

Environment Protection Authority

# Underground Petroleum Storage Systems

Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019



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# Contents

<b>1. Introduction</b>	<b>1</b>
1.1. Aim and scope	1
1.2. Regulatory framework	1
1.3. Appropriate regulatory authority	1
Contact details	2
1.4. Application of the Regulation	2
1.5. Referenced documents	2
1.6. Person responsible	3
1.7. Duly qualified person	3
1.8. Planning issues	3
1.9. Exemptions	4
1.10. Compliance	4
Enforcement	4
Penalties and offences	5
Investigation	5
<b>2. UPSS equipment</b>	<b>6</b>
2.1. New, old and modified UPSS installations	6
Significantly modified	6
2.2. Mandatory equipment for a new and modified UPSS	6
2.3. Leak detection systems	7
Groundwater monitoring wells	7
Groundwater test records	9
Alternative leak detection systems	9
2.4. Other recommended equipment and practices	12
Fill points	12
Dispenser sumps	12
Cathodic protection for steel tanks and piping	13
Management of service station forecourt areas	13
<b>3. Design and installation of a UPSS</b>	<b>14</b>
3.1. Design and installation – regulatory requirements	14
3.2. Equipment integrity testing	14
Minimum requirements for equipment integrity tests	15
Frequency of equipment integrity testing	15
3.3. Record-keeping	15
<b>4. Operation of a UPSS</b>	<b>16</b>
4.1. Introduction	16
4.2. Fuel system operation plan	16
Format and keeping of the fuel system operation plan	17

<b>4.3. Loss monitoring</b>	<b>17</b>
Accuracy	19
<b>4.4. Loss detection and investigation procedures</b>	<b>19</b>
<b>4.5. Incident management procedures</b>	<b>20</b>
<b>4.6. Incident logs</b>	<b>20</b>
<b>4.7. Incident notification</b>	<b>20</b>
<b>4.8. System maintenance</b>	<b>21</b>
<b>4.9. Record-keeping</b>	<b>21</b>
Changes in responsibility	22
Access to records	22
<b>5. Modifying a UPSS</b>	<b>22</b>
<b>5.1. Repair of a UPSS</b>	<b>22</b>
Steel tanks	22
Other tanks	23
Steel piping	23
Other piping	23
<b>5.2. Re-use of UPSS tanks</b>	<b>23</b>
Non-steel tanks	23
Steel tanks	23
<b>5.3. Record-keeping – significant modifications</b>	<b>24</b>
<b>6. Decommissioning a UPSS</b>	<b>25</b>
<b>6.1. Decommissioning a tank or system</b>	<b>25</b>
<b>6.2. Notification requirements of a tank or system being decommissioned</b>	<b>27</b>
Planning requirements – local authorities	27
Work health and safety requirements – SafeWork NSW	27
<b>6.3. Reporting requirements following the decommissioning, removal or replacement of a UPSS</b>	<b>27</b>
Preparation by a duly qualified person	28
Description of processes and assessment of contamination	28
Describe any necessary remediation works.	30
<b>6.4. Record-keeping</b>	<b>30</b>
<b>6.5. Reporting considerations</b>	<b>31</b>
Data quality objectives	31
Quality assurance/Quality control (QA/QC)	31
Soil sampling	31
Groundwater assessment	31
Contaminants of concern	32
Documenting field practices	32
<b>Appendix 1: Definitions</b>	<b>34</b>
<b>Appendix 2: Duly qualified person checklist</b>	<b>38</b>

<b>Appendix 3: Sample record sheets for groundwater monitoring</b>	<b>39</b>
<b>Appendix 4: Planning and consent</b>	<b>41</b>
<b>Role of consent and determining authorities</b>	<b>41</b>
Australian Standards	41
General considerations for consent conditions	41
<b>Issues to be considered by consent authorities under the Regulation</b>	<b>41</b>
Repair to a UPSS	45
<b>Appendix 5: Loss monitoring investigation</b>	<b>46</b>
<b>Appendix 6: Checklist for reporting following the decommissioning, removal or replacement of a UPSS</b>	<b>48</b>

# 1. Introduction

These guidelines provide details on the environmental requirements for operating underground petroleum storage systems in NSW.

Leaks from underground fuel tanks and pipework are a common source of soil and groundwater contamination in NSW. Many of the contaminated sites notified to the NSW Environment Protection Authority (EPA) have involved **underground petroleum storage systems (UPSS)**.

There is a clear need for operators of a UPSS to guard against, monitor for, and fix fuel leaks promptly. This can reduce environmental impacts, save costly clean-ups and protect the public.

## 1.1. Aim and scope

The guidelines in this document specify the level of environmental performance expected of an operator of a UPSS in NSW. They are designed to assist with achieving compliance with requirements of the **Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019**.

The guidelines also summarise best-practice equipment and procedures in the fuel storage and delivery sector and refer to other sources of information about best practice. The guidelines do not cover other legislation and legal obligations that UPSS operators are required to meet, such as those relating to work health and safety, and dangerous goods requirements.

## 1.2. Regulatory framework

The NSW Government introduced a new law in 2008 requiring operators of UPSS to install tanks, pipes and monitoring equipment for underground fuel systems in accordance with industry best practice. The Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008 also required operators to monitor for leaks and have documented management procedures for their underground fuel system.

The Regulation was updated in 2014 and 2019 to include changes in fuel systems terminology, technology and best practice. These guidelines are made under the Regulation and assist with its implementation. In the case of any inconsistency between the Regulation and these guidelines, the Regulation prevails to the extent of the inconsistency.

## 1.3. Appropriate regulatory authority

When the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation was first made on 1 June 2008, the EPA was declared to be the **appropriate regulatory authority (ARA)** for all UPSS-related matters. The EPA was responsible for assisting the fuel industry to implement and comply with the new regulatory requirements. It was always envisaged that local councils would resume regulatory responsibility after an implementation period for the new regulatory requirements.

On 1 September 2019 local councils resumed responsibility for regulating most UPSS sites in their local areas. The EPA remains responsible for regulating UPSS sites that are:

- operated by a public authority, or
- subject to an Environment Protection Licence, or
- in the unincorporated areas of NSW where there is no local council, or
- subject to a notice, direction or requirement made, issued or given by the EPA before 1 September 2019 for a matter under the Regulation until the actions in that notice, direction or requirement have been complied with.



## Contact details

### NSW Environment Protection Authority (EPA)

Environment Line (02) 9995 5555 or 131 555 (from anywhere in NSW)

Email: [upssreg@epa.nsw.gov.au](mailto:upssreg@epa.nsw.gov.au)

### Local councils

To find the contact details for your local council, use the [search function](#) on the Office of Local Government website.

### SafeWork NSW

Phone: 13 10 50

Website: [www.safework.nsw.gov.au](http://www.safework.nsw.gov.au)

To notify SafeWork NSW of an abandoned tank, use this online form:

[Notification of Schedule 11 Hazardous Chemicals and Abandoned Tanks Guidance Material](#).

## 1.4. Application of the Regulation

The Regulation applies to all UPSS in NSW, except for:

- storage systems where all tanks are situated wholly above ground (regardless of where any associated pipes, valves and other equipment are situated)
- sumps, separators, stormwater or wastewater collection systems, catchment basins, pits, septic tanks or other like structures, unless petroleum routinely passes through the structure from one part of the storage system to another
- bunded tanks that are situated below ground level but not in the ground (such as in a basement, cellar or tunnel)
- liquefied petroleum gas (LPG) storage systems.

A UPSS is defined in the [Regulation](#) as a system with one or more tanks that are completely or partially buried in the ground and which contain, or are intended to contain, petroleum. This definition also includes any piping associated with the tanks and fuel dispensers, but not piping related to vents or vapour recovery.

## 1.5. Referenced documents

These guidelines include references to the following documents:

- AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*
- AS 4976–2008, *The Removal and Disposal of Underground Petroleum Storage Tanks*
- AS 1692–2006, *Tanks for Flammable and Combustible Liquids*
- AS 4482.1–2005, *Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds*
- AS 1940– 2017, *Storage and Handling of Flammable and Combustible Liquids*
- Work Health and Safety Regulation 2017 (WHS Regulation) – *Notification of Schedule 11 hazardous chemicals that are used, handled or stored above certain quantities*
- [Model Code of Practice: Managing risks of hazardous chemicals in the workplace](#)
- SafeWork NSW safety alert WC01188, [Potential risks when removing underground storage tanks](#).

- Guidelines for sampling design for contaminated land in NSW (EPA, to be published 2021)
- Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020)
- Waste Classification Guidelines (EPA 2014)
- General Guidance for using EPA's Standard Test Procedures for Evaluating Release Detection Methods (USEPA 510-B-19-006; May 2019)
- Guidelines for the NSW Auditor Scheme (3rd edition 2017)
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 1999)
- Assessment of Underground Storage Systems (EPHC & NEPC 2003).

## 1.6. Person responsible

The Regulation defines the **person responsible** for a UPSS as the person who has management and control of the storage system. The person responsible is legally required to ensure the UPSS complies with the requirements of the Regulation. Where a corporation is responsible for a UPSS, an individual who is authorised to act on behalf of that corporation must be nominated to the appropriate regulatory authority as a contact.

Where a UPSS is no longer in use but has not yet been decommissioned, the person responsible is the person who had management and control of the system immediately before it ceased operating. If that person cannot be located, the person who owns the land on which the UPSS is located is deemed to be the person responsible.

Where more than one party is involved in managing a UPSS site through specific legal and/or contractual arrangements, determining the person responsible is a question of fact that depends on the relevant management arrangements and what happens in practice.

## 1.7. Duly qualified person

The Regulation requires that a **duly qualified person** be used to carry out certain activities such as designing, installing, modifying or decommissioning a UPSS. Any testing, repairs and ongoing maintenance of the storage system must also be undertaken by a duly qualified person.

Each of these activities requires different skills and presents varying levels of complexity. Duly qualified persons of different specialisations may therefore be required to undertake different components or stages of an activity (i.e. different stages may require an architect, UPSS installer, a hydrologist, a laboratory analyst, a contaminated land and/or groundwater consultant, a drilling contractor, and so on).

Affiliation to an industry accreditation scheme and/or having relevant trade permits or professional qualifications can help to indicate whether a person may be considered as being duly qualified to undertake the required activity. Table 2 in *Appendix 2: Duly qualified person checklist* provides a checklist to assist in considering who is a duly qualified person.

## 1.8. Planning issues

Planning authorities, usually local councils, assess development proposals under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Such proposals include those for new or modified UPSS or their decommissioning. These planning processes are independent of the Regulation and are not affected by it.

Most development proposals relating to UPSS sites do not require integrated development approval as UPSS sites do not require an environment protection licence.

The Regulation requires specific conditions to be met in the design, installation and commissioning of all new and significantly modified UPSS, as well as when a tank is to be removed or replaced or



the system decommissioned. These requirements are specified in Part 2 of the Regulation and are best considered at the planning stage.

Further information about planning issues is contained in *Appendix 4: Planning and consent for a UPSS*.

## 1.9. Exemptions

Clause 29 of the Regulation allows the appropriate regulatory authority to exempt a person or a class of person/s from any of the requirements of the Regulation.

The EPA issued exemptions to many UPSS sites when the Regulation was first introduced. These exemptions allowed time for UPSS operators to comply with the new requirements, such as the need to monitor for fuel losses and install groundwater monitoring wells. All these exemptions granted by the EPA have now expired.

It is the EPA's current policy that an exemption will only be considered where it is not possible for the person responsible to comply with certain provisions of the Regulation, and equivalent environmental protection measures can be put in place. The equivalent measures must be designed and installed by a duly qualified person.

On 1 September 2019 councils became the appropriate regulatory authority for most UPSS sites in their local areas. Councils can exempt persons responsible for a UPSS in their local area from complying with any of the requirements of the Regulation. Councils should also develop and/or adopt a policy regarding the granting of exemptions, to ensure consistency and transparency.

Exemptions issued by the EPA or councils:

- may be granted on application or on their own motion
- may be issued to a person or to a class of persons
- must be in writing and be either published in the *Government Gazette* or served upon the person specified in the exemption order
- may be granted subject to conditions as specified in the exemption order
- may be granted for set periods of time or until revoked.

To apply for an exemption, contact the appropriate regulatory authority for the site (see section 1.3) to discuss the application process. The appropriate regulatory authority may charge an application fee for an exemption.

## 1.10. Compliance

The EPA and councils are responsible for enforcing compliance with the Regulation for sites for which they are the appropriate regulatory authority.

The EPA enforces compliance with the Regulation in accordance with its compliance policy. Councils enforce compliance in accordance with their own policies and procedures. The EPA cannot direct a council regarding compliance action for premises for which they are the appropriate regulatory authority, and vice versa.

## Enforcement

Certain enforcement powers are available to appropriate regulatory authorities under the *Protection of the Environment Operations Act 1997* (POEO Act) to enforce compliance with the Regulation and manage and prevent pollution incidents. These powers include issuing clean-up notices and prevention notices requiring actions to be taken at UPSS sites.

## Clean-up notices

Under the POEO Act, the appropriate regulatory authority may issue a clean-up notice requiring certain persons to take clean-up action where it reasonably suspects that a pollution incident has occurred or is occurring.

Actions that could be required may include:

- taking appropriate measures to prevent, minimise, remove, disperse, destroy or mitigate any pollution resulting, or likely to result, from the pollution incident
- ascertaining the nature and extent of the pollution incident and any actual or likely resulting harm to the environment or human health
- preparing and/or carrying out a remedial plan of action agreed to by the appropriate regulatory authority.

## Prevention notices

Under the POEO Act, an appropriate regulatory authority may issue a prevention notice when it reasonably suspects that an activity has been or is being carried out in an 'environmentally unsatisfactory manner' as defined in the POEO Act.

Examples of actions that may be required by a prevention notice include:

- installing, repairing, altering, replacing, maintaining or operating control equipment or other plant
- monitoring, sampling or analysing any pollution or otherwise ascertaining the nature and extent of pollution or the risk of pollution
- preparing and carrying out a plan of action to control, prevent or minimise pollution or waste
- providing regular progress reports to the appropriate regulatory authority on implementing the action(s) required to be taken by the notice.

## Penalties and offences

The **person responsible** is legally accountable for ensuring their UPSS site(s) complies with the Regulation. There are offences for contravention of the requirements of the Regulation. A person who commits an offence may receive a penalty notice or be prosecuted in court by the appropriate regulatory authority. The Regulation outlines the maximum penalties for offences in the event of court action. A list of penalty notice offences against the Regulation is contained in Schedule 6 of the Protection of the Environment Operations (General) Regulation 2009.

Penalties and offences under the POEO Act may also apply to the operation of a UPSS. For example, it is an offence for a person to willfully or negligently cause any substance to leak, spill or escape from a storage system in a manner that harms, or is likely to harm, the environment. It is also an offence to pollute waters or land.

## Investigation

Chapter 7 of the POEO Act contains the powers of entry and investigation of authorised officers of the EPA and councils. An appropriate regulatory authority or authorised officer may require a wide range of documents to be provided. In these circumstances, anyone furnishing information or making a statement to the appropriate regulatory authority that they know is false or misleading in a material respect is guilty of an offence.

## 2. UPSS equipment

Leaks from underground fuel systems can cause contamination that can harm the environment and human health. Cleaning up contamination is also very expensive. That is why the Regulation requires best-practice equipment to be installed.

### 2.1. New, old and modified UPSS installations

The 2019 Regulation has some slightly different requirements depending on whether a **new** or **old** UPSS is involved.

A UPSS approved, installed or commissioned on or after 1 June 2008 is considered a **new** UPSS and must fully comply with the Regulation.

A UPSS approved, installed or commissioned before 1 June 2008 is considered an **old** UPSS.

Old UPSSs need to comply with all the operational requirements of the Regulation **except** that they do not need to be retrofitted with the new infrastructure specified in Part 2 of the Regulation, unless there is a significant modification of the system.

Consult with the consent authority, usually local council, whether development approval is necessary for installing new or modifying existing tanks.

#### Significantly modified

Any significant modification to an old or new UPSS triggers the need for the system to fully comply with the Regulation. **Significant** means any modification to the UPSS that involves replacement of:

- the whole system
- or
- half or more of the tanks in the system.

### 2.2. Mandatory equipment for a new or modified UPSS

All new and significantly modified UPSSs must have equipment installed as required by Australian Standard AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*. The equipment required by AS 4897–2008 includes (but is not limited to):

- non-corrodible tanks and piping
- secondary containment of tanks and piping
- overfill protection devices
- leak detection for tanks and piping.

For further detail on what constitutes non-corrodible tanks and piping materials, what secondary containment requires and what overfill protection devices are, see Australian Standard AS 4897–2008.

The equipment specified in the Regulation represents the minimum requirements that must be included in new or significantly modified UPSS from an environment protection perspective. This is not intended to limit the use of alternative materials, designs, technology and methods where they can be shown to offer the same or better protection to the environment and human health as the specified equipment.

Tanks and piping will also need to conform with any other state and federal requirements for UPSS for the storage of flammable liquids.

## 2.3. Leak detection systems

All UPSS, whether 'old' or 'new', must have a leak detection system installed and be regularly tested (see parts 3 and 4 of the Regulation). A leak detection system acts as a backup in case the loss monitoring system fails to detect a leak from the UPSS.

A UPSS cannot be used unless a leak detection system is in place. There are numerous types of leak detection systems available (see Figure 1). The most appropriate leak detection system for a site will need to be recommended by a duly qualified person.

A [fact sheet on leak detection systems](#) has been prepared as a quick and simple reference.

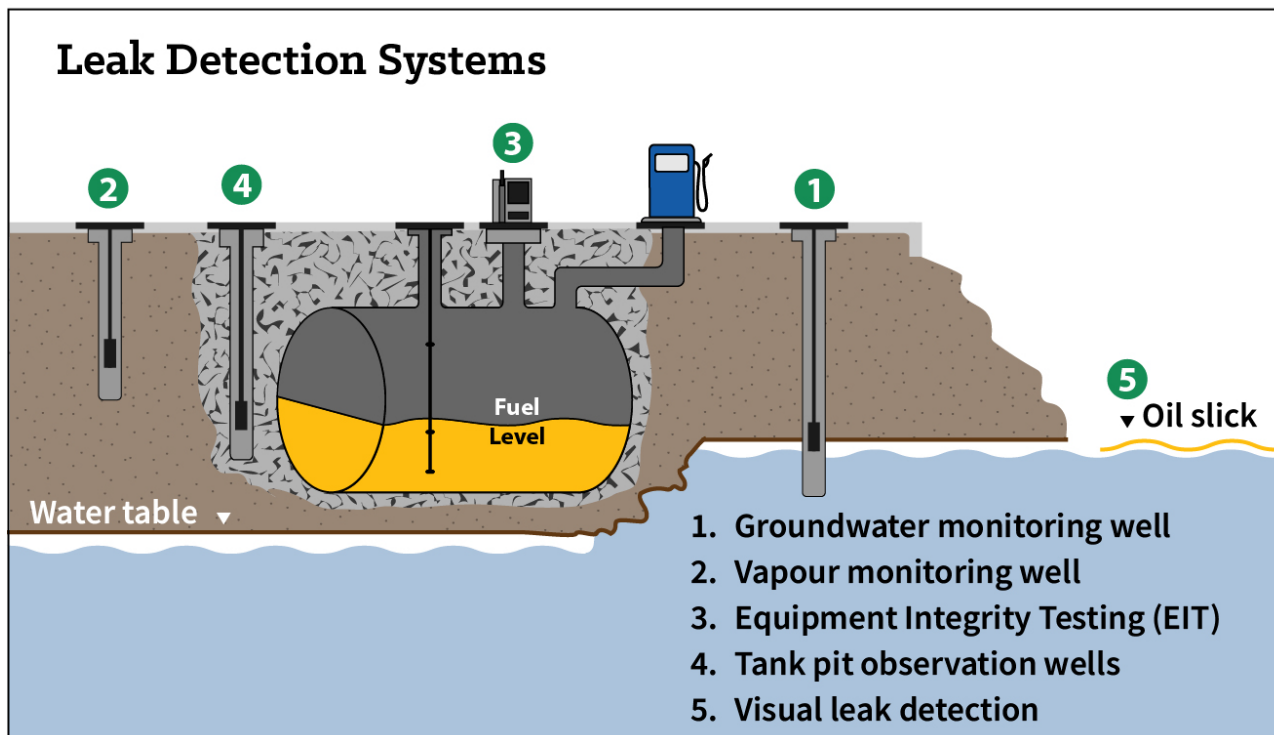


Figure 1 Leak detection systems for a UPSS

### Groundwater monitoring wells

The preferred leak detection system is a network of groundwater monitoring wells around the UPSS. The wells must be checked and/or tested every six months for the presence of fuel to help detect any leak in the system.

### Installation of wells

A duly qualified person who is experienced in designing and/or installing groundwater monitoring wells, such as a groundwater consultant or groundwater-well driller, should assess the UPSS site and determine the number and positioning of the wells.

The wells must be positioned to maximise the likelihood of intercepting contaminated groundwater if the UPSS were to leak. As a minimum, there must be one well installed up-gradient of the UPSS and two wells down-gradient. If groundwater cannot be found within 10 metres of the surface, an alternative leak detection system may be considered.

The person who designs and/or installs groundwater monitoring wells is required to provide the person responsible for the UPSS with a written report on the installation of the groundwater monitoring wells. This report must outline the final construction details of the wells and the industry standards met in their design and installation. It must also confirm that the wells' design, location and installation satisfy industry best-practice requirements.

The location of each groundwater monitoring well and its designated number (e.g. MW 1, MW 2, etc.) must be identified in the **fuel system operation plan** (section 4.2).

Section 4.5.7 of Australian Standard AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*, gives further details about the construction and installation of groundwater monitoring wells.

## Checking of wells

Each well must be checked at least every six months for the presence of hydrocarbons as their presence may indicate a leak (see Figure 2). This can be done manually or by using an interface probe or photoionisation detector (PID).

Manual checks should be made immediately after the bailer is raised from each well:

- Make a visual check for a sheen by looking across the water surface in a bright light.
- Make a visual check of the outside of the bailer for a sheen or any sign of hydrocarbons.
- Identify if any hydrocarbon odour is present in the well or bailer.

All health and safety precautions must be followed. A duly qualified person is required to provide training and a detailed written instruction on how to check the wells for contamination and recording of the results. This instruction is to be kept in the fuel system operation plan (section 4.2).

Any odour or sheen observed in the bailer or detected by a PID indicates the likely presence of hydrocarbons in the groundwater under the site. Further sampling will be required to confirm the presence of hydrocarbons.

## Sampling of wells

If checks of the wells suggest the presence of hydrocarbons, **sampling and analysis of the groundwater is required**. All samples for laboratory testing must be taken by a duly qualified person and be analysed in a laboratory accredited by NATA (the National Association of Testing Authorities).

Wells must be sampled:

- when a new UPSS or tank is installed
- when a new well is installed
- where six-monthly checking indicates that groundwater may be contaminated by petroleum, or
- upon the discovery of a leak, whether through loss monitoring of tanks and piping, inventory control, discrepancy or loss investigation, or some other method.

If the test results confirm that hydrocarbons are present in the groundwater monitoring well, the appropriate regulatory authority (local council or the EPA) must be advised using a **leak notification form**.

The results of groundwater testing and monitoring must be recorded and be kept for at least seven years after the date of the tests. The results must be included in the site's fuel system operation plan or be made available within three days of being requested by an authorised officer (if stored in a centrally maintained database).

For best practice, every six months, each well on site is sampled by a duly qualified person and analysed in a laboratory accredited by NATA (the National Association of Testing Authorities).

## Groundwater test records

The results of the six-monthly groundwater monitoring tests must be recorded. The records must include:

- the date and time of the tests
- any observations such as evidence of an odour or sheen or indication of the presence of free-phase hydrocarbons
- the name and signature of the person who conducted the tests. For electronically stored records, the name of the person who conducted the tests will suffice.

Sample recording sheets are provided in *Appendix 3: Sample record sheets for groundwater monitoring*. Copies of these records must be kept for at least seven years after the date the of the tests, in the fuel system operation plan.

If it is determined that there are free-phase hydrocarbons in groundwater at the site, or it is likely that offsite migration of hydrocarbons is occurring or has occurred, the appropriate regulatory authority must be notified immediately.

## Alternative leak detection systems

Where groundwater monitoring wells are not effective or suitable, an alternative leak detection system can be used, providing it has been designed and installed by a **duly qualified person**. The duly qualified person must certify in writing that it is appropriate for the site and offers a level of environment protection equivalent to that of groundwater monitoring wells.

The following examples of alternative leak detection systems are not exhaustive. A duly qualified person is free to specify other alternative leak detection systems but must certify these as appropriate for the site. Written certification should be provided to the person responsible for the UPSS and kept with the fuel system operation plan (section 4.2.).

### Interstitial monitoring

If interstitial monitoring is to be used as an alternative leak detection system, it must be capable of detecting a leak through either the wall of the tank or piping. Testing of the interstitial monitoring system must be undertaken at least every six months as outlined in AS4897 and recorded in the fuel system operations plan.

As interstitial monitoring cannot quantify any losses from a storage system, it cannot be considered a loss monitoring system.

### Vapour monitoring

This alternative leak detection system can be used either continuously or regularly to monitor for hydrocarbon vapours in the soil surrounding the tanks. Generally, it requires porous backfill material and a tracer element in the tanks that allows vapours to be detected. The vapours cannot be affected by rainfall (moisture) and any background contamination cannot interfere with readings.

Such a system requires installation of vapour monitoring wells designed and located appropriately by a duly qualified person.

### Equipment integrity testing (EIT)

See section 3.2.

### Tank-pit observation wells

Tank-pit observation wells are used to check whether liquid in the tank pit contains leaked or spilled petroleum, or vapours.



They are typically installed at the time a UPSS is installed, prior to backfilling the tank excavation, and are best practice. The tank-pit observation well(s) do not have to penetrate the groundwater table as this is not their main purpose.

Tank-pit observation wells can be considered **instead of** groundwater monitoring wells where:

- the receiving environment of any groundwater flow that could potentially contain hydrocarbons is particularly sensitive and near tanks, such as when the UPSS site is near surface waters or an adjacent dwelling with a basement
- the UPSS is located right next to the site boundary
- the groundwater table is normally greater than 10 metres below the surface.

When installing a tank-pit observation well, the duly qualified person should confirm all the following construction details have been met:

- the well construction and installation comply with requirements of AS4897
- the well is installed to intercept the tank excavation area or be as close to it as is technically feasible
- the tank-pit excavation is graded to a low point and a tank-pit observation well has been installed to within 150 millimetres vertically of the low point
- at least one tank-pit observation well is installed in each individual tank excavation pit. For an excavation pit with two or more tanks there must be at least two observation wells
- the well does not penetrate the bottom of the tank excavation and terminates at least 150 millimetres below the bottom of the tank
- the well can detect the presence of petroleum vapour and/or enable confirmation of free-phase petroleum in the tank excavation
- the well is clearly marked and secured to avoid unauthorised access and tampering
- the well is sealed from the ground surface to the top of the filter pack.

### Visual observation

A duly qualified person may recommend visual observation as the most appropriate leak detection system for a site, particularly where it is determined groundwater monitoring wells would not be practical or effective. For example, groundwater monitoring wells may not be effective at a marina site where tanks are in a tidal zone, or where a UPSS is located next to a waterway.

A rigorous and regular visual check of the waterway (preferably twice a day) with records kept for inspection would be required to justify this as being an appropriate leak detection system.

The person responsible for the UPSS must also ensure that an incident management procedure can be rapidly activated to respond to any observed sheen or hydrocarbon contamination in the waterway. (See section 4.5.)

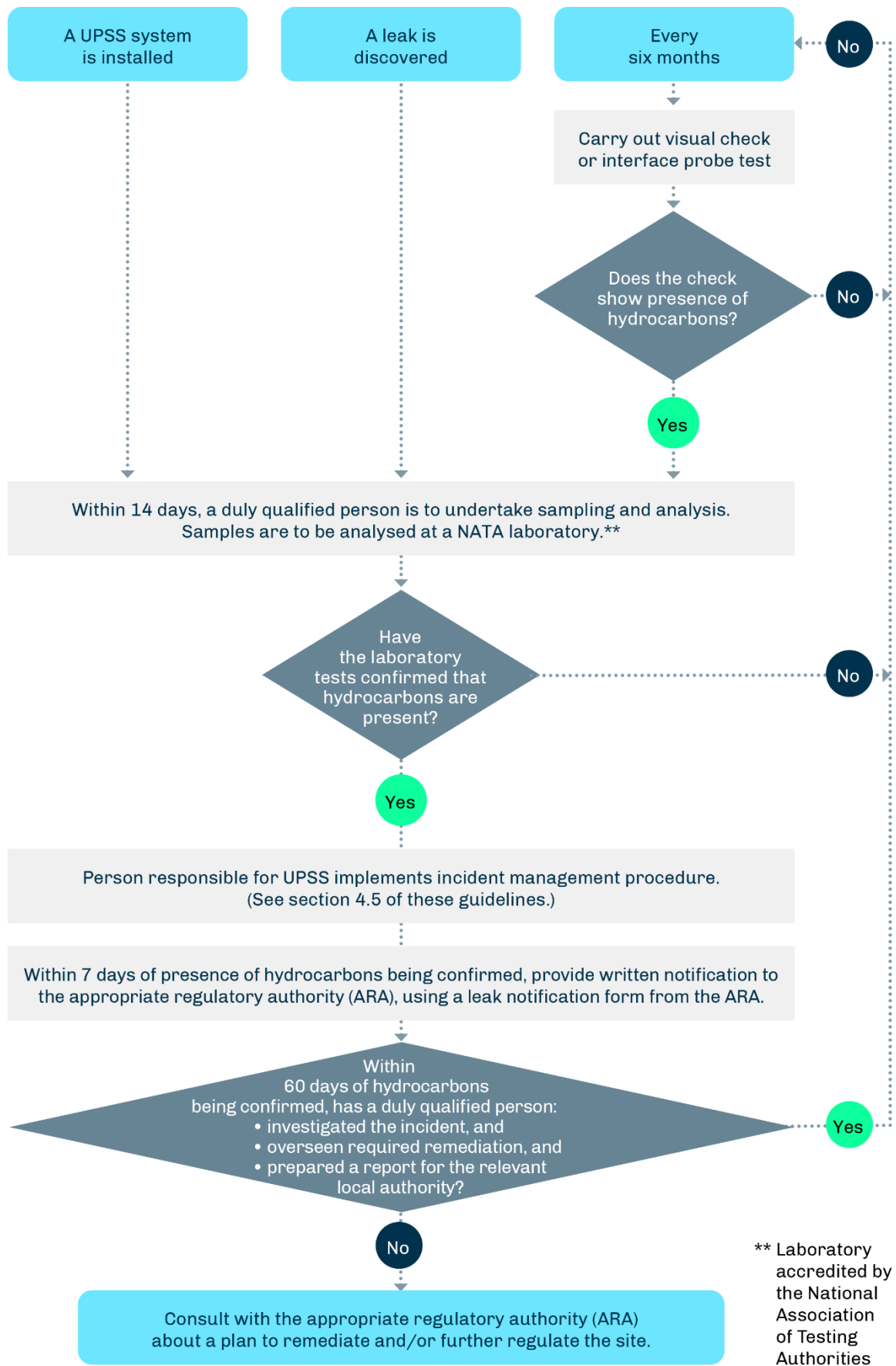


Figure 2 Checking, sampling and analysing groundwater monitoring wells for groundwater contamination

## 2.4. Other recommended equipment and practices

Equipment or infrastructure that is not required under the Regulation but is part of good environmental practice at UPSS sites includes:

- tank-pit observation wells
- additional monitoring/sensor probes
- the automatic shutdown/cut-off valves integral to the operation of the system.

See Australian Standard AS4987–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*, for further information.

### Fill points

It is best practice that each fill point:

- be dedicated to one tank only
- be accessible from the vehicle unloading position with a hose no more than six metres long
- have a spill containment device with a minimum capacity of 15 litres
- have a system for the safe removal of any petroleum (or contaminated water) that collects in the spill containment device
- allow adequate access for visual inspection
- be identified on site drawings.

### Dispenser sumps

It is best practice to install sumps under fuel dispensers to prevent the release of petroleum to the environment. Dispenser sumps must:

- be able to collect and contain leaks from the dispenser
- have a system in place to detect liquid in the sump and send an alarm or notification to the site operator
- have a system for the safe removal of any petroleum (or contaminated water) that collects in the sump.

Consider keeping a record of the date, quantity and nature of any petroleum that is removed from a dispenser sump. While not required by the Regulation, these records may be useful for reconciliation purposes or in determining whether loss from a system to a dispenser sump is an ongoing problem that needs to be rectified.

## Cathodic protection for steel tanks and piping

All new and significantly modified UPSS with steel tanks and piping must be cathodically protected against corrosion, and designed and installed in accordance with the following Australian Standards:

- AS 2832.1–2004, *Cathodic Protection of Metals: Part 1 – Pipes and Cables*
- AS 2832.2–2003, *Cathodic Protection of Metals: Part 2 – Compact Buried Structures*.

An effective cathodic protection system should minimise the risk of corrosion and the potential for petroleum to leak from a UPSS.

Best practice for cathodic protection of steel tanks and piping includes:

- inspection and testing within 12 weeks of installation and at least every year thereafter
- where impressed-current cathodic protection systems are used, monthly monitoring of the system in accordance with a corrosion specialist's instructions (to ensure correct operation)
- maintenance of cathodic protection systems in accordance with recommendations of the manufacturer
- documenting the maintenance requirements and inspection and testing procedures, and retaining these records in the fuel system operation plan.

## Management of service-station forecourt areas

While not strictly a UPSS issue, management of forecourt run-off at a UPSS site is an important part of the design of the facility and should be considered at the planning stage. An EPA Practice Note, [Managing Run-Off from Service Station Forecourts](#), describes how to design and operate a best-practice management system for forecourt run-off to avoid polluting waters.

## 3. Design and installation of a UPSS

Fuel is often stored in underground storage systems to save space and for safety reasons. However, storing fuel underground creates a risk that a leak may occur undetected.

### 3.1. Design and installation – regulatory requirements

All new and significantly modified UPSS coming into operation for the first time (i.e. being commissioned) must be designed, installed and tested in accordance with the provisions of clauses 6–13 of the Regulation.

To meet the requirements of the Regulation, a UPSS must:

- be designed by a duly qualified person
- be installed by a duly qualified person
- include the equipment required by Australian Standard AS 4897–2008
- pass an **equipment integrity test** carried out in accordance with the written directions of a duly qualified person. (See section 3.2.)

The duly qualified person(s) who designs and/or installs a UPSS must prepare written documentation and details of all relevant industry standards and specifications used in the design and installation process. This documentation must be given to and retained by the person responsible for the system.

This is important information about the UPSS because standards and specifications may vary over time. This documentation will detail the standards and specifications used at the time the system was installed. If the system leaks in the future, the documentation can be used to determine how the system is configured and help find the source of the leak.

As part of this documentation process, current **as-built drawings** for the system must be prepared at the completion of the installation process and provided to the person responsible. The Regulation defines these drawings as ones that depict the current configuration of the UPSS in relation to the storage site (that is, as installed below ground level). There must be detailed site plans (to a recognisable scale) that depict the final installed configuration of all parts of a UPSS and any construction deviations from plan showing all features of the storage site as currently built. The drawings do not include pre-construction drawings.

Consult with the consent authority, usually local council, on any necessary approval/s that may be required for installing a new UPSS on site.

Further, ensure all requirements of the Work Health and Safety Regulation 2017 (WHS Regulation) have been considered – in particular, the notification of Schedule 11 hazardous chemicals that are to be used, handled or stored above certain quantities.

### 3.2. Equipment integrity testing

An **equipment integrity test** (EIT) measures the containment integrity of the tanks, fittings and pipes by applying a pressure or vacuum to them and measuring any pressure changes.

An EIT must be performed on all new, repaired and significantly modified UPSS prior to the system being commissioned. The EIT must be undertaken in accordance with section 8.5 of AS 4897–2008. An EIT is also a useful diagnostic tool to assist in confirming the location of a leak that has been detected by a loss monitoring system. (See section 4.3.)

The person performing the EIT must provide the person responsible for the UPSS with a certificate stating how the testing was carried out, that the method used is a certified method and results of the EIT. These documents must be kept for seven years after the system is decommissioned.

### Minimum requirements for equipment integrity tests

An EIT must:

- be capable of detecting a leak of 0.38 litres per hour, with a probability of detection of at least 95% and a probability of false detection of 5% or less in accordance with AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*
- be conducted by a duly qualified person in accordance with the manufacturer's written instructions specific to the UPSS component/s
- use a nationally approved and certified method of testing that meets, at a minimum, the requirements or certification standards of General Guidance for Using EPA's Standard Test Procedures for Evaluating Release Detection Methods (USEPA 510-B-19-006; May 2019).

Usually an EIT involves a vacuum or pressure test (using inert gases) on the UPSS. The duly qualified person carrying out the test will determine the best test method. Both tanks and pipework need to be tested.

### Frequency of equipment integrity testing

The Regulation requires an EIT to be conducted:

- before a new UPSS is commissioned
- after any modification or upgrade of UPSS (including tank relining)
- after any repair following the discovery of a leak in the system or replacement of tanks or piping.

EITs are generally not considered adequate as the sole method for leak detection because they are done infrequently. However, if an EIT is recommended as an alternative leak detection system for a UPSS, it is to be conducted at least annually and be coupled with **statistical inventory reconciliation analysis** (SIRA) undertaken at least monthly.

## 3.3. Record-keeping

The Regulation requires documents detailing the design, installation, modification and repair of a UPSS to be kept for specified periods of time. The person responsible must keep records during the life of the system that detail any modifications, replacement of tanks or piping, any EITs and any decommissioning and site reports. To ensure this important documentation is preserved, it is required to be passed to subsequent operators of the UPSS upon transfer or sale of the system. Section 4.9 of these guidelines provides further details of record-keeping requirements.

Details of the certification and record-keeping requirements for EITs are outlined in Appendix C of AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*.



## 4. Operation of a UPSS

Operators of UPSSs must ensure their fuel systems are monitored for leaks.

### 4.1. Introduction

Part 4 of the Regulation requires the following measures to be in place for any operating UPSS:

- a fuel system operation plan
- a loss monitoring system
- an incident management procedure
- a maintenance schedule for the system
- an inventory of staff training and induction about the system.

These measures are required for all operating UPSS, whether they are classed as 'old' (pre-1 June 2008) or 'new' (post-1 June 2008) systems.

### 4.2. Fuel system operation plan

A UPSS must not be used unless a fuel system operation plan (formerly known as an environment protection plan) has been developed and implemented at the site by the person responsible. The fuel system operation plan is a document describing how the underground fuel system at the site is configured, managed and maintained. Staff should be able to refer to the plan quickly for guidance in the event of an incident (e.g. leak or spill) and inform contractors and regulators about the specific features of the site and system.

An EPA fact sheet, [Fuel System Operation Plans](#), provides a quick and simple reference.

Clause 18 of the Regulation requires a fuel system operation plan include:

- details of the loss monitoring system used for the UPSS
- an incident management procedure that sets out the actions to be followed in dealing with any leaks and spills from the UPSS
- maintenance details for the UPSS
- the current 'as built' drawings – as per section 6.4.3 of AS4897. Where current as-built drawings are not available for a system (e.g. the system is very old and inadequate records have been kept), an approximate diagram of the known layout of the underground structures can be included, noting that 'this is a best approximation'
- a plan of the storage site, including but not limited to the location of the storage system, all buildings and associated infrastructure, all fences and gates, location of all groundwater monitoring wells, unsealed surfaces, drainage and services, buildings and associated infrastructure (above and below ground)
- a list of industry standards that were followed for the design, installation and operation of the UPSS
- a copy of industry standards that have been followed in constructing and maintaining the UPSS
- a copy of the specifications for the design, installation and operation of the UPSS. If this information is not included, the person responsible can instead provide evidence in the plan of their attempts to obtain this information (see clause 18(5)(c) of the Regulation)
- an inventory of employee site induction and incident management training that has been provided to site staff.

Additionally, the fuel system operation plan must include:

- the person responsible for the UPSS along with a 24-hour contact number for that person
- where a body or organisation is responsible, the title and contact details of the individual who is authorised to act on behalf of the company in relation to the control of the UPSS
- the name of the person who owns the storage site (if the site owner is different from the person responsible for the UPSS)
- land title particulars (such as the lot and DP numbers) of the land on which the UPSS is situated
- details of access to the system and its security, including information on all locks, gates, fences and similar, and how to open them
- written instructions provided by the duly qualified person on how to check groundwater monitoring wells
- monitoring and/or sampling (dates and results) of the site's groundwater monitoring wells or alternative leak detection system
- details and certification of any tank abandonment and/or decommissioning undertaken on site
- the location of all records kept in accordance with Part 5 or 6 of the Regulation.

The fuel system operation plan must comply with any other requirements outlined in this guideline and must also be updated as required.

### **Format and keeping of the fuel system operation plan**

A fuel system operation plan must be accessible on site and contain information and records specific to the UPSS located on site. The plan can be held electronically or in hardcopy form, either as a dedicated document or as part of other site management procedures.

The plan must also be kept up to date by the person responsible identified in the plan. It must be able to be provided to the appropriate regulatory authority upon request.

If records that are a required component of the plan (e.g. groundwater monitoring records stored in electronic format) are stored offsite, this must be disclosed in the plan. These records must be made available to the appropriate regulatory authority within three days of a request being made by an authorised officer.

The person responsible for the UPSS should also ensure the plan is complete and implemented. It is recommended that duly qualified and experienced persons prepare certain procedural documents (such as the maintenance schedule, site drawings, and details of industry standards and specifications) to ensure that these documents are accurate and complete.

The person responsible for a UPSS must retain each version of the plan for at least seven years after the decommissioning of the UPSS. The person responsible may change if the site is sold or its ownership transferred, or through some other business or contractual change. In that case, all documents must be transferred to the new person responsible. These documents include copies of the current fuel system operation plan and any previous such plans (formerly known as environment protection plans).

### **4.3. Loss monitoring**

A UPSS cannot be used unless a loss monitoring system is in place. A combination of loss monitoring systems can be used at a site (e.g. automated tank gauging and statistical inventory reconciliation analysis).

Monitoring for unexpected losses of fuel or gains of water in underground tanks and pipes will help detect any leaks early. Early detection will minimise environmental impacts and clean-up costs. Loss monitoring is mandatory for all UPSS, whether old, new or modified.

An EPA fact sheet, Loss Monitoring Systems, provides a quick and simple reference.

A loss monitoring system is a fuel stock reconciliation system based on three data inputs:

- the amount of fuel delivered into the system
- the amount of fuel sold or used
- the amount of fuel remaining in stock.

It is designed to ensure that the amount of fuel that **should be present** in the UPSS is **actually present**, and that there are no unexpected losses or gains.

The loss monitoring system must be designed by a duly qualified person and comply with section 4.5 of this document and/or Appendix D of Australian Standard AS 4897–2008.

Various methods of loss monitoring are available which comply with approved and certified methods of testing that meet, at a minimum, the requirements or certification standards of General Guidance for Using EPA's Standard Test Procedures for Evaluating Release Detection Methods (USEPA 510-B-19-006; May 2019). They can be broadly categorised into automated and manual methods.

### Automated inventory reconciliation

Automated inventory reconciliation is the preferred loss monitoring method. Sensor probes in underground tanks perform **automated tank gauging** (ATG), constantly measuring the amount of fuel in each tank. This information is combined with fuel delivery and sales data and reconciled. This method can usually meet the performance criterion for detecting losses of fuel (or gains of water) from the system of 0.76 litres per hour or greater, with at least 95% accuracy.

### Manual wet-stock reconciliation

This is a basic loss monitoring method that involves manually dipping tanks to measure fuel levels and calculating whether fuel is lost, or water gained, after accounting for fuel sales and deliveries.

Tank levels are typically measured daily by manually dipping each tank using a dipstick. This process is less accurate than automated systems because of uncertainties introduced by the calibration of the dipstick, the thermal expansion of fuel and how accurately the dipstick is read. Manual wet-stock reconciliation is acceptable if the operator can demonstrate that the process can detect any loss from the system at or above 0.76 litres per hour with at least 95% accuracy.

All manual dips and reconciliation undertaken must be recorded in a legible manner and kept on site. If requested by an authorised officer, the person responsible for the UPSS should be able to demonstrate that the amount of fuel that should be in the tank is the amount of fuel that is actually in it.

### Statistical inventory reconciliation analysis

Statistical inventory reconciliation analysis (SIRA) is a best-practice method of loss monitoring using computer software to conduct ongoing statistical analysis of fuel inventory, delivery and dispensing data. It can be used with data inputs from either ATG and/or manual dipping methods.

SIRA is a service usually provided to UPSS operators by a specialist third party. It is mostly provided as a monthly report that flags data inconsistencies. These inconsistencies flag possible leaks in the system that the operator must investigate immediately. (See section 4.4 below.)

## Other loss monitoring methods

Interstitial monitoring detects any change in liquid or pressure in the space between double-skinned tanks and piping systems. It is only suitable as a back-up loss monitoring system for a UPSS.

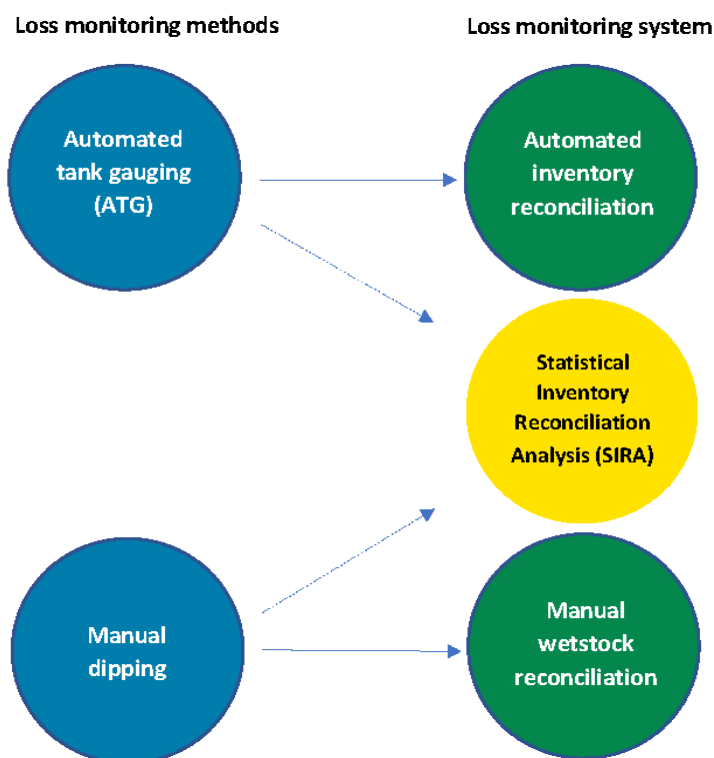


Figure 3 Loss monitoring systems and methods

## Accuracy

The frequency, sensitivity and reliability of loss monitoring will lead to a high level of confidence that any potential fuel loss (or gain in water) will be detected in time to allow a response before a risk is posed to human health or the environment.

The loss monitoring system must at least meet the detection limit of 0.76 litres per hour or greater, with at least 95% accuracy.

To achieve industry best practice, a duly qualified independent third party needs to certify that the loss monitoring methods used meet the requirements of the Regulation, in line with the protocols and system of verification recommended by the *Standard test procedures for evaluating leak detection methods: Volumetric tank tightness methods* US EPA/530/UST-90/004, United States Environmental Protection Agency (USEPA 1990).

## 4.4. Loss detection and investigation procedures

Discrepancies identified by the loss monitoring system can indicate a potential loss of fuel from the system, an influx of groundwater or delivery of fuel into the wrong tank. They do not necessarily mean that the UPSS is leaking. A 'fail' or 'inconclusive' SIRA result could be caused by mis-calibrated dispensers, inaccurately metered deliveries, human error in recording, or stolen product.

If loss monitoring detects a discrepancy in fuel levels, or a fail notification is received from SIRA, the person responsible for the UPSS must take action to investigate the discrepancy within 60 days of becoming aware of it. If a leak is confirmed, further action must be taken to identify the

source of the leak, stop it, fix it and record the details of the actions taken in the fuel system operation plan.

Investigating discrepancies may involve system checks, such as reviewing inventory records and checking measuring equipment and records. The person responsible may wish to engage a qualified person with suitable experience in discrepancy or loss investigations to identify the cause of the discrepancy.

See *Appendix 5: Loss monitoring investigation*, Table 6, for suggested loss detection procedures.

## 4.5. Incident management procedures

All persons responsible for a UPSS must have documented incident management procedures as part of their fuel system operation plan. These procedures should outline:

- how the person responsible will determine whether an apparent loss of petroleum has been caused by a leak or spill, or has arisen from something else (such as incorrectly calibrated equipment or faulty accounting procedures)
- what has to be done if there has been a leak or spill.

Under ‘what has to be done’, consider putting the following points into your incident management procedures:

- who should notify the site supervisor that there has been a leak or spill, and who will notify the appropriate regulatory authority if necessary
- how you will:
  - prevent any more petroleum being released into the environment
  - identify and address any risks posed by the petroleum vapour – fire, explosion or people breathing the vapour
  - identify the source of any spill or leak
  - engage a duly qualified person to identify the nature and extent of any contamination caused by the spill or leak
  - prevent any further release of petroleum into the environment
  - recover or remove the spilled/leaked petroleum
  - remove or (where practicable) repair leaking UPSS components, in accordance with industry best practice.

## 4.6. Incident logs

The Regulation requires the person responsible for a UPSS to ensure that an incident log is maintained which records:

- actions by anyone, other than at the direction of the person responsible, that have affected, are affecting, or could affect the integrity of the UPSS
- any unplanned or abnormal incidents, including operational disruptions or equipment failures, that have affected, are affecting, or could affect the long-term safety of the UPSS.

The incident log must be kept on site or at a location specified in the fuel system operation plan.

## 4.7. Incident notification

Where a leak or spill at a UPSS is causing or is likely to cause material harm to the environment or human health, the person responsible must notify the appropriate regulatory authority of the incident **immediately**. The appropriate regulatory authority is either the local council or the EPA (see section 1.3).

Failure to report such pollution incidents is an offence under Part 5.7 of the POEO Act. Incidents involving a UPSS that must be notified include (but are not limited to):

- a leak or spill from a UPSS, verified in accordance with loss detection or incident management procedures, that is causing or threatens material harm to human health or the environment
- evidence on the site of free-phase hydrocarbons in surface water or groundwater at the site
- evidence that off-site migration of hydrocarbons could occur, is occurring or has occurred.

A written notification must be submitted to the appropriate regulatory authority **within seven days** of the incident. This written notification must be made using a leak notification form obtained from the appropriate regulatory authority (ARA). If the EPA is the ARA, use the EPA's UPSS Regulation leak notification form. In all other cases, contact the local council for its leak notification form.

## 4.8. System maintenance

A UPSS must not be used unless all gauges, indicators, probes, sensors and any other measuring instruments in the system are checked and maintained (and where necessary calibrated) in accordance with the manufacturer's specifications and/or recommendations.

System maintenance procedures and a maintenance schedule must be documented in the fuel system operation plan.

## 4.9. Record-keeping

The Regulation requires certain documents detailing the design, construction, operation and decommissioning of UPSS to be kept for specified periods of time. This is to preserve vital information about the system so that in the event of any leak or failure, details can be accessed quickly and used in any response.

The person responsible for a UPSS must retain the following required documents for a minimum of **seven years from their date of creation**:

- certificates and associated documentation relating to equipment integrity testing
- data from any measuring instrument such as loss monitoring equipment and leak detection equipment
- documentation associated with loss investigation
- any notifications of a pollution incident involving the system given to the ARA.

The person responsible for a UPSS must retain the following documents for a minimum of **seven years from the date of the decommissioning of a UPSS**:

- certificates and associated documentation relating to equipment integrity testing
- reports detailing the installation of a leak detection system (e.g. a groundwater monitoring well installation report)
- each version of the fuel system operation plan
- records about any significant modifications to the system
- reports associated with the removal or replacement of tanks or the decommissioning of the system
- the incident log for the system
- any reports made as a consequence of action taken under Part 5.7 of the POEO Act in connection with a pollution incident involving the system



## Changes in responsibility

Within 30 days of a change in responsibility for a UPSS, the person formerly responsible for the system should deliver to the new person responsible all the documents they have for the system that are required to be retained.

## Access to records

Under the POEO Act, a fuel system operation plan must be provided to an authorised officer upon request.

Records that are a required component of the fuel system operations plan but are stored offsite (e.g. groundwater monitoring records stored in electronic format) must be disclosed in the plan. These records must be made available to the appropriate regulatory authority within three days of being requested by an authorised officer.

# 5. Modifying a UPSS

Any significant modification to a UPSS (that is, replacing or upgrading half or more of the tanks in the system) means the whole UPSS must meet all the requirements of the Regulation.

The person responsible must ensure that all equipment and infrastructure is modified, repaired or reused in accordance with AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*, and with the procedures outlined in this section. Repairs must leave systems both structurally sound and fully functional.

Recommendations and requirements relating to the repair, testing, reuse and documentation of modifications are discussed in the following sections.

## 5.1. Repair of a UPSS

As a minimum, all relevant documentation associated with the repair of UPSS equipment must meet:

- the equipment manufacturer's instructions
- the equipment's original specifications
- be retained by the person responsible for repair for at least seven years.

## Steel tanks

Steel tanks can be repaired only if they have been inspected by a duly qualified person who can certify that the tank:

- is suitable for repair
- is structurally sound
- has not previously been repaired using an internal lining.

Where a duly qualified person has certified that the tank is suitable for repair, the repair must:

- be supervised by a lining-equipment manufacturer
- meet the requirements of industry best practice and occupational health and safety legislation.

When installation of the internal lining is complete, before the repaired tank is commissioned, it:

- must be inspected internally by a competent and experienced person and certified to be structurally sound
- must be cathodically protected

- must pass an equipment integrity test (section 3.2).

## Other tanks

Tanks constructed of fibre-reinforced thermosetting resin composite, or with an outer wall of this material and a steel inner wall, must be repaired in accordance with the tank manufacturer's instructions and the requirements outlined in this section. Tanks can be repaired only if they have been internally inspected by a competent and experienced person: that person must certify that the tank has been repaired in accordance with the tank manufacturer's instructions.

The person responsible must ensure that the person repairing the system provides written documentation that it has been repaired in an appropriate manner and, where relevant, in accordance with the manufacturer's specifications.

## Steel piping

Any steel piping that has leaked, is suspected of leaking, or is otherwise in need of repair, must **not** be repaired or reused but instead replaced.

## Other piping

Piping, other than steel piping, that has leaked or is suspected of leaking, must be either replaced or repaired in accordance with the piping manufacturer's instructions, or otherwise decommissioned and removed from the ground.

Any replacement piping must meet the requirements outlined in section 4.3 of AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*. Repaired or replaced components must pass an equipment integrity test before the UPSS system is recommissioned.

## 5.2. Re-use of UPSS tanks

### Non-steel tanks

The reuse of non-steel tanks is to meet the following requirements:

- the tank has been designed and installed in accordance with the requirements of section 3 of this guideline
- an equipment integrity test has been performed and the tank passed the test
- the tank manufacturer has inspected the tank to be reused, certified that it meets all the relevant requirements of this section and provided a warranty appropriate for the expected life of the UPSS.

All relevant documentation associated with the reuse of the tank must be retained by the person responsible for a UPSS for at least seven years from the date the system is decommissioned.

### Steel tanks

Steel tanks can only be reused when they meet the following requirements:

- the tank conforms with the requirements of AS 1692–2006, *Tanks for Flammable and Combustible Liquids*, as amended or updated
- the tank manufacturer has inspected the tank internally and externally and has certified that it is suitable for reuse because:
- the tank has not been repaired previously and:
  - is structurally sound
  - no areas of the tank's walls are less than 100% of their original thickness

- the tank's dielectric coating has been tested and meets the requirements for a new tank, including condition, thickness and electrical insulation
- the tank is installed in accordance with the requirements of section 3 of this guideline
- an equipment integrity test has been performed and the tank passed the test.

### Notes

AS4897 stipulates that tanks which have been taken out of service shall only be reused for the storage of used oil.

SafeWork NSW must be notified beforehand and approve of any proposed change to the contents of an operational tank, for example changing from diesel storage to unleaded petrol.

## 5.3. Record-keeping – significant modifications

Details of any significant modifications to a UPSS must be documented and kept for at least seven years after decommissioning of the system. Records are to include as a minimum:

- a comprehensive description of the modifications
- the dates the modifications were started and completed
- the results and certification of the equipment integrity test that was carried out
- a revised copy of the as-built drawings that reflects the modifications and is included with the fuel system operation plan.

## 6. Decommissioning a UPSS

Where a tank or UPSS has not been used to store fuel for two or more years or where it is not intended to be used to store fuel again, it is deemed to be **abandoned** (see Figure 4).

Abandoned UPSSs or tanks **must be decommissioned** appropriately. This means to remove the system or render it permanently unusable.

Proper decommissioning of an individual tank or UPSS significantly reduces the environmental and human health risk if the site is to be redeveloped in future. A site environmental assessment is required to ensure that there is no adverse and/or ongoing contamination from the former UPSS. A decommissioning report must be provided to the relevant local council.

### 6.1. Decommissioning a tank or system

If a tank or UPSS has been abandoned, a duly qualified person must be engaged to:

- remove all flammable and/or combustible liquid and dispose of it appropriately, and
- remove any residual flammable vapour for safe disposal, and
- remove the tank/s and associated pipework

or

- if it is not reasonably practicable to remove the tank or UPSS, ensure that it is made safe by filling the tank with an inert solid material.

Examples of when it may not be reasonably practicable to remove a tank include where the removal would present an unacceptable risk of damage to:

- a supporting foundation of an existing building or structure
- an in-service tank or UPSS
- sub-surface pipework, services infrastructure or assets which are unrelated to the UPSS
- a sensitive receiving environment.

In these circumstances, it is recommended that a duly qualified person (i.e. a structural or electrical engineer) confirms that it is impractical to remove the tank(s).

If the UPSS or tank is to be removed from the ground, it must be correctly disposed of in accordance with:

- Australian Standard AS 1940–2017, *The Storage and Handling of Flammable and Combustible Liquids*
- Australian Standard AS 4976–2008, *The Removal and Disposal of Underground Petroleum Storage Tanks*
- SafeWork NSW safety alert WC01188, [Potential risks when removing underground storage tanks](#).

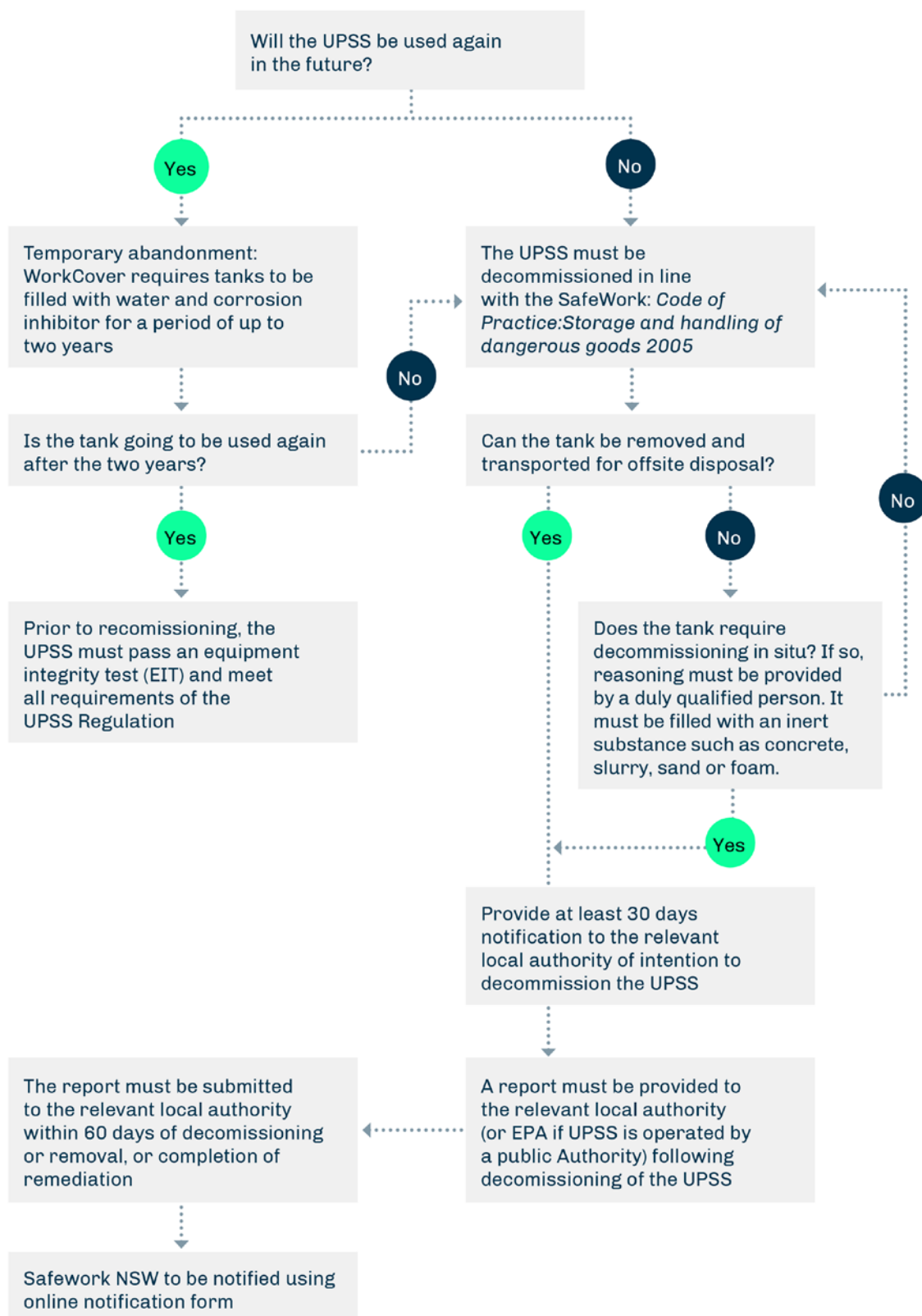


Figure 4 Overview of requirements for abandoning or removing a UPSS

## 6.2. Notification requirements of a tank or system being decommissioned

### Planning requirements – local authorities

Clause 23 of the Regulation requires the person responsible for the storage system to advise the relevant local council **at least 30 days prior to the proposed decommissioning** of the tank or storage system. For urgent or unforeseen situations, the notification must be made as soon as possible.

Consult with the local council for any requirements and/or approvals necessary for the proposed tank removal and/or remediation works.

Then, no later than 60 days following the decommissioning of a tank or UPSS, a report must be provided to the relevant local council (or the EPA, if the UPSS is located in an unincorporated area). If remediation of the site is required, the report is required no later than 60 days after the remediation has been completed.

The report must meet requirements outlined in *Appendix 6: Site reporting requirements following decommissioning of a UPSS*.

Where a disused tank is recommissioned, the Regulation will apply to the tank and any associated piping. This includes the need to conduct an equipment integrity test prior to recommissioning.

### Work health and safety requirements – SafeWork NSW

Along with environmental risk, an abandoned UPSS can pose significant risk to people and property. Any residual flammable vapour in a tank can be ignited resulting in fire and explosion. This presents a particularly dangerous hazard when an abandoned tank is left on a site which, in time, may be subject to redevelopment, excavation works and/or a change of land use.

SafeWork NSW must be notified when a UPSS or underground tank has been abandoned using the prescribed SafeWork NSW form.

The person responsible for the tank or UPSS will also need to demonstrate that the tank has been decommissioned appropriately as required by the Hazardous Material and Abandoned Tanks guide.pdf.

## 6.3. Reporting requirements following the decommissioning, removal or replacement of a UPSS

The person responsible for the tank or UPSS at the time of decommissioning must ensure that the site is investigated for any potential contamination.

A report must be submitted to the relevant local authority (usually council) within 60 days of the decommissioning of a system or tank, or the completion of any necessary remediation works. Where a tank or UPSS located in an unincorporated area has been decommissioned, or the operator is a public authority, the report must be provided to the EPA.

The relevant authority must be satisfied that the report delivers on the regulatory requirements following decommissioning, removal or replacement of a storage system.



## Preparation by a duly qualified person

The report must be prepared by a duly qualified person in accordance with this guideline.

See section 1.7 and *Appendix 2: Duly qualified person checklist* for help in determining whether a person is **duly qualified** to report on the requirements following decommissioning, removal or replacement of a storage system.

Where a duly qualified person chooses to deviate from the relevant requirements of these guidelines, clear reasons must be given at each reporting stage to justify this decision.

## Description of processes and assessment of contamination

The report must describe the processes used to decommission, remove or replace the tanks and assess contamination at the storage site.

If the storage system is no longer intended to be used or being replaced, the report must outline:

- why the storage system is being decommissioned or replaced. Is there a proposed change of land use? You will need to confirm that all required approvals, permits etc. were attained and notifications to authorities made
- how the storage system was decommissioned or replaced (what method/s were used) without risk to the environment or human health and safety
- who the duly qualified person/s was who decommissioned the storage system
- where the storage system was located on the site
- where the storage system has been taken for appropriate disposal
- when the decommissioning works started and when they were completed.

## Assessing the risk of contamination

Each site with a decommissioned, abandoned or removed storage system must also be assessed to determine if a tank or associated piping has leaked and caused contamination, and if so, what the extent of contamination is.

There may be no immediate evidence of contamination at all. If there is contamination, it may be:

- in the immediate vicinity of where the UPSS was located, such as the tank pit
- across part or all of the site
- in areas beyond the site boundary.

The likelihood of contamination from a decommissioned storage system can be determined from certain risk factors. These include (but are not limited to):

- the age and condition of tanks, piping and associated equipment
- any localised ground and/or groundwater contamination identified on the walls and/or pooling at the bottom of the tank pit during excavation
- the history of compliance with loss monitoring and leak detection requirements
- any previous known leak incidents
- known hydrogeology of the local area; for example, preferential pathways such as cracks, fissures or utility corridors. These, along with permeable material, need to be considered as likely conduits of hydrocarbon contamination.

The reasoning for determining the risk of contamination from a UPSS must be detailed clearly and concisely.

## Designing and implementing a sampling program

A properly considered sampling program should:

- identify the sampling objective, and
- outline the sampling scope, and
- take the situation into account when determining the number and location of points to be sampled. The number of samples, and where they are taken, will depend on whether the storage system will be removed or decommissioned in situ. If the decommissioning is in situ, the tank pit will not be fully excavated, so there will be less opportunity to see or smell soil immediately around and beneath the tank. In this case, more samples will have to be taken from the site to establish that it is not contaminated and will be suitable for its proposed use
- describe how the contamination status of the site was assessed and evaluated to determine any necessary remediation strategy. Sampling programs at UPSS sites must establish the depth and lateral spread of any contamination and arrive at a scientifically defensible and statistically valid dataset that characterises chemical concentrations.

Hydrocarbon contamination must be analysed using discrete samples. Composite sampling must be avoided because volatiles may be lost through mixing. For more information, refer to:

- Guidelines for sampling design for contaminated land in NSW (EPA, to be published 2021)
- Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020).

The examples below are indicative only for an appropriate sampling program.

### Example 1

An underground storage tank being decommissioned is assessed as being in good physical condition. There is no previous history of contamination from six-monthly testing of groundwater monitoring wells located onsite. The initial observation of the walls and bottom of the tank pit indicates no discolouration or contamination of soil or back fill.

**Contamination risk:** low.

**Sampling program:** sample from tank-pit walls and bottom and areas of associated pipework. Continue observation during decommissioning works for any change in contamination risk.

### Example 2

The site is old and the age of the UPSS is unknown. The forecourt has evidence of staining and surface water management/disposal practices do not appear to meet best practice. Loss monitoring and leak detection records are unavailable. During excavation, it is observed that the tank pit is emitting diesel odours.

**Contamination risk:** medium.

**Sampling program:** samples collected only from the walls and/or bottom of the tank pit may not necessarily represent the full extent of contamination. The sampling program would need to be extended appropriately to ascertain extent of contamination across the site.

### Example 3

During tank-pit excavation, it is observed that backfill from the tank pit (and/or surrounding soil profiles) is discoloured and/or has significant odour. The service station is in a low-lying area where the water table is generally high. A patch of vegetation on an adjacent site appears to be dying.

**Contamination risk:** high.

**Sampling program:** samples collected only from the walls and/or bottom of the tank pit are unlikely to represent the full extent of contamination on and/or off site. The sampling plan is to be extended appropriately to ascertain extent of contamination across and potentially beyond the site.

### Escalation of the risk of contamination

The extent of contamination will need to be re-assessed if further evidence of contamination is identified or suspected during initial site excavations or sampling activities. The sampling and analysis plan will need to be escalated to ensure appropriate levels of testing is undertaken to establish the full extent of contamination.

If the appropriate regulatory authority reasonably believes contamination may have occurred across and/or beyond the site boundaries, it can request further sampling be conducted to confirm the contamination status.

### Describe any necessary remediation works.

This part of the report must indicate whether the sampling program identified contamination on the site. This section has been prepared to help achieve a uniform approach on site reporting requirements.

The report must outline:

- the location, nature, level and extent of any contamination identified on the site
- the appropriate remediation strategies used
- the objectives of any remediation activities have been met
- any residual contamination on the site is not having an impact on the environment
- the site is suitable for its ongoing or future use.

The assessment of the site must focus on collecting clear evidence to ascertain whether these goals have been met.

The necessary remediation goals and site assessment processes must be clearly defined and understandable to the appropriate regulatory authority.

A conceptual site model (CSM) is also useful to characterise a site. It can be used to test the assessment outcomes and indicate whether there are gaps in the data that may warrant further investigation and remediation.

The CSM must be updated as new information is obtained, creating a more realistic model for identifying issues such as permeability of the soil/sediment, known groundwater flow patterns within the area, and whether undetected preferential pathways for contaminant migration may be present. If a CSM is to be submitted to the appropriate regulatory authority, it must comply with the requirements of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended in 2013).

*Appendix 6: Checklist for reporting following the decommissioning, removal or replacement of a UPSS* shows what can be included in a decommissioning report for the local council (or EPA). The report must ultimately provide a clear conclusion stating whether the site is suitable for its existing or proposed future use.

## 6.4. Record-keeping

The decommissioning report for storage system must be retained by the final person responsible for the UPSS for seven years from the date of decommissioning.

In situations where there is a change of land use, additional site investigation, remediation and/or procedures may be required, consistent with the requirements of the relevant planning authority and State Environmental Planning Policy No 55 – Remediation of Land.

## 6.5. Reporting considerations

### Data quality objectives

Reporting activities are to be informed by the **data quality objectives** (DQO) process, which is used to define the type, quantity and quality of data needed to support a decision relating to the environmental condition of the site. The development of a sampling program with a pre-determined DQO process provides the statistical basis for decision-making. A sampling analysis plan (SAP), which explains the justification for sampling and the practices to be adopted as part of the plan, must include a quality assurance/quality control protocol to ensure sample integrity. (See Contaminated Land Management: Guidelines for the NSW Auditor Scheme.)

### Quality assurance/Quality control (QA/QC)

The inherent nature of chemicals associated with UPSS (generally liquid, highly mobile and volatile) is such that degradation, volatilisation and/or transformation may affect a sample's integrity from the time the sample is recovered. Attention must be paid to preserving the sample's integrity and how the sample is handled must be documented under a **chain of custody** protocol.

Guidance on appropriate sample collection and preservation methods, health and safety, decontamination of sampling equipment between successive sampling, and quality assurance procedures, can be found in Australian Standard 4482.1–2005, *Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds*.

### Soil sampling

Soil sampling design and assessment at a UPSS site must be undertaken in accordance with the following NSW guidelines:

- Guidelines for sampling design for contaminated land in NSW (EPA, to be published 2021)
- Consultants Reporting on Contaminated Land: Contaminated Land Guidelines
- Contaminated Land Management: Guidelines for the NSW Auditor Scheme.

All contamination assessments for sites containing a UPSS must also be performed in line with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 1999) and *Assessment of Underground Storage Systems* (EPHC & NEPC 2003).

It is recommended that waste materials exported for disposal, or backfill sourced on-site or imported to the site, be characterised using an appropriate frequency and method of soil sampling. For further information, refer to the Waste Classification Guidelines.

Where there are departures from the guidelines, clear justification must be given and any significant deviations listed.

### Groundwater assessment

Groundwater assessment is critical in determining any potential environmental effects of a UPSS. When UPSS contents leak into soil there may be low or non-detectable concentrations within the soil matrix while groundwater is contaminated beyond drinking-water standards.

Groundwater must be assessed if soil contamination has been encountered or identified. Keep in mind the possibility of residual groundwater contamination at sites where the UPSS has been abandoned or removed but the environmental assessment has been inadequate or not done at all. Groundwater assessment at or beyond a UPSS site must be undertaken in accordance with the EPA's Guidelines for the Assessment and Management of Groundwater Contamination.

The factors to consider in an assessment include:

- the distance to receptor(s), both surface and groundwater
- whether sufficient monitoring wells are located on site, installed correctly and positioned to intercept contaminants down-gradient
- whether bore logs are available and sufficiently detailed
- groundwater flow direction
- whether there are other potential sources of contamination.

Groundwater monitoring wells must be designed and installed by a duly qualified person as required under Part 3 of the Regulation.

The NSW Department of Planning, Industry and Environment (DPIE) and WaterNSW have requirements for licensing the installation of water bores and wells and must be contacted before installing any wells on a UPSS site.

## Contaminants of concern

The duly qualified person will need to determine a list of contaminants of concern to consider when investigating, remediating or reporting on a UPSS site. This list may include, as a minimum:

- total petroleum hydrocarbons (TPH) (C<sub>6</sub>–C<sub>9</sub>, C<sub>10</sub>–C<sub>36</sub>)
- benzene, toluene, ethyl benzene and xylene (BTEX)
- chlorinated solvents (degreasers)
- polycyclic aromatic hydrocarbons (PAHs), including benzo(a)pyrene
- lead
- the pH of the medium.

Other analytes that can be considered include:

- MTBE and other possible fuel additives such as ethanol
- selected heavy metals (such as cadmium, chromium, zinc, copper, mercury, arsenic and nickel)
- phenols.

Where additional contaminants are suspected and/or identified during preliminary site screening, these must also be included as part of the test suite.

Depending on site history, other possible contaminants could include:

- petroleum fuels, lubricating oils, and additives such as organometallic compounds, surfactants, biocides, molybdenate compounds and corrosion inhibitors
- waste oils and cooling liquids of highly variable compositions
- chemicals associated with the fuel manufacturing process, such as catalysts, metals and solvents that may have been used at the site (i.e. vanadium, cobalt, molybdenum and platinum)
- other chemicals, including pesticides/herbicides
- asbestos (as a result of mechanical repairs including the cleaning of parts, brake machining and other repairs).

Review of the site history supplemented by field screening can help determine if any information on potential contaminants can be gathered while on site.

## Documenting field practices

Field observations and activities must be accurately recorded by an experienced person, through contemporaneous written notes supplemented by photos or video. Good-quality visual evidence

may be hard to obtain because of adverse site conditions, such as poor lighting in excavations. Appropriate personal protective equipment must be used and WH&S (work health and safety) procedures adhered to at sites that may have volatile substances, particularly in confined spaces.

Use standardised checklists to record critical aspects of tank pulls to ensure comprehensive and consistent data capture. The records provide evidence to justify decisions made during the site works and to allow critical assessment of the appropriateness of the site works undertaken.

# Appendix 1: Definitions

The terms used in this guideline have the same meaning as in the Regulation or as listed below. If any inconsistency arises, the definitions in the Regulation take precedence.

**Table 1** Definitions of terms used in the UPSS Regulation

Term	Definition
Abandoned tank	The tank is taken to be abandoned if: <ul style="list-style-type: none"> <li>the tank has not been used to store petroleum product for two years, or</li> <li>the person responsible does not intend to use the tank to store petroleum product again</li> </ul>
Appropriate regulatory authority (ARA)	See definition in section 6 of the POEO Act, although in the context of the Regulation, local councils share the ARA responsibility for UPSS sites with the NSW EPA from the commencement of the Regulation on 1 September 2019.
As-built drawings (current)	Drawings that depict the current configuration of the storage system in relation to the storage site.
Cathodic protection system	Method of preventing or reducing corrosion of a metal surface by making the metal a cathode (i.e. the positive charge) by using either an impressed direct current or attached sacrificial anodes.
Commission	To bring a storage system or leak detection system into use for the first time following its installation, modification or repair.
Decommission	To remove a storage system or to render it permanently unusable.
Discrepancy	A lack of agreement or balance. There is a <b>discrepancy</b> in fuel levels when there is a difference between amount of fuel that should be in an underground storage tank and the amount of fuel that is actually in it.
Duly qualified person	A person who has competence and experience (in relation to a specific activity) that is recognised by a peak body in the relevant industry, or recognised generally in the relevant industry as appropriate for that activity.
Fuel system operation plan (the plan)	Documentation for a storage system that contains the procedures and other information required by clause 18 of the Regulation.
Equipment integrity test (EIT)	A test conducted to evaluate whether a storage system is providing containment as originally designed, in accordance with the manufacturer's specification. The EIT must be able to detect a leak of 0.38 litres per hour with a probability of detection at least 95% and a false detection of 5% or less in accordance with AS4897-2008 (AS 2008a).



Term	Definition
Groundwater monitoring well	A well that has been installed as part of a groundwater monitoring system around an UPSS site. It must be located in an appropriate place to detect any leaked petroleum that may have migrated into the groundwater (or to characterise the quality of groundwater flowing onto the UPSS site).
Incident management procedure	A documented response procedure to manage a leak or spill of petroleum from a storage system; also known as leak or spill response procedure.
Installation	The original installation of a storage system on the premises on the storage site, including any work in the vicinity of the storage site necessary for the installation and anything done to the system before it is commissioned.
Leak	Any loss of petroleum from a storage system because the storage system is not providing full and continuous containment of petroleum.
Loss detection	Procedures and processes able to identify the cause of a discrepancy (loss or gain) from any part of an UPSS (e.g. leak from tanks or pipework).
Loss monitoring system	One or more procedures for undertaking inventory control (reconciliation) of the petroleum in a system. The procedure(s) must be able to identify a discrepancy in the volume of petroleum (either loss or gain) and have the means to record any identified discrepancy that triggers the need for further action.
Modification	Any upgrade, extension, alteration or replacement of the system, or any component of the system, but not including: <ul style="list-style-type: none"> <li>• anything done to the system before it is first commissioned</li> <li>• anything done to the system after it is decommissioned</li> <li>• anything done to the system as part of routine maintenance (including any repairs to the system that are done in the course of regular scheduled upkeep of the system)</li> <li>• anything done to the system before 1 June 2008</li> <li>• anything done to a storage site, or any building on a storage site, that does not directly affect the system.</li> </ul>
Modified storage system	A storage system that has been modified.
NATA	National Association of Testing Authorities
New storage system	Any storage system that is not an old storage system.

Term	Definition
Old storage system	<p>Any storage system:</p> <ul style="list-style-type: none"> <li>for which development consent had been obtained under the <i>Environmental Planning and Assessment Act 1979</i> before 1 June 2008</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>for which installation had lawfully commenced before 1 June 2008</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>that was commissioned before 1 June 2008.</li> </ul>
Person responsible	<p>The person who has the management and control of a system. If a system is no longer in use but has not been decommissioned, the person responsible is the person who had management and control of the storage system immediately before it ceased to be used or, if that person cannot be located, the person who owns the land on which the storage system is located.</p>
Petroleum	<p>Any fuel that consists predominantly of a mixture of hydrocarbons, whether or not the fuel includes additives (such as ethanol) and includes used oil.</p>
Piping	<p>Pipework within a UPSS that is integral to the transfer and routine containment of petroleum.</p>
Remediate	<p>In the context of this guideline, remediate means:</p> <ul style="list-style-type: none"> <li>removing, dispensing, destroying, mitigating or containing the contamination of any land or waters</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>eliminating or reducing any hazard arising from the contamination of the land, including by preventing the entry of persons or animals on the land.</li> </ul>
Secondary containment	<p>Equipment or infrastructure such as double-walled tanks and double-walled piping (with an interstitial space) that is designed to contain a leak and/or prevent it from escaping beyond the containment area of a UPSS.</p>
Significant modification	<p>Any modification to the system that results in:</p> <ul style="list-style-type: none"> <li>the replacement of the whole system</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>the replacement of a half or more of the tanks in the system.</li> </ul>
Spill	<p>Any loss of containment of petroleum from a storage system during physical management, such as:</p> <ul style="list-style-type: none"> <li>transfer, delivery or removal</li> <li>any UPSS operation</li> <li>maintenance or testing</li> <li>repair or closure.</li> </ul>

Term	Definition
Storage system	<p>A system of tanks, pipes, valves and other equipment that is designed to:</p> <ul style="list-style-type: none"> <li>• contain petroleum</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• control the passage of petroleum into, out of, through or within the system,</li> <li>• and includes any structure through which petroleum routinely passes from one part of the system to another.</li> </ul>
Sump	In relation to a storage system, a structure used for the purpose of collecting spilled or excess oil, water and other liquids in the system.
Tank	A container or vessel intended for the storage of petroleum within a storage system that, for the purpose of the Regulation, is buried below the ground surface to such an extent that the base of the tank (in the ground) is not visible.
Underground petroleum storage system (UPSS)	Same meaning as <b>storage system</b> .
Use	To allow petroleum to remain in the system.
Used (waste) oil	Oil that has been used for lubricating or other purposes and has become unsuitable for its purpose due to the presence of impurities or loss of the original properties (and it is not intended for combustion).

# Appendix 2: Duly qualified person checklist

The Regulation requires a duly qualified person to be a person who has competence and experience in relation to that specific activity. While there is no ‘one size fits all’ competency or qualification that sanctions a person as being duly qualified, the checklist below can be used to help determine whether the person undertaking a specific UPSS activity can be considered to be duly qualified.

**Table 2      Qualifications and competencies of a duly qualified person**

Qualifications and competencies
<input type="checkbox"/> Does the person have appropriate qualification(s)? (Engineering, science, environmental or relevant trade certificate.)
<input type="checkbox"/> Is the person a member of a prescribed professional organisation? (That is, one that requires an entrance exam, minimum qualification and/or ongoing professional development.)
<input type="checkbox"/> Documented experience working on UPSS activities
<input type="checkbox"/> Knowledge of the Protection of Environment (Underground Petroleum Storage Systems) Regulation 2019
<input type="checkbox"/> Knowledge of the Protection of the Environment Operations Act 1997
<input type="checkbox"/> Understanding of the requirements of AS 4897–2008
<input type="checkbox"/> Familiarity with relevant industry standards, policies, requirements, guidelines and codes of practice

# Appendix 3: Sample record sheets for groundwater monitoring

**Table 3** Groundwater monitoring test record – six-monthly visual inspections – business details

Business details	
Site name (or name of business)	<a href="#">Click or tap here to enter text.</a>
Address	<a href="#">Click or tap here to enter text.</a>
Lot and DP number	<a href="#">Click or tap here to enter text.</a>
WorkCover dangerous goods (DG) notification number	<a href="#">Click or tap here to enter text.</a>
WorkCover DG notification – expiry date	<a href="#">Click or tap here to enter text.</a>

Table 4      Groundwater monitoring test record – six-monthly visual inspections – test details

Well number	Date	Time	Type of test (visual inspection*)	Observations (e.g. visible sheen or evidence of free-phase hydrocarbons)	Number of samples	Name of sampler	Company	ABN	Signature

This form must be kept for at least seven (7) years from the date of the last test recorded.  
\* Interface probe results must be recorded on a separate sheet by a suitably qualified and experienced person.

# Appendix 4: Planning and consent

## Role of consent and determining authorities

From 1 September 2019, regulatory responsibility for the Protection of the Environment Operations (Underground Petroleum Storage System) Regulation 2019 (the Regulation) is shared between the NSW Environment Protection Authority and local authorities (councils). Councils continue to be responsible under the POEO Act for regulating environmental issues such as spills and stormwater pollution resulting from UPSS site activities.

A council also has responsibility for considering development applications incorporating a UPSS for which they are the **consent authority** under planning legislation. Councils should therefore establish a clear set of management requirements for UPSS installations at the planning stage. Incorporating UPSS requirements in consent conditions is an effective way to ensure that UPSS sites comply with the Regulation from the beginning of a development.

Environmental assessment for UPSS activities undertaken by public authorities, departments or agencies is undertaken under Part 5 of the *Environmental Planning and Assessment Act 1979*.

## Australian Standards

Consent authorities are encouraged to ensure that new and significantly modified UPSS developments adopt design standards consistent with the Regulation and industry best practice set out in the appropriate industry standards, such as Australian Standard AS 4897–2008, *The Design, Installation and Operation of Underground Petroleum Storage Systems*.

Other industry standards that may be useful to planners and proponents include:

- AS 1940–2017, *Storage and Handling of Flammable and Combustible Liquids*
- AS 4976–2008, *The Removal and Disposal of Underground Petroleum Storage Tanks*.

## General considerations for consent conditions

As with many developments, it may not be practical for all technical aspects to be resolved prior to the submission of a development application. However, to ensure all activities are completed to an appropriate standard by a duly qualified person, the planning authority may choose to include a broad condition of consent that will necessitate the minimum requirements of the Regulation are to be met.

It may also be useful to stage when and how the requirements are to be met. For example, design of a new UPSS by a duly qualified person may be required at the consent stage, whereas the satisfactory results of an equipment integrity test may be required before an occupancy certificate is issued.

Council may also consider requiring declarations or proof of qualifications to be submitted with the development application, to support the claim that the contractors engaged are duly qualified persons.

## Issues to be considered by consent authorities under the Regulation

A UPSS must meet all the relevant requirements of the Regulation where planning approval is granted **on or after 1 June 2008**.

The key issues that consent authorities need to consider when assessing a UPSS development are outlined in Table 5 below.



**Table 5** Guidance for Consent and Determining authorities considering an underground petroleum storage system (UPSS) proposal.

Action(s) the proposal involves	Requirements to be incorporated into the planning approval conditions	Regulation (reference)
Design and installation of a new UPSS	<p>The UPSS must be designed and installed by a duly qualified person.</p> <p>UPSS equipment must meet the relevant industry standards and design specifications, as documented in AS 4897.</p> <p>The UPSS must not operate without loss monitoring and leak detection systems.</p> <p>Installation reports for UPSS equipment must be prepared by a duly qualified person.</p> <p>If relevant, a plan showing the locations of groundwater monitoring wells is prepared by a duly qualified person, must be included.</p> <p>Current, 'as built' drawings of the system must be prepared by a duly qualified person and included in the <b>fuel system operation plan</b>. The newly installed UPSS must not be commissioned unless an equipment integrity test is performed and the system has been certified as having satisfied the test.</p> <p>The person responsible must be provided with the certificate and the results of the equipment integrity test.</p>	<p>Part 2 clauses 6–9</p> <p>Part 3 clauses 15–17</p>

Action(s) the proposal involves	Requirements to be incorporated into the planning approval conditions	Regulation (reference)
A significant modification to an existing UPSS	<p>The modification must be designed and implemented by a duly qualified person.</p> <p>Must meet the relevant industry standards and design specifications, as documented in AS 4897.</p> <p>Must not be operated without loss monitoring and leak detection systems.</p> <p>Must be recorded and current 'as built' drawings revised to reflect the modified system.</p> <p>Must not be commissioned unless an equipment integrity test is performed. and the system has been certified as having satisfied the test and the person responsible provided with the certificate and the results of the equipment integrity test.</p>	<p>Part 2 clauses 10–13</p> <p>Part 5 clause 22</p> <p>Part 3 clauses 15–17</p>
Removal and/or replacement of a UPSS tank	<p>A report for the storage site must be prepared by a duly qualified person and submitted to the relevant local authority no later than 60 days after the tank is removed or replaced.</p> <p>The report must describe the processes used to remove or replace the tanks concerned, assess contamination at the storage site, and detail any remediation work carried out during the removal or replacement of the tank.</p> <p>A modified system involving the removal or replacement of any tank must not be commissioned unless an equipment integrity test is performed.</p> <p>The person responsible for the UPSS must be provided with the certificate and the results of the equipment integrity test.</p>	<p>Part 5 clause 24</p>

Action(s) the proposal involves	Requirements to be incorporated into the planning approval conditions	Regulation (reference)
Decommissioning of a UPSS	<p>The person responsible for the storage system must notify the relevant local authority no later than 30 days before the system is decommissioned or removed.</p> <p>A site report must be prepared and submitted to the local authority no later than 60 days after the system is decommissioned. If remediation of the site is also required as part of decommissioning, the report must be submitted to the local authority no later than 60 days after the remediation is completed.</p> <p>The report must be prepared by a duly qualified person and describe the processes used to decommission the storage system and those used to assess contamination at the storage site.</p> <p>The report must also describe any remediation works that were carried out during the removal of the tanks.</p>	Part 5 clauses 23–24

Action(s) the proposal involves	Requirements to be incorporated into the planning approval conditions	Regulation (reference)
Current or proposed operation of a UPSS	<p>A fuel system operation plan (FSOP) must be prepared and implemented.</p> <p>Measuring instruments in the system must be checked and maintained in accordance with the manufacturer's instructions, (or the FSOP if there are no such instructions) and recording of the data produced.</p> <p>Undertake loss monitoring and appropriate record-keeping of the results.</p> <p>Test the leak detection system as per the written instructions of a duly qualified person.</p> <p>Investigate any discrepancies detected by the loss monitoring system within 60 days of becoming aware of the discrepancy.</p> <p>In addition:</p> <ul style="list-style-type: none"> <li>any documents required by clause 26 of the Regulation (such as records of activities, equipment integrity tests measuring instrument data and incidents) must be kept for at least seven years from their date of creation</li> <li>where responsibilities for the system change, all relevant records must be transferred to the new person within 30 days.</li> </ul>	<p>Part 4 clauses 18–21</p> <p>Part 6 clauses 26–28</p>

## Repair to a UPSS

Depending on the nature of the activity, repairs may not trigger the need for development consent. Following repair or rectification after discovery of a leak, a modified or repaired storage system can only be recommissioned where an **equipment integrity test (EIT)** has been performed in line with the written directions of a duly qualified person and the system satisfies the EIT.

# Appendix 5: Loss monitoring investigation

To assist in determining the cause of a discrepancy identified during loss monitoring, the following system checks may be initiated (where appropriate) by the person responsible for a UPSS.

**Table 6** Suggested loss monitoring procedures

Suspected issue	Loss or gain?	System check
Inventory records	Loss or gain	Check the inventory control records of the preceding three months (or to a point where records are deemed satisfactory) to ensure the discrepancy has not been caused by a record-keeping error.
Security/pilfering	Loss	Check the following: <ul style="list-style-type: none"> <li>for sites that do not operate continuously (non-24-hour sites), that all tank openings (e.g. dip and fill points) are secured</li> <li>on self-serve sites, that controlled authorisation of dispensers is operating</li> <li>CCTV or similar security system (where available) is working correctly.</li> </ul>
Dipstick	Loss or gain	Check the following: <ul style="list-style-type: none"> <li>the dipstick(s), for wear or damage (replace if necessary)</li> <li>that each tank has the correct dipstick</li> <li>if using automatic tank gauging, that the system is operating to the manufacturer's specifications.</li> </ul>
Water	Gain	Check each tank for the presence of water by using: <ul style="list-style-type: none"> <li>an interface probe</li> </ul> or <ul style="list-style-type: none"> <li>water-finding paste on a dipstick.</li> </ul> Identify entry point(s) (e.g. if the tank has a hole, or water is entering via open valve, fill point, etc.).
Pumps and piping manifolds	Loss	For a dispenser with a pump located inside the dispenser unit, remove covers and check valves and pipework for leaks, both during operation and when switched off. For submersible pumps, lift the pump cover and check wells for leaks. For piping manifolds, lift the pit cover and check for any leak.
Tank-pit observation wells and groundwater monitoring wells	Loss	Check: <ul style="list-style-type: none"> <li>for any evidence of petroleum in the tank-pit observation well and/or groundwater monitoring well, by using a measuring instrument such as an interface probe or a clean see-through bailer lowered slowly into the well to observe water interface</li> <li>for vapours, by using a portable gas analyser.</li> </ul> Undertake further investigation of the system to identify the source of leak.
Vents	Loss	Check: <ul style="list-style-type: none"> <li>vent caps for any visible blockages</li> <li>vents for evidence of petroleum blow-out at either vent outlet or below vents on ground or buildings.</li> </ul>

Dispenser pumps are over or under dispensing	Loss or gain	<p>Check:</p> <ul style="list-style-type: none"> <li>that dispenser totals and console totals are recorded and fall within their accepted tolerances, and that the records produced by each, for the same period, correlate within acceptable limits</li> <li>the maintenance schedule and calibration of dispensers.</li> </ul>
Sales test	Loss or gain	<p>Determine tank and dispenser relationships by identifying single stock systems.</p> <p>Establish opening stock information and do not alter the single stock systems for the duration of the sales test.</p> <p>During the sales test the operator must satisfy the requirements of the delivery procedures and run the test for five days unless significant loss or gain variations can be determined in a shorter period.</p> <p>The final stock reconciliation must be performed by the person responsible for the UPSS.</p>
Interstitial monitoring (for equipped UPSSs only)	Loss	<p>Check:</p> <ul style="list-style-type: none"> <li>the system is active</li> <li>leak detection measurements (e.g. liquid levels or pressure levels) are within the manufacturer's tolerances</li> <li>leak detection measurements have been recorded for the system.</li> </ul> <p>If any losses outside the manufacturer's leak detection tolerances have been reported in the last six months, further investigate the system to identify the source of leak.</p>
Human error	Loss or gain	<p>Check:</p> <ul style="list-style-type: none"> <li>UPSS installation records – was the installer accredited/certified?</li> <li>for inaccurate measuring/recording</li> <li>delivery losses/tank filling activities</li> <li>for inadequate system management</li> <li>for failure to complete physical system checks.</li> </ul>
Recent repairs undertaken on UPSS	Loss or gain	<p>Check:</p> <ul style="list-style-type: none"> <li>maintenance of records</li> <li>in the case of repair and reuse, whether compatible materials were used.</li> </ul>
Temperature	Loss or gain	<p>Check:</p> <ul style="list-style-type: none"> <li>delivery temperature correction</li> <li>calculations have been temperature-corrected to 15°C (or recommended ambient temperature).</li> </ul>
Equipment integrity test	Loss or gain	<p>If none of the above investigations reveals a reason for the discrepancy in the reconciliation records, an EIT may be considered and performed in accordance with section 3.2 of these UPSS Guidelines.</p>

# Appendix 6: Checklist for reporting following the decommissioning, removal or replacement of a UPSS

Where a UPSS has been decommissioned, removed or replaced a report must be provided to the local council.

The report must:

- be prepared by a duly qualified person in accordance with these guidelines
- describe how the storage system was decommissioned
- outline how the storage site was assessed and whether any contamination was identified.

The following checklist is designed to help achieve a uniform approach to reporting on UPSS sites following decommissioning, replacement or removal of a storage system and assist compliance with clause 23 and 24 of the Regulation.

The reporting requirements outlined below are consistent with reporting requirements in Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020).

Each section in the checklist can be considered for a UPSS site where a storage system has been decommissioned, replaced or removed. However, not all the items relating to each subject (as provided in the checklist) will be relevant to each site.

**Table 7 Sample checklist for a report for the decommissioning, replacement or removal of a storage system**

Report section	Required information	Included
Document control	Date, version number	<input type="checkbox"/>
	Author and reviewer (including qualification and/or certification details), contact details, company name, ABN	<input type="checkbox"/>
	Who commissioned the report	<input type="checkbox"/>
Executive summary	Summary of key findings, observations and sampling results	<input type="checkbox"/>
Introduction	Background	<input type="checkbox"/>
	Purpose of report – i.e. whether it is for the decommissioning, replacement or removal of a storage system	<input type="checkbox"/>
	Objectives of the sampling program	<input type="checkbox"/>
	Scope of work – how the storage system will be decommissioned, replaced or removed	<input type="checkbox"/>
Site information	Name, address, lot & DP number, local government area	<input type="checkbox"/>
	Site owner's trading name, description of owner (company, operator, third party), current site use, reason for removal/decommissioning	<input type="checkbox"/>



Report section	Required information	Included
Site information (continued)	Details of person responsible for the UPSS (if different to site owner)	<input type="checkbox"/>
	Geographic coordinates	<input type="checkbox"/>
	Locality map	<input type="checkbox"/>
	Current site plan with scale bar, showing the direction of north, local water drainage and other local environmentally significant features	<input type="checkbox"/>
Site history and proposed site use	Summary of site use, zoning, proposed site use, proposed development details (if any)	<input type="checkbox"/>
	Current and historical details of the underground storage tanks located on site	<input type="checkbox"/>
Site condition and surrounding environment	Topography, hydrology, geology, groundwater depth and direction	<input type="checkbox"/>
	Direction of surface drainage	<input type="checkbox"/>
	Distance to surface water features and observations of any local sensitive environment/s	<input type="checkbox"/>
	Groundwater bores located on or near the site	<input type="checkbox"/>
	Summary of adjacent sites' use, zoning, off-site effects, etc.	<input type="checkbox"/>
	Summary of any evidence of existing site contamination, including discolouration of soils, dead or dying vegetation on or near the site, staining or discolouration of surface areas, any pooling of odorous and/or tainted water in the tank pit	<input type="checkbox"/>
Existing records	Summary of any previous equipment integrity tests (EITs), groundwater monitoring well six-monthly monitoring results and loss monitoring methods and results. Append if necessary	<input type="checkbox"/>
Conceptual site model  For further guidance see Table 2(a) of the Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020)	Contamination sources and extent, concentration and predicted movement of contaminants	<input type="checkbox"/>
	Refer to contaminants of concern – section 6.5.5	
	Mechanism for contamination, affected media, receptors and exposure pathways	<input type="checkbox"/>
	Assessment of any identified data gaps	<input type="checkbox"/>
	Sampling analysis and quality plan – methodology and justification	<input type="checkbox"/>
	Refer to: <ul style="list-style-type: none"> <li>quality assurance and control – section 6.5.2</li> <li>soil sampling – section 6.5.3</li> <li>groundwater assessment – section 6.5.4</li> </ul>	

Report section	Required information	Included
Data quality objectives For further guidance see Table 2(b) of the Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020) if more detail is required.)	Refer to data quality objectives – section 6.5.1	
	Field screening protocols	<input type="checkbox"/>
	Photos, logs, field observations	<input type="checkbox"/>
Validation results and discussion	Summary of results from sampling program, in a table that shows: <ul style="list-style-type: none"> <li>essential details i.e. sample identification numbers, depth, etc</li> <li>sample descriptions of all media (soil, groundwater etc)</li> <li>remediation criteria</li> </ul> highlighting samples that exceed remediation criteria	<input type="checkbox"/>
	Site plans or excavation logs of all sample locations	<input type="checkbox"/>
	Site plan(s) showing extent of soil and/or groundwater contamination	<input type="checkbox"/>
Remediation options (if necessary)  See Table 2(d) of the Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA 2020) if more detail is required)	Summary of options available	<input type="checkbox"/>
	Preferred option and rationale – Remediation Action Plan (RAP)	<input type="checkbox"/>
	Remediation details: <ul style="list-style-type: none"> <li>roles and responsibilities</li> <li>sequence of works</li> <li>work health and safety issues</li> <li>site preparation</li> <li>methodology and timeframes</li> </ul> Waste management – waste classification report in accordance with EPA waste classification guidelines Documentation – including material handling and tracking	
Quality assurance and quality control (QA/QC)	Refer to section 6.5.2	
	Verification of compliance with regulatory requirements	<input type="checkbox"/>
	Identify and discuss any ongoing monitoring (if required)	<input type="checkbox"/>
Conclusions and recommendations	Brief summary of all findings	<input type="checkbox"/>
	Rationale and justification in reaching the conclusions	<input type="checkbox"/>
	Any recommendations based on the conclusions	<input type="checkbox"/>
	A clear statement that the duly qualified person considers the subject site to be suitable for the proposed use or other nominated potential uses	<input type="checkbox"/>
	A statement detailing all limitations and constraints on the use of the site (where applicable)	<input type="checkbox"/>
	Recommendations for further work, if appropriate	<input type="checkbox"/>