ADDFIELD LOW CAPACITY INCINERATOR OPERATIONS AND COMPETENCE TRAINING

INTRODUCTION

Our priority at Addfield is to provide you with a document that supports you with a document that provides you with a competence training guide that provides you with an easy comprehensive working structure for the operation of an Addfield incinerator and to ensure the operator understands the principles behind good practice. The document is aimed specifically at ABP incinerator and is designed to be used in conjunction with the operation manual for your machine. This document uses picture of specifically an Addfield machine, however the document is applicable to the whole incinerator range.

It is important to note this document isn't exhaustive and provides an insight into operational procedures.

This document is broken down into several segments. These are:

Incinerator components
Combustion Theory
Visual observations of emissions
Managing Spills and fluids
Manual handling of animals
Standard Management Plan
Mitigating risks to the environment
Mitigating risks to staff

INCINERATOR COMPONENTS

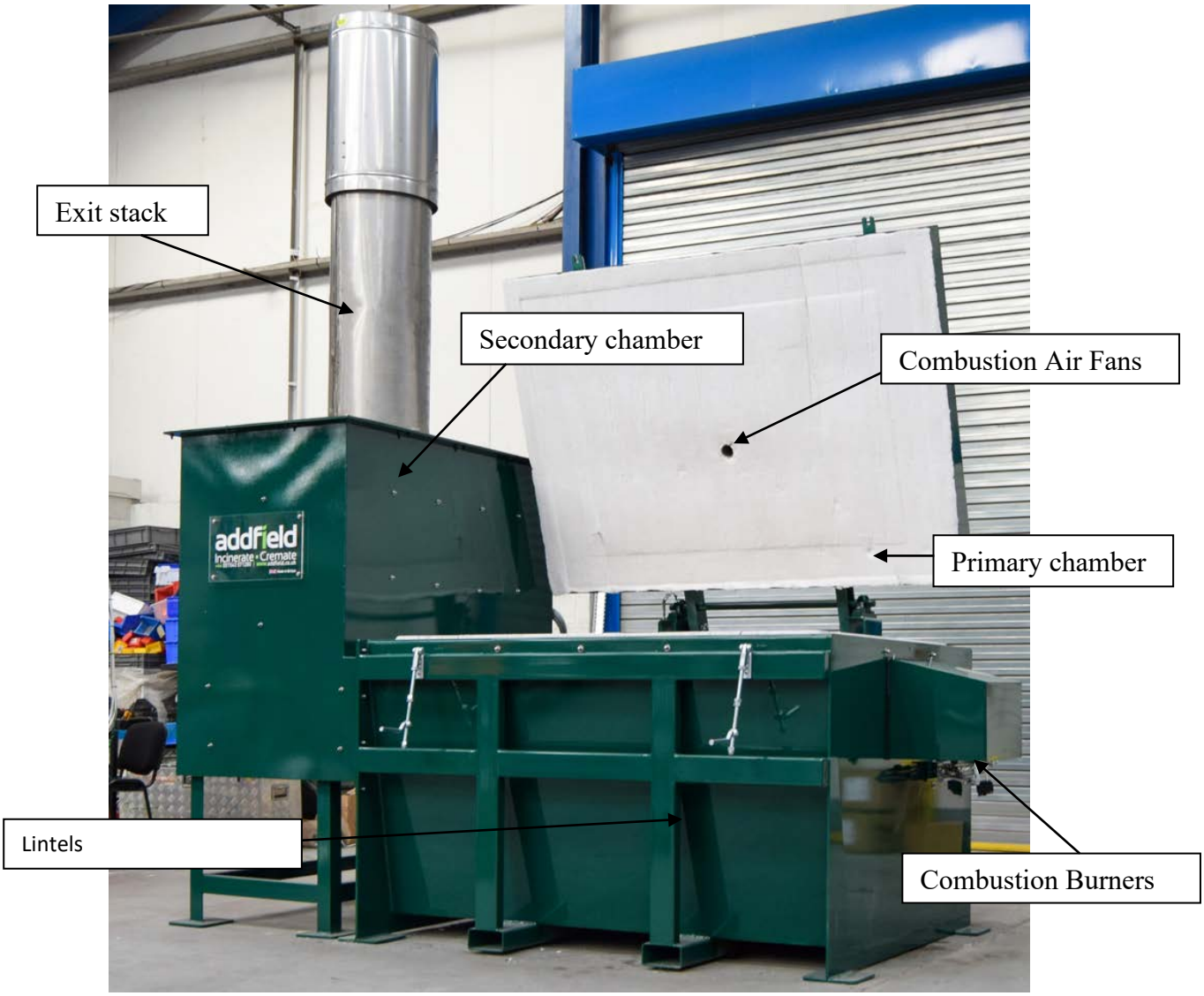
Structure
The modern animal incinerator is in determined by the maximum potential size of an animal. In the vast majority of cases the abp incinerator units are at rated less than 50kg per hour (with some exceptions). We offer a top loading bunded chamber to incinerate the waste

The incinertors are split into two distinct areas each of which have distinct functions:

The primary chamber
The location where the pet is placed and primary combustion assisted by burners and air takes place. The products of the combustion process, smoke and volatile gasses, which are not burnt in the primary chamber, pass into a secondary chamber.

The secondary chamber
In accordance with the Animal By-Products Regulations, this chamber is maintained at a minimum of 850°c by a secondary afterburner(s)

Air is introduced to ensure any remaining products of combustion are burnt off.. In accordance with the EU regulation the secondary chamber will be of sufficient volume to ensure it takes two seconds for the products of combustion to pass through after the after burner position or the last injection of air if further along the route. The temperature of the gases must be measured at the end of this two second run, this is done with a temperature sensor known as a thermocouple.



Hot face Refractories
In the areas of the incinerator where the temperature is highest and corrosive gases are strongest, hot face refractories are used. The hot face, or the incinerators thermal mass is constructed using a high alumina content which enables them to withstand such conditions. The refractory interlocks and is cemented together using a heat resistant mortar.

The incinerator is brought up to temperature and then used throughout the day to carry out a number of incinerator the refractories will only expand and contract, as they do aperture opens and closes the unit will be exposed to thermal shock this is a natural occurrence of a incineration operation. Brick refractories have a temperature rating of 1600°C and good resistance to thermal shock (the expansion and contraction of a material as it heats up and cools down which can cause movement and cracking). The brick system used to promote the incinerators efficiency and longevity.

Insulating Refractories
Insulation material is also placed behind the hot face refractory. Typically it is not possible to visually observe.
The insulation layers act as a barrier between the hot face and the steel work minimising heat loss and maximising efficiency but ensuring heat says on the hot the face - the machines thermal mass.

Typically insulation materials consist of refractory insulation brickwork, ceramic board or ceramic fibre.

Burners

Burner provide the mechanism in which the process of combustion can be safely contained. Combustion consists of:

- Fuel
- Air
- Ignition

A burner delivers all three. The burner is designed to raise the temperature of a respective chamber to the required minimum. In the secondary chamber this would be 850 deg.C. In a primary chamber this would be 600-700 deg.C

Incinerators normally use packaged burners - typically an MAX12 120kw burners for diesel and MAX120P 120kw burners for gas. Each burner will be fed with a fuel and electricity in order work.

The air is supplied from an integral fan attached to the burner and mixed at the burner head with fuel. As fuel is ignited by a spark produced from the burner's electrode, a burner is produced from the blast tube.
A flame failure detection device, also known as a fire eye or ionisation probe will be incorporated in the burner head. This ensures a flame is always present and will shut down the fuel if it is extinguished for any reason.

The burner and its components require regular annual and preventative maintainace to avoid build up of Carbon on the burner face. Any incorrect operation with relay to the control box on the burner which in turn will cause the burner to go to lock out and the incinerator will revert to a shutdown mode.

It is recommend that operators familiarise themselves with burner maintainace ideally with face-to-face training. A guide can also be found on the following video: https://www.youtube.com/edit?o=U&video_id=eQT_Fs9D3Us

For the burners to run efficiently the correct volume proportions of fuel and air must be mixed. Too much air will require additional heat and waste fuel. Too little air will mean there is not enough oxygen for the fuel to burn and a proportion of the fuel will remain un-burnt.

The burner in the primary chamber may run most of the time when a small animal is incinerated or for larger bodies will provide an initial heat surge to begin the process and then be used towards the end of

the incineration process, when the temperature in the primary zone is dropping, to destroy any remaining tissue and calcify the remains. In effect this reduces the skeletal material, which is extremely strong, to a chalk-like consistency, which can be reduced into cremated remains.

The final use of the burner is to ensure the temperature within the secondary zone remains at 850ºC, in accordance with the Animal By-Product Regulations, to destroy products of combustion.

The oil in liquid form must be turned into a vapour and mixed with air before it can burn. The burner will incorporate an oil pump which delivers the oil from the storage tank, pressurises it and delivers it to the nozzle of the burner in a fine mist (known as atomising). This mist is then mixed with air and ignited by a spark from the electrode.

Burners should be serviced each year. The electrodes and ionisation probes may need regular cleaning. It is useful to keep a selection of spare parts so that even if an engineer has to be called they will be readily available for him. Suppliers often have to order parts as they are not held in stock. Keeping spares will ensure you are not out of action. It is useful to have a spare burner head made up so that it can easily be changed over if the burner fails to start first thing in the morning. The burners can be affected by damp and may need to be dried out if not used for a period of time.

Combustion Air Supply

The oxygen contained in air is, as we have already seen, a primary requirement for combustion. Air is normally supplied from a number of centrifugal fans located fixed to the incinerator along ducting, which is normally in floor trenches or suspended at a high level in the incinerator.

The air enters the primary chamber through the burner heads (whilst the gas is turned off the burners can be used as air jets) and through steel pipes passing through the refractories set in the primary chamber lid.

Air intakes also exist in the secondary chamber, where air is introduced to mix with the remaining products of combustion from the primary chamber. This ensures they are able to burn.

The final use for air is to induce suction and cool down sensitive parts of the system, these aspects are covered under the sections ‘Suction and draught’ below.

It is important that the inicnerator system receives sufficient air; failure to do so can lead to poor combustion, lack of suction and even the build up of volatile gases, which may then explode.

COMBUSTION THEORY

Volatile Gases
As the combustible materials of the body (carbohydrates, fats and proteins) burn, they produce volatiles, which are combustible gases. As these gases burn they increase the temperature within the incinerator resulting in the rapid release of more volatiles. If the incineration taking place is of an obese animal and the cycle of producing increasing amounts of volatiles is not controlled the incineration process can itself get out of control.
As the temperature increases and increasing amounts of volatiles are given off and ignite, it will be necessary to introduce increasing amounts of oxygen to support the combustion process. Failure to do so will result in the production of un-burnt gasses, which will be seen as smoke. This course of action must be followed unless the combustion process is becoming uncontrollable, in which case, the amount of oxygen in the primary chamber must be reduced in order to decrease the rate of combustion, resulting in a drop in temperature and slowing the production of volatiles.

Suction and Draught
One of the prime considerations affecting the performance of any incinerator or incinerator relates to an understanding of the necessity to maintain such equipment under suction.

Any burning material confined in a chamber will produce products of combustion, which occupy a volume many times larger than the materials from which they were given off.

Because of this, there is always a tendency for combustion occurring within an enclosed space to pressurise that space unless the flue gases can be conveyed to atmosphere at a rate faster than they are being produced.

With incinerators, therefore, it is extremely important that operating conditions should always keep the incinerator at a negative pressure or under suction, otherwise rather nasty fumes and smoke leak out round door seals into the incinerator.

Suction or draught is achieved in one of two ways:
1. By a tall, hot chimney stack.
2. By some system of induced draught additional to the chimney

For a chimney of a given height, the higher its temperature, then the greater the suction or draught at the base of the chimney. It will readily be appreciated, therefore, that at the beginning of the working week, when the chimney is particularly cold, first incineration may be especially difficult because there is simply not enough suction available to allow the incinerator process to proceed at its normal rate. So, for good operating efficiency, thorough pre-heating is essential to warm up the flue and chimney.

Flues and Chimney
The gases pass away from the incinerator through a flue. It is required to cope with high temperatures and is, therefore, constructed from a refractory material contained within insulation and an outer decorative casing, after which point the construction of the flue is normally stainless or mild steel which may be covered with an insulating material and decorative casing.
Each incinerator must have its own flue in which emissions can be visibly monitored and thermal buoyancy can be maintained.

The chimney should be of sufficient height and not have any form of capping which could reduce its efficiency to disperse smoke which should leave the chimney at an efflux velocity of 10m per second.

The Control Mechanisms and Minimising Environmental Impact
Control System
For incinerators at a site rated under 50kg per hour the control system will be based a manual operation. The system will comprise
1) Measurement of temperatures
2) Manual recording of temperatures
3) Visual Observation of flue emissions
4) Monitoring odours around the site

Automatic systems may be used to reduce the amount of involvement by the operator and options will be discussed later in this section.

Measurement of temperatures—Thermocouples
It is of course important to measure temperatures within the incinerator. If the temperature within the primary chamber becomes too hot the process of combustion could accelerate, producing too great a volume of emissions for the incinerator to cope with, and in extreme cases, could result in damage to the flues, incinerator and even the building. Alternatively, if the temperature falls too low in the primary chamber, combustion will not take place. In the secondary chamber it is important to monitor temperature to ensure the 850ºC required by the Animal By-Product Regulations is maintained.

Temperature is measured using an instrument called a thermocouple.

A thermocouple consists of two wires contained within a heat resistant ceramic or metal tube, which is inserted into the incinerator through a narrow hole in the refractory insulation and casing. The wires within the tube, when heated, produce a small electric current, which is proportional to the temperature within the current produced. The small current produced is monitored and converted by a digital temperature display.

A number of thermocouples are placed within the incinerator to measure temperature at strategic points. Normally they are placed within the primary chamber and at the end of the secondary chamber to demonstrate that the required 850ºC is met for the two second residence time. If a second burner is placed along the secondary chamber a thermocouple must be placed before that burner to prove the temperature has remained above 850 degrees to that point. The temperature is an important indicator of safety and how the incinerator is proceeding.

Spare thermocouples should always be kept as they will burn out over time. If they fail during incinerator and no replacement is available then the secondary chamber temperature cannot be monitored and the incinerator must shut down.

Manual Recording of Temperatures
The purpose of recording temperatures is to demonstrate to the competent authority that the incinerator is being operated in accordance with the Animal By-Product Regulations. We are therefore only interested in recording the secondary chamber temperature at the exit point after the gases have completed their two second residence time. Recording and monitoring temperatures are two separate items. In a manual control system the monitoring of the temperatures to ensure the incinerator is being carried out properly should be frequent.

VISUAL OBSERVATION OF FLUE EMISSIONS

What can we expect to see?
As we have seen, incinerator of organic material to produce acceptable products in the waste gas stream relies on the principles of combustion (the three Ts)

- **Time** in seconds that the combustion gases remain in the secondary chamber
- **Temperature** of the waste gas stream in the secondary chamber which should be an average of 850C
- **Turbulence** of the gases in the secondary chamber that must be mixed thoroughly with the oxygen in air in a controlled fashion as early as possible

If the three Ts are complied with then perfect combustion takes place and we have the following reaction :
C + O2 + H produces CO2 + H2O

The emissions will be odourless and colourless and be comprised of carbon dioxide and water vapour. Whilst CO2 is a major greenhouse gas it is not harmful to health.

If the three Ts are not met then carbon (C) and carbon monoxide (CO) will be formed. In the chimney stack with free ventilation CO is not a major cause for concern but the carbon will be in the form of soot which is termed a particulate. It will form a dark plume (more carbon means a darker plume) in the exhaust emissions — in other words dark smoke.

Hydrogen and carbon come from the cadaver and from the fuel and the oxygen is derived partly from the cadaver and from the combustion and secondary air. Particulates are potentially harmful to health as they can enter the lungs and cause respiratory diseases, depending on the concentrations involved. This is why dark smoke is deemed potentially harmful for all but a brief period (regulations are based on avoidance and minimisation of risk) as well as being visually unappealing and distastefully pungent.

Interpreting Visual Emissions and Actions to be Taken
Smoke is an important indicator of combustion during the incinerator process. The presence of smoke can indicate the following conditions:

White Smoke produced:
Possible cause
Incomplete combustion due to low temperature within the primary or secondary chamber.

Solution
Reduce any excess air entering the incinerator which may have a cooling effect and increase temperature by
introducing burners in the primary and secondary chambers.

Black Smoke produced:
Possible cause
Combustion is too rapid and is producing a lot of volatiles which remain as unburned particles.
Solution
Increase oxygen content within the incinerator to support combustion.

Black Smoke produced:
Possible cause
Combustion is too rapid and is out of control.
Solution
The process of combustion must be slowed by starving the primary chamber of oxygen by switching off air jets to the primary chamber. At the same time the amount of air to the secondary chamber will be increased to burn off the volatiles.

No Smoke produced
Complete Combustion

Problems caused by equipment failure
Equipment failure should be limited if a proper maintenance programme is carried out. There are three areas that can cause problems :

- Failure of the Burners
- Failure of the air supply
- Total failure of power

Failure of the Burners
This is normally caused by
A) Dirty or worn ignition probes. Regular cleaning will keep these in good condition. Failure can be remedied quickly by keeping spares to hand. A complete spare combustion head is useful as this can be simply changed over to get running again as quickly as possible.
B) Power failure due to blown fuse. Ensure a supply of spare fuses are kept and a chart to indicate which fuses serve which pieces of equipment.
C) Dirty or worn ionisation probe. Remedy as in (A) above.

2.2.2.2 Failure of air supply
This would be very unusual unless the motor on a fan fails. Regular inspection and maintenance should avoid this. Failure of fans is usually down to a blown fuse and the remedy in (B) above will apply.

2.2.2.3 Total Failure of Power
If this happens on a regular basis a back-up power source should be installed. Occurrences of total power failure during operation times should be reported to the Environment Agency together with details of emissions and any remedies taken.
The remedy will be largely a damage limitation exercise and will depend on the stage of the incineration. When the incineration is in the early stages the drop in temperatures will result in smoke which may be black. There is a danger that heat may come back up into the burners causing damage but this will not occur if there is sufficient natural draught from the chimney.
If the incineration is burning rapidly there may be very little in the way of visible emissions even though the secondary temperature falls below the 850C and the best option is to keep the burn going. The door may need to be opened a little to allow air to get to the incineration to keep the temperature up. If the incineration is in the early stages and has not yet ignited then closing all air holes into the primary chamber may stop any further burn. If the incineration is in the final stages then it will either keep going to completion or fade out without any significant emissions.
Any details of smoke and smell must be recorded and the duration of the problem noted.

2.3 Standard Manual Record Form
It is important not to let the recording of observations get in the way of carrying out correct operational procedures.

In their Guidance Notes DEFRA give an example of recording 10% of burns at 2 hour intervals. This is not relevant to most individual incineration processes as many do not last 2 hours. Unfortunately many Animal Health Offices have simply put this example as a licence requirement without it having much meaning.

As we have stated before, where there are no automatic recording or control mechanisms in place then observation should be more or less continuous. The recording of observations must be sufficient to satisfy the following conditions.

To enable an inspector to easily verify the incineration is being operated within the conditions of the Animal By-Products Regulations.

To protect the site against charges of smoke or odour made by neighbours, clients or passers-by.

The second point is particularly important as if complaints are made and there are no records to refer to, the inspectors may have cause to insist on automatic monitoring equipment being installed. It is therefore important to record factors such as wind direction and any odours or smoke coming from outside your site in order to refute any claims against you.

From the above we can deduce that the best system will be one that records the data on a daily basis and throughout the working period. It is important that recording the data is not too much of a burden as this would take the operator away from actually ensuring the incineration progresses correctly. The Standard Manual Record Form on the following page provides for a regular check on smoke and odours from both on and off site and allows space for recording any additional occurances and irregular patterns of incineration.

As Best Practice the advises this is kept on a daily basis with checks being recorded at least every hour. However, where licence conditions and agreements with local inspectors are in place it could be used for the periods specified on the licence (eg 10% of burns). The form may be modified as circumstances dictate. If the secondary chamber has two temperature readouts then that column can be divided into two. If wind direction changes are more common then the columns can again be subdivided.
Recording extra data is never a problem but the basic form will ensure that a good level of record keeping is achieved.

AUTOMATIC CONTROL SYSTEMS

These are not required for an under 50kg per hour site capacity but may be used for additional controls or to reduce operator involvement. It is also useful to see the controls in place on Human Cremators and the following gives details of the automatic systems used.

Programmable Logic Controller (PLC)

In a human cremator the combustion process within the cremator is normally controlled either by a computer or programmable logic controller (PLC) receiving signals from a range of monitoring sensors within the incinerator and flue system. The computer programme monitors and interprets the signals to ascertain what is taking place within the incinerator. It then controls the response of the burners, air jets and suction accordingly. The computer also monitors any unsafe situation which may arise in the incinerator and takes all necessary steps to prevent the situation becoming dangerous, including over-riding the operator if necessary.

The computer also records emissions and the operation of the incinerator, providing an excellent diagnostic tool to identify causes of faults and failures

Carbon Monoxide Meter

Carbon monoxide is measured using non-dispersive infra-red analysis, which is based on the fact that gas molecules absorb infra-red wavelengths unique to their molecular structure. Carbon monoxide is indicative of incomplete combustion and is another explanation for the presence of smoke.

Key Stages of the incineration Process

Now that you are aware of the components that make up the incinerator, it is time to consider a incineration. There are a wide variety of incinerators having different forms of construction. We will concentrate on the most suitable form which is the bunded design for retention of liquids.

Pre-Heating

The first stage of work when the incinerator is switched on is to pre- heat the secondary chamber to 850C, in accordance with the Animal By Product Regulations. This must be carried out before incineration can take place. It must also be carried out between burns when the secondary temperature has fallen. The air fans are turned off to prevent unnecessary cooling and the burners switched on. There will be a short run of the burner air which will disperse any combustible gases that may remain and ignite when the burner fires. The burners will come on and heating takes place until the secondary chamber temperature reaches 850C. The primary chamber should be heated to 650-750C to give efficient initial combustion.

However, when very obese animals are incinerated it is advisable to keep the initial temperature in the primary down as it could lead to the incinerator getting out of control. The heat from the hot hearth is normally sufficient to induce combustion.

3.2 Charging

The body should be placed close to the door of the incinerator. Large animals should be placed using mechanical lifting devices.

Before the body can be charged the following conditions must be met :

a) The secondary chamber must be at the required temperature.

b) The burners in the primary chamber must be switched off. This is a safety requirement to reduce the possibility of the body igniting and the flame travelling back out of the incinerator (a ‘flashback’) and endangering the operator. The operator should also be wearing protective clothing. The body should be positioned so that larger animals sit centrally and smaller ones sit in front of the primary burner. Communal incinerator should be spread evenly over the hearth. Care should always be taken when handling bodies and it is useful to imagine the owner standing behind you.

The charge door should then be closed immediately. There should be an exit from the incinerator available during the charging to allow the operator to escape from possible flashback. To protect the public from the same danger family members wishing to witness the charging, (common amongst Hindus and Buddhists), should be limited in number and should be directed to stand well back. They should be chaperoned by a second member of staff, to ensure they do not interfere with the charging process, or block the operator’s route of escape. Ideally, a viewing area should be provided if this service is to be offered. It should also be made clear that combustion may take place

immediately and may be unpleasant to witness. Most people will avoid viewing the charging if the reality of the process is made clear to them.

CADAVER WITHIN BODY BAG IMMEDIATELY AFTER LOADING

3.3 First Phase : Initial Combustion

When the charging door has closed, the process of incinerator can begin. Due to the influx of air when thebody is charged the secondary temperature may drop below 850C. This is allowed for in DEFRA's Guidance Notes. There are no artificial materials in the chamber, the heat from the primary burner and the amount of fat and fur on the animal. A small animal may have to have the primary burner running all the time and there will be little the operator has to adjust between phases. A very obese animal may ignite immediately or may take some time if earlier in the day and the stored heat is low. Careful observation must be made to see when the incinerator enters phase two, the volatile phase.

3.4 Second Phase : Combustion of the Cadaver

This phase occurs when the cadaver starts to reach maximum combustion. Small pets may show only a slight increase in the primary chamber temperature but larger animals will exhibit a rapid rise. As it does so the temperature of the secondary chamber will increase as the maximum amount of volatile gases is given off. Where thermostats control the burners the secondary burner will automatically switch off as the temperature exceeds 850C. When manually controlled the operator must turn off once the temperature starts to rise. Failure to do this may mean the incinerator getting out of control and producing smoke. Observation of the stack on a more or less continual basis should be made during this phase and the secondary air increased if any signs of smoke appear or there are emissions into the incinerator room. If the incinerator is under control then the primary air supply may be increased to maintain the burning of the carcase. This should be closed if the incinerator becomes too volatile.

3.5 Third Phase : Calcination

As the cadaver is reduced the amount of combustible material also decreases. The rate of combustion begins to decline and the temperature and pressure decrease within the primary chamber. The burn may still continue with primary chamber air but as it cools the primary burner will need to be switched back on. With a combination of air and heat from the burner combustion will be maintained. During this phase the charging door may need to be opened and the remains raked to position them to burn off any remaining material.

The combustion process is complete when the only identifiable material visible on the hearth are skeletal remains. The high temperature will have calcified them and the remaining skeletal material will be brittle.
If there are any flames the incinerator is not complete and air jets and burners should continue to be used until combustion ceases.

Providing there are no flames, the incinerator is complete and the primary burner is switched off. The secondary burner may also be switched off to aid cooling of the remains depending on the design of the incinerator. It may be helpful at this stage to rake the remains forward. This enables them to cool quicker and smoothes the remains off the hearth ensuring they do not become embedded.

3.6 Raking out and Collecting the Cremated Remains

If the incineration process is complete the remains may be removed. The incinerator must first be cooled to a safe temperature for raking down. The burners are switched off and air is introduced to cool the primary chamber. When the desired temperature is reached the cremated remains can then be raked forward and brushed into a collecting tray or wheel barrow. All remains on the floor must be removed.. This process will involve a certain amount of dust and protective masks should be worn.

MANAGING SPILLS AND FLUIDS

Procedure for Managing Spills of Blood and Body Fluids.
Overview
Spillages should be dealt with immediately to prevent risk to other people.
Spills should be cleared up before the area is cleaned
Personal protective equipment should be used
Hands must be washed thoroughly and dried after cleaning.

Equipment
Disinfectant solutions.
Absorbent paper towel and / or absorbent granules
poop-scoops
Disposable rubber gloves suitable for cleaning impervious to liquid ingress
Disposable apron
Eye and respiratory protection if a major spill and aerosol droplets may be generated.

Disinfectants
There are a number of suitable products on the market. It is best to investigate which is easily available in your location. The kits usually consist of: Protective gloves, apron, absorbent granules, disinfectant wipes and fluids surface cleaners, disposal sacks, scraper and dustpan shovel and air freshener

Procedure
Ensure the correct PPE is worn. Large solids can be remove with a poop-scoop / paper town. Liquids need to be mopped up with paper towel or by placing absorbent granules onto the spillage followed by removal
Once removed thoroughly clean the area by using disinfectant solution. Wipe dry with paper towel or cloth.
Removal and/or disposal of PPE equipment should be followed by washing hands.

Waste generated should be disposed of in a yellow clinical or offensive waste bag.

MANUAL HANDLING OF ANIMALS

Manual handling of pet has to be carried out with safety and compassion of the pet in mind. Like with any guidance in this document common sense should be used. The Health and Safety Executive provide clear guide on how to lift safely. For risk of duplicating content, in depth guidance can be found on the HSE website here: http://www.hse.gov.uk/pubns/indg143.pdf

Personal Protective Equipment
The most useful items to help protect the person(s) lifting are Back Support Belt - this should be worn as it not only provides support for the lower lumbar region but acts as a reminder to take care.

Protective footwear - This is essential when lifting heavy bodies, especially when frozen. A dropped container or body may easily break toes or damage the body of the foot.

Mechanical Handling
The best solution to prevent injuries while lifting is not to lift. This may sound simplistic but a person may be tempted to lift and carry a body when it is possible to move it onto a trolley. It may take a little longer and more effort to use the trolley but in the long run it will prevent many injuries.
The hydraulic lifting table is essential for loading into the incinerator as it not only eliminates lifting but enables careful handling of the body. The body may be slid into the chamber making it easier to avoid contact with hot surfaces.

Best techniques for lifting heavy weights
1) Lift a solid item. Place the body onto a stretcher or into a container before moving.
2) Use two people when possible. We recognise this may not always be practical when collecting but should always be considered when planning collections.
3) Don't lift unless absolutely necessary. A heavy body on the floor may be carefully rolled into a container and the container rolled upright and slid onto a trolley rather than attempting to lift. Again, use trolleys wherever possible.
4) Use correct lifting technique. The following recommendation is from the HSE guidelines.

Keep the load close to the waist. Keep the load close to the body for as long as possible while lifting. Keep the heaviest side of the load next to the body. If a close approach to the load is not possible, try to slide it towards the body before attempting to lift it.

Adopt a stable position. The feet should be apart with one leg slightly forward to maintain balance (alongside the load, if it is on the ground). The worker should be prepared to move their feet during the lift to maintain their stability. Avoid tight clothing or unsuitable footwear, which may make this difficult.

Get a good hold. Where possible the load should be hugged as close as possible to the body. This may be better than gripping it tightly with hands only.

Start in a good posture. At the start of the lift, slight bending of the back, hips and knees is preferable to fully flexing the back (stooping) or fully flexing the hips and knees (squatting).

Don't flex the back any further while lifting. This can happen if the legs begin to straighten before starting to raise the load.

Avoid twisting the back or leaning sideways, especially while the back is bent. Shoulders should be kept level and facing in the same direction as the hips. Turning by moving the feet is better than twisting and lifting at the same time.

Keep the head up when handling. Look ahead, not down at the load, once it has been held securely.

Move smoothly. The load should not be jerked or snatched as this can make it harder to keep control and can increase the risk of injury.

Don't lift or handle more than can be easily managed. There is a difference between what people can lift and what they can safely lift. If in doubt, seek advice or get help.

Put down, then adjust. If precise positioning of the load is necessary, put it down first, then slide it into the desired position.

5) When carrying keep the weight close to your body with your arms and chin tucked in. Keep your body straight and avoid twisting, bending or leaning back. Do not change your grip and make sure you have a clear view ahead.

6) Plan the job. Ensure your route is clear and safe before trying to move a heavy body. Assess how you are going to lift it and if you will need assistance. Never try to lift anything you do not feel capable of.

Pushing or Pulling Loads
Trolleys should have handle heights between the waist and shoulder. They should be well maintained with smooth running wheels that are suitable for the terrain. As a rough guide the amount of force needed to move a load over a flat, level surface is at least 2% of the load weight. Pushing is preferable to pulling. Be careful with slopes as this will considerably increase the force required. Assistance may be needed. Soft ground and uneven surfaces will also increase the force required. Do not exceed a walking pace.

General Guidelines
There is no such thing as a completely safe manual handling operation. Assessment will depend on physical capabilities and this will be linked to age and gender. The illustration below is taken from the HSE guidelines and indicates guideline weights for lifting. You can see that guideline weights are reduced if handling is done with the arms extended. This should be considered when carry a body in the arms. These guidelines should not be regarded as safe limits. In practice a person may be able to lift more or less but work outside the guidelines is likely to increase the risk of injury. As the risk increases more attention must be made to the assessment of how it should be carried out.

THE STANDARD MANAGEMENT PLAN

The Management Plan is drawn up as part of the Environmental Permitting Regulations and controls the risks to the Environment. It is published as part of the Management of the incinerator and must be drawn up before an Environmental Permit for the incinerator is granted by the Environment Agency. It is important that all staff at the site are aware of the Management Plan since it affects the daily routines. The Plan has been drawn up to be read in conjuction with Sections 2 and 3 of this course. And those sections will be attached to the plan when submitted to the Agency. The Plan is reproduced from Module 1 of this course and shown in this Appendix.

Standard Management System for the incinerator
Introduction
The incinerator will be operated in the most environmentally efficient way within the restrictions of the legislation.

Scope of Work
The incinerator will only accept the ABPR from the farm.
Ashes from process will go into skip/onto land.
Disposal ashes will only be transferred to a licensed landfill site.

Staffing of the Site
All staff involved in the work on site will be suitably trained
incinerator Operators will be training inline with the manufacturers directions
A list of staff will be kept together with details of their training.

Assessment of Risks.
The risks to the environment from a ABPR incinerator will come from the following sources:

- Handling the body when receiving and preparing for incineration. The risk will be from body fluids escaping onto the ground and from odours being released.
- Emission of smoke, particulates and odours from the incinerator process.
- Uncontrolled distribution of ashes onto unlicensed ground areas or into the atmosphere.
- Nuisance from noise and vibration.
- Risks to the public from contamination by body fluids and from access to the incinerator and body storage areas.
- Risks to staff from contamination by body fluids, manual handling of heavy animals, operation of machinery including contact with hot surfaces and inhalation of dust.

MITIGATING RISKS TO STAFF

Ensure all staff wear the appropriate PPE and have been provide adequate training when handling bodies and operating the equipment.

Staff will wear appropriate gloves and protective clothing when handling bodies. Hands must always be washed after handling.

2.3.2 Staff operating machinery will be fully trained and be familiar with the Operator Manual.
2.3.3 Heavy weights must be placed onto hydraulic lift , or mechanical lift. When moving heavy bodies a solid platform must be used.
2.3.4 Dust masks must be worn when raking and sweeping the incinerator chamber
2.3.5 Any hot surfaces will be identified and staff trained to be aware and take necessary precautions when working alongside.

3. Accident Management

This will refer to any accidents that may have an impact on the environment. The risks will be :
A Spillages from body fluids
B Emissions from the incinerator
C Equipment failure on the incinerator
D Storage of fuel supplies
E Fire Risk

3.1 Procedure for Managing Spills of Blood and Body Fluids.

See section 'Managing spills and fluids above' above

Emissions from the incinerator

This is dealt with under 2.1.2 above.

Equipment Failure on the incinerator

This may occur when

- The burners fail to ignite
- The fans fail to operate
- Interruption of the power supply
- Lack of fuel

Burners fail to Ignite

A failure in the secondary burner will cause a drop in temperature in the secondary chamber and the 850C two second residence time will not be met. Suitable spare parts will be kept to enable swift repairs as detailed in the Operator Training Manual. Training of the operators will provide the knowledge to deal with abnormal situations. Burners will be serviced once a year and inspected on a regular basis.

Fans fail to operate

In the event of a failure in the air supply the incinerator will be shut down as soon as possible. This is a very low risk problem and will normally involve an electrical fault which is remedied by resetting a trip switch or replacing a fuse.

Interruption of the Power Supply

In the event of power failure at the mains the incinerator will be shut down and any remaining material allowed to burn as quickly as possible. If power cuts become a regular feature then a back up power source will be investigated.

Lack of Fuel

A regular delivery schedule will be agreed with the supplier for the projected fuel consumption.
This will be reviewed on a regular basis to ensure sufficient fuel is maintained.

Storage of Fuel Supplies
Fuel will be stored in the approved manner. This will be checked with the supplier and all safety rules given by the supplier will be followed.

Fire Risk
No combustible material will be stored in the building housing the incinerator.
No combustible material will be used in the construction of the buiding in the immediate vicinity of the incinerator
Fire extinguishers will be available and placed according to the recommendation of the supplier.
These will be serviced or replaced on an annual basis. Requirements for fire extinguishers will be reviewed annually.

Complaints Procedure
To enable the public to report any problems a sign will be displayed at the entrance to the site at a reception point.
The sign will include:

- The permit holder's name
- The operator's name if different
- An emergency contact name and the licence holder and/or operator's telephone number.
- A statement that the site is permitted by the Animal Health Veterinary Laboratory.
- The permit number.
- The telephone number of the relevant APHA licensing department.
- A record will be kept of any complaints made to the site by a member of the public and details of any
- action taken.

Site Security
The areas or buildings containing storage and equipment will be locked when not attended by a member of staff. Public will not have access to these areas unless accompanied. A sign advising the public of this will be placed in an appropriate location.

Records
The following records will be maintained and kept for a minimum of 6 years.

Acceptance Records
This will include:

- Yearly transfer notes with commercial firms, eg veterinary practices
- Transfer / collection notes for ash removal.
- Transfer Notes from external carriers arriving at the site.

Incineration Records
These records will show how the bodies taken by the acceptance records are cremated. The incinerator diary will show the time of loading and the weight or category of weight of animal(s) placed into the incinerator.

Temperature and Emission Monitoring Records
These will be based on the form as provided in the operational manual giving details of time, secondary chamber temperature, evidence of smoke or odour, evidence of vermin on site and any emissions coming into the site from outside sources.

MITIGATING RISKS TO THE ENVIRONMENT

Handling Procedures
Reception of bodies

The bodies are be placed into leak proof containers or loaded directly into the machine.

Storage of Bodies
Bodies awaiting incineration will be stored inside proof containers with covered lids for no longer than 24 hours.

Odour Control
Odours will be limited to leak containers. The machine will be positioned to ensure no nuisance to the local vicinity. Best practice will always be to incinerate whilst waste is generated

Cleaning and Disinfection of Spillages
See section 'Managing spills and fluids above' above

Emission Controls
incinerator Chimney
Emissions are controlled by
(a) Using a incinerator with a two second residence time at 850C for exhaust gases in the secondary chamber.
(b) Operating the incinerator in the manner outlined in the Addfield Operator Training Module.

By (a) and (b) above the control of smoke, particulates and odour will be achieved.

Dispersal of Ashes
Dust is an inevitable outcome when operating with such a process and therefore actions must be minimised in order mitigate risk to the operator and general public. As such:

- Any ashes for disposal will be transferred in sealed containers to an authorised site.

Controlling Nuisance from Noise and Vibration
Combustion air systems are the biggest emitter of noise and vibration. However these will be limited to the sites boundaries. In the event the existing structure is not adequate for noise attenuation then additional steps will be taken to add extra soundproofing to the building housing the incinerator.

Mitigating Risks to the Public
The siting of the incinerator will be away from the public in a remote location, only trained operators will be within the vicinity of the machine. The lid will have a padlock to ensure no one an open the machine
Clients wishing to observe an incinerator must be accompanied at all times by a member of staff particularly when the machine is operating.