

Leak detection for underground petroleum storage systems

What is the problem with leaking underground petroleum storage systems (UPSSs)?

Leaks of petroleum from a UPSS can contaminate the soil, groundwater, surface water and air.

As some of the components of petroleum are very toxic and carcinogenic, for example benzene, toluene, ethyl-benzene and xylene, the release of petroleum-based substances into the environment poses significant risks to the health of humans and ecosystems.

Undetected leaks, even slow leaks, may contaminate soils and groundwater and move considerable distances off site.

This results in a direct economic loss to the UPSS owner or operator through the loss of product but, far more costly, is the clean-up of contaminated soils and groundwater which can range anywhere from **\$100,000 to well over \$1 million**.

Nearby properties may also be affected and the person responsible for the leaking UPSS could be liable for third party damages.

Environment Protection Authority Victoria (EPA) has been involved in numerous investigations where they have identified the failure of a UPSS resulting in petroleum leaking into the environment.

It is therefore critical that UPSSs are regularly monitored for leaks and that leaks are stopped and addressed as quickly as possible.

Do you own or manage UPSSs?

Do you know the minimum requirements to manage UPSSs?

Do you know the costs of a leaking tank?

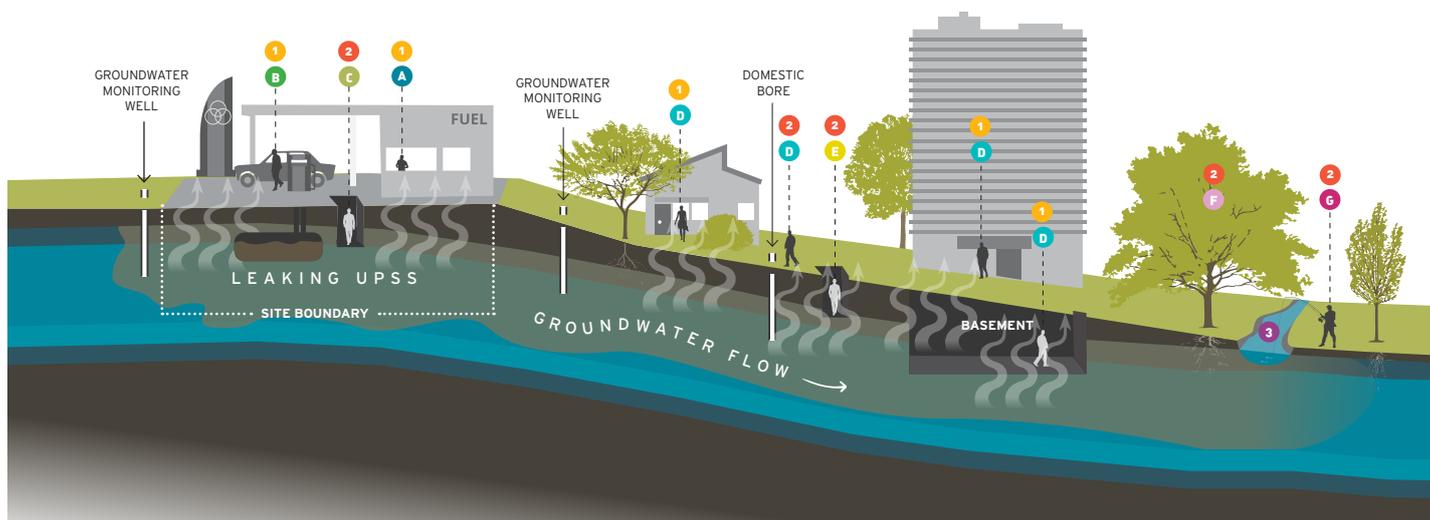
How leaking underground petroleum storage systems affect our environment

TYPES OF EXPOSURE TO CONTAMINATION

- 1 Vapours that can be inhaled or lead to risk of explosion
- 2 Direct contact with skin or by ingesting
- 3 Contaminated groundwater connects to surface water

WHO/WHAT CAN BE IMPACTED

- | | |
|-----------------------|------------------------------------|
| On-site | Off-site |
| A Employees | D Residential/commercial buildings |
| B Site visitors | E Maintenance workers |
| C Maintenance workers | F Ecology |
| | G Recreational activities |



Leak detection

As set out in EPA's Guidelines, a leak detection regime should include statistical inventory reconciliation analysis (SIRA) and, if a site is deemed sensitive, groundwater monitoring. See Appendix 4 of EPA's *Guidelines on the design, installation and management requirements for underground petroleum storage systems* (EPA Publication 888.4) for details on the minimum standard for leak detection systems and the site classification system.

What is SIRA and why use it?

SIRA is a common method of leak detection. It requires the use of sophisticated computer software to conduct a statistical analysis of inventory, delivery and dispensing data. Trained professionals can provide the UPSS owner or operator with monthly reports.

SIRA is very different to basic inventory control in which the owner or operator records dip readings, deliveries, and sales. Basic inventory control is relatively imprecise because fuel is a volatile product and it is difficult to detect product losses due to shrinkage or evaporation. You could be losing hundreds of litres every month without realising anything is wrong.

In comparison, SIRA analysis can be very sensitive and accurate. A SIRA vendor can take the same inventory data and analyse it for releases so small they would go unnoticed with basic inventory control.

There are generally only three final results for any SIRA test, pass, fail or inconclusive. These results are described below.

Pass	Analysed data indicates the UPSS is not leaking.
Fail	Analysed data indicates a potential loss of product from the system or an influx of groundwater. However, a fail does not necessarily mean that your UPSS is leaking. A fail could be the result of miscalibrated dispensers, inaccurately metered deliveries, or stolen product. If you receive a fail, you must investigate possible reasons for the fail.
Inconclusive	If the information provided to the SIRA vendor is inaccurate it's likely it won't be possible to make a determination. Inaccurate information can often be traced back to poor tank dipping or administration practices (for example, a new staff member who has received inadequate training). Whatever the reason, an inconclusive result means, in effect, that you have failed to perform leak detection on the UPSS in question for that month.

Why do I also need to monitor groundwater if my site is classified as sensitive?

EPA's Guidelines require any leak detection regime for a sensitive site to include groundwater monitoring as an additional precaution. This is because most SIRA systems are only able to detect a leak as small as 0.76 L/hour which means a leak smaller than this will go undetected.

If a small leak, at a sensitive site, accumulates over time the impacts on the local environment and community can be very significant.

In addition to this, although SIRA is far more accurate than basic inventory control it can, on rare occasions, provide a false positive result. Therefore it is important to have secondary leak detection to pick up leaks before any product moves offsite.

VACC's Occupational Health, Safety and Environment team can assist with your environmental obligations - phone (03) 9829 1111 or visit www.vacc.com.au.

COST OF LEAK PREVENTION VERSUS COST OF CLEAN UP

Cost for SIRA approx
\$20/tank/month

Cost savings through preventing fuel loss approx
\$6000/tank/year

Cost of cleaning up contaminated site
\$100,000 +

The minimum requirements for the management of UPSS to protect people, property and the environment are set out in EPA's *Guidelines on the design, installation and management requirements for underground petroleum storage systems*.

These guidelines are available on EPA's website epa.vic.gov.au/upss