# Sources of Petroleum Product Contamination and Their Impacts on the Environment

## Common Sources

The most common sources of petroleum contamination from stationary petroleum storage systems are:

- leaks in piping and joints,
- leaks from corroded tanks, and
- various equipment failures upon startup of newly installed storage systems,
- overfills and spills while filling tanks.

When released to the environment, petroleum and petroleum products can contaminate:

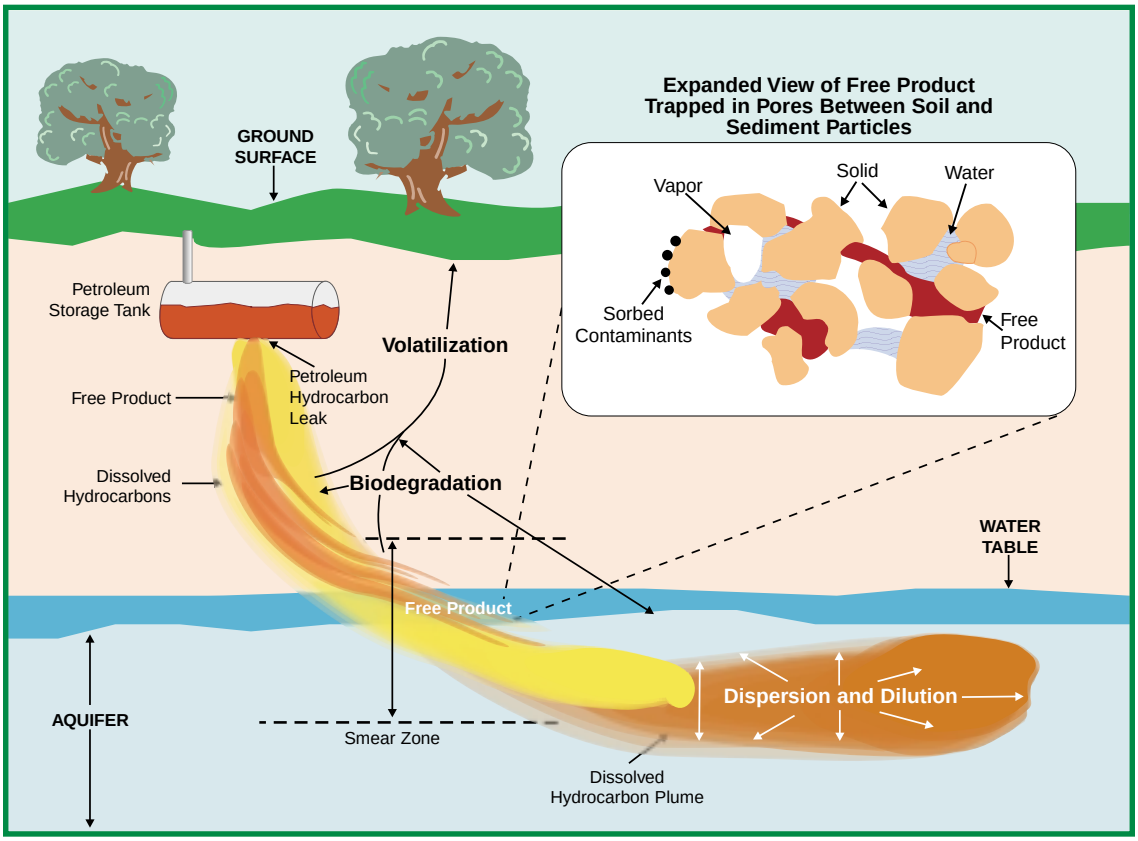
- Soil
- Groundwater
- Surface water
- Air

## Contaminant Plumes

The type, amount, and duration of the discharge, the length of time elapsed since the discharge, and the hydrogeologic conditions underlying the site, will determine the size, length, and depth of the contaminant plume. Many factors will determine how quickly a plume will migrate, including:

- Groundwater flow rate
- Adsorption (adherence) to soils
- Dispersion
- Biodegradation (microbes using the contaminant as food)
- Volatilization (vaporization of contaminants)
- Preferential pathways through highly permeable zones and channels.

Because petroleum is lighter than water, free (undissolved) product and most dissolved contamination is usually concentrated near the top of the groundwater table. As the water table rises and falls with seasonal variations and drought or flood conditions, contaminants concentrate in smear zones above and below the mean water table. Adequately treating these smear zones plays a key role in the remediation process.



## Sources of Petroleum Discharges and Their Impact on the Environment *(continued)*

### Threats from Contaminants in the Environment

Though relatively rare, explosive vapors from discharged petroleum products can accumulate in confined spaces such as an abandoned tank, a subsurface cable vault, in sewer pipes or beneath buildings. Ignition of these vapors can cause an explosion with potentially catastrophic results.

Human exposure to petroleum contaminants can occur through:

- Ingestion of contaminated drinking water and soil residues,
- Inhalation of vapors and airborne soils,
- Contact of contaminants with skin (dermal exposure).

Health impacts of exposure to petroleum contamination may include skin and lung irritation, headaches, dizziness, fatigue, diarrhea, cramps, and nervous system effects. Benzene and other chemicals found in petroleum products have been determined to be carcinogenic (cause cancer). Chronic (long-term) exposure to contaminants by ingestion and inhalation was considered in the derivation of the petroleum cleanup target levels referenced in Chapter 62-777, Florida Administrative Code (F. A. C.) discussed further on page 11.

More information regarding toxicity of petroleum chemicals is available from the Agency for Toxic Substances and Diseases Registry, an agency of the U.S. Department of Health and Human Services. Their homepage address on the world wide web is www.atsdr.cdc.gov.

Petroleum contamination may also cause adverse impacts to nearby plants and animals, from the smallest to the largest members of the natural food chain. Plants growing in contaminated soils or water may die or appear distressed. Animals may drink contaminated water or feed upon plants or other animals which have been exposed to contaminants. Although not visible to the naked eye, subsurface elements of ecosystems, such as microorganisms, may be overwhelmed by contaminants. Sensitive habitats, such as wetlands and marine ecosystems, are particularly susceptible to petroleum chemicals.