Plan view of contaminated ground water in bedding planes and fractures in a rock aquifer, caused by leachate from a landfill (Miller et al., 1976).

Contamination in a three-aquifer system.
M.S.W. LINER SYSTEM

WASTE

FILTER FABRIC

18" Protective Cover

Leachate Collection

Primary Liner

Secondary Liner

Geonet Detection Drain

6" Subbase

Ground

Filter Fabric; Aggregate; w/ Pipes

Exaggerated Scale
A. SEASONAL HIGH GROUNDWATER

B. REGIONAL GROUNDWATER TABLE

REQUIRED ISOLATION DISTANCE BETWEEN LINER SYSTEM AND GROUNDWATER TABLE
Groundwater Monitoring

Diagram showing a conceptual model of groundwater monitoring, including the water table, landfill, background or control well, compliance wells, unconfined aquifer, confining unit, and confined aquifer.
Landfill Gas Vent

Concrete Collar

Non-Slotted Pipe

Sand/Bentonite Mixture

Sand

Expansion Fitting

4" Slip Coupling

Pea Gravel

6" Slotted Pipe

6" Cap

24" Dia. Min.
36" Dia. Max. Bore

Varies

5'-0"
FIGURE 10.17 Double-lined landfill with leachate collection system. Primary liner consists of five feet of compacted clay soil with hydraulic conductivity of no more than $1 \times 10^{-7}$ cm/sec. Secondary liner is flexible membrane such as 40 mil HDPE plastic. Leachate collection system consists of one-foot-thick sand layers with perforated pipes, which drain to a leachate collection tank.
FIGURE 10.24 Design of a low-permeability multimedia cap to cover waste. Fill material is used above waste to create a 3 percent slope if the waste material or land surface over the waste material is not sloped.
FIGURE 10.27 Use of extraction wells to remove contaminated ground water. Source: U.S. Environmental Protection Agency.