



Avian Influenza Bird Carcass Disposal

Disposal of Culled Birds and Dead Wild Birds at Remote Locations

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Introduction

During an Avian Influenza outbreak the bird carcasses need to be euthanized and destroyed with as little handling and movement as possible to prevent further spread of the disease. There are not many options for accomplishing that task. One of the most successful methods is the use of Air Curtain Burners manufactured by Air Burners, Inc. These machines have been successfully deployed in animal disease outbreaks around the world and many of the technical or scientific reports from these deployments are available on the Air Burners website or by request from Air Burners.

Animal Carcass Burning



Bovine Carcass Disposal (Florida)

Because air curtain burners burning wood waste or black coal develop very high burn chamber temperatures, portable Air Burners FireBoxes have been utilized numerous times around the world for disaster clean-up where it was necessary to incinerate animal carcasses, especially from diseased animals that required special disposal procedures, such as in the case of animals affected by BSE or Avian Influenza. In the case of BSE, the emphasis lies on the destruction of the Prions requiring temperatures above 850°C (approximately 1560°F) constantly

for a prolonged period of operating (retention) times. In the case of the Avian Flu, the emphasis lies on avoidance of cross contamination in the field and rapid destruction of massive quantities of birds on site. The minimum temperature that must be sustained to render the influenza virus ineffective is much lower, around 72°C (approximately 162°F). Temperature fluctuations are therefore less critical.

Many Air Burners machines have been purchased by government agencies to meet bio-terrorism contingencies, as Agriculture-Terror ("AG-Terror") is an ongoing concern. Air Burners FireBoxes are the only portable field option available to safely destroy a large herd or flock of animals poisoned in a bioterrorism attack. The machines can be transported, delivered and be operational within hours of an outbreak.



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Bird Carcasses

Conventional disposal practices, such as burial in the ground and landfill disposal, do not lend themselves well to the safe disposal of massive quantities of birds infected with the highly contagious bird flu virus. Burial and land-filling are not desirable, because of the lack of control over the containment of the virus to keep it from spreading to other birds and possibly mammals. Incineration is the most effective solution. Incineration in conventional MSW incinerators and autoclaves is not practical and economical for the safe destruction of large volumes of bird carcasses due to the high cost of transportation and the low throughput associated with these types of incinerators. In contrast, disposal in portable refractory walled FireBoxes is the most suitable and cost effective option to safely destroy large carcass volumes on site. Employing this method obviates the need to transport disease-ridden carcasses over public roads thereby minimizing cross contamination.

Some bird carcasses, such as chickens that contain high levels of water, must best be introduced into the firebox immediately upon euthanization, as they tend to decompose very rapidly in the open environment. Wild birds that have died from the bird flu must be collected swiftly and completely to avoid their consumption as food by mammals and vultures. The cross contamination of mammals, such as cats or badgers is of extreme concern, as it would manifest the spreading of the virus across species and possibly mutations of the virus which is very resilient and can survive in the environment at quite extreme conditions. It is the fear of such mutations that may result and have resulted in the contraction of an H5N1 type virus by humans in Asia and the Middle East.

Technical Discussion

This Technical Memorandum provides an understanding of the "standard" methods that have been employed to date using the Air Burners air curtain burners. In addition, this memorandum provides a technical overview of two new developments on the Air Burners machines:

- 1) The patented Diesel burner augmentation for areas where wood is scarce and where coal as a substitute for wood is also unavailable. The FireBoxes can be fitted with automatically controlled Diesel burners. These DB-Versions can be operated as standard FireBoxes and their combustion capacity can be augmented on an as-needed basis by flame burners, should wood waste or coal be scarce to support combustion of carcasses or other waste streams.

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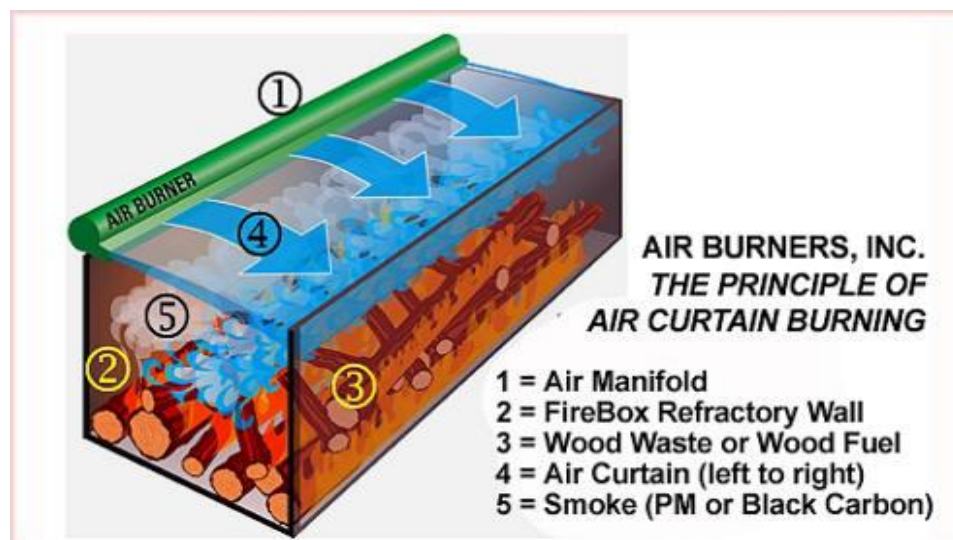
- 2) Air Burners FireBoxes are available as R-Versions for self-loading and self-unloading by the use of standard US or international roll-off trucks.

Standard Firebox Use

The standard fireboxes were originally designed to be used as an environmentally friendly alternative to open burning of wood waste. Their primary purpose is to control particulate matter (smoke) generated from burning wood. This is accomplished by directing an "air curtain" across the top of the open firebox (#4 in Figure below). This air curtain traps a majority of the smoke particles (#5) and causes them to re-burn in the extremely hot area just below the air curtain and above the burning wood waste. The temperatures in this area can exceed 1400°C (approximately 2500°F). The principle of air curtain incineration and operational videos are available for more details on our Web Site. www.airburners.com.



Standard Wood Burning Firebox in Full Operation



The S-Series fireboxes lend themselves best for bird carcass destruction. They are fully self-contained and they do not require any set up at site. The units are ready to load and start burning as soon as they are off the trailer. They are fully

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portable and transportable on a variety of standard trailers, including standard self-loading and unloading trailers and roll-off trucks.

Wood Fuel

To date the most common way to incinerate the bird carcasses is using highly burnable wood waste as the “fuel” to burn the carcasses, however, black coal has been used with great success where wood was not readily available. The Firebox is operated in its normal manner burning wood waste. Once the fire is hot enough the carcasses can be loaded into the FireBox for incineration. In order to be successful, the operator will have to observe a wood weight to carcass weight ratio of approximately 1:1 (i.e., 10 tons of carcasses will need 10 tons of wood waste, less if wood is substituted with coal). The drier and more burnable the wood waste is, the hotter and cleaner the incineration operation will be and the higher the through-put. The chunks of coal should be about the size of a man's two fists. Detailed instructions are available upon request from info@air-burners.com.

Transportation

The Fireboxes can be transported by flat-bed truck as depicted below or they can be transported by a standard self loading roll-on roll-off truck.



S327 Transported on Step-deck Tractor-Trailer

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S-111 and Air Burners Roll-Off Truck



Operation

Site preparation, start-up, and loading procedures are basically the same procedures for wood burning as with carcass burning in our air curtain burners. Air Burners, INC. operating manuals for the appropriate model that is being used should be consulted. These operating manuals can be freely downloaded from our Web Site at www.airburners.com/ab-opmanuals.htm.

Fuel Loading Start the fire as outlined in the Air Burners operating manual. The most important issue in preparing to burn carcasses is to insure that you have a good hot fire base before you load any carcasses. This start-up preparation usually takes one to two hours of wood or coal only burning. It must be made certain that the entire bottom of the firebox is covered with at least two feet of burning hot material (hot coals from wood or black coal). If you load too soon, the carcasses may fall through onto the dirt and there will be no heat or fire to burn them. They will eventually burn, but the overall through-put will suffer and smoke may increase.

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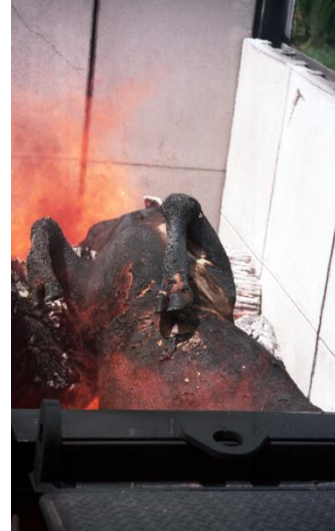
Charging of Chicken Carcasses

Once loading carcasses has begun the process is to build layers. After each layer of bird carcasses an equal amount of wood (or some coal) must be introduced.

The most common mistake is to "rush the fire." The through-put will start out low and increase as the day goes on. If you rush the fire by adding carcasses and wood too fast, then the

overall temperature will drop, the smoke will increase and the through-put will go down significantly. Remember, the wood (or coal) is your fuel; be sure it is burning strong, before you load more carcasses onto it. This is especially true for chicken carcasses.

Carcass Loading Using the appropriate loading machinery, try to place the carcasses in the middle section of the firebox. The photo above shows bird carcasses being introduced into a standard S-300 firebox. The important thing to remember is that rapid incineration is all about surface area. If you place a massive pile of carcasses in the middle of the firebox, then the carcasses will incinerate around the entire external area of the carcass deposits. If you pile that same carcass volume up against the firebox wall, then the carcasses will only incinerate from the exposed areas, and the through-put will slow down.



Bovine Carcass in S220

Loading Equipment For bird carcasses, a wheeled loader with a rake is practical. Using a wheeled loader with a bucket is also possible, but one of the problems with a bucket is the potential for "scooping" up dirt when picking up the bird carcasses. Dirt smothers the fire, and the more dirt that goes into the firebox the slower the operation will be. An excavator with a grapple works well, if the carcasses are large and mostly intact. It also is effective for loading the wood waste to support combustion.



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Shut Down Once you have finished loading the carcasses continue to add wood until the last load of carcasses has been incinerated, usually in about one hour. Then follow normal shut down procedure described in the operating manual.

Ash Removal In all of the cases where the residual ash has been tested after the incineration operations using the Air Burners machines, the ash has been found to be sterile. For ash removal follow normal procedures outlined in the operating manual. Whether the ashes should be dumped or land applied (buried) is usually a decision of the competent local authorities.

A useful implement for ash removal is the "ash-rake" made by Air Burners for its FireBoxes. The ash-rake is fitted with a universal quick disconnect faceplate for use with a Bobcat, Skidsteer, loader, etc.

Safety

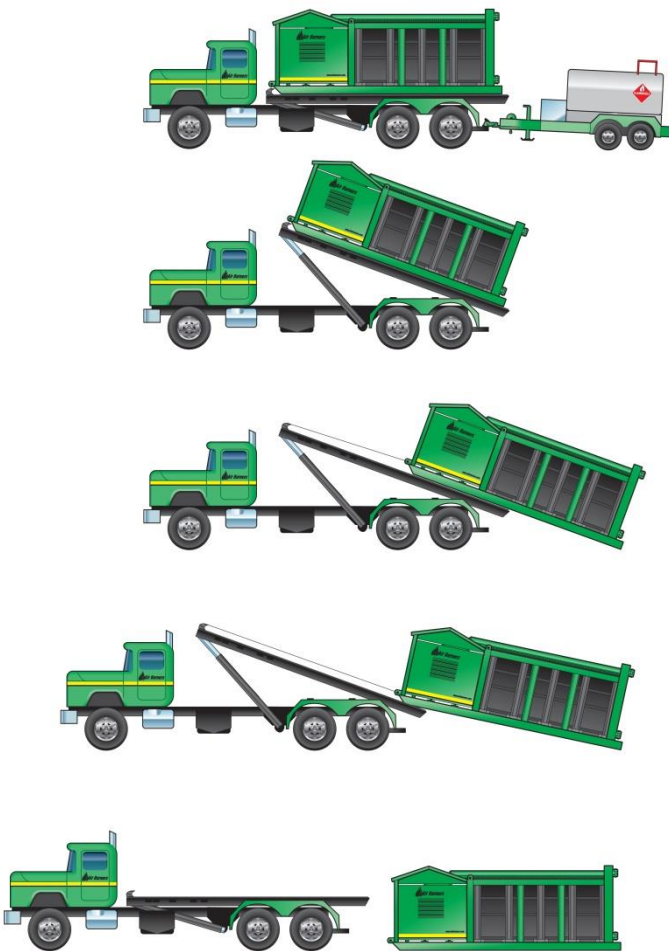
The standard FireBox unit has an open bottom, so it must not be placed on flammable materials such as dry grasses or peat moss. During operations hot embers will fly from the open top. They usually fall very near to the machine less than 30m (100 feet). Always follow the safety procedures outlined in the operating manual.

Only personnel trained in the operation of the air curtain burner should come within 300 feet of the entire FireBox operation. This guideline only addresses the basic operation of the FireBox itself and it does not address considerations relative to possibly present contagious or poisonous agents and the procedures and safety requirements governing human exposure to them or environmental issues and other safety considerations connected to them. They would be addressed and managed by the HazMat safety team assigned to the disaster recovery operation.

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**Disaster Response Package (Example)
S-111 with Roll-Off Truck and Water Trailer**

<p>Air Burners Truck with S-111 FireBox and 1000 gallon mobile water trailer pulls up to disposal site.</p> <p>Water trailer is parked and FireBox unloading begins.</p> <p>A powerful winch with steel cable lowers the FireBox.</p> <p>The FireBox is placed onto the ground from where it can be relocated by dragging, if needed.</p> <p>The truck pulls away. It can be parked on site or be used for other tasks, including the deployment of multiple FireBoxes.</p>	
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