

A Citizen's Guide to Air Stripping



What Is Air Stripping?

Air stripping is the process of moving air through contaminated groundwater or surface water in an above-ground treatment system. Air stripping removes chemicals called “volatile organic compounds” or “VOCs.” VOCs are chemicals that easily evaporate, which means they can change from a liquid to a vapor (a gas). The air passing through contaminated water helps evaporate VOCs faster. After treating the water, the air and chemical vapors are collected, and the vapors are either removed or vented outside if VOC levels are low enough. Air stripping is commonly used to treat groundwater as part of the “pump and treat” cleanup method. (See *A Citizen's Guide to Pump and Treat* [EPA 542-12-017].)

How Does It Work?

Air stripping uses either an air stripper or aeration tank to force air through contaminated water and evaporate VOCs. The most common type of air stripper is a packed-column air stripper, which is a tall tank filled with pieces of plastic, steel, or ceramic packing material.

Contaminated water is pumped above ground and into the top of the tank and sprayed over the top of the packing material. The water trickles downward through the spaces between the packing material, forming a thin film of water that increases its exposure to air blown in at the bottom of the tank. A sieve-tray air stripper is similar in design but contains several trays with small holes. As water flows across the trays, a fan at the bottom blows air upwards through the holes, increasing air exposure. Aeration tanks are another type of design that remove VOCs by bubbling air into a tank of contaminated water.

Rising air and vapors accumulate at the top of the air stripper or aeration tank where they are collected for release or treatment. Treated water flows to the bottom, where it is collected and tested to make sure it meets cleanup requirements. The water may be further treated, if necessary, to achieve required levels. Clean water may be pumped back underground, into local surface waters, or to the municipal wastewater treatment plant.

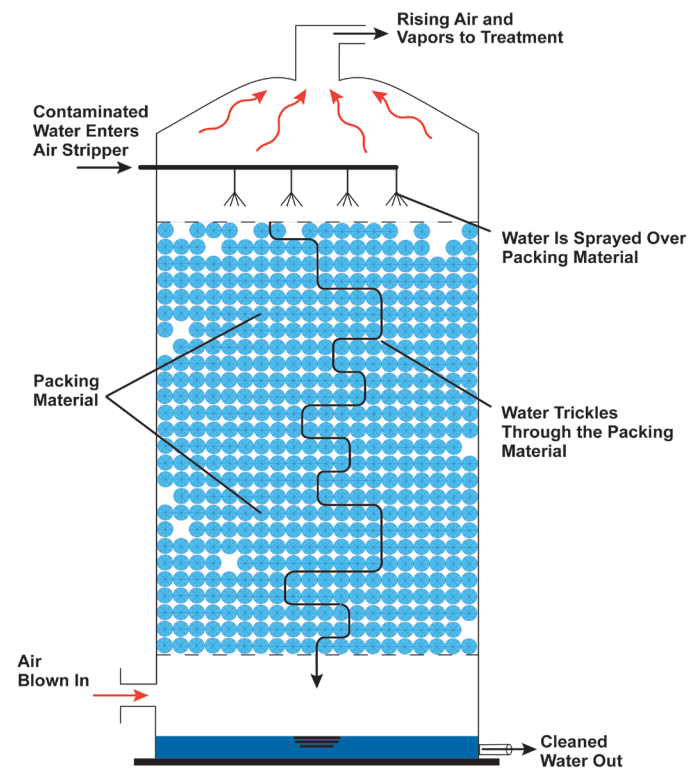
Aeration tanks are typically shorter than packed-column or sieve-tray air strippers. The size and type of air stripper used will depend on the types and amounts of contaminants as well as the quantity of water requiring treatment.

How Long Will It Take?

The flow of water through an air stripper or aeration tank may take only a few minutes, depending on the size of the device and the rate of water flow through it. However, cleanup of all the contaminated water at a site can take several months to years. The actual cleanup time will depend on several factors. For example, it will take longer where:

- Contaminant concentrations are high or the source of dissolved contaminants has not been completely removed.
- The amount of water requiring treatment is large.
- Groundwater cannot be pumped at a fast rate.
- Buildup of mineral deposits or algae on the packing material require frequent removal.

These factors vary from site to site.



Packed-Column Air Stripper

Is Air Stripping Safe?

Air stripping is generally considered to be safe to use. Air strippers may be brought to the site so that contaminated water does not have to be transported to a cleanup facility. Contaminated water is contained throughout cleanup so that there is little chance for people to come into contact with it. The treated water usually may be returned to the groundwater or discharged to surface water. The chemical vapors produced by air stripping are treated, if necessary, to ensure unsafe levels of vapors are not released.

How Might It Affect Me?

Installation of the air stripper and treatment equipment may require use of heavy machinery, especially at large contaminated sites. Area neighborhoods may experience some increased truck traffic as the equipment is delivered. Large tanks or columns may be visible from the street and may need to operate for many years. However, care is taken to make sure the operation of air strippers is as quiet as possible.



Air stripper and treatment building

Why Use Air Stripping?

Air stripping is an effective way of removing VOCs from contaminated water and is commonly used as part of groundwater pump and treat systems at sites around the country. Air strippers can be brought to the site eliminating the need to pump contaminated water for offsite treatment.



Sample plastic packing material. (Photo from Mass Transfer, Ltd.)

Example

Air stripping is part of the treatment for four groundwater pump and treat systems operating at the North Indian Bend Wash Superfund site in Arizona. Groundwater at the site is contaminated with an industrial solvent called trichloroethene (TCE) and other VOCs. Contamination extends over an area of about 8 square miles and to depths over 100 feet.

The first pump and treat system began operating in 1994. The others were added later to improve cleanup. The packed-column air strippers remove VOC vapors, which are then treated with activated carbon and another method called "ultraviolet oxidation." Cleaned water is discharged to an area irrigation network and reservoir. As of 2011, over 40,000 pounds of TCE had been removed, and cleanup of some areas was nearly complete. The systems are expected to operate for another 40 to 70 years to clean up the entire site.

For More Information

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

www.cluin.org/remediation
www.cluin.org/products/citguide

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