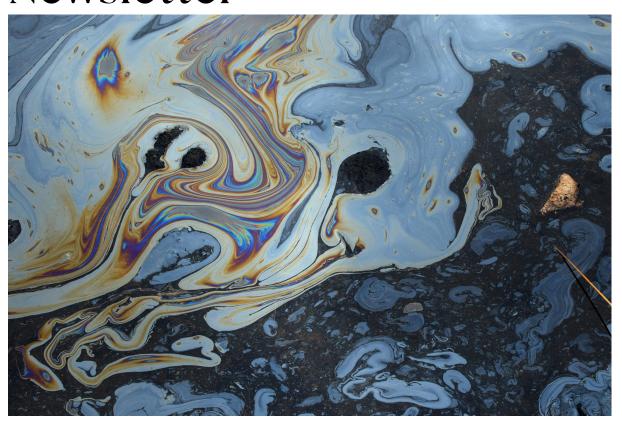
Brownfields Newsletter

KNIK TRIBE

Novemeber 2025



When Petroleum Becomes Pollution

Petroleum fuels Alaska's economy and daily life—it heats our homes, provides electricity, and powers our fishing boats, trucks, and planes. But when fuel spills into soil or water, it can create significant environmental and human health problems.

Petroleum is the most common pollutant in Alaska. It can be found at tank farms, gas stations, industrial sites, government facilities, and homes. Knik Tribe is working to address these releases to protect the environment and human health.

This issue of the Brownfields Newsletter takes a closer look at where petroleum contamination originates, how it affects people and ecosystems, and what's being done to restore these lands for safe, productive reuse.

In this newsletter:

Sources of Petroleum Contamination

Remediation Methods

Health Effects

Environmental Effects

Common Sources of Petroleum Contamination in Alaska

1. Gas Stations and Fueling Facilities

Leaking underground storage tanks (USTs) are a major cause of petroleum contamination statewide. Older gas stations and bulk fuel depots can have tanks that are compromised or have failed, releasing petroleum into the soil and potentially groundwater.



When leaks occur, gasoline and diesel can migrate through soil into groundwater, releasing harmful compounds like benzene, toluene, ethylbenzene, and xylene (collectively known as BTEX). Vapors can also migrate into nearby buildings, creating vapor intrusion risks for homes and businesses.

The Alaska Department of Environmental Conservation (ADEC) estimates that thousands of UST sites have required cleanup over the past several decades.



2. Home Heating Oil Tanks

Many Alaskan homes—especially in rural areas—rely on heating oil stored in above-ground or underground tanks. When these tanks corrode, overfill, or are damaged, they can leak into nearby soil or snowmelt, seeping into basements, drinking water wells, or migrate to surface water.



Even small releases can produce a strong odor and lasting contamination, particularly where permafrost and cold temperatures slow the breakdown of petroleum compounds.



Tips for homeowners: Inspect tanks annually, replace corroded fittings, and install secondary containment where possible. Make sure to keep your water separator free of water so it doesn't freeze and break. Keep tank at a tilt and drain water often. Most tank failures occur from corrosion on the inside where water collects. See Issue #2 of the newsletter for more information regarding Home Heating Oil Tanks.

Common Sources of Petroleum Contamination in Alaska (con't)

Remediation and Cleanup Options for Petroleum Sites

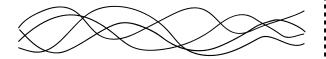
3. Fuel Storage and Transportation

Large storage facilities, bulk plants, airports, and marine terminals store millions of gallons of petroleum products statewide. Train cars transport fuels throughout the Railbelt. Spills can result from tank overfills, equipment failure, derailments, or natural disasters such as flooding or permafrost thaw.



Remote fuel delivery systems—including barge landings, rural tank farms, and pipeline transfer stations—also pose contamination risks if not properly maintained.





·Excavation and Soil Removal

The most direct approach is to excavate contaminated soil and transport it to a permitted treatment or disposal facility. Clean fill is then brought in to restore the site.



Soil Vapor Extraction (SVE) and Air Sparging

Vacuum or pressure systems are used to remove petroleum vapors from soil, preventing vapor intrusion into buildings and helping to break down contaminants.

·Pump-and-Treat

Contaminated groundwater can be pumped, treated, and safely discharged or reinjected.



·Natural Attenuation and Monitoring

In some cases, contamination levels decline naturally over time through evaporation, microbial activity, and oxidation—especially when the source has been removed. Regular sampling ensures the process remains protective of human health.

Human Health Effects

Exposure to petroleum products can occur through inhalation of vapors, skin contact, or ingestion of contaminated water.

- **Short-term exposure** can cause headaches, dizziness, skin irritation, and nausea.
- Long-term exposure—particularly to constituent compounds like benzene—can increase the risk of cancer, anemia, and nervous system disorders.
- Children and pregnant women are especially vulnerable to the effects of petroleum vapors and contaminated drinking water. Birth defects have been observed in children born to women exposed to benzene in drinking water.

Residents living near contaminated sites or cleanup areas should avoid contact with visible oil sheens, strong fuel odors, or discolored soil and report concerns to ADEC.

However, more common exposure routes include improper storage of fuels and heating oil stoves. If you must store fuel, try to store it in a detached shed. If that is not possible and you must store it in your garage, minimize the quantity stored to no more than 1-5 gallons, make sure it is stored in approved containers, keep it away from ignition sources, and store them on a spill tray in case of leaks. If you have an oil stove, make sure to maintain it properly and check pipes, fittings, and the storage tank frequently to ensure there are no leaks or other issues. Ensure that the exhaust does not easily enter the house.



Environmental Effects

• **Soil and vegetation:** Petroleum reduces soil fertility, damages root systems, and can kill vegetation. If contaminated groundwater is inadvertently used to irrigate crops, reduced yields and human exposure to contaminants through residues can occur.



- Water and aquatic life: Spills can contaminate groundwater and streams, harming fish and wildlife habitats. Even small amounts of diesel can produce an oily sheen and suffocate aquatic organisms, and extremely low amounts of PAHs, a class of petroleum constituent compounds, can result in death or deformities in juvenile salmon and other fish species.
- Wildlife exposure: Birds and mammals exposed to petroleum-contaminated environments may suffer from reduced insulation, ingestion of toxins during preening, and decreased reproductive success.



In Arctic and subarctic environments, low temperatures and permafrost slow natural degradation, meaning petroleum can persist in the environment for decades if not actively remediated.

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