRWC is where the general public take their recycling and general household waste, therefore helping to divert more waste from landfill.

EfW/ERF

The terms 'energy recovery (from waste)', or 'energy from waste' (commonly abbreviated to EfW) can be used interchangeably and cover a range of different processes and technologies.

'Energy from waste' can be used to describe a number of treatment processes and technologies used to generate a usable form of energy and which also reduce the solid volume of residual waste. This energy can be in the form of electricity, heating and/or cooling, or conversion of the waste into a fuel for future use e.g. transport fuels, or a combination of these forms.

"Converting waste into energy solves two problems at once: It diverts rubbish from landfill sites: and it reduces greenhouse gas emissions because it avoids the need to burn fossil fuels to produce energy. It has the added bonus of providing a relatively deep stream of fuel."

Financial Times - 23rd October 2006

How it works:

Energy Recovery from Waste describes the process in which energy (in the form of heat) is recovered from the incineration of waste, and used to generate electricity which is then fed back into the national grid, or provide both electricity and heat (combined heat and power) to nearby communities or other uses. Waste may be in the form of an individual waste stream, generally from a commercial or industrial activity, which is used in existing plant as a fuel; it may be the residue once recyclables are separated from a general waste stream; or it may be a specially produced refuse-derived fuel (RDF) which must meet certain standards to be burnt in plant such as cement kilns or, potentially, power station furnaces.

There is a range of incinerator technology used, from mass-burn (generally the simplest approach) to fluidised bed combustion (utilising a moving bed of sand), pyrolysis and gasification (more novel technologies which produce gas from the waste by heating it in either a zero or low-oxygen environment, which is then burnt).

There are currently around 15 'energy from waste' (EfW) plants in the UK, which together incinerate over 3 million tonnes of municipal waste. To put this into context, in 2004/5, 67% of municipal waste was sent to landfill, 23.5% recycled or composted and 9% incinerated. Recently, waste incineration in the UK has been unpopular with the public, with fears over the health effects of emissions from EfW plants. Some of these fears are fuelled by the poor emissions performance of the previous generation of incinerators. Yet stringent restrictions imposed by the EC on the amount of waste which maybe be sent to landfill has led to the Government indicating in its Waste Strategy Review that EfW may have to play a bigger role, despite the current emphasis on recycling. The Government estimates that EfW could increase from its current 9% of municipal solid waste (MSW) treated to around 25% if waste growth levels are high.

CIWEM website – http://www.ciwem.org/knowledge-networks/panels/waste-management/energy-recovery-from-waste.aspx

In Vessel Composting

Trainer can use "Viridor IVC Animation" Video from the bank to help support IVC discussion. In-vessel composting (IVC) can be used to treat food and garden waste mixtures. These systems ensure that composting takes place in an enclosed environment, with accurate temperature control and monitoring.

There are many different systems these include:

- Containers
- Silos
- Agitated bays
- Tunnels
- Rotating drums
- Enclosed halls

How does IVC work?

IVC has three stages before the compost is screened for use.

Stage 1

The food waste, which comes primarily from local authority waste collections either separate or already mixed with garden waste, as well as commercial and industrial sources, is delivered to an enclosed reception area.

Firstly, any contamination such as plastic bags or metal cans are removed before it is shredded to a uniform size and loaded into what is known as the 'first barrier', which will be a bay/tunnel etc., depending on the system used. All the material delivered to a facility, plus the first barrier stage, is considered a 'dirty area' under the Animal By-Products Regulations (ABPR). The regulations ensure that strict procedures are in place to prevent cross-contamination of 'clean areas' (where product is processed and stored) from 'dirty areas'.

The composting process is kick-started by naturally occurring micro-organisms already in the waste. These break down the material, releasing the nutrients and in doing so increase the temperature to the 60-70ºC range needed to kill pathogens and weed seeds, and meet the regulations for processing animal by-product (ABP) material.

Stage 2

Stage two normally lasts between seven days and three weeks. The material is transferred to the 'second barrier', where the composting process continues.

Processing in two stages ensures that all parts of the composting mass reach the required temperature. The oxygen level, moisture and temperature are carefully monitored and controlled during both composting stages to ensure the material is fully sanitised.

Stage 3

Once the sanitisation process is complete, the compost is left to mature in an open windrow, or an enclosed area for approximately 10-14 weeks to ensure stabilisation.

Screening

Screening usually takes place pre or post maturation, to produce a range of product grades suitable for various end uses such as soil conditioning.

What can the compost be used for?

The compost can be used in a range of places including:

- Gardens
- Brownfield sites
- Landscaping
- Agriculture

Anaerobic Digestion

The term ‘anaerobic digestion’ refers to a natural biological process which converts organic matter such as commercial and household food waste, garden waste and farm slurry, into energy.

There are two main types of anaerobic digestion called thermophilic and mesophilic – the primary difference between the two types is the temperatures reached in the process. Thermophilic processes reach temperatures of up to 60C and mesophilic normally runs at about 35-40C.

Inform the group that there are 2 main products of AD – biogas (a mixture of mainly methane and carbon dioxide) and digestate (liquid and solid fractions)

Biogas - The biogas can be used to generate surplus heat and electricity, or compressed for use as a biofuel.

Digestate - The material left over at the end of the process (digestate) is rich in nutrients and it can be used on land as fertiliser or soil improver (liquid fraction) or further processed in composting operations (solid fraction).

Landfill – burying waste underground

A **landfill site** (also known as a **tip, dump, rubbish dump, garbage dump** or **dumping ground** and historically as a 'midden') is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. Historically, landfills have been the most common method of organised waste disposal and remain so in many places around the world.

Some landfills are also used for waste management purposes, such as the temporary storage, consolidation and transfer, or processing of waste material (sorting, treatment, or recycling).

Module 2 – Appendix 2A

Employer Responsibilities – to align with page 4 of your work book:

Who should an employer appoint to help with your duties?	Appoint a competent person to help meet your health and safety duties
What is the purpose of health and safety policy?	To describe how you manage health and safety
Why does an employer need to control risks in the workplace?	They have a duty to protect the health, safety and welfare of their employees
Why should employers consult employees?	Allows staff to raise concerns and influence decisions on managing H&S
Why should employers provide training and information?	Everyone needs to know how to work safely and control risks.

What is a competent person?

SKATE:

- Skills
- Knowledge
- Attitude
- Training
- Experience

Module 4 – Appendix 4A

Bird's Triangle – optional handout:

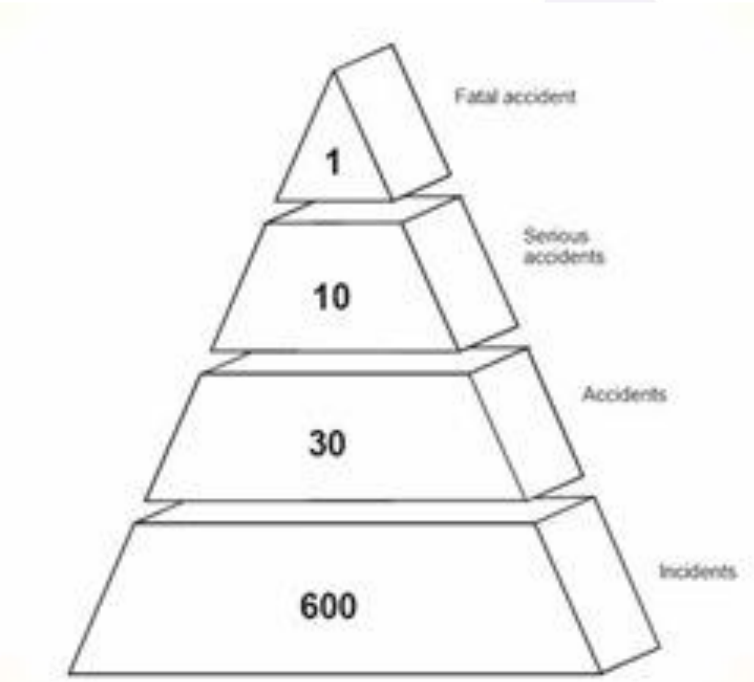
The Safety Triangle Explained

In 1969, a study of industrial accidents was undertaken by Frank E. Bird, Jr., who was then the Director of Engineering Services for the Insurance Company of North America. He was interested in the accident ratio of 1 major injury to 29 minor injuries, to 300 no-injury accidents first discussed in the 1931 book, Industrial Accident Prevention by. H. W. Heinrich.

Since Mr. Heinrich estimated this relationship and stated further that the ratio related to the occurrence of a unit group of 330 accidents of the same kind and involving the same person, Mr. Bird wanted to determine what the actual reporting relationship of accidents was by the entire average population of workers. H.W. Heinrich's classic safety pyramid is now considered the foremost illustration of types of employee injuries.

There, Bird analysed 1,753,498 accidents reported by 297 cooperating companies. These companies represented 21 different industrial groups, employing 1,750,000 employees who worked over 3 billion hours during the exposure period analysed. The study revealed the following ratios in the accidents reported:

For every reported major injury (resulting in fatality, disability, lost time or medical treatment), there were 9.8 reported minor injuries (requiring only first aid). For the 95 companies that further analysed major injuries in their reporting, the ratio was one lost time injury per 15 medical treatment injuries.



Forty-seven percent of the companies indicated that they investigated all property damage accidents and eighty-four percent stated that they investigated major property damage accidents. The final analysis indicated that 30.2 property damage accidents were reported for each major injury.

Part of the study involved 4,000 hours of confidential interviews by trained supervisors on the occurrence of incidents that under slightly different circumstances could have resulted in injury or property damage. Analysis of these interviews indicated a ratio of approximately 600 incidents for every reported major injury.

In referring to the 1-10-30-600 ratio detailed in a pyramid it should be remembered that this represents accidents reported and incidents discussed with the interviewers and not the total number of accidents or incidents that actually occurred.

ENERGY & UTILITY SKILLS

Module 4 – Appendix 4B

Fire Extinguishers – a table demonstrating which class of fire the different fire extinguisher can put out:

CLASS OF FIRE	WATER	FOAM	CARBON DIOXIDE	DRY POWDER	WET CHEMICAL
(A) Paper, Wood & Textiles					
(B) Flammable Liquids					
(C) Flammable Gases					
(D) Combustible Metals					
Electrical Equipment Fires					
(F) Cooking Oils and Fats					

Module 5 – Appendix 5A: Pub quiz – COSHH signs

Team name: ________________________

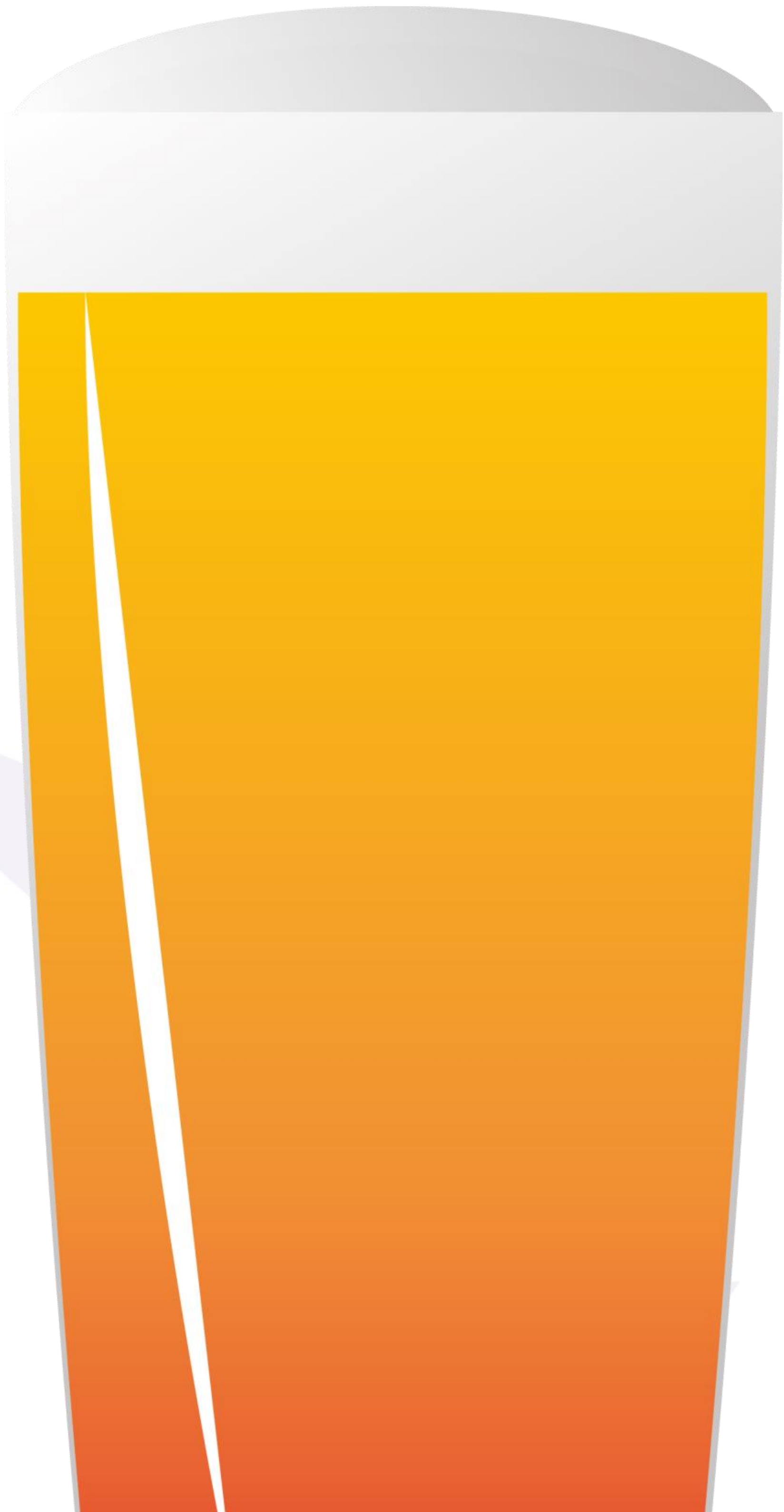
Q1	
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	
Q9	
Q10	











Module 6 – Appendix 6A: Falls Questions – HSE Q&A Brief work at height regulations 2005

Question 1 Who do the Work at Height Regulations apply to?

Question 2 What is working at height?

Question 3 What is a risk assessment?

Question 4 How does the requirement to do a risk assessment under the Management of Health and Safety at Work Regulations differ from these Regulations?

Question 5 What is required when planning to do work at height?

Question 6 Who is competent to work at height?

Question 7 How can I avoid working at height?

Question 8 How can I prevent someone from falling when working at height?

Module 6 – Appendix 6B: Falls Answer Sheet – HSE Q&A Brief work at height regulations 2005

Question 1 – Who do the Working at Height Regulations apply to?

The Regulations place duties on employers, the self-employed, employees and anyone who controls the way work at height is undertaken, for example a principal contractor, a client, a managing agent, contractors, or factory owner etc.

Question 2 – What is working at height?

Work at height is work in any place, including a place at, above or below ground level, where a person could be injured if they fell from that place. Access and egress to a place of work can also be work at height.

Examples of work activities that are classified as working at height include:

- working off bandstands;
- working on a flat roof;
- erecting falsework and formwork;
- working from a ladder;
- working at ground level adjacent to an open excavation;
- working on formwork within an excavation;
- working near or adjacent to fragile materials.

Some examples of where the Regulations will not apply:

- walking up and down a staircase in an office;
- working in the upper floors of an office block or a temporary accommodation building;
- operator sitting in a seat on an excavator;
- sitting in a chair.

Question 3 – What is a risk assessment?

The Work at Height Regulations are based on a risk assessment approach. When considering work at height, a risk assessment should be undertaken in order to identify what the hazard is and the degree of risk present.

A risk assessment is a careful examination of what could cause harm to people as a result of a work activity, and it allows you to take the necessary precautions to prevent the harm occurring.

Question 4 – How does the requirement to do a risk assessment under the Management of Health and Safety at Work Regulations differ from these Regulations?

All recent health and safety legislation is goal setting and based on a risk assessment approach. The Management of Health and Safety at Work Regulations (the Management Regulations) have required the use of risk assessments to manage health and safety since 1992.

The requirement under the Management Regulations for a risk assessment is no different from the requirement for one under the Work at Height Regulations. However, the risk assessment under the Work at Height Regulations is focused upon controlling the risks associated with working at height and the selection and use of work equipment for working at height.

If you are already using risk assessments to address working at height, then there is normally no need to change what you are doing in order to comply with the requirement for risk assessment under the Work at Height Regulations.

Question 5 – What is required when planning to do work at height?

Any work at height needs to be planned in advance of the work activity, with careful consideration given to the selection and use of work equipment. The safe system of work needs to take account of:

- Any supervision of workers that may be necessary, e.g. work equipment selected lower down the hierarchy of control, such as fall arrest equipment, will require a higher level of supervision.
- Any weather conditions that workers may be exposed to, e.g. carrying out maintenance on an icy roof, or working in rainy conditions on a slippery surface;
- Any emergency or rescue procedures that may be required, e.g. if persons fall while using a fall arrest system. It is not acceptable just to rely on the emergency services, it needs to be covered in the risk assessment and planned prior to the work activity being carried out. For example, how will an unconscious person be rescued after having fallen into a net? How will a person be rescued after having fallen in a fall-arrest harness? You may need to consider the use of a mobile elevated work platform (MEWP), ladder or tower to undertake a rescue. Please see Question 19 for further guidance.

Question 6 – Who is competent to work at height?

Competency is the experience, knowledge and appropriate qualifications that enable a worker to identify the risks arising from a situation and the measures needed to be taken.

Those undertaking a height work activity need to be trained in the selected system of work and any particular work equipment chosen. For example, if a MEWP is selected then the operator must be trained in its use. If nets are used the net riggers must be trained in how to erect them safely. Managers should check that those doing the work are adequately trained.

For employees who regularly carry out work at height, e.g. roofers, it may be necessary for them to attend a formal training course on safe working procedures when at height, rather than just on-the-job training.

Question 7 – How can I avoid working at height?

A risk assessment for undertaking work at height should always consider how the work activity at height could be avoided. This may require modifying a design, e.g. erecting guardrails on steelwork at ground level and then craning the steel and the guardrails into place, or doing the work from underneath, e.g. using a MEWP or a mobile platform inside a building to repair a roof internally. However, in most instances in the construction industry, avoidance will not be possible and control measures for working at height will be required.

Question 8 – How can I prevent someone from falling when working at height?

Falls from height can be prevented through the use of working platforms with guardrails, or particular access equipment, such as MEWPs (cherry pickers, scissor lifts, mast climbers etc.).

Personal protective equipment can also prevent falls, such as a work restraint system, but this form of protection is lower down the hierarchy and should only be considered if the collective method of protection, as mentioned above, has been ruled out. However, in selecting work equipment for fall protection, all risks associated with that equipment must be considered, e.g. the risks involved in installing, using, dismantling and rescue related to that equipment