United States
Environmental
Protection Agency

Region 9 Ground Water
Office (WTR-9)

EPA 909-F-01-001
APRIL 2001

Seepage Pits May Endanger Ground Water Quality

In 1999, EPA promulgated regulations prohibiting the use of cesspools for the disposal of sewage from multi-family dwellings, and any other buildings where cesspool capacity was for 20 or more persons per day, such as schools, hospitals, and manufacturing facilities. In that rule, a cesspool was defined as *"a "drywell" that receives untreated sanitary waste containing human excreta, and which sometimes has an open bottom and/or perforated sides. "Drywell" means a well, other than an improved sinkhole or subsurface fluid distribution system, completed above the water table so that its bottom and sides are typically dry except when receiving fluids.* These regulations also contain a prohibition against the use of any seepage pit, drywell, septic system, or other subsurface disposal system for the disposal of hazardous or toxic substances (40 CFR part 144.)

While the use of cesspools for sewage disposal has been prohibited in most states for a number of years, some local ordinances still allow for the construction of drywells as a means of dispersing effluent from septic tanks. When used in this fashion, they are more commonly called "seepage pits." This method of effluent dispersal is deficient for a number of reasons:

1. Seepage pits disperse effluent in anoxic, or oxygen-poor, environments, where pathogens (especially viruses) may not be treated before they reach the water table. They place fluids below the root zone, where there is no immediate uptake by plants of the water and nutrients, nor is there the potential for treatment by evaporation or evapotranspiration.

2. If septic tanks and other treatment components are not properly sized, constructed and maintained, seepage pits may receive sewage solids (essentially functioning like cesspools.)

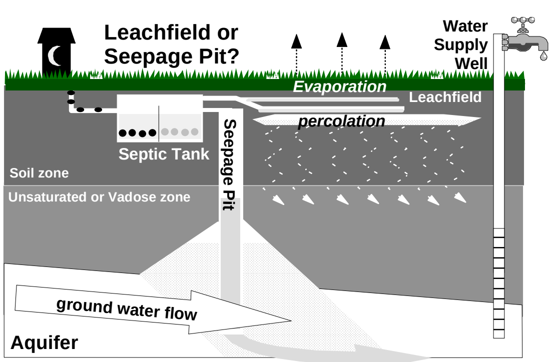
3. Water tables are not static, and may rise above the bottom of the seepage pit, flooding it and allowing direct contact of pathogens and nitrogen species with ground water.

4. Seepage pit construction and use may open up pathways to cracks and fissures in rock, sending effluent directly to waterways.

5. Depending on their depth, seepage pits may allow contaminated ground water to pollute pristine aquifers.

6. Seepage pits used for the disposal of untreated or partially treated industrial or commercial waste may pose additional hazards to ground water quality, if the effluent contains soluble toxics.

Seepage pits may cause other hazards not directly related to water quality. They are a hazard for people, animals and property that may fall into them. They may also affect slope stability and promote landslides. For all of these reasons, the Ground Water Office at EPA, Region 9 **discourages the use of seepage pits for onsite sewage (or septic) system effluent**, particularly on steep slopes, fractured rock areas, areas with shallow ground water, and/or areas where ground water provides the sole source of drinking water.



Exceptions should only be allowed where the seepage pit is backfilled with cobbles or other weight-bearing material, where the sanitary waste stream has been treated (e.g., disinfection, nitrogen removal), and no other effluent dispersal mechanism is feasible. Regulators should assess cumulative impacts based on the number and types of other nearby subsurface discharges.

References are listed on the reverse of this sheet. For more information, please call Elizabeth Janes at (415) 972-3537, or e-mail *janes.elizabeth@epa.gov*.

Seepage Pit References

1. **Need for Soil Treatment** (see also county and state water quality plans, and onsite sewage regulations.)

Crites, Ron and Tchobanoglous, George: Small and Decentralized Wastewater Management Systems, McGraw-Hill, 1998, page 653: ...Removal of microorganisms, including pathogenic bacteria, viruses, and helminths, is accomplished by **soil** filtration, adsorption, desiccation, radiation, predation, and exposure to other adverse environmental conditions.

International Association of Plumbing and Mechanical Officials, 1998 California Plumbing Code, Title 24, Appendix K3: ...(4) the minimum required area of porous formation shall be provided in one or more seepage pits. No excavation shall extend within ten (10) feet of the water table nor to a depth where sewage may contaminate underground water stratum that is usable for domestic purposes.

Oakley, Stewart M., for California Wastewater Training and Research Center, September 1999, Onsite Wastewater and Nitrogen Removal: Within a well-designed and constructed subsurface absorption trench, diffusion of oxygen into the vadose zone promotes the biological oxidation of $NH^{4}+$ (ammonia) to $N0^{3}-$ through biological nitrification. Depending on soil moisture conditions and organic matter concentrations within the soil column, $N0^{3}-$ can be reduced, under anoxic conditions, to N^{2} gas through heterotrophic biological denitrification. A carbon source is required for denitrification to occur. In many instances there may not be sufficient organic substrate at a depth below the "A" horizon to promote denitrification; under these conditions $N0^{3}$-N can migrate into the groundwater aquifer. The conventional practice of constructing relatively deep subsurface soil absorption trenches (2 to 4 feet) for septic tank effluents thus may often have the effect of exacerbating denitrification problems and enhancing nitrate movement into groundwater. (page 5.)

USEPA, October 1980, Design Manual, Onsite Wastewater Treatment and Disposal Systems: ...Travel through two to four feet of unsaturated soil is necessary to provide adequate removal of pathogenic organisms and other pollutants from the wastewater before it reaches the groundwater. (p. 207)...Seepage pits are generally discouraged by many local regulatory agencies in favor of trench or bed systems... Maintaining sufficient separation between the bottom of the seepage pit and the high water table is particularly important consideration for protection of ground water quality. (p. 235)

US EPA, June 1987, Septic Tank Siting to Minimize the Contamination of Ground Water by Microorganisms: ...As the septic tank effluent percolates through the soil, its bacteriological quality changes depending upon the characteristics of the subsurface environment. One of the most important factors is the pore size of the soil matrix. Many bacteria are large enough to be filtered out as the water moves through the soil pores, thus limiting the depth of penetration. Another limitation on the distances bacteria can travel is the moisture content of the soil; bacteria can move greater distances in saturated soil than in unsaturated soil *(Hagedorn, 1984, p. 9)*

2. **Slope Stability**

California Coastal Commission, Land Form Alteration Policy Guidance, Attachment 2, December 1993:
...Septic systems with leach fields require fairly gently sloping land with granular soils to be effective. Most local health departments are familiar with the slope and soil requirements for safe septic operation. In addition to testing that the soils on site will percolate, it is normal for leach fields to be limited to slopes less than 30%. In some locations this limitation can effectively prohibit development on a lot; however, some areas such as Los Angeles county allow seepage pits to be used if leach fields cannot be established... In areas with landslide potential, slides can be activated by increases in groundwater... Although a single septic system may not be enough to raise concern about the activation of a landslide, the cumulative impact from ten or twenty lots, with septic systems, irrigated landscaping and other small sources of groundwater, may pose a serious concern.

3. **Collapse Hazard:** See http://www.vvdailypress.com/topstory/dp120400d.html (November 2000, Apple Valley, California incident, reported in (High Desert) Daily Press.

of 55 counties responding	YES	NO
Standard drainfield 2'-6' allowed	55	0
Shallow trenches <2' allowed	44	11
Deep trenches >6' allowed	37	18
At-grade* allowed	38	16
Imported fill* allowed	28	27
Sand-lined trenches* allowed	22	33
Gravel-less (chambers)* allowed	48	7
Seepage pits allowed	28	25
Constructed wetland* allowed	2	51
Evapotranspiration system* allowed	25	28
Pressure drip irrigation* allowed	17	36
Absorption mound* allowed	42	11

EXAMPLE: Local Variation in California. From *California Onsite Status Report, CSU-Chico CWTRC/EPA (1999)*

*Underground Injection Control Regulations may be found at Title 40 of the **Code of Regulations**, parts 144-147.*

Onsite Wastewater Online:
www.epa.gov/owm/decent/index.htm
or www.nsfc.wvu.edu