

UNDERGROUND FUEL SYSTEMS

Your ultimate risk management toolkit



Stay safe

Save money

Protect your assets

Comply with regulations



LEIGHTON O'BRIEN

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Introduction

Owning and operating an underground petroleum storage system (UPSS) is a serious responsibility, practically and legally. UPSS's have the potential to leak, which can go unnoticed for long periods of time, resulting in serious environmental, commercial and reputational damage, as well as clean-up costs.

The proximity of marinas to populated areas such as beaches or marine parks puts them under close scrutiny from the public and industry regulators to ensure they meet environmental compliance obligations.

It's easy to see how time and the perceived cost can be barriers to UPSS risk mitigation. Different environmental regulations between states can also make compliance confusing.

Research from the Environment Protection Authority (EPA) Victoria indicates a non-compliance rate of 78% among small site operators based on a self-evaluation questionnaire*.

If you've never had a fuel leak at your marina, it might seem like you are doing a good job with your risk management. However, if you have no, or inadequate, leak detection measures in place, you're relying on luck rather than good management.

The floating nature of marinas means that constant movement puts the fuel lines at an increased risk of damage and loss of integrity.

Of the thousands of tanks that we test for integrity each year, 12% of unmonitored fuel systems fail the initial test, indicating a leak or maintenance issue.

There is also the risk of fuel contamination. Our data shows 36% of fuel tanks contain some degree of contamination at the bottom of the tank. Selling mariners contaminated fuel can lead to engine failure, which is particularly fatal if they're stranded in the elements.

It's important that you know and understand the risks, responsibilities and recommendations related to UPSS operation. The benefits of a proactive approach to risk management far outweigh the costs. Doing nothing will only increase your risk over time.

We recognise that this important aspect of marina management is also a complex one. This toolkit has been designed to provide you with essential information and guidance to help improve your safety, compliance and your bottom line. Underground fuel systems may be largely out of sight, but they should not be out of mind.

Reed Leighton
CEO
Leighton O'Brien





What are the risks of fuel leaks near water?

Underground fuel systems are designed to contain and store petroleum-based products, but sometimes fuel gets out of these systems due to leaks caused by their age, poor maintenance and installation. There are some significant risks if that happens.



Undetected leaks from underground fuel systems can lead to costly consequences for site operators

Top 5 risks

Environmental

Leaks from underground fuel systems can have serious environmental consequences. Pollution from a UPSS at a marina can feed directly into the ocean, as well as the backfill, groundwater and the air, damaging local ecosystems and water sources for many years.

Health and safety

Fuels are classified as hazardous chemicals. Petrol is highly flammable and some of its hydrocarbon components are toxic and carcinogenic. Release of petroleum-based fuels into the environment poses significant risks to peoples' health and safety, as well as risking the ocean wildlife.

Commercial

Leaks can result in direct financial loss through loss of product. However, the clean-up and remediation of contaminated soil, groundwater, a nearby harbour or the ocean can be far more costly. Nearby properties can also be affected and, as an owner or operator, you may be liable for third party damages. There will also be a loss of revenue if your business cannot operate during remediation works.

Regulatory

Fines for non-compliance with UPSS regulations can cost tens or even hundreds of thousands of dollars. Remediation works, or upgrades required to meet regulatory standards, can cost into the millions of dollars. In Victoria alone, as at September 2018, there were 30 active clean-up notices issued by the EPA to fuel retail sites considered an unacceptable risk to human health or the environment.

Reputational

Being held accountable for a fuel leak or contaminated product will damage your marina's reputation. This can result in members going elsewhere to berth their vessels and buy their fuel, reducing your revenue and costing you your business.



What causes fuel leaks?



Severe corrosion of a submersible turbine pump

1 Quality of installation

Installer quality is the single biggest risk with new tank installations. Our experience in testing thousands of new installations indicates 90% of new or remodelled sites have small leaks from pipes and fittings that need to be fixed before concreting. For older steel systems, the quality of the original installation is also a key contributing factor along with ground disturbance and changing backfill conditions.

2 Corrosion

Corrosion of underground fuel systems is a major source of leaks. Old single-walled steel tanks without cathodic protection and steel pipelines are particularly susceptible. The risk of leaks due to corrosion depends on the:

- age of the tank
- type of backfill
- presence of groundwater
- proximity to water
- use of cathodic protection (protecting the steel tank by connecting it to a more easily corroded metal).

3 Incompatible materials

Using materials in underground fuel systems that are not compatible with the type of product being stored can increase the risk of leaks. For example, a fibreglass resin tank is not compatible with ethanol as it can compromise the integrity of the fibreglass.

4 Backfill condition

Quality of backfill around underground tanks is important, including strength, permeability and moisture content. Poor quality backfill can increase the risk of leaks. For example, it can cause concrete to sink which impacts tank and pipework integrity. At marinas, the rising and falling of tides makes backfill such as sand or soil more susceptible to ground disturbance.

“Our experience in testing thousands of new installations indicates **90%** of new or remodelled sites have small leaks from pipes and fittings that need to be fixed before concreting.”

5 External causes

Factors outside the immediate fuel system or installation can also cause leaks. The effects of these can be immediate or over time, such as:

- puncture of tank or pipework from external works e.g. drilling
- ground movement due to tidal flows
- movement of tanks by groundwater.

Most leaks tend to start small but gradually increase over time, so early detection is critical. Leaks, and the impact of leaks, can be made worse by:

- poorly maintained leak detection equipment (or none at all)
- testing not being done after UPSS modification or upgrade
- inventory control methods with potentially high levels of administrative error

- lack of secondary containment for tanks or lines
- failure of sensor/alarm systems
- delayed response to leaks.

6 Spills

In addition to leaks, spills can be caused by:

- overfilling underground tanks
- pump leaks
- pressure line fittings failing or not sealing properly
- delivery spills
- customers spilling fuel by overfilling watercraft tanks
- shut-off valve on nozzle not operational.

It's important to clean up spills quickly and appropriately. You should have a procedure on site that can be followed by all operators.



A tank shell breach leading to a major leak





This CAN happen to you

Fuel leaks can, and do, happen. In fact, leaks can happen at any time, at any marina, large or small. If you aren't monitoring or testing, how do you know that you don't have a leak, or simply haven't found it yet?

Could this be happening on your site? Clean-up and fines can be crippling. So too can headlines when fuel leaks are publicised by the media.



Large undetected leaks can do significant damage to the environment and lead to negative media coverage for your marina.

Local marina receives \$288k fine for oil spill

A local marina has been fined \$288,000 for a major oil spill into the central harbour.

The cause of the discharge was oil escaping from two holes in a rusted lateral pipe which was a key part of the marina's underground storage tank pipeline system.

The company was sentenced in court today after earlier pleading guilty to a charge of discharging a contaminant into water.

The court heard the marina failed to make crucial repairs when a corroded pipe was first identified years ago.

The charge attracts a maximum penalty of \$600,000.

Between 3,000 and 4,000 litres of fuel leaked from a lateral pipe into the harbour.

The spill initially only affected the marina, but then travelled in the harbour where it washed ashore.

The marina owners have paid \$1.8 million in reimbursements and other costs including reimbursing the regional council almost \$1.2 million for costs incurred in the clean-up.

Actual media story that has been 'de-branded'



Ways you can detect leaks



Groundwater monitoring can detect contamination before it becomes a problem

If there is no form of fuel loss monitoring or leak detection in place, visible signs of leaks at a marina could include:

- strong or persistent petrol odours
- expanding stains on the ground
- slow or hesitant pump dispensers
- fuel visibly floating on the water in the surrounding area.

Unfortunately, by the time these signs become visible, you would very likely have a major problem on your hands. A loss monitoring system will pick up changes in your fuel levels or quality well before this. There are different ways you can monitor and detect fuel losses from underground systems.

Wetstock inventory SIRA

Statistical Inventory Reconciliation Analysis (SIRA) uses computer software to analyse inventory, delivery and sales data to estimate what is really going on in the tank. A report is then produced. This is a very sensitive and accurate method of loss monitoring. Small leaks that would be missed using manual dipping can be picked up using SIRA. Sites using Leighton O'Brien's SIRA monitoring have increased their fuel profit by up to 32% by identifying and rectifying the source of fuel loss earlier.

Manually dipping tanks and conducting your own reconciliation is **NOT a compliant* method, as loss monitoring systems must be able to detect leaks at a particular rate.**

Groundwater monitoring

Groundwater monitoring can detect contamination before it becomes a problem. If a fuel layer is found in the monitoring well, this means that fuel has likely leaked from the UPSS and is polluting the groundwater, or there has been a spill. A sample is collected and analysed and a decision made as to whether any further action is required to meet environmental compliance.

System testing

Integrity testing

Underground fuel tanks and lines must be completely sealed or 'tight'. Integrity tests on fuel systems check for 'tightness'. This includes checking for any faults or signs of deterioration that can cause tank failure and result in fuel leaks or contamination. Testing can also be used to identify water ingress and equipment issues.

Tank interstitial monitoring

Many fuel tanks are double-walled - like a tank within a tank - as extra protection against fuel leaks. The space between double-walled tanks is called an interstice, which can be tested or inspected to determine if there is a fuel leak from the inner tank.



Equipment integrity testing

Automated systems

Automated electronic systems can provide live monitoring of fuel systems. There are options available for detecting volume loss or fuel leaks.

- Automatic tank gauging (ATG) systems use floats in the UPSS for continuous tank level monitoring. These can be combined with SIRA for a completely automated approach to loss detection.
- Automatic line detectors are positioned in the fuel system piping to detect changes in pressure that would signal a leak.

These systems can include alarms to alert operators of any sudden changes, and even automatic shut-off systems.

* AS 4897 - 2008 The design, installation and operation of underground petroleum storage systems, p21; 4.5.1 (d)



What are your compliance obligations?

As a UPSS owner or operator, do you know what your obligations are? Is your marina compliant with the required standards? Who will be checking up on you?

Polluting the environment is a crime. The law requires all business owners, including marinas, to take all reasonable precautions to prevent damage to the environment.

Regulations, and who enforces them, depend on which state or country you are operating in. In Australia, as a minimum you should meet the Australian Standard (AS4897-2008) which includes information on UPSS design and management to prevent and detect leaks. As an owner or operator of a marina dispensing fuel, you must have:

- a monitoring system in place for early detection of fuel loss
- a detailed process in place to investigate loss of fuel.

Loss monitoring

UPSS operators must have a monitoring system in place to detect fuel losses as soon as possible, that is, before environmental pollution occurs.

Loss monitoring systems must be able to detect tank leaks and pipe leaks of at least 0.76 litres/hour (18 litres/day) with greater than 95% confidence.

As well as mandatory primary leak detection systems, under NSW regulations you must have a secondary leak detection system such as groundwater monitoring wells installed and

inspected every six months. In Victoria, you must undertake groundwater monitoring if you have a sensitive site, such as a marina. If you don't know whether your site is sensitive, you should engage an environmental consultant to determine the site classification.

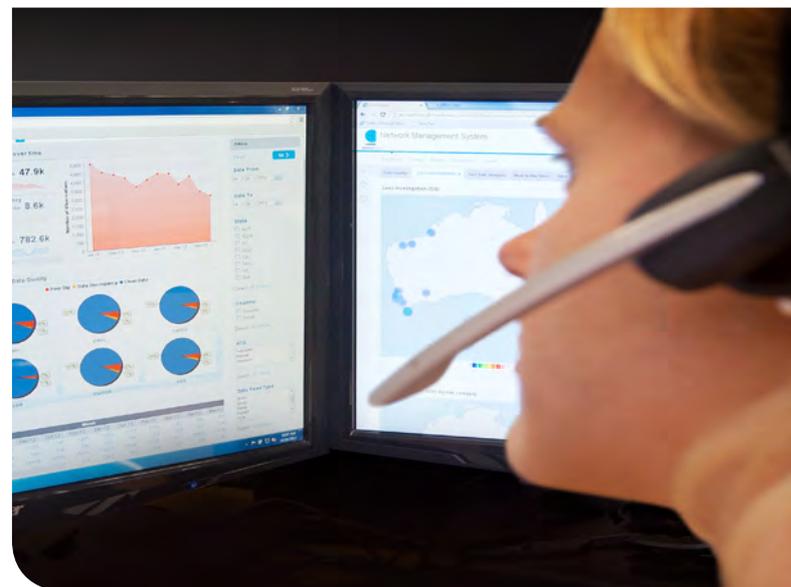
Loss investigation

An investigation must be conducted immediately if somebody detects a leak or if loss monitoring methods indicate a discrepancy. You should have a procedure on site that can be followed by all operators.

System design

As per AS 4897—2008 (clause 8.5.2), upgraded and new UPSS's should be designed to minimise risk wherever possible.

- Tanks and pipes should be made of non-corrodible materials.



SIRA is a sensitive and accurate loss monitoring method

“As a UPSS owner or operator, do you know what your obligations are? Is your marina compliant with the required standards? Who will be checking up on you?”

- Systems should be integrity-tested:
 - prior to commissioning, upgrade or repair (we recommend testing in two stages: pre-bury and post-bury).
- Systems should have the following features:
 - secondary containment
 - leak detection
 - fill point requirements
 - vapour recovery on delivery for UPSS's with existing infrastructure
 - dispenser sumps
 - overfill protection
 - earthing of the system
 - tank pit monitoring wells
 - groundwater monitoring wells.

Compliance

Compliance and enforcement are managed by different authorities across the states and territories. Outside Australia, you need to check your local market compliance requirements, which varies between states and countries.

- **NSW** – NSW EPA enforces mandatory regulations on the management and operation of UPSS's. Later in 2019 this will become the role of local councils.
- **VICTORIA** – EPA Victoria has provided industry with information through its guidance, *The design, installation and management requirements for underground petroleum storage systems*. It also ensures industry complies with its duties under the *Environment Protection Act* by monitoring compliance and enforcing the law. New environment protection laws, *The Environment Protection Amendment Act*

2018, will take effect from 1 July 2020. The Act focuses on preventing pollution impacts rather than managing those impacts after they have occurred.

- **QLD** – guidelines are enforced by local councils.
- **WA** – The The Department of Mines, Industry Regulation and Safety outlines statutory requirements as contained in the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (the Storage and Handling Regulations)* and supporting codes of practice.
- **SA** – EPA South Australia recommends compliance with Victorian EPA guidelines. The South Australian Government has added fuel retail sites to the list of activities of environmental significance requiring authorisation (via a license) by the EPA under the *Environment Protection Act 1993*. This new requirement will take effect in January 2020. The EPA is currently engaging with all stakeholders in regards to the licence scheme.
- **TASMANIA** – EPA Tasmania enforces compliance via *The Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010*. There are also Worksafe requirements.
- **ACT** – EPA ACT has developed *Environmental Guidelines for Service Station Sites and Hydrocarbon Storage (2014)*.

Specific regulations and standards are listed on page 28.



Buying or selling a marina?

What you need to consider to protect your investment.

Buying a marina comes with unique considerations. Wherever fuel is kept in underground tanks, there is a higher risk of environmental contamination than with other types of commercial sites.

Commercial and environmental due diligence is an important part of any transaction involving a marina. This can include soil testing or evaluation of tank conditions. Financial institutions often require Environmental Site Assessments which may include backfill tests, tank integrity tests and groundwater sampling to be carried out before they're willing to finance investments in marinas.

Site tests will confirm compliance with standards. If you are buying, they will help reduce surprises such as unexpected remediation or upgrade costs. If you are selling, demonstrating a clean bill of site health can help you secure an optimum sale price.



What are the risks of fuel contamination?



Fuel contamination can damage marine vehicle engines, causing poor performance or engine failure

Thirty-six per cent of underground fuel tanks contain some degree of contamination at the bottom of the tank.

Watercraft damage

Contaminated fuel damages marine vehicle engines. It can cause poor performance or even complete engine failure. This may be a result of corrosion or clogging of parts within the fuel system, or blockage of fuel supply to the engine, which can result in customers and members being stranded in the ocean on their vessels.

Reputational damage

Damage to your customers' engines will result in damage to your reputation. Customers expect to buy a quality product from a reputable marina - this includes fuel. Reports of contaminated fuel being sold from your marina and compensation claims will see a loss of business and memberships.

Equipment damage

Contaminants in fuel can corrode steel and significantly reduce the lifespan of your tank. In this way, fuel contamination can lead to a fuel leak. Contaminants can also affect other system components, such as filters, pumps and automated sensors. Slow-flowing pumps can create a poor customer experience and impact customer loyalty.

Thirty-six per cent of underground fuel tanks contain some degree of contamination at the bottom of the tank. Do you know if your fuel is clean?



What causes fuel contamination?



Diesel sample at dip point

Diesel sample at ATG

Contaminants found in fuel can be water (most common), bacteria, sediment or other particles. They can enter the fuel system a number of ways.

System integrity

Ageing and poorly maintained fuel systems, especially steel tanks, are at high risk of corrosion, loose fittings and other faults that can allow contaminants, particularly water, to get into the fuel.

Transport/transfer

Fuel can be contaminated while it is stored in tanks at a marina. However, contamination can also happen during transfer of petrol anywhere from the terminal to the marina to a member's vessel. Fuel tankers, underground storage tanks and pipework all offer potential sources of fuel contamination into watercraft.

Other contaminants

Certain micro-organisms live and grow when water is inside fuel storage tanks. Waste, rust and sludge from these organisms can corrode steel and damage other components in the fuel system. New tank systems are just as susceptible as old systems.

High quality fuel can be maintained by:

- testing for water daily
- good housekeeping and regular inspection
- high turnover of fuel products
- addressing sources of contamination
- removal of contaminants with fuel cleaning
- reconditioning of degraded fuel (diesel).

National Fuel Standards: what you need to know

The quality of petrol and diesel fuel in Australia is regulated by the *Fuel Quality Standards Act 2000*. This legislation places strict requirements on the fuel industry (including marinas) to protect consumers and the environment.

Modern marine vehicles use technologies that require high quality fuels with certain specifications. The new fuel standards for petrol and diesel have been established to meet these specifications.

Poor quality or 'dirty' fuel can increase watercraft emissions and can also cause engine malfunction or failure.

- Increased emissions damage the environment and are dangerous to our health. The standards aim to reduce vehicle emissions that affect our air quality.
- Sale of contaminated fuel is a breach of consumer rights. Each state has its own governing body to enforce Australian Consumer Law.

Petrol can contain up to 10% or more of ethanol. Fuel containing ethanol must have a label at the pump stating that the petrol contains ethanol.

Fuel quality in Australia is monitored through a fuel testing program.

- Fuel testing is carried out on importers, refineries, distributors, service stations and marinas.
- Inspectors can conduct a site visit at any time.
- A site visit may include testing and sampling of fuels being sold, inspection of fuel delivery documentation, inspection of ethanol labelling, and checks on any other requirements under the Act.



This CAN happen to you

Or rather, it can happen to your customers and members if you are selling contaminated or poor quality fuel. You don't want to leave it until customers and media are complaining about your fuel to check your fuel quality.

Contaminated fuels found to clog watercraft engines

Contaminated fuel that has clogged and damaged watercraft engines has been found being dispensed from a prolific marina, according to sources.

Six samples of fuel sold at the marina had “resulted in severe sludging at centrifuges, clogged pipelines, overwhelmed fuel filters.”

The findings follow reports of more than 100 vessels that loaded similarly contaminated fuel in other well-known marinas and ports earlier this year.

“The test results of the local samples seems to point to contaminated diesel infected with diesel bug” being sold at the marina, sources said.

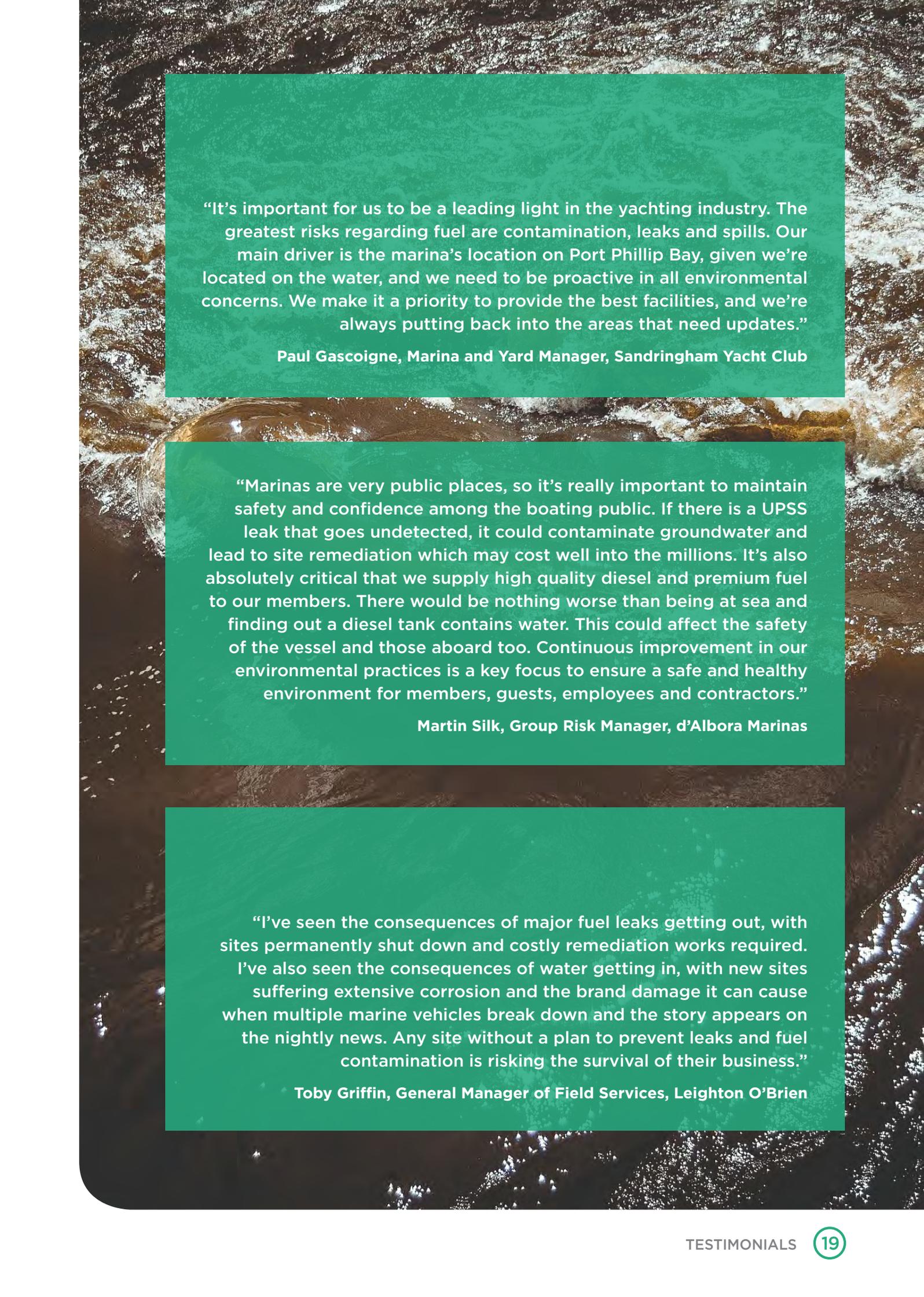
Contaminated fuels can cause costly damage to watercraft engines, and many of the vessels that took on the tainted batches earlier this year required extensive flushing and repair before being put back to work, costing the marina in excess of \$334,000, four trade sources said.

The first problem sample resulted in a “dead ship” that had to be towed back to port from off the coast with all fuel pumps damaged, said the alert.

Sources also reported that many members of the marina had moved their boats to berth at other nearby clubs.

Further legal action is yet to proceed against the marina.

Actual media story that has been 'de-branded'



“It’s important for us to be a leading light in the yachting industry. The greatest risks regarding fuel are contamination, leaks and spills. Our main driver is the marina’s location on Port Phillip Bay, given we’re located on the water, and we need to be proactive in all environmental concerns. We make it a priority to provide the best facilities, and we’re always putting back into the areas that need updates.”

Paul Gascoigne, Marina and Yard Manager, Sandringham Yacht Club

“Marinas are very public places, so it’s really important to maintain safety and confidence among the boating public. If there is a UPSS leak that goes undetected, it could contaminate groundwater and lead to site remediation which may cost well into the millions. It’s also absolutely critical that we supply high quality diesel and premium fuel to our members. There would be nothing worse than being at sea and finding out a diesel tank contains water. This could affect the safety of the vessel and those aboard too. Continuous improvement in our environmental practices is a key focus to ensure a safe and healthy environment for members, guests, employees and contractors.”

Martin Silk, Group Risk Manager, d’Albora Marinas

“I’ve seen the consequences of major fuel leaks getting out, with sites permanently shut down and costly remediation works required. I’ve also seen the consequences of water getting in, with new sites suffering extensive corrosion and the brand damage it can cause when multiple marine vehicles break down and the story appears on the nightly news. Any site without a plan to prevent leaks and fuel contamination is risking the survival of their business.”

Toby Griffin, General Manager of Field Services, Leighton O’Brien

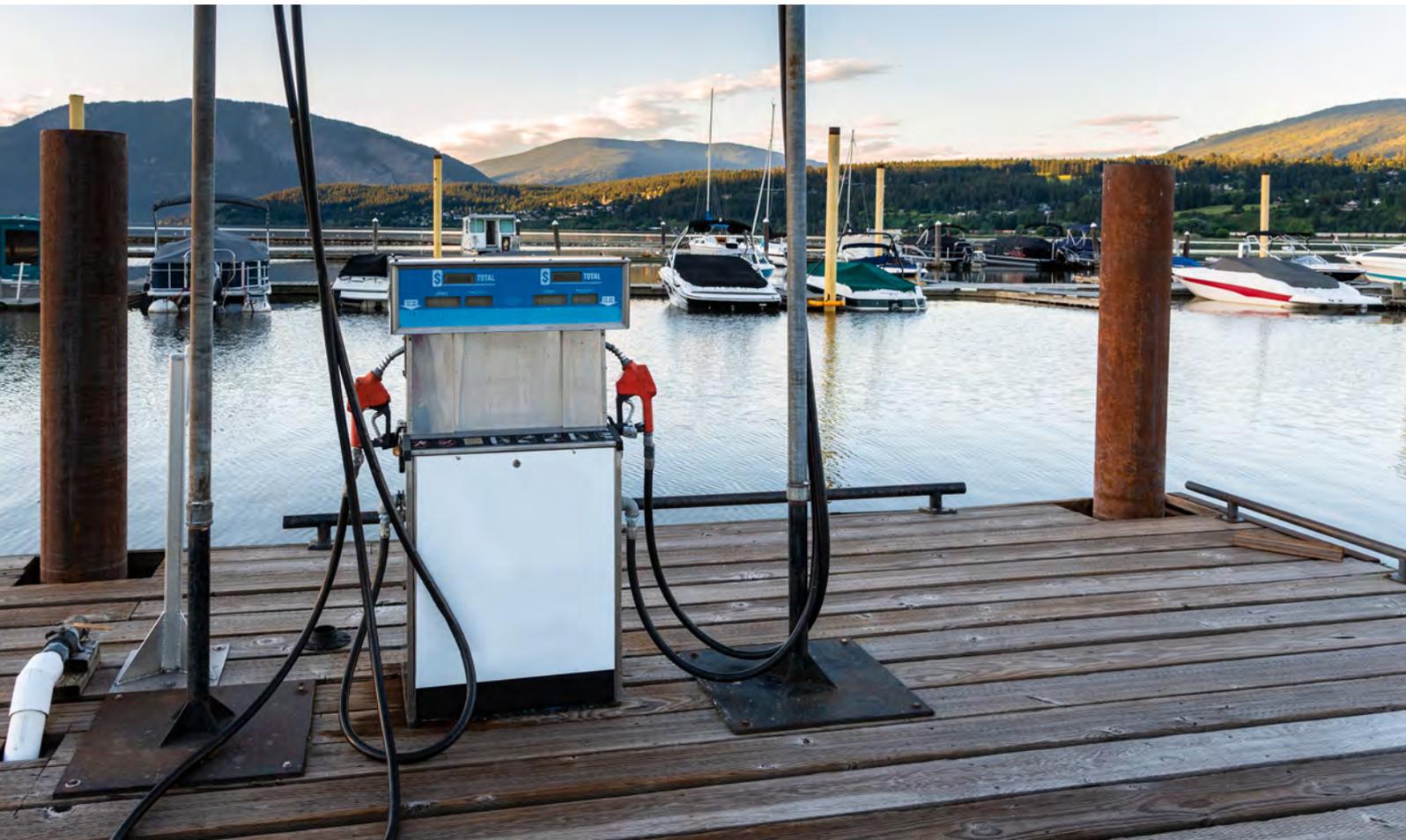


Protecting your asset vs ignoring your risk: the costs

The costs of breaching environmental regulations, or an actual leak or contamination event, can be devastating. They could even force you out of business altogether.

The cost of managing your UPSS infrastructure by monitoring your fuel system and fuel quality is a relatively small outlay – as little \$46 per

week. In addition to saving the significant costs of non-compliance or adverse events, having a monitoring system in place could save you on insurance costs and operational product loss. It will also increase the value of your asset – rather than allowing it to become a liability.



Cost of leak prevention

Basic leak prevention, detection and fuel quality monitoring

Annual cost for a marina with 2 underground tanks and 2 groundwater monitoring wells

Monthly SIRA loss monitoring	\$600
Groundwater monitoring	\$1,040
Fuel sampling	\$550
TOTAL COST	\$2,190

A tank and line integrity test may also be required for deeper investigation of a SIRA fail, indicating a loss of product from the system. Also required after a UPSS upgrade - \$1,500 for 1 underground tank at a marina.

VS

Cost of contamination and clean-up

The cost of undetected leaks, fuel and site contamination can involve the following:

Small leak	Medium leak	Large leak
<ul style="list-style-type: none"> • Disposal of contaminants • Fuel loss/lost sales 	<ul style="list-style-type: none"> • Disposal of contaminants • Fuel loss/lost sales • Marine vehicle repairs from damaged engines • Insurance claims • Equipment upgrade/repair/relining/replacement 	<ul style="list-style-type: none"> • Disposal of contaminants • Fuel loss/lost sales • Vehicle repairs from damaged engines • Insurance claims • Equipment upgrade/repair/relining/replacement • Site shut down • Removal of vessels • Site contamination clean up and remediation • Ongoing environmental consultant fees • EPA fines
TENS OF THOUSANDS OF DOLLARS	HUNDREDS OF THOUSANDS OF DOLLARS	INTO THE MILLIONS



What should you do?

A proactive approach to environmental risk management

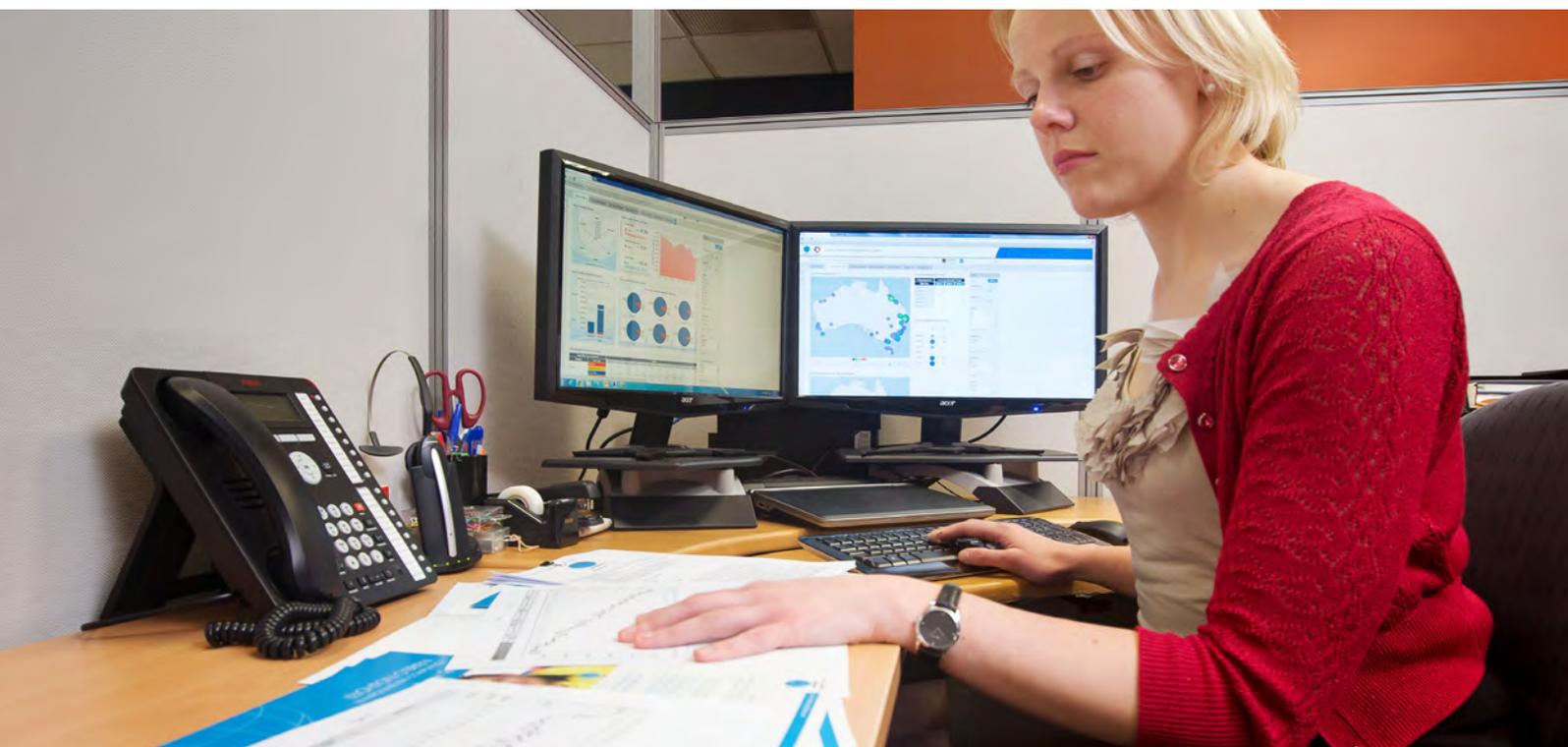
Every marina is different, so you should determine and understand your risk profile, which depends on the location of your site, age of your UPSS infrastructure, level of maintenance and leak detection systems in place. An estimated 50% of underground storage tanks in Australia are steel, which significantly increases an operator's risk profile. The location of marinas also makes them especially sensitive.

The bottom line measurement of risk management is the effectiveness of leak detection practices in minimising the size of

any leaks. This is determined by the rate of the leak, the time to detection and the time to stop the leak.

A simple, regular monitoring, sampling and maintenance schedule, completed by on-site staff with the support of qualified technical experts, will help keep you safe, profitable and compliant. Make sure you record all your measurements and maintenance activities.

As a minimum your leak detection regime should include monthly loss monitoring through SIRA, and groundwater monitoring to identify any site contamination.



SIRA analyst monitoring for fuel loss

Daily actions

- Dip tanks and record measurements
- Dip E10 (bio-blend) tanks for water and all tanks after heavy rain
- Check fill/dip points for damage
- Check drains and remove blockages
- Check spill-kit contents, remove litter
- Check collection pits and sump levels
- Check hoses and nozzles for damage
- Check ATG (if present) for any alarms and action as required

Weekly actions

- Check dip stick for wear
- Dip tanks for water and remove water if present (non E10 and bio-blends)
- Check vent points and remove blockages
- Check tank pit observation wells and immediately investigate leaks
- Check under pump sumps and immediately investigate leaks
- Check fill point spill containment area for product/water. Remove liquid prior to delivery and store for appropriate waste disposal.

Monthly actions

- Check SIRA report and immediately investigate all discrepancies including fail and inconclusive results.

Six-monthly actions

- Sample groundwater monitoring wells and immediately investigate leaks (mandatory in NSW)
- Fuel quality sampling

Annual actions

- Integrity test on tank/s (in the absence of a continuous leak detection system such as SIRA or ATG)
- Integrity test on lines (in the absence of a pressure line leak detector)
- Function test pressure line leak detector by leak simulation
- Certify Automatic Tank Gauge and function test floats or probes
- Check or test space between a double-walled interstitial tank
- AST AS 1940 inspection if tanks are above ground
- Service cathodic protection systems
- Meter calibration check (refer to local regulations and consult with SIRA provider if required)
- Check functionality of critical safety devices such as shear valves, ATG alarms/probe/floats/spacers, under pump sump and containment sensors, tank overfill protection devices, tanker delivery connections, spill recovery kit, fire extinguishers and other emergency response equipment
- An inspection of orifice plates and pressure vacuum valves for extraneous matter, correct sealing and the presence of corrosion (NSW manual vapour recovery sites only)
- Every 3 years test the vapour containment integrity of the underground storage tank (NSW manual vapour recovery sites only)
- Every 3 years test the pressure vacuum valves for correct functioning (NSW manual VR sites only)

Six-monthly and annual checks are comprehensive. We recommend that these are completed by a suitably qualified and experienced technician.

Actions for new or modified systems

- Ensure a suitably qualified person tests the system and pipework for leaks before and after burial, according to Australian Standard 4897-2008.
- Check requirements to install vapour recovery at service stations if not present (NSW only).

Sourced from EPA Victoria flipchart, *Victorian underground petroleum storage systems: A guide to preventing and managing leaks and spills*, combined with Leighton O'Brien's best practice recommendations.



Akuna Bay – a d’Albora Marina

Case Study: d'Albora Marina

Martin Silk manages environmental risk across seven first-class marinas in prime locations across New South Wales and Victoria.

Beaches, harbours and marine parks are normally located within close proximity to marinas. Their location puts them under close surveillance from the media, the public and industry regulators, who are constantly assessing their level of environmental compliance.

Marinas face a very specific challenge due to their location. The floating component of marinas puts fuel lines under constant movement, leading to increased risk of damage and loss of integrity.

Inspecting fuel lines is also difficult because they're often located beneath floating pontoons or can be partly submerged due to tidal heights.

Fuel leaks and spills are front of mind for Martin.

"Any kind of problem with fuel is a real concern," said Martin. "If there is a UPSS leak that goes undetected, it could contaminate groundwater and lead to site remediation which may cost well into the millions.

"Marinas are very public places, so it's really important to maintain safety and confidence among the boating public," he said.

Serving customers high quality fuel is also a key priority.

"It's absolutely critical that we supply high quality diesel and premium fuel to our members," Martin said. "There would be nothing worse than being at sea and finding out a diesel tank contains water. This could affect the safety of the vessel and those aboard too."

In Australia, 36% of underground tanks have some form of contamination at the bottom of

the tank. Contaminated fuel can cause engine failure, which is particularly fatal to mariners if they're stranded in the elements with a broken-down engine.

A key element of d'Albora's risk management strategy is taking a proactive approach to maintaining its underground fuel system infrastructure to prevent leaks and fuel contamination.

D'Albora's UPSS's are monitored for leaks and product loss by Leighton O'Brien's SIRA compliance monitoring tool. Each day d'Albora staff send sales, delivery and inventory data to a portal, which is then analysed for any trends in fuel losses or gains.

"SIRA is able to identify a fuel theft or verify whether a fuel supplier is actually supplying the fuel we pay for," Martin said. "It can also help to identify calibration errors from Automatic Tank Gauging, or from the meters in our fuel dispensers."

All underground tanks and fuel lines are also tested annually for leaks, equipment issues or water ingress. "The integrity test is conducted with such high accuracy that it's really useful to compare reports year to year to understand any minor discrepancy and identify even the smallest risk of a tank failing," Martin said.

Staying on top of d'Albora's fuel quality supply is a also key priority, according to Martin. "We check for water daily, and get our fuel sampled annually as part of our integrity testing," he said.

"Leighton O'Brien keeps our risk profile very low," Martin said. "They help us ensure we're on track and compliant, which is really useful when running a busy business near the water."

Sources

Victorian underground petroleum storage systems: A guide to preventing and managing leaks and spills - EPA Victoria flipchart.

Leak detection for underground petroleum storage systems - EPA Victoria fact sheet, 2016.

Underground petroleum storage systems: Best practice guide for environmental incident prevention and management - NSW EPA, 2016.

Loss monitoring of underground petroleum storage systems (UPSS) - ACAPMA best practice guidelines, 2017.

Regulatory documents and resources

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About Leighton O'Brien

Leighton O'Brien is a market leader in UPSS environmental risk mitigation and fuel quality management. We specialise in tank and line integrity testing, tank cleaning and fuel restoration, SIRA and groundwater monitoring.

Our services and software help storage tank operators prevent and reduce the risk of leaks and fuel loss, enhance fuel quality, prevent equipment damage and meet compliance requirements.



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