

# A Citizen's Guide to Incineration



## What is Incineration?

Incineration is the process of burning hazardous materials at temperatures high enough to destroy contaminants. Incineration is conducted in an "incinerator," which is a type of furnace designed for burning hazardous materials in a combustion chamber. Many different types of hazardous materials can be treated by incineration, including soil, sludge, liquids, and gases. Although it destroys many kinds of harmful chemicals, such as solvents, PCBs (polychlorinated biphenyls), and pesticides, incineration does not destroy metals, such as lead and chromium.

## How Does It Work?

Hazardous materials must be excavated or pumped into containers before incineration. They may require further preparation, such as grinding or removing large rocks and debris, or removing excess water. The materials are then placed in the combustion chamber of an incinerator where they are heated to an extremely high temperature for a specified period of time. The temperature and length of time depend on the types of wastes and contaminants present. Air or pure oxygen may be added to the chamber to supply the oxygen needed for burning. The destruction of contaminants will depend on:

- Reaching the target temperature: Depending on the contaminants present, the target temperature may range from 1,600 to 2,500°F.

- The length of time the waste is heated in the combustion chamber: Typically, solid wastes must be heated for 30 to 90 minutes, while liquid and gaseous wastes may only require 2 seconds.
- Mixing of the waste material. Mixing helps all of the waste to be heated to the proper temperature.

As the wastes heat up, the contaminants volatilize (change into gases) and most are destroyed. Gases that are not destroyed pass through a secondary combustion chamber for further heating and destruction. The resulting gases then pass through air pollution control equipment, which removes particulate matter (extremely small particles or liquid droplets) and "acid gases." Acid gases such as sulfur dioxide are very corrosive.

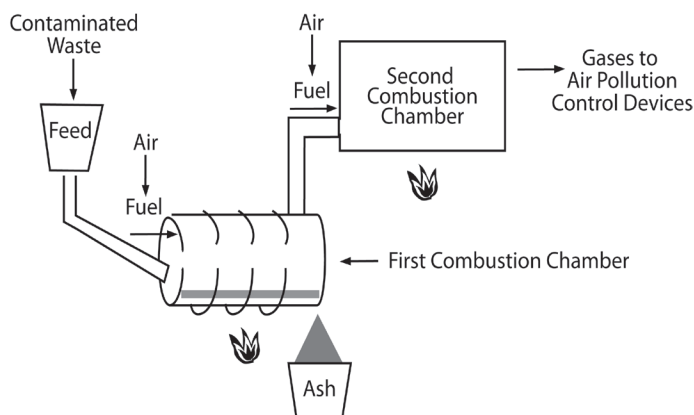
Incinerators can be constructed for temporary use at the site. However, in recent years, it has been more common for the wastes to be loaded onto trucks for transport to a permanent offsite facility. EPA requires that an incinerator can destroy and remove at least 99.99 percent of each harmful chemical in the waste it processes. When some extremely harmful chemicals are present, EPA requires that an incinerator show it can destroy and remove at least 99.9999 percent of contaminants in the waste. Ash remaining at the bottom of the combustion chambers likely will require disposal in a hazardous waste landfill. However, the amount of material that requires disposal after incineration is much less than the initial amount of waste that was burned.

## How Long Will it Take?

Incineration of all waste at a site might take a few weeks to several years. The actual cleanup time will depend on several factors. For example, it may take longer where:

- The amount of waste is large, requiring more time to excavate or pump out.
- The waste contains large rocks or debris that must be removed before incineration.
- The capacity of the incinerator is small.

These factors vary from site to site.



*How an incinerator converts waste into ash and gases.*

## Is Incineration Safe?

An incinerator that is properly designed and operated can safely destroy harmful chemicals. Proper temperatures must be maintained for complete incineration, and air pollution control equipment must be monitored to ensure all contaminants are removed from the offgases. Hazardous materials transported to offsite incinerators are covered or contained to prevent their release.

## How Might It Affect Me?

Residents and businesses near the site may see and hear large earth-moving equipment such as backhoes that may be needed to excavate wastes for incineration. They will notice increased truck traffic if wastes must be transported to an offsite incinerator. Odors, smoke, and dust are not typically issues with modern incinerators, though residents may occasionally see harmless white steam that disappears quickly into the air.

## Why Use Incineration?

Incineration can destroy a wide range of highly contaminated wastes and greatly reduce the amount of material that must be disposed of in a landfill. For small contaminated areas, excavation and transport to an offsite incinerator can be a quick cleanup approach. A faster cleanup may be important when a site must be cleaned up quickly to prevent immediate harm to people or the environment.

Although incinerators require a lot of fuel for their operation, the heat generated sometimes can be used to generate electric power in a process called “waste to energy.”

Offsite incineration has been selected or is being used at over a hundred Superfund sites, while onsite incineration has been selected or is being used at over 40 Superfund sites across the country.



*Example of offsite incinerator.*

## Example

Incineration was used as part of the cleanup effort at the MOTCO, Inc. Superfund site in Texas. From the 1950s through 1970s, the site was contaminated with tar- and petroleum-related chemicals from tar recycling activities. Investigation of the site in the 1980s found seven unlined waste disposal pits containing 7 million gallons of PCB-contaminated liquid and 18 thousand cubic yards of sludge and tar. These wastes had to be removed to prevent further contamination of soil and groundwater.

From 1993 to 1996, the liquid, sludge, and tar were excavated and transported about 280 miles to an incinerator in Louisiana. The remaining contaminated soil beneath these wastes was covered with a cap and surrounded by underground slurry walls to prevent release of any contaminants that remained. Removal of the contaminant sources was expected to speed up the cleanup of groundwater.

## For More Information

For more information about this and other technologies in the Citizen's Guide Series, visit:

[www.cluin.org/remediation](http://www.cluin.org/remediation)  
[www.cluin.org/products/citguide](http://www.cluin.org/products/citguide)

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