

Environmental CLEANUP

Jet Propulsion Laboratory Information Sheet

January 1996

SOIL

THE
COMPOUNDS
BEING INVESTI-
GATED IN THE
SOIL AT JPL
ARE VOLATILE
ORGANIC
COMPOUNDS

Contamination initially detected in ground water led to JPL's designation as a Superfund site. The most likely source for that contamination, however, probably resides on or within the soil above the water table. So, in addition to studying the ground water, it is necessary that we determine the nature and extent of contamination in this soil.

SOIL STUDIES

The part of the subsurface above the water table is referred to as the *vadose zone*. Investigating this vadose zone will help to determine exactly where sources of contamination might still exist, how contamination is carried downward into the ground water, and how contamination might eventually be prevented from reaching the ground water.

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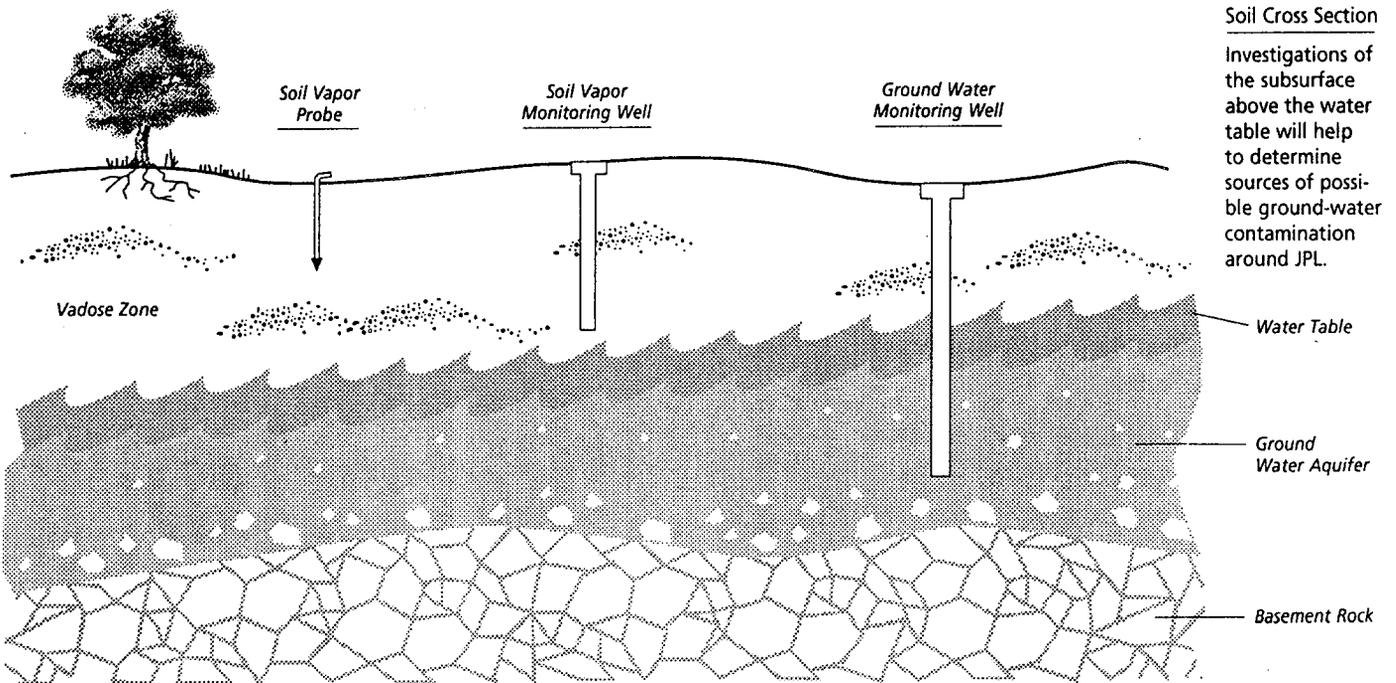
For our purposes, *soil* refers to the unconsolidated sedimentary material that washes down from the mountains via rivers and streams. It is generally composed of sand, silt, and clay minerals in varying proportions, and is derived from the physical and chemical weathering of mountain rocks.

SOIL DEFINING

There are several ways to look for soil contamination. One is simply by obtaining a sample of the soil itself, which, in the case of soils exposed at the surface, is a relatively simple task. Collecting samples of subsurface soil, however, usually requires drilling. As a soil-sampling borehole is drilled, the chips of rock and soil produced by the drilling are monitored for any changes. After every 10 feet of drilling, or more often if there is a change in the soil, drilling is stopped and a sample is taken by lowering a special sampling device down the borehole.

SOIL SAMPLING

Soil-sample boreholes are generally drilled to just above the water table. Once the soil sampling is



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complete, the drill hole is either converted into a soil-vapor monitoring well or backfilled with bentonite, a clay material that effectively seals off the hole from bottom to top.

Another way to detect contamination in soils is to sample the air (usually referred to as soil vapor) surrounding the soil particles. This soil vapor resides in the open space, or porosity within the soil, much like ground water does below the water table. In addition, the soil vapor can move through the soil, again like ground water, if the soil is permeable.

The chemicals being investigated at JPL are primarily a group of chemicals called volatile organic compounds (VOCs). They are liquids, primarily solvents, that evaporate readily at room temperature. If liquid VOCs are present in the soil, then they will also be present in the soil vapor. VOCs are described in more detail in the information sheet on *Hazardous Chemicals*.

At JPL, soil vapor is being sampled in two ways: by soil-vapor probes and soil-vapor wells. A soil vapor probe is first hammered into the ground, using a steel pipe to drive the tip of the probe downward. Inside the steel pipe is a flexible tube, which connects the probe tip to the surface. When the proper depth is reached (or the probe will go no deeper), the pipe is removed and the hole is backfilled with sand and bentonite.

The probe itself consists of a steel tip and a piece of tubing with openings just behind the tip. When the soil is being sampled, soil vapor is drawn in through the sampling tube by a pump connected to the tube on the surface.

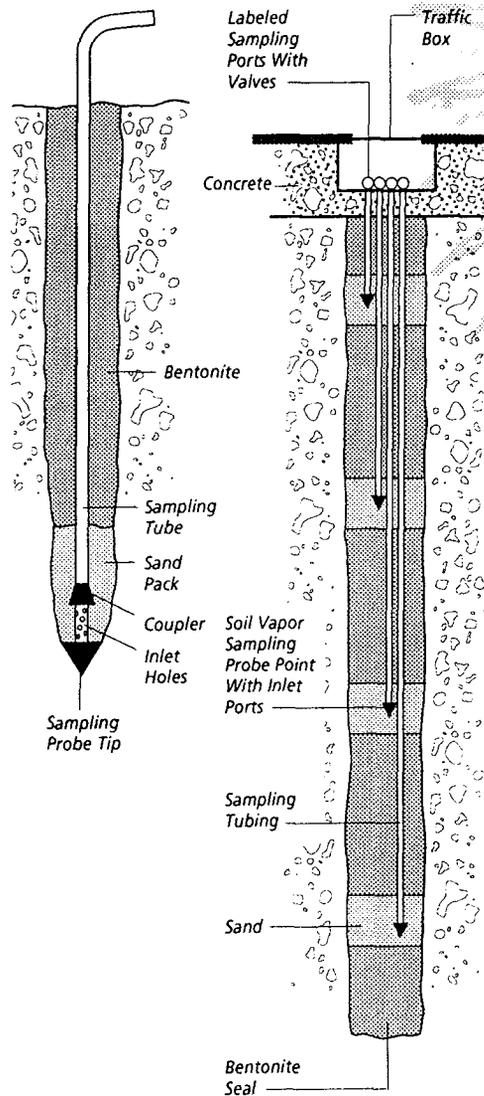
Bore holes drilled for soil sampling are sometimes converted into soil-vapor monitoring wells. In these small wells, soil-vapor probes are built into the wells at different levels below the surface. Each level at which a probe is placed is filled with coarse sand. The remainder of the well is filled with bentonite, sealing the well and ensuring that only vapor from the specified depth is sampled.

Soil Vapor Probe

A typical soil-vapor probe. Soil vapor is drawn through the sampling tube by a pump on the ground surface.

Soil Vapor Well

Bore holes drilled for soil sampling can be converted into small monitoring wells at different levels.



SOIL ABOVE THE WATER TABLE IS A COMMON SOURCE OF GROUND WATER CONTAMINATION

SUPERFUND INFORMATION

For information on the environmental cleanup effort at JPL, and for ideas on how you can become involved, please contact:

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