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Burning Waste

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Alaska statute, AS 46.06.021 recognizes a national solid waste management hierarchy that ranks management practices in the following order of preference: reduction, recycling, treatment, and lastly disposal. In Alaska, options for waste reduction and recycling are often limited so treatment is often the management option of choice over that of disposal. Burning waste is a common method of treating solid waste. If done properly, burning reduces waste volume (as much as 90% in some cases), creates an ash that is inert, does not attract animals, and minimizes water and air pollution problems. Ash disposal does not require as much attention to cover at landfills because animal vectors are not attracted. Ash also compacts much better than other forms of waste (i.e., raw garbage), thereby minimizing infiltration of water and leachate formation.

In many situations in Alaska open burning is the treatment method used. Open burning takes place on the ground, in burn barrels and some cases burn boxes. The Alaska Department of Environmental Conservation (ADEC) discourages the use of open burning in lieu of better burning methods. Open burning generally does not achieve the temperatures, turbulence or residence times needed to prevent environmental hazards. The result is combustion that smolders throughout the burning cycle causing air pollution and unburned waste in the final ash by-product. Open burning is most effective when clean & dry wood and paper are used. Please refer to the fact sheet entitled "Open Burning Solid Waste at Class III Municipal Landfills" for information on how to properly open burn solid waste.

Effective combustion occurs when the burnable gases are heated beyond 1200 degrees Fahrenheit (°F) and mixed with oxygen. As the waste heats up from 250 to 1200 °F, substances in the waste are converted into burnable gases. This is called the "start-up" phase of a burn cycle. Smoke (visible emission) is produced in this temperature range. The longer the waste remains within this 250-1200°F temperature range, the more smoke and contaminants are produced. Above 1200°F, smoke (and air pollution) is generally not created. This is called the "operational" phase of a burn cycle. All waste should be completely consumed during this phase. Thus, the "start-up" and the "cool-down" phases of a burn cycle should be minimized as much as possible. Open burning methods produce the most smoke because the waste and gases commonly do not reach temperatures above 1200° F.

The amount of pollutants emitted to the environment depends on the completeness of the combustion process. In order to effectively burn waste without producing pollution, the following items are needed for a burning system:

- A design that gets air into the burning chamber, including beneath the burning waste (under fire air).

- Turbulence. A mechanical draft is best. A natural draft is unlikely to supply enough air or achieve turbulent mixing in the high temperature region. This is especially true when burning garbage or waste with a high percentage of non-combustibles and moisture.
- Supplemental fuel. Supplemental fuel is recommended for starting the burn and for burning the gases and smoke. Garbage generally does not burn completely, especially under wet or cold conditions, without supplemental fuel and a mechanical draft.
- A method to retain heat inside the burning chamber. This is accomplished by using enclosed units and a refractory, a heat insulating lining in the burn chamber. Incineration units without a refractory do not hold heat particularly well and develop low-temperature areas within the burning waste that will produce smoke.
- Holding time. Combustion takes time. Holding time is the length of time needed to completely burn the waste and is affected by a number of factors. Reduced temperature, turbulence and BTU value, or an increase in moisture content will increase the holding time needed to completely burn waste.

Best management practices for any burning method include the following:

- Elimination of hazardous and other prohibited wastes from the burning process. Incineration methods are able to burn some forms of more hazardous wastes than open burning because incineration units generally burns at higher temperatures.
- Separate non-combustibles (i.e. glass & metal) and wastes that have high moisture content (i.e. food wastes) as these items rob energy from the combustion process. This is especially true for lower-temperature burning processes. Less separation of these items is needed for the higher temperature incineration methods.
- Site the burning system such that prevailing winds blow away from the community, residences and other affected interests.
- Manage and monitor the combustion cycle for maximum combustion efficiency.
- Remove and dispose of ash when it is thoroughly cooled in order to prevent wildfires.

Using the practices mentioned above will promote more thorough burning of the waste and yield less polluted exhaust. This will also produce ash that is inert, will prevent animals from being attracted to the ash and will minimize water and air pollution problems.

A more thorough discussion of the theory and practice of burning solid waste is available in the ADEC document "Burning Garbage and Land Disposal in Rural Alaska." This guidebook is intended to be a resource for communities and others considering incineration as an element of their waste management program.

You may also contact your local ADEC Solid Waste Program office for more information.

Topics covered in the publication include:

- the various methods of burning and the advantages and disadvantages of each;
- heat recovery as a means to offset system costs and provide a useful source of hot water or steam;
- summary of the current regulations regarding air quality and solid waste management;
- case studies of three Alaskan community burning systems currently in use; and a
- database of small direct combustors that is intended to be a general guide to incinerators available for small-scale waste treatment. The database describes 87 systems constructed or sold by 34 private companies or public organizations.