

Community Guide to Incineration



What Is Incineration?

Incineration is the process of burning hazardous materials at temperatures high enough to destroy contaminants. An incinerator 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:

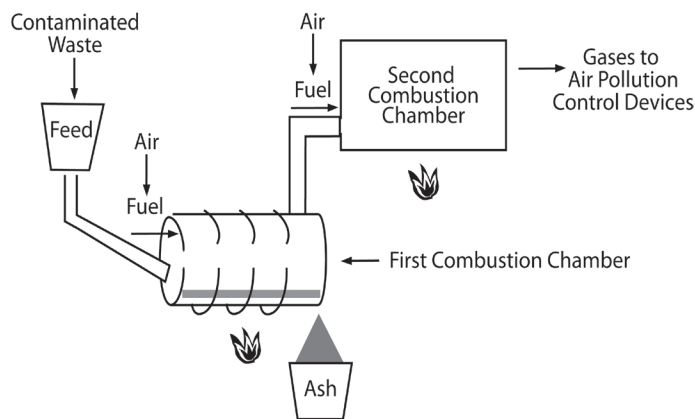
- **Reaching the target temperature.** Depending on the contaminants present, the target temperature may range from 1,600 to 2,500°F.
- **The length of time the waste is heated in the combustion chamber.** Typically, solid wastes must be heated for 30 to 90 minutes, while liquid and gaseous wastes may require only 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 cleanup time will depend on several factors that vary from site to site. For example, incineration will take longer where:



How an incinerator converts waste into ash and gases.

- 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.

Is Incineration Safe?

A well-designed and operated incinerator will safely destroy harmful chemicals. Proper temperatures are maintained for complete incineration, and air pollution control equipment is used to ensure all contaminants are removed during secondary treatment. Hazardous materials transported to offsite incinerators are covered or contained to prevent releases in transit.

How Might It Affect Me?

You may see or hear large earth-moving equipment such as backhoes that may be needed to excavate wastes for incineration. You might also notice increased truck traffic if wastes must be transported to an offsite incinerator. Odors, smoke and dust are not typically problems with modern incinerators, although you 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 “waste to energy” process. Offsite and onsite incineration have been selected for use at over 100 Superfund sites and many other cleanup sites across the country.



Example of an offsite incinerator.

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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 the recycling of styrene tar. Investigation of the site in the 1980s found seven unlined waste disposal pits containing 7 million gallons of PCB-contaminated liquid and 3.6 million gallons 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 to an incinerator in Louisiana. The remaining contaminated soil beneath these wastes was covered with a cap and surrounded by underground barriers to contain the contaminants. Removal of the contaminant source will reduce the volume of groundwater that must be cleaned up by pump and treat. Small amounts of tar removed during pumping are transported to the incinerator for destruction.

For More Information

- About this and other technologies in the Community Guide Series, visit: <https://clu-in.org/cguides> or <https://clu-in.org/remediation/>
- About use of cleanup technologies at a Superfund site in your community, contact the site's community involvement coordinator or remedial project manager. Select the site name from the list or map at <http://www.epa.gov/superfund/sites> to view their contact information.