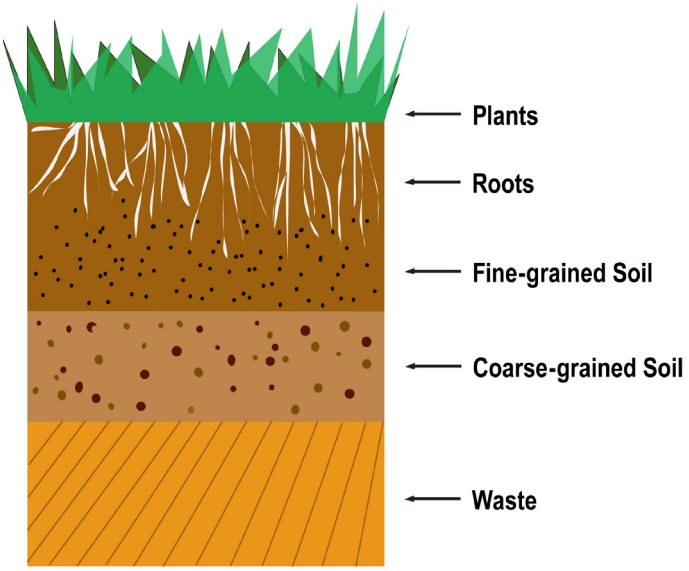
A Citizen's Guide to Evapotranspiration Covers

What Are Evapotranspiration Covers?

Evapotranspiration (ET) covers are a type of cap placed over contaminated material, such as soil, landfill waste, or mining tailings, to prevent water from reaching it. They differ from other types of caps (See *A Citizen's Guide to Capping* [EPA 542-F-12-004].) in the way they prevent water from seeping into the waste. ET covers store water from rainfall and snowmelt until drier or warmer weather evaporates the water, or until the water is taken in by plant roots and released to the air as water vapor through the leaves and stems. This process is called "transpiration."

How Do They Work?

Like other caps, ET covers do not destroy or remove contaminants. Instead, they isolate them and keep them in place to prevent the spread of contamination and protect people and wildlife from the contaminated material. ET covers are constructed by placing a 2- to 10-foot-thick layer of fine-grained soil containing silt and clay over the contaminated material. The type of soil is chosen for its ability to store water and promote plant growth. The thickness of the cover depends on how much rainfall and snowmelt is expected in the area. Grass, shrubs, or small trees that form extensive root systems and survive the local climate are usually planted in the soil. Plants native to the area often work best.



Example of ET cover used at Operating Industries, Inc. Landfill Superfund site.

The soil-plant layer of an ET cover slows the downward movement of rainwater and snowmelt and promotes storage of the water. The stored water will either evaporate or transpire. Together, evaporation and transpiration ("evapotranspiration") keep water from seeping into contaminated material and carrying contaminants downward into groundwater.

Construction of an ET cover sometimes involves placing the layer of fine-grained soil over a 1-to 2-foot-thick layer of coarse-grained soil, such as sand or gravel. This extra layer allows the fine-grained soil layer to hold more water through a process known as "capillary action." This type of cover usually needs a smaller amount of fine-grained soil to have the same water storage as a regular ET cover. Use of clean, locally-available soil for these layers will speed up construction and decrease costs.

How Long Does It Take?

Building an ET cover can take a few days to several months. Construction may take longer when:

- The contaminated area is large.
- A thick cover is needed.
- Supplies of clean soil, gravel, or other cap materials are not available locally.
- The growing time for the plants is long.

ET covers must be maintained for as long as the contaminated materials remain in place to ensure the plants and soil continue to keep water away from contamination.

Are They Safe?

When designed for local conditions, ET covers offer a very safe and effective way to isolate wastes. Regular inspections are made to ensure that the weather, plant roots, and animal activity have not damaged the soil cover and that any plants that are part of the cover are still growing. Also, groundwater wells around the covered area are sampled to ensure the cover is working and contaminants remain isolated.

How Might It Affect Me?

Residents and businesses close to a site may see increased truck traffic as materials are brought to the site. Construction of the cover may involve bulldozers, backhoes, and other noisy equipment, and some soil may need to be excavated for use in the cap. Any dust from excavation and construction can be controlled by spraying water or covering stockpiled materials with tarps.

Why Use ET Covers?

ET covers can be a quick, relatively inexpensive way to isolate landfill wastes and other buried contaminated materials. Like conventional caps, installing an ET cover can avoid the excavation of large amounts of soil or waste having low levels of contamination. ET covers can be designed to provide equal performance to conventional caps, and the plants can make the site more attractive. They are also less likely than conventional caps to be damaged by repeated freezing and thawing as seasons change. ET covers are more commonly used in dry climates where there is little rainfall.

Wheatgrasses, sage bush, pinyon and juniper are part of an ET cover at the Monticello Mill Tailings Superfund site in Utah.

Example

An ET cover was installed over wastes buried in the former Box Canyon Landfill, one of several contaminated areas at the Camp Pendleton Marine Corps Base Superfund site in California. The 28-acre landfill received municipal solid waste and commercial wastes from 1974 to 1984. In the 1990s, low concentrations of contaminants were found in groundwater and soil around the landfill.

Rather than excavating the wastes, in 2002 a 6-foot thick ET cover was constructed over the entire landfill. Quick-growing non-native plants were in the original plant mix to provide erosion control. These later were replaced with native grasses and brush to return the site to a natural coastal sage scrub habitat. The cover is inspected every six months to make sure the cover is in good condition and the plants are healthy.

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
www.cluin.org/products/evap/

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