

## EPA ONSITE TECHNOLOGIES

In many areas, onsite systems have been plagued by poor public acceptance; feelings that those systems were second rate, temporary, or failure prone. This perspective contributed to poorly designed, poorly constructed, and inadequately maintained onsite systems.

Recently, the situation has begun to change. **Federal, state, and local governments have refocused their attention on rural wastewater disposal** and, more particularly, on **wastewater systems affordable by the rural population**. Onsite systems are now gaining desired recognition as a viable wastewater management alternative **that can provide excellent, reliable service at a reasonable cost, while still preserving environmental quality**.

**Federal and many state and local governments have initiated public education programs dealing with the technical and administrative aspects of onsite systems and other less costly wastewater handling alternatives for rural areas.**

In this time of population movements to rural and semirural areas, **high costs of centralized sewage collection and treatment, and new funding incentives for cost and energy saving technologies, those involved with rural wastewater management need more information on the planning, design, construction, and management of onsite systems**. This process design manual provides primarily technical guidance.

Technologies discussed in this manual were selected because of **past operating experience and/or because of the availability of information and performance data on those processes**.

Because a particular wastewater handling option is not discussed in this manual does not mean that it is not acceptable. All available technologies should be considered when planning wastewater management systems for rural and suburban communities.

Groundwater and surface water pollution are major environmental considerations when onsite systems are used. All wastewater treatment and disposal systems must be designed, constructed, operated, and maintained to prevent degradation of both groundwater and surface water quality.

For onsite systems designed and constructed using Environmental Protection Agency funds, all applicable regulations must be complied with, including requirements for disposal to ground waters (**4 FR 6190, February 11, 1976**).

### **3.2.2 Wastewater Treatment and Disposal by Evaporation**

Wastewater can be returned directly to the hydrologic cycle by evaporation. This has appeal in onsite wastewater disposal because it can be used in some areas where site conditions preclude soil absorption or in areas where surface water or groundwater contamination is a concern.

The wastewater can be confined and the water removed to concentrate the pollutants within the system. Little or no treatment is required prior to evaporation. However, climatic conditions restrict the application of this method.

Evaporation can take place from a free water surface, bare soil, or plant canopies. Evaporation from plants is called transpiration. Since it is often difficult to separate these two processes on partially bare soil surfaces, they are considered as a single process called evapotranspiration (ET).

If evaporation is to occur continuously, three conditions must be met (3). First, there must be a continuous supply of heat to meet the latent heat requirements of water (approximately 590 cal/gm of water evaporated at 15°C). Second, the vapor pressure in the atmosphere over the evaporative surface must remain lower than the vapor pressure at the surface.

This vapor pressure gradient is necessary to remove the moisture either by diffusion, convection, or both. Third, there must be a continuous supply of water to the evaporative surface. The first two conditions are strongly influenced by meteorological factors such as air temperature, humidity, wind velocity, and solar radiation, while the third can be controlled by design.

Successful use of evaporation for wastewater disposal requires that evaporation exceed the total water input to the system. Rates of evaporation decrease dramatically during the cold winter months. In the case of evaporative lagoons or evapotranspiration beds, input from precipitation must also be included.

Therefore, application of evaporation for wastewater disposal is largely restricted to areas where evaporation rates exceed precipitation rates. These areas occur primarily in the southwestern United States (see Figure 3-1). In other areas, evaporation can be used to augment percolation into the soil.

Transpiration by plants can be used to augment evaporation in soil-covered systems (5)(6). Plants can transpire at high rates, but only during daylight hours of the growing season. During such periods, evapotranspiration rates may exceed ten times the rates measured in Class A evaporation pans (7)(8)(9). However, overall monthly evaporation rates exceed measured evapotranspiration rates. Ratios of evapotranspiration to evaporation (as measured from Class A pans) are estimated to be 0.7515

**(GET THIS) Manual of Septic Tank Practice. NTIS Report No. PB 216 240, Public Health Service, Washington, D.C., 1967. 92 pp.**