Draft Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations

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Environment Protection Authority

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Contents

1 Introduction

1.1 Purpose of this document

This document, entitled Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations (**Standards and Guidelines**), has three functions:

1. To specify further the relevant standards that are required by the provisions in Division 5 of Part 6 of the Protection of the Environment Operations (Clean Air) Regulation 2010 (**the Regulation**), for vapour recovery at petrol service stations. Because these standards are required by the Regulation, they are statutory requirements and therefore mandatory. These standards are set out in section 5 of this document.
2. To provide best practice guidelines for maximising vapour recovery.
3. To provide within one document a summary of all regulatory requirements, and best practice guidelines, to assist the occupiers of service stations to comply with the Regulation and achieve best practice.

The Protection of the Environment Operations Act 1997 defines the **occupier** of premises as the person who has the management or control of the premises. The occupiers of petrol service stations should be aware of their obligations under the Regulation and also under the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014.

Compliance with the Standards and Guidelines will not necessarily ensure compliance with the abovementioned regulation, nor with the full vapour recovery provisions of the Regulation. The Standards and Guidelines should be read in conjunction with both regulations.

1.2 Background

The refilling of underground petrol storage tanks and the filling of vehicle fuel tanks lead to the displacement of petrol vapour equal in volume to that of the fuel being transferred. This vapour is released into the atmosphere unless otherwise captured. It contains benzene, xylene, toluene and other volatile organic compounds (VOCs) which contribute to local, regional and global air pollution.

In 2009, the Protection of the Environment Operations (Clean Air) Amendment (Vapour Recovery) Regulation 2009 made substantial changes to the Protection of the Environment Operations (Clean Air) Regulation 2002, to prescribe specific controls to minimise the emission of VOCs from petrol service stations.

The 2002 Regulation has been re-made into the Protection of the Environment Operations (Clean Air) Regulation 2010 (the Regulation). The provisions to prescribe controls to minimise VOC emissions from service stations are found in Division 5 of Part 6 of the Regulation.

1.3 Structure of this document

This document is structured as follows:

- sections 1 and 2 of this document cover interpretation and definitions
- section 3 introduces the general principles of vapour recovery at petrol service stations
- section 4 gives an overview of the regulatory requirements for vapour recovery at petrol service stations
- section 5 sets out the additional **mandatory requirements** required by the Regulation to be set out in this document
- section 6 sets out best practice guidelines for the design and operation of vapour recovery systems.

2 Interpretation and definitions

Where the Regulation and these Standards and Guidelines differ on any point, the Regulation prevails. Terms used in these Standards and Guidelines have the same meaning as set out in the Regulation, unless otherwise stated.

3 General principles of vapour recovery at petrol service stations

This section presents a general overview of the principles of vapour recovery at petrol service stations.

3.1 Stage 1 vapour recovery

Stage 1 vapour recovery (VR1) at petrol service stations limits the emissions of volatile organic compounds (VOCs) that result from unloading petrol from a road tanker into petrol service station storage tanks.

When petrol is transferred from a delivery tanker to an underground storage tank, a slight pressure build-up occurs in the underground storage tank, which displaces vapour. VR1 systems return displaced vapour back to the delivery tanker by means of a vapour-tight connection line. A simple VR1 system is shown in Figure 1.

To minimise vapour loss from the underground storage tank through the vent during filling, the vent pipes are fitted with a 10-millimetre orifice. A pressure vacuum relief valve (PV valve) is fitted, to prevent hazardous pressures or vacuums building up. The PV valve should remain closed except under adverse conditions.

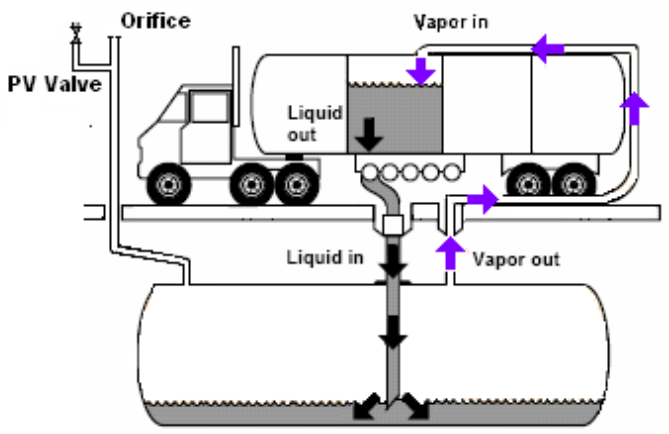

Figure 1:
Stage 1 Vapour Recovery

Figure 1: Stage 1 vapour recovery

3.2 Stage 2 vapour recovery

When vehicles are refuelled at petrol service stations, the vapour in the vehicle fuel tanks is displaced by the fuel. Stage 2 vapour recovery (VR2) equipment is designed to capture the displaced vapour and return it to the underground fuel storage tank or other appropriate vessel.

Usually, the fuel dispenser hose contains both fuel and vapour return lines. The vapour is drawn through the vapour return line by a vacuum pump. VR2 systems are intended to limit the emissions of fuel vapour when vehicles refuel by recovering at least 85% of the displaced vapour. Figure 2 shows the principles of operation of VR2.

Vapour recovery equipment needs to be properly maintained so it is vapour-tight and operates as specified by the manufacturer. VR2 systems need to be tested regularly. System testing includes monitoring the effectiveness of vapour recovery at the dispenser and the vapour containment in the underground storage tank, pipe work and fittings.

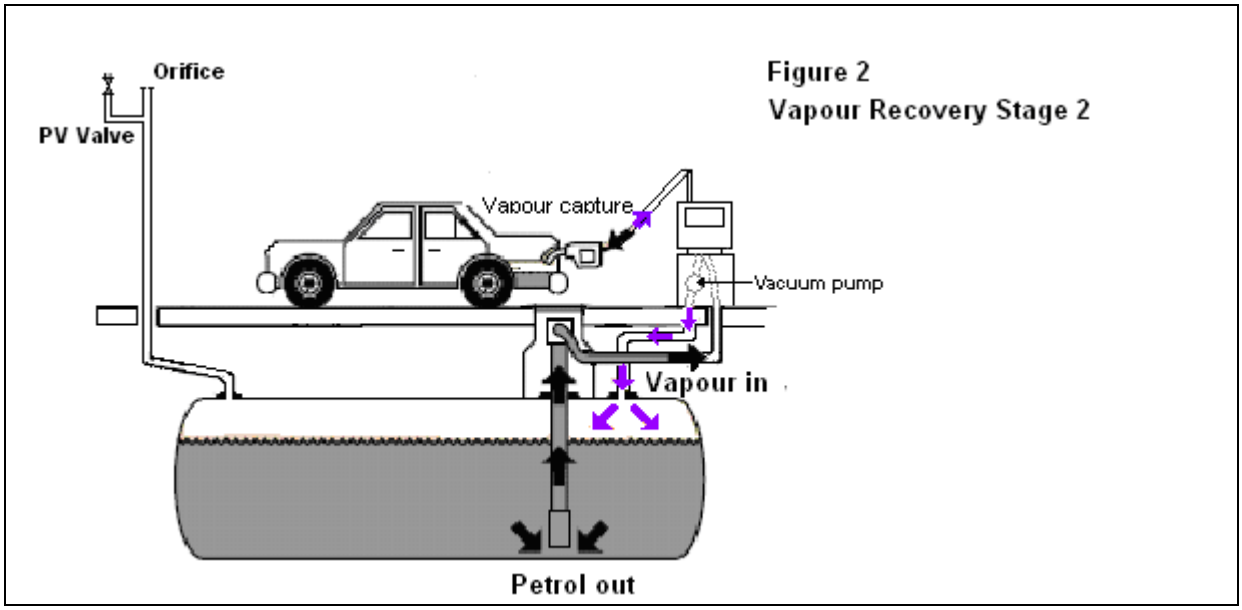

Figure 2: Stage 2 vapour recovery

4 Overview of the Regulation

This section summarises the vapour recovery provisions of the Protection of the Environment Operations (Clean Air) Regulation 2010 (the Regulation). This is a summary only, so refer to the Regulation for specifics of individual legal obligations. The Regulation provides for a range of prescribed control equipment and techniques to reduce the emission of petrol vapour from the following activities at petrol service stations:

- the unloading of petrol from road tankers into underground storage tanks
- the storage of petrol
- the dispensing of petrol into vehicle petrol tanks.

The requirement to fit vapour recovery equipment depends on petrol throughput (the quantity of petrol dispensed per annum) and the location of the service station. If the petrol service station throughput subsequently falls, continued operation of the vapour recovery systems is required.

4.1 VR1 requirements

Some Stage 1 vapour recovery controls were progressively introduced from 1986 in Sydney. The 2009 amendments to the Regulation required service stations in the Sydney, Central Coast, Illawarra, Shoalhaven and Lower Hunter regions to introduce more stringent VR1 controls, based on throughput thresholds and the local government area in which they are situated. The prescribed equipment is designed to achieve a capture efficiency of 97% of petrol vapour. Appendix 3 contains a comprehensive listing of prescribed control equipment for VR1.

In Figure 3, the regions inside the blue line, service stations are now required to have the upgraded VR1 equipment if they dispense more than 0.5 million litres of petrol per year.

Petrol includes petrol blends, but not diesel.

A newly modified service station is a service station that has been substantially upgraded.

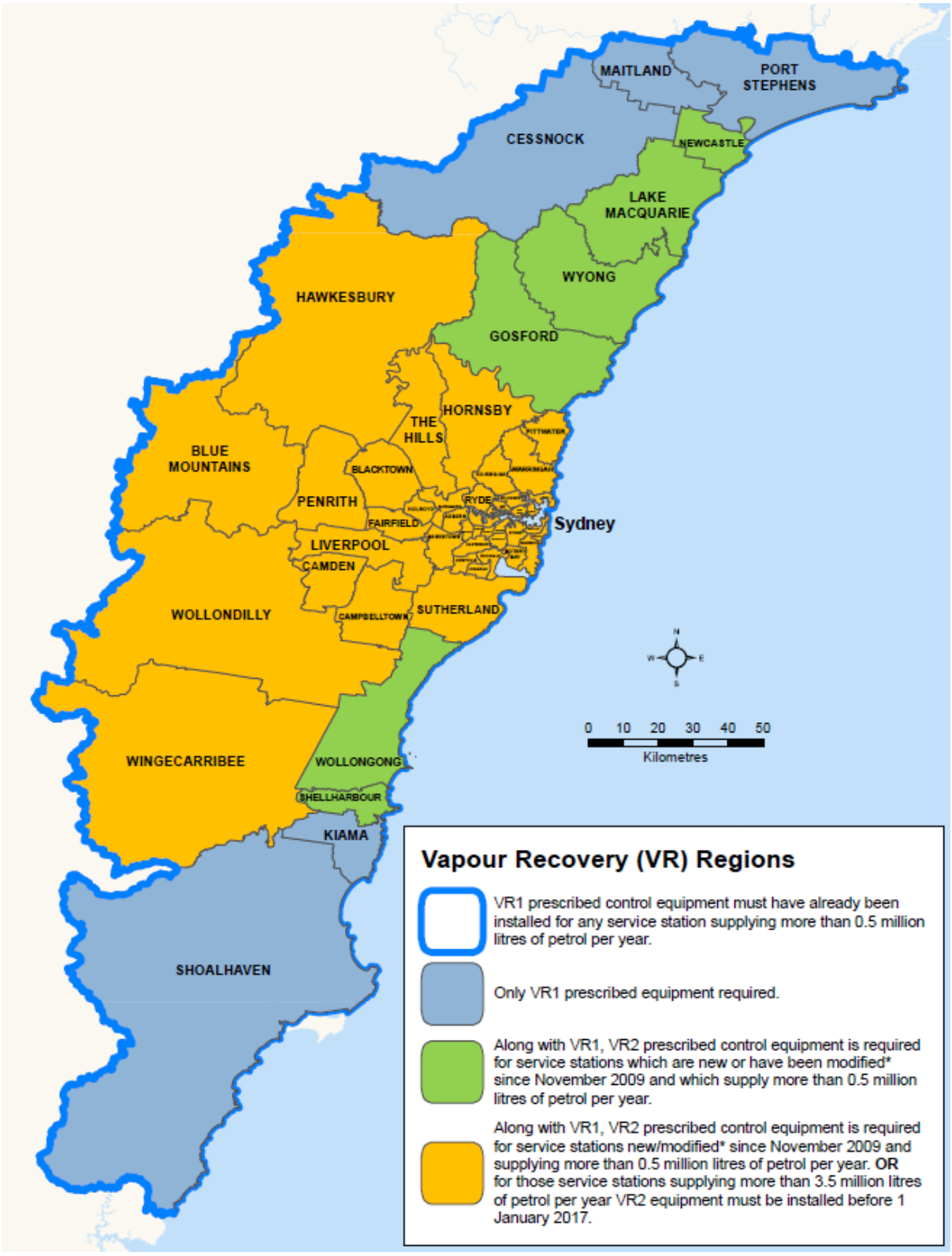

Figure 3: Regions in which vapour recovery is required (2015 local government areas)

Stage 1 vapour recovery systems must return displaced vapour to the delivery tanker via a vapour return line or to a vapour processing unit. The Regulation requires each underground storage tank to have:

- **vapour return lines/a transfer system** that returns all vapour displaced from the storage tank to the delivery tanker or vapour processor

- **vapour tight couplings on the vapour line** that close automatically when disconnected
- **liquid tight couplings** on the liquid transfer hoses
- **incompatible liquid and vapour couplings**
- **spill containment** enclosures for the storage tank fill connection point
- **secure seals** on tank filling pipes and vapour return pipes that minimise vapour leaks when the pipes are not in use
- **submerged fill pipes,** so they terminate below the suction inlet used for the pumping of petrol out of the storage tank
- **overfill protection devices** (float vent valves) fitted to shut off the petrol flow at the level advised by the tank manufacturer
- for new petrol service stations, **overfill prevention devices** (mechanical, electrical or electronic) that slow delivery of petrol into the storage tank as the level in the storage tank approaches the design fill level – the devices should be positioned to stop the petrol flow before the float vent valve operates
- **secure seals** on any dip hatch openings
- **a pressure vacuum valve and a 10-millimetre orifice** fitted to the storage tank vent pipe. Similar devices are permitted, but will only be accepted by the EPA where they are certified by the manufacturer to perform the same duty.

A vapour processing unit may also be fitted but it must be certified as meeting the hydrocarbon capture efficiency criteria specified in section 5 of these Standards and Guidelines.

The Regulation also requires that the covers on all access points to storage tanks must be kept closed whenever they are not in use.

If vapour recovery systems are connected to an E85 installation – the term E85 means a blend of ethanol and petroleum with the ethanol comprising around 85% – or ethanol rich fuel where the ethanol component is greater than 50%, consideration should be given to the safety risks involved, as advised in section 6.3. Until the risks have been further studied, ethanol rich fuel tanks should not be connected to VR2 systems.

Before VR1 prescribed control equipment is fitted, the tank must be tested for liquid leaks. After installation, the VR1 system must be tested for vapour leaks (vapour containment testing). The VR1 system must be retested for vapour containment whenever components required to ensure vapour containment integrity are opened for repairs or modifications. See section 5 of these Standards and Guidelines for details.

VR1 systems need to be regularly inspected to avoid vapour return pipes, fittings or vents becoming blocked. They must be tested for vapour containment every three years and the orifice and pressure vacuum valve must be inspected every year.

Use of **automatic pressure monitoring is highly recommended** as the yearly inspection of the orifice and pressure vacuum valve and the three-yearly test for vapour containment are not required where such automatic monitoring is used.

4.2 VR2 requirements

Stage 2 vapour recovery (VR2) controls have been required progressively since July 2010 for petrol service stations in the Sydney, Newcastle, Wollongong and Central Coast metropolitan areas (VR2 area – the yellow and green areas in Figure 3).

In the VR2 area:

- From 1 July 2010, new and newly modified petrol service stations supplying more than 0.5 million litres of petrol per year in the VR2 area (the yellow and green areas in Figure 3) are required to have the VR2 prescribed control equipment fitted and operating.

- From 1 January 2014, the remaining petrol service stations supplying more than 12 million litres of petrol per year in the VR2 area the yellow and green areas in Figure 3) are required to have VR2 controls fitted and operating.
- From 1 January 2017, the remaining petrol service stations supplying more than 3.5 million litres of petrol per year in the yellow area in Figure 3, the Sydney Metropolitan Area – B (as defined in the Regulation) must have VR2 controls fitted and operating.

The VR2 prescribed control equipment is required to capture 85% or more of the vapour displaced when vehicles re-fuel.

A modified petrol service station means an existing petrol service station on which works requiring development consent are carried out that involve opening the forecourt, opening the petrol product lines, modification of the storage tanks, tank vents, petrol dispensers or tanker connection points.

The most common means of achieving this is to ensure that the fuel dispensing nozzle and hose incorporate a vapour return line connected to a vacuum. The volume of air recovered can then be controlled either by using a proportional valve or a variable speed vacuum pump. The vapour rich air can then be returned to the petrol storage tank. Section 6.2 provides more details on typical VR2 systems. Appendix 3 contains a comprehensive listing of prescribed control equipment for VR2.

Petrol service stations with an annual throughput of more than seven million litres must install an automatic monitoring system to monitor the vapour system recovery performance. The automatic monitoring system must monitor for recovery performance faults and also look for faults in its own function. It must post warnings when faults are detected and shut down the dispenser(s) if the fault is not fixed after seven days.

Petrol service stations with less than seven million litres throughput may use manual or automatic monitoring. Those with throughputs of less than 3.5 million litres are not required to install VR2 prescribed control equipment unless they are newly installed or modified, and must then monitor the system using either manual or automatic monitoring.

The VR2 system must be tested for vapour system recovery performance before commissioning, and whenever components required to ensure the integrity of the system are removed and replaced, for example, during maintenance. Sections 5.3 and 5.4 of these Standards and Guidelines set out the testing requirements in detail.

Periodic testing requirements depend on the means of monitoring the vapour system recovery performance. Systems that are automatically monitored for vapour system recovery performance need only have the vapour recovered to petrol dispensed ratio (V/L ratio) tested every three years. The V/L ratio is the ratio of volume of petrol vapour recovered measured against the volume of liquid petrol dispensed, calculated over the duration of the filling operation.

Where manual monitoring is used, weekly system checks are required and vapour system recovery performance must be tested every six months.

Note: Automatic monitoring systems for vapour system recovery performance must detect the following faults, as specified in the Regulation:

- a fault exists when the V/L ratios are less than or equal to 85% or more than 115% for at least 10 consecutive filling operations, where the V/L ratio is averaged over at least 20 seconds during which the minimum rate of petrol dispensed is at least 25 litres per minute
- a fault exists in the automatic monitoring system if a fault in the V/L ratio would not be detected.

Records of the date and type of fault of the last one hundred faults and the last one year's operational data must be retained in the monitoring system and must be easily accessible to operators or inspectors.

4.3 4.3 Record keeping and reporting

Record keeping

A log book must be kept that stores any relevant information relating to the prescribed control equipment. Examples are equipment certificates, test results, details of repairs and maintenance and descriptions of incidents involving faults/malfunctions of the vapour recovery system. If manual monitoring is used, the weekly results must also be recorded.

The Regulation requires the following items to be stored in the log book:

- the name, address and contact details of the occupier of the service station
- a description of the installed prescribed control equipment, including types, serial numbers (if any) and the manufacturer's equipment certificates
- the name and address of the person with overall responsibility for installation and commissioning of the vapour recovery system
- a description of the testing of the operation of the prescribed control equipment including the type of test, all test results and the name and address of the person with overall responsibility for carrying out the test
- details of repairs and maintenance including the name and address of the repairer
- weekly check results for manual monitoring
- a description of any incidents involving faults with or malfunction of the vapour recovery system and the measures taken to investigate and respond to the fault
- the date of the last report to the EPA.

Details of anything done before commencement of the amendments to the Regulation do not need to be recorded. Records need to be kept for three years by the occupier, even if the petrol service station is decommissioned.

If the petrol service station has a log book for the purposes of other legislative obligations, that same log book can and should be used for vapour recovery records as well. The regulation requires the log book to be kept on site. However, the logbook may be electronic and accessible from the site. It is an acceptable practice to keep some records electronically that are not immediately accessible, such as maintenance records, so long as they can be made available to a compliance officer within three business days upon request. Details about how to access the log book records, including the name(s) and contact details of the person(s) responsible, must be kept on site and made available to a compliance officer upon request.

Note: The Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014 requires the Environmental Protection Plan be kept for seven years. If the vapour recovery log book is part of the Environmental Protection Plan, it must be kept for seven years.

Reporting

Reporting is required within one month of commissioning new or modified vapour recovery systems on the form provided in Appendix 1.

Annual reporting, within one month of the end of the financial year (by 31 July), is then required **only if there have been significant failures** of the vapour recovery system in the preceding twelve months. The information submitted to the EPA will be used to assess the cost and effectiveness of the vapour recovery requirements, assist in determining level of

compliance and inform any adjustments to improve operability or limit costs of vapour recovery.

Note: significant failures specified in the Regulation (clause 75) are:

- failure of the vapour containment system that requires opening of the forecourt for repairs
- any results of tests of the vapour system recovery performance of a manually monitored petrol dispenser and prescribed control equipment that show vapour system recovery has fallen below 85%
- repeated warnings generated by automatic monitoring systems that require repair – more than two repairs in a year is considered a significant failure.

Signage

Each petrol dispenser that is fitted with VR2 control equipment must display a sign stating VR2 equipment is present. If every petrol dispenser is fitted, a sign indicating that vapour recovery equipment is in use must also be attached to the petrol service station premises.

5 Requirements for the purposes of obligations under the Regulation

The Regulation contains a series of references to requirements specified in the Standards and Guidelines. This section sets out these requirements. Where the Regulation requires that the specification is set out in these Standards and Guidelines, the Regulation clause number is quoted and prefaced by the words **for the purposes of**. These are statutory requirements and therefore mandatory.

This section should be read in conjunction with the Regulation. In the event of any inconsistency between the two, the Regulation will always prevail. Note that the instructions set out here are **mandatory** and **enforceable.**

Clause in regulation	Section in this guideline	Clause in regulation	Section in this guideline
Equipment for Stage 1 vapour recovery		**Equipment for Stage 2 vapour recovery**	
69(1)(d)(ii)	5.1.1	72(a)	5.2.1
69(1)(k)	5.1.2	**Testing Stage 2 vapour recovery systems**	
69(1)(k)(i)	5.1.3	72(c)	5.4.1
69(1)(l)	5.1.4	73(1)	5.4.2
Testing Stage 1 vapour recovery systems		73(1)	5.4.4
69(2)	5.3.1	73(1)	5.4.9
69(3)	5.3.2	73(2)	5.4.3
71(1)	5.3.3	73(2)	5.4.5
71(2)	5.3.4	73(2)	5.4.10
Reporting		**Monitoring Stage 2 vapour recovery**	
75(1)	5.5.1	74(1)(f)	5.2.2
75(2)	5.5.2	74(2)(a)	5.4.6
75(3)(c)	5.5.3	74(4)(a)	5.4.7
		74(5)(b)	5.4.8

5.1 Stage 1 vapour recovery prescribed control equipment

5.1.1 For the purposes of subclause 69(1)(d)(ii), if the overfill prevention device is electrically powered or contains electronic components, it must meet the following standards:

- it must be constructed in accordance with relevant safety and electrical standards
- it must be installed in accordance with relevant safety and electrical standards.

5.1.2 For the purposes of subclause 69(1)(k):

- where a device similar to a pressure vacuum valve is used, it must have settings that can:
  - provide emergency relief of excessive pressure or vacuum
  - vent sufficient volume flow rate to prevent exceedences of maximum tank design pressure/vacuum under adverse conditions

  - be certified by the manufacturer as providing a seal against leakage when the device is in the closed position with the same performance as that in the CARB TP201.1E leak test
- where a device similar to a 10-millimetre orifice is used in the vent line, it must be certified by the manufacturer as retaining 97% of vapour in the proposed system.

Note that subclause 69(1)(k) also requires that the device:

- is of a size and type, and possesses the safety features, that a duly qualified person has advised is suitable
- is installed in accordance with the advice of a duly qualified person.

Note: A duly qualified person means a person who has such competence and experience in relation to the activity as is recognised in the relevant industry as appropriate to carry out that activity.

5.1.3 **For the purposes of subclause 69(1)(k)(i)**, the pressure vacuum valve (or similar device) settings criteria are:

- the device must be of a size and weight to allow an emergency release of vapours at not more than 80% of maximum tank design pressure
- the device must be of a type that:
  - is certified by the manufacturer as conforming with any applicable standards published by Standards Australia, European Standards, British Standards or United States Underwriters Laboratories (UL) and
  - is certified by the manufacturer as meeting the pressure specifications and total leak rates set out at sections 3.5.1 and 3.5.2 of the California Environmental Protection Agency Air Resources Board Vapour Recovery Certification Procedure CP201 of January 9 2013.

5.1.4 **For the purposes of subclause 69(1)(l),** the vapour processing unit must, before commissioning:

- be certified by the manufacturer as having a hydrocarbon capture efficiency of at least 97%
- be certified by the manufacturer as conforming with any applicable standards published by Standards Australia, European Standards, British Standards or United States Underwriters Laboratories (UL).

5.2 Stage 2 vapour recovery prescribed control equipment

5.2.1 **For the purposes of subclause 72(a),** before commissioning**,** the vapour recovery system must be certified by the manufacturer or the supplier as being of the following type and having the following hydrocarbon capture efficiency:

- Type: a stage 2 vapour recovery system, with a visual indicator that the vacuum operates when fuel is dispensed. The certification must be in accordance with:
  - EN 16321-1:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations - Part 1: Test Methods For The Type Approval Efficiency Assessment of Petrol Vapour Recovery Systems (or equivalent standard)
  - the provisions of Ordinance on the Limitation of Hydrocarbon Emission Resulting from the Fuelling of Motor Vehicles – 21, BImSchV (section 3, paragraph 6)
- Hydrocarbon capture efficiency: a hydrocarbon capture efficiency of not less than 85% vapour recovery to liquid dispensed by volume as measured using a test for active vapour recovery systems in:

- EN 16321-1:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations – Part 1: Test Methods for the Type Approval Efficiency Assessment of Petrol Vapour Recovery Systems (or equivalent standard)
- Verein Deutscher Ingenieure (VDI) specification 4205.

The certification obtained must certify that the VR2 system achieves at least 85% vapour recovery and must specify the test used.

5.2.2 **For the purposes of subclause 74(1)(f)**, the automatic monitoring system for vapour system recovery performance must be certified in the following manner:

- certification by to the manufacturer the EPA in accordance with:
- EN 16321-1:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles At Service Stations – Part 1: Test Methods for the Type Approval Efficiency Assessment of Petrol Vapour Recovery Systems (or equivalent test method)
- the provisions of Ordinance on the Limitation of Hydrocarbon Emission Resulting from the Fuelling of Motor Vehicles – 21, BImSch V (section 3, clause 5) [2002] with the exception that the number of days until the automatic system shuts off the flow is to be seven days. The test procedure for demonstrating the correct function of the automatic monitoring system is an automatic monitoring test in VDI specification 4205.

5.3 Stage 1 vapour recovery testing

Definitions used in testing requirements

A **new** storage tank is one that has not previously been used to store fuel and has been newly installed and connected to vapour recovery equipment following the introduction of this regulatory amendment.

An **existing** or **modified** underground storage tank is a storage tank that was used to store petrol in a petrol service station before the introduction of this regulatory amendment and is subsequently modified to include a vapour recovery system.

Before installing new Stage 1 vapour recovery equipment

5.3.1 **For the purposes of clause 69(2),** before any control equipment is fitted to an underground storage tank, it must be tested in the following manner:

- it must be certified as being leak free in accordance with the provisions for equipment integrity testing specified in AS-4897: 2008, section 8.5 or a test procedure that is certified as being capable of detecting any leak in the liquid space of the underground petroleum storage system as defined in the NSW Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014. If the tank has been certified to be leak free in the last three years, the leak free certification is deemed to satisfy this provision.

Before commissioning new Stage 1 vapour recovery equipment

5.3.2 **For the purposes of clause 69(3),** a storage tank that has been fitted with the prescribed VR1 control equipment must be tested for vapour containment integrity in the following manner before the equipment is commissioned:

Either:

- in accordance with CARB Vapour Recovery Test Procedure 201.3 (TP-201.3), in the case of new storage tanks, with the orifice isolated or blocked

- Test Procedure 201.3A (TP-201.3A) in the case of existing or modified storage tanks, with the orifice isolated or blocked
- using a test on the dry portion of the tank and lines capable of detecting a gas leak equivalent to 0.38 litres per hour with a probability of detection of at least 95% and of false detection of 5% or less, in accordance with AS 4897–2008.

Periodic testing of Stage 1 vapour recovery equipment

5.3.3 For the purposes of clause 71(1), the prescribed control equipment and the petrol storage tank to which it is fitted must be tested in the following manner and at the times specified:

Test	Timing
The vapour containment integrity of the underground storage tank, fittings and lines must be tested in one of the ways specified in section 5.3.2.	Vapour containment testing must be undertaken: • following the removal or replacement of any of the components required to ensure the integrity of the containment system • at least once every three years if the station does not have an appropriately certified automatic pressure monitoring system.*****
An inspection of orifice plates and pressure vacuum valves for extraneous matter, correct sealing and the presence of corrosion.	Must be conducted at least once a year if the petrol service station does not have an appropriately certified automatic pressure monitoring system.*****
Pressure vacuum valves must be checked for correct functioning in accordance with CARB Vapour Recovery Test Procedure 201.1E (TP-201.1E) or equivalent procedure.	Must be undertaken at least once every three years if the petrol service station does not have an appropriately certified automatic pressure monitoring system.*****
*** Note**: where a properly functioning certified automatic pressure monitoring system is installed and is fully operational during any filling of the underground storage tank, operators are not required to undertake any of the tests marked with an asterisk above.	

Results of tests must be kept in the log book.

5.3.4 For the purposes of clause 71(2), the standard required is that the prescribed storage tank and any control equipment must pass the most recent tests undertaken as specified in sections 5.3.1, 5.3.2 or 5.3.3.

5.4 Stage 2 vapour recovery testing

Testing requirements before commissioning

5.4.1 For the purposes of subclause 72(c), the Stage 2 vapour recovery system must be tested in the following manner before commissioning:

- test the Stage 2 vapour system recovery performance with a test which meets:
  - EN 16321-2:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations – Part 2: Test Methods for Verification of Vapour Recovery Systems at Service Stations (or equivalent method)
  - VDI specification 4205: Part 2 – Wet method or Part 3 – Dry method, or equivalent vapour system recovery performance test specified

- test the VR1 system for vapour containment integrity in accordance with section 5.3.2.

Testing requirements following the removal or replacement of components required to ensure the integrity of the VR2 system

5.4.2 For the purposes of clause 73(1), the prescribed control equipment must be tested in the following manner and at the following times:

Test	Timing
Test the Stage 2 vapour system recovery performance with a test which meets: • EN 16321-2:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations - Part 2: Test Methods for Verification of Vapour Recovery Systems at Service Stations (or equivalent method) • VDI specification 4205: Part 2 – Wet method or Part 3 – Dry method.	Testing is required immediately after the removal or replacement of any of the components required to ensure the integrity of the vapour recovery system.

Results of tests must be kept in the log book.

5.4.3 For the purposes of clause 73(2), the most recent vapour system recovery performance test result from sections 5.4.1 or 5.4.2 must demonstrate that the vapour recovery to liquid dispensed ratio was between 95% and 105% inclusive.

Periodic testing requirements for manually monitored VR2 systems

5.4.4 For the purposes of clause 73(1), the control equipment for a **manually monitored system** must be tested for vapour containment integrity and vapour system recovery performance in the following manner and at the following times:

Test	Timing
Test the VR2 system recovery performance with a test which meets: • EN 16321-2:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations – Part 2: Test Methods for Verification of Vapour Recovery Systems at Service Stations (or equivalent method) • VDI specification 4205: Part 2 – Wet method or Part 3 – Dry method.	Testing is required every 6 months, in the absence of a properly functioning automatic control system.
Test the vapour containment integrity of the underground storage tank, fittings and lines in the following manner: Either: • in accordance with CARB Vapor Recovery Test Procedure 201.3 (TP-201.3) in the case of new storage tanks, with the orifice isolated or blocked • Test Procedure 201.3A (TP-201.3A) in the case of existing or modified storage tanks, with the orifice isolated or blocked • using a test on the dry portion of the tank and lines capable of detecting a gas leak equivalent to 0.38 litres per hour with a probability of detection of at least 95% and of false detection of 5% or less, in accordance with AS 4897–2008.	Every three years, in the absence of a properly functioning automatic pressure monitoring system.

Results of tests must be kept in the log book.

5.4.5 For the purposes of clause 73(2) a prescribed petrol dispenser must not be operated unless the most recent test results (of tests under clause 73(1)) meet the following standard:

- the vapour system recovery performance test found that the V/L ratio was between 95% and 105% inclusive
- the vapour containment test result was a pass.

5.4.6 For the purposes of subclause 74(2)(a), the manual test of the functionality of the required control equipment must be carried out in the following manner:

- check the visual indicator on the vacuum during a dispensing operation to ensure the vacuum is functioning
- inspect for torn, flattened or kinked hoses and damaged seals on vapour recovery return hoses and lines
- enter the checks and findings in the petrol service station log book.

5.4.7 For the purposes of clause 74(4)(a), the test of functionality is passed if the hoses, lines and seals are not damaged and the vacuum is functioning properly as shown by the visual indicator on the vacuum during a dispensing operation.

5.4.8 **For the purposes of subclause 74(5)(b**), the person must be trained to check the prescribed control equipment in the following manner:

- they must be instructed in correctly identifying an operating vacuum as seen by the visual indicator on the vacuum during a dispensing operation
- they must be trained to fully inspect hoses and seals for flattened or kinked hoses and damaged seals on vapour recovery return hoses and lines
- they must be shown how to enter weekly checks in the petrol service station log book indicating if the vacuum is operational and whether hoses and seals are fit for the purpose.

Periodic testing requirements for automatically monitored systems

5.4.9 **For the purposes of clause 73(1),** the prescribed control equipment for an **automatically monitored system** must be tested in the following manner and at the following times:

Test	Timing
• EN 16321-2:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations – Part 2: Test Methods for Verification of Vapour Recovery Systems at Service Stations (or equivalent method) • VDI specification 4205: Part 2 – Wet method or Part 3 – Dry method	Every 3 years.
Note: vapour containment integrity testing of the VR1 system is not required where automatic monitoring is in place.	

Results of tests must be kept in the log book.

5.4.10 **For the purposes of clause 73(2),** a petrol dispenser must not be operated unless the most recent test result met the following standard:

- the vapour system recovery performance test found that the V/L ratio was between 95% and 105% inclusive.

5.5 5.5 Reporting requirements

5.5.1 **For the purposes of clause 75(1**), written notice to the EPA on commissioning must take the following form:

complete and sign the form entitled Commissioning of Stage 1 and/or Stage 2 vapour recovery provided in Appendix 1.

The form must be submitted within one month of the commissioning of new and modified Stage 1 and Stage 2 vapour recovery systems.

5.5.2 **For the purposes of clause 75(2),** the annual report to the EPA of significant failures must take the following form:

- complete and sign the form entitled Significant vapour recovery system faults annual report provided in Appendix 1.

The form must be submitted within one month of the end of the financial year.

5.5.3 **For the purposes of subclause 75(3)(c**), the number of warnings by an automatic monitoring system is more than **two**.

6 Advice on best practices for achieving compliance

This section provides recommendations to help petrol service station operators maximise vapour recovery. The recommendations are not mandatory, although voluntary compliance with them is recommended as industry best practice.

6.1 Stage 1 vapour recovery

Operational techniques

In addition to the requirements of clause 69(1), the following VR1 operational control techniques should be used where VR1 equipment is installed:

- before a fuel delivery, connect the vapour return hose first to the road tanker and then the storage tank, and then attach the delivery hoses
- if storage tanks or road tanker compartments are dip-tested before delivery, close the dip openings and seal them securely before delivery
- close all road tanker compartment vents and discharge valves on completion of the delivery, unless it would be unsafe to do so
- on completion of unloading, discharge and disconnect the delivery hoses first, and then the vapour hose; disconnect the delivery hoses at the road tanker end first and the vapour return hose at the storage tank end first
- securely seal all connection points after delivery to prevent vapour loss
- if storage tanks or road tanker compartments are dip-tested after delivery, close the dip openings and seal them securely immediately afterwards to prevent vapour loss
- close access entry points to storage tanks and keep them securely sealed except in an emergency or when carrying out any maintenance, testing or tank gauging which require entry to the tank.

General

- All tank vents should be situated to not cause a hazardous or unsafe environment. Consideration should be given to all relevant Australian standards and codes. For example, the position of window openings and air conditioning air intakes to any on-site or adjacent buildings should be considered.
- Overfill prevention devices reduce liquid spills and subsequent petrol vapour emissions. Overfill prevention devices are only prescribed control equipment for new petrol service stations but they are widely used internationally and should be considered industry best practice even for existing petrol service stations.

Automatic monitoring of tank pressure

This section refers specifically to automatic pressure monitoring rather than automatic monitoring for vapour system recovery. Whilst petrol service stations with an annual throughput of more than seven million litres are required to install an automatic monitoring system, automatic **pressure** monitoring is not mandatory but is also recommended for **all** petrol service stations, **regardless of throughput**. Use of automatic monitoring systems is considered best practice.

If a **certified** automatic pressure monitoring system is present, the Regulation allows periodic testing of vapour containment and inspections of the orifice and pressure vacuum valve to be avoided.

The Regulation requires that an automatic pressure monitoring system must detect faults in the proper functioning of the VR1 system and indicate faults to the operator. Such an automatic pressure monitoring system must also be able to detect faults in its own operation.

The underground storage tank and piping vapour containment system is considered to be functioning correctly when the pressure ranges between 1.85 kilopascals below ambient atmospheric pressure and 0.60 kilopascals above ambient atmospheric pressure. If the pressure readings vary by less than 0.03 kilopascals, the pressure detection may be faulty.

Technical guidance on requirements for certification of automatic pressure monitoring systems

To be certified, the automatic pressure monitoring system must be able to detect the following fault conditions in the underground storage tank and vapour piping vapour containment system:

1. **Vapour pressure, over a continuously moving 1-hour test period, exceeds 0.75 kilopascals above ambient atmospheric pressure or 2 kilopascals below ambient atmospheric pressure for at least 30 minutes.**
   The monitoring system must post a warning alarm when the fault occurs at least once in a test day and recurs for seven consecutive days. The monitoring system should continue to post daily warning alarms if the fault persists and automatically cut off the flow of fuel if the fault is not rectified within 30 days.
2. **Vapour pressure, over a continuously moving 1-hour test period, exceeds 1.75 kilopascals above ambient atmospheric pressure or 2.5 kilopascals below ambient atmospheric pressure for at least three minutes.**
   The monitoring system must post a warning alarm immediately when the fault first occurs. If the fault recurs, additional warning alarms must be posted each time. If the fault is present at least once during a test day, the monitoring system must also post a daily alarm(s) summary. Where a fault of this kind is present and continues for consecutive days, the monitoring system must continue to post daily warning alarm summaries and automatically cut off the flow of fuel if the fault is not rectified within seven days.
3. **Vapour pressure, over a continuously moving one-hour test period remains within ± 0.03 kilopascals, or remains consistently above or below 0.00 kPa, relative to ambient atmospheric pressure.**
   The monitoring system is required to post a warning alarm when the fault condition occurs for at least 23 out of 24 hours throughout a test day. Where a fault of this kind is present and continues for consecutive days, the monitoring system must continue to post daily warning alarms and automatically cut off the flow of fuel if the fault is not rectified within seven days. If the system is not used to dispense petrol or refilled in the 24-hour period, a nil response may be posted.

Technical notes on automatic pressure monitoring

The automatic pressure monitoring system should be certified by the manufacturer as meeting the conditions and criteria established in this section of these Standards and Guidelines, and in accordance with the following specifications:

- Pressure samples are to be taken on average at least once every 30 seconds to be considered continuous monitoring.
- A test day is any 24-hour period starting and ending at a specified start time (e.g. 8:00 am).
- A no test result may be issued if the pressure remains within ±0.03 kilopascals because the vapour containment system is not in use.
- All test results and warnings must be available at the end of each test day except where immediate warning is required. Results for each test type must include at least a qualitative indication of pass, warn, shutdown, or no test. Warn or shutdown must also include a quantitative indication of the fault.

- The monitoring system must retain the date and type of the last one hundred faults and one year of daily pressure data. The data must be easily accessible to operators or inspectors.

6.2 Stage 2 vapour recovery

Petrol service stations are not constrained in how they recover vapour during filling of vehicle petrol tanks, provided that the minimum hydrocarbon capture efficiency requirements are met and the provisions of the Regulation in relation to equipment type approval are adhered to.

The following is an example of control equipment and techniques that can be used. Regardless of the equipment used, in all cases it must be approved as prescribed in the Regulation.

Automatic monitoring systems are recommended for all Stage 2 vapour recovery systems.

Open active vapour recovery system with return of vapour to underground storage tank

When petrol enters the vehicle fuel tank, an open active petrol vapour recovery system uses a vacuum pump to draw a proportional volume of vapour back into a storage tank. Typical components of an open active vapour recovery system include:

- a vapour recovery nozzle
- a coaxial hose through which vapour is collected, and a pipe through which the vapour is returned
- a vacuum pump, either multiple distributed units or a central unit
- a system to control the ratio of the volume of vapour recovered to the volume of petrol dispensed, which can be achieved by using a proportional valve controlled either hydraulically or electronically or by controlling the speed of the vacuum pump
- a vapour storage tank, i.e. the petrol storage tank.

6.3 Risk management

The occupier of a petrol service station must take all practical measures to manage the risk associated with the storage and handling of dangerous goods. For example, the NSW Work Health and Safety Act 2011, NSW Workcover 2005 *Storage and handling of dangerous goods: Code of practice*; the *National Occupational Health and Safety Commission's National Standard for the Storage and Handling of Workplace Dangerous Goods*, and the *National Code of Practice for the Storage and Handling of Dangerous Goods*, as well as all other applicable laws, will be very relevant for the conduct of vapour recovery at petrol service stations.

Before a vapour recovery system is installed at a petrol service station, a thorough risk analysis for the site should be undertaken by a duly qualified person who has competencies and experience that are recognised as appropriate for the task by the industry. A duly qualified person includes personnel that have been trained, authorised and accredited by the manufacturer of the vapour recovery system.

All vapour recovery equipment used should be designed, installed and tested with reference to relevant Australian and international standards, national methods, codes of practice and industry guidelines that were in place when the equipment was installed, unless prescribed by the Regulation or these Standards and Guidelines. Some relevant reference documents are listed in the Appendix 2.

7 Appendix 1: Reporting templates

To obtain electronic copies of the reporting forms, email: vapour.recovery@epa.nsw.gov.au

Send completed reports to:

Vapour recovery reporting
NSW Environment Protection Authority
PO Box A290
Sydney South, NSW 1232

Reports may be emailed to: vapour.recovery@epa.nsw.gov.au

Commissioning of Stage 1 Vapour Recovery

1. Name and address of petrol service station

Name:	ABN:
Address:	

2. Company or person responsible for the operation of the petrol service station (the occupier or franchisee)

Name:	Telephone:
Email:	

3. Entity or person that owns the petrol service station and related infrastructure

Name:	Telephone:
Email:	

4. Annual petrol throughput of petrol service station for the last three years (designed throughput for new stations)

Year	Throughput

5. Name and contact details of vapour recovery service technician and tank tester:

Technician Name:	Telephone:
Email:	
Tank Tester Name:	Telephone:
Email:	

6. New or modified: Is the service station new, or was it upgraded after 1 July 2010?

☐ Yes ☐ No

7. Pass date of pre-commissioning tank integrity test ____/_____/_____ (dd/mm/yy)

Please specify the test method: _____

Note: The occupier of the petrol station is required to keep a Vapour Recovery Logbook. It must contain copies of the Tank Integrity Test results, the Commissioning Report, the Vapour Containment Test results, periodic test results, maintenance records and certificates for the installed equipment. For more information, see the Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations.

8. Stage 1 vapour recovery date of commissioning ____/_____/_____ (dd/mm/yy)

9. Is automatic pressure monitoring installed? ☐ Yes ☐ No

10. Have the underground storage tank and vapour recovery pipes and components passed the vapour containment integrity test? ☐ Yes ☐ No

    Attach the vapour containment integrity test results or use the form provided with this report.

    Please specify the test method:

Signature

It is an offence to supply any information to the EPA in this report that is false or misleading. The maximum penalty for the offence is currently $11,000 for a corporation or $5500 for an individual.

To be signed by the occupier/owner of the petrol service station:

Signature: Date:

Name:

Position:

Commissioning VR1 Attachment 1: Vapour containment integrity test results

Name of Service Station: _____

Address of Service Station: _____

Phone number of Service Station: _____

Owner name: _____ Phone number: _____

Number of underground storage tanks:			
Tank number		**Tank number**	
Capacity of tank		Capacity of tank	
Fuel volume		Fuel volume	
Ullage		Ullage	
Initial pressure		Initial pressure	
Final pressure		Final pressure	
Allowable final pressure		Allowable final pressure	
Tank number		**Tank number**	
Capacity of tank		Capacity of tank	
Fuel volume		Fuel volume	
Ullage		Ullage	
Initial pressure		Initial pressure	
Final pressure		Final pressure	
Allowable final pressure		Allowable final pressure	
Tank number		**Tank number**	
Capacity of tank		Capacity of tank	
Fuel volume		Fuel volume	
Ullage		Ullage	
Initial pressure		Initial pressure	
Final pressure		Final pressure	
Allowable final pressure		Allowable final pressure	

Signature

I certify that the vapour containment integrity test was carried out in accordance with the test procedures as outlined in the *Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations*, and the results recorded here are true and correct to the best of my knowledge.

Signature of Tester: _____ Date: _____/_____/_____

Name of Tester: _____

Test company name: _____ Phone number:_____

Commissioning of Stage 2 Vapour Recovery

1. Name and address of petrol service station

Name:	ABN:
Address:	

2. Company or person responsible for the operation of the petrol service station (the occupier or franchisee)

Name:	Telephone:
Email:	

3. Entity or person that owns the petrol service station and related infrastructure

Name:	Telephone:
Email:	

4. Annual petrol throughput of petrol service station for the last three years (designed throughput for new stations)

Year	**Throughput**

5. Stage 2 vapour recovery compliance certificate number and issuer

Certificate number:
Issuer**:**

6. Name and contact details of vapour recovery system installer and tester:

Technician Name:	Telephone:
Email:	
Tester Name:	Telephone:
Email:	

7. Type of Stage 2 vapour recovery monitoring (V/L ratio monitoring)?

☐ Automatic ☐ Manual

8. Stage 2 vapour recovery date of commissioning : ____/_____/_____ (dd/mm/yy)

9. Have all dispenser hoses passed a leak test? ☐ Yes ☐ No

10. Specify the method used to test the efficiency of the Stage 2 vapour recovery:

☐ Wet ☐ Dry

11. Date of vapour system recovery performance test: ____/_____/_____ (dd/mm/yy)

Attach the vapour system recovery performance test results or use the form provided with this report.

Please specify the test method:

Signature

It is an offence to supply any information to the EPA in this report that is false or misleading. The maximum penalty for the offence is currently $11,000 for a corporation or $5500 for an individual.

To be signed by the occupier/owner of the petrol service station:

Signature:	Date:
Name:	
Position:	

Commissioning VR2 Attachment 1: Vapour system recovery performance test results

Facility information

Name of Service Station: _____

Address of Service Station: _____

Phone number of Service Station: _____

Owner name: _____ Phone number: _____

Test information

A total of _____ nozzles have been tested.

Test Method Used (circle method used): Wet Method Dry Method

If **Dry method** used, state the correction factor**:** _____

Outdoor Temperature: _____ Test Date: _____/_____/_____

Note: Automatic control systems are required to be retested every 3 years; manual control systems – every six months.

- If Wet Method is used, record results in the **before adjustment** column
- If Dry Method is used, both **before and after adjustment test results must be recorded**
- Where additional dispensers are present, please attach additional test results on separate sheet.

Dispenser number	Dispenser side	Grade name	V/L ratio and fuel flow rate			
			Before adjustment		After adjustment (if dry method was used)	
			[%]	[L/min]	[%]	[L/min]
1	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				
2	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				
3	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				

Dispenser number	Dispenser side	Grade name	V/L ratio and fuel flow rate			
			Before adjustment		After adjustment (if dry method was used)	
			[%]	[L/min]	[%]	[L/min]
4	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				
5	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				
6	1	G1				
		G2				
		G3				
	2	G1				
		G2				
		G3				

Comments (additional information regarding the testing):

Signature

I certify that the vapour system recovery performance test was carried out in accordance with the test procedures as outlined in the *Standards and Best Practice Guidelines for Vapour Recovery at Petrol Service Stations*, and the results recorded here are true and correct to the best of my knowledge.

Signature of Tester: _____ Date: _____/_____/_____

Name of Tester: _____

Test company name: _____ Phone number: _____

Significant vapour recovery system faults annual report

Do not report unless significant faults occur.

Report significant failures in any financial year (1 July–31 June).

Report by 31 July.

A significant failure has occurred when there are:

- vapour containment failures, where repairs required opening of the forecourt
- six-monthly tests of the V/L ratio in a manual monitored system that show vapour
- system recovery had fallen below 85%
- three or more warnings requiring repairs in any year.

Date of report (dd/mm/yy): __/__/__

Name and address of petrol service station

Name:

ABN (if applicable):
Address:

Please list the type of fault occurring and date of fault in the vapour recovery system (attach additional pages if required).

Date	Type of fault	What repairs were required? How long did repairs take?	Name and contact details of service technician/tester
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		

Date	Type of fault	What repairs were required? How long did repairs take?	Name and contact details of service technician/tester
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		
	☐ Forecourt opened to repair vapour containment ☐ Measured V/L ratio below 85% ☐ System generated 3 or more warnings requiring repair		

Signature

It is an offence to supply any information to the EPA in this report that is false or misleading. The maximum penalty for the offence is currently $11,000 for a corporation or $5500 for an individual.

To be signed by the occupier/owner of the petrol service station:

Signature: Date:

Name:

Position:

Appendix 2: References

European Standards and test methods

EN-16321-1-2013 Petrol vapour recovery during refuelling of motor vehicles at service stations - Part 1: Test methods for the type approval efficiency assessment of petrol vapour recovery systems.
Available from a range of Standards providers including: https://www.document-center.com/standards/show/EN-16321-1
EN-16321-2-2013 Petrol vapour recovery during refuelling of motor vehicles at service stations - Part 2: Test methods for verification of vapour recovery systems at service stations.
Available from a range of Standards providers including:
https://www.document-center.com/standards/show/EN-16321-2
DIRECTIVE 2014/99/EU of 21 October 2014 amending, for the purposes of its adaptation to technical progress, Directive 2009/126/EC on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations
http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=URISERV:ev0020&from=EN
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0099&from=EN

Other standards and test methods

Verein Deutscher Ingenieure (The Association of German Engineers) (VDI)
The following VDI Stage 2 vapour recovery equipment standard test methods are available in English at http://www.vdi.eu/engineering/vdi-standards/vdi-standards-details/?tx_wmdbvdirilisearch_pi1%5BsearchKey%5D=4205&tx_wmdbvdirilisearch_pi1%5Bmode%5D=1&tx_wmdbvdirilisearch_pi1%5BsingleSearch%5D=1:
VDI 4205: Measurement and test methods for the assessment of vapour recovery systems on filling stations:

- Part 1 – Fundamentals (as adopted July 2003)
- Part 2 – Wet method (as adopted July 2003)
- Part 3 – Dry method (as adopted November 2003)
- Part 4 – Measurement and test methods for the assessment of vapour recovery systems on filling stations: System test for active vapour recovery systems (as adopted August 2005)
- Part 5 – Measurement and test methods for the assessment of vapour recovery systems on filling stations: System test of automatic monitoring systems of active vapour recovery systems (as adopted September 2006).

German Federal Ordinance
Twentieth Ordinance of the Implementation of the Federal Immission Control Act (Ordinance on the Limitation of Hydrocarbon Emissions Resulting from the Fuelling of Motor Vehicles – 20, BImSch V) of May 1998.
Twenty-first Ordinance of the Implementation of the Federal Immission Control Act (Ordinance on the Limitation of Hydrocarbon Emissions Resulting from the Fuelling of Motor Vehicles – 21, BImSch V) of October 1992.

California Air Resources Board (CARB)
The following CARB vapour recovery certification and test procedures are available at http://www.arb.ca.gov/testmeth/vol2/currentprocedures.htm

- CP-201: Certification Procedure for Vapor Recovery Systems at Dispensing Facilities (as adopted 23 April 2015)
- TP-201.1E: Vapor Recovery Test Procedure for Leak Rate and Cracking Pressure of Pressure/Vacuum Valves (as adopted 8 October 2003)

- TP-201.2: Vapor Recovery Test Procedure for Efficiency and Emission Factor for Phase II Systems (as adopted 26 July 2012)
- TP-201.3: Vapor Recovery Test Procedure: Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities (as adopted 26 July 2012)
- TP-201.3A: Vapor Recovery Test Procedure: Determination of 5 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities (as adopted 12 April 1996)

References and further reading

Australian Standards

AS 1940:2004 The storage and handling of flammable and combustible liquids
AS 3000:2007 Electrical installations
AS 3800:2012 Electrical equipment for explosive atmospheres
AS 4897:2008 The design, installation and operation of underground petroleum storage systems
AS 2381.1:2008 Electrical equipment for explosive gas atmospheres – selection, installation and maintenance
AS 2229:2004 Fuel dispensing equipment for explosive atmospheres

Other relevant documents

NSW *Work Health and Safety Act 2011*
http://www.workcover.nsw.gov.au/newlegislation2012/Pages/default.aspx
WC01354 Workcover 2005, Storage and handling of dangerous goods: Code of practice. http://www.workcover.nsw.gov.au/__data/assets/pdf_file/0019/17074/storage-handling-dangerous-goods-1354.pdf
EPA 2008, *Guidelines for implementing the POEO (Underground Petrol Storage Systems) Regulation 2008*, visit http://www.epa.nsw.gov.au/clm/upssguidelines.htm
NOHSC:2017 (2001), National Occupational Health and Safety Commission 2001, *National code of practice for the storage and handling of workplace dangerous goods*, visit http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/cp2001storageandhanding
Information on the European Union petrol vapour recovery requirements

http://ec.europa.eu/environment/air/transport/petrol.htm

Directive 2009/126/EC of the European Parliament and of the Council on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations

http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009L0126&from=EN

Appendix 3: Collated regulatory requirements

Stage 1 vapour recovery prescribed control equipment

Table A3.1 sets out the prescribed control equipment for Stage 1 vapour recovery.

Table A3.1: Prescribed control equipment for Stage 1 vapour recovery

Equipment	Specification	Regulation reference
vapour transfer system	Trucks used to supply petrol to petrol service stations must be equipped with vapour return lines to which the petrol service station vapour transfer system is connected.	**subclause 69(1)(a)**
coupling for the vapour return line	A coupling on the vapour return line that makes a vapour-tight connection with the vapour return hose on the delivery tank and that closes automatically when disconnected	**subclause 69(1)(b)**
fill pipe	A submerged fill pipe that terminates below the lowest point of any suction inlet used for the pumping of petrol out of the storage tank	**subclause 69(1)(c)**
overfill prevention device	A new petrol service station must have an overfill prevention device installed in the tank fill piping or a supply system that slows delivery of petrol into the storage tank to prevent overfilling.	**subclause 69(1)(d)(i)**
	If the overfill prevention device is electrically powered or contains electronic components, the overfill prevention device must meet the following standards: • it must be constructed in accordance with relevant safety and electrical standards • it must be installed in accordance with relevant safety and electrical standards.	**subclause 69(1)(d)(ii)**
storage tank overfill protection	Storage tank overfill protection, comprising a float vent valve positioned: • above the highest point of any overfill prevention device when in the closed position • so the valve shuts off the flow into the storage tank at the level advised by the manufacturer of the storage tank or, if no level is advised, at 95% of the storage tank's capacity.	**subclause 69(1)(e)**
connection points and seals	Spill containment enclosures for all storage tank fill connection points.	**subclause 69(1)(f)**
	A coupling on the storage tank's fill pipe that makes a liquid-tight connection with the delivery tank's liquid transfer hose	**subclause 69(1)(g)**
	Secure seals on connection points of tank filling pipes and vapour return pipes that minimise vapour leaks when those pipes are not in active use	**subclause 69(1)(h)**
	Secure seals for the apertures for the use of a dipstick, if dip hatches are provided on the storage tank	**subclause 69(1)(i)**
incompatible fittings	Fittings on the petrol delivery lines and hoses must be incompatible with the fittings on the vapour return lines and hoses so as to prevent misconnection or the accidental discharge of liquid petrol into the vapour return lines or pipes	**subclause 69(1)(j)**
storage tank vent pipe	A pressure vacuum valve and a 10 millimetre orifice fitted to the storage tank vent pipe. Similar devices are permitted where they can be shown by an accepted certifying agency to achieve the same requirements.	**subclause 69(1)(k)**
	Pressure vacuum relief valves must achieve the following:	

Equipment	Specification	Regulation reference

	The settings criteria are:
	the device must be of a size and weight to allow an emergency release of vapours at not more than 80% of maximum tank design pressure
	• the device must be of a type that:
	  ○ is certified by the manufacturer as conforming with any applicable standards published by Standards Australia, European Standards, British Standards or United States Underwriters Laboratories (UL) and
	  ○ is certified by the manufacturer as meeting the pressure specifications and total leak rates set out at sections 3.5.1 and 3.5.2 of the California Environmental Protection Agency Air Resources Board Vapour Recovery Certification Procedure CP201 of January 9, 2013.
	• is of a size and type and possesses the safety features that a duly qualified person has advised is suitable.
	• is installed in accordance with the advice of a duly qualified person
		subclause 69(1)(k)(i)
		subclause 69(1)(k)(ii)
		subclause 69(1)(k)(iii)
		69(1)(k)(i)

	A 'duly qualified person' means a person who has such competence and experience in relation to the activity as is recognised in the relevant industry as appropriate to carry out that activity.	**clause 59**
	Where a device similar to a 10-millimetre orifice is to be used in the vent line, it must have certification from a testing authority accepted by the EPA that it retains 97% of vapour in the proposed system.	**subclause 69(1)(k)**
	Where a device similar to a pressure vacuum valve is used, it must have settings that can provide emergency relief of excessive pressure or vacuum and vent a sufficient volume flow rate to prevent exceedences of maximum tank design pressure/vacuum under adverse conditions. When the device is in the closed position, it must provide a seal against leakage with the same performance as that included in the CARB TP201.1E leak test. The device must be certified the manufacturer.	**subclause 69(1)(k)**
vapour processing unit	Where a storage tank is fitted with a vapour processing unit, it must, before commissioning: • be certified by the manufacturer as having a hydrocarbon capture efficiency of at least 97%, and be certified by the manufacturer as conforming with any applicable standards published by Standards Australia, European Standards, British Standards or United States Underwriters Laboratories	**subclause 69(1)(l)**

Stage 2 vapour recovery prescribed control equipment

Table A3.2 sets out the prescribed control equipment for Stage 2 vapour recovery.

Table A3.2: Prescribed control equipment for Stage 2 vapour recovery

Equipment	Specification	Regulation reference

vapour recovery system	A vapour recovery system is to be fitted to the petrol dispenser. Before commissioning, the vapour recovery system must be certified by the manufacturer as being of the following type and hydrocarbon capture efficiency:
	• Type: a Stage 2 vapour recovery system certified by the manufacturer in accordance with:
	  ○ EN 16321-1:2013 Petrol Vapour Recovery During Refuelling of Motor Vehicles at Service Stations - Part 1: Test Methods for the Type Approval Efficiency Assessment of Petrol Vapour Recovery Systems (or equivalent standard)
	  ○ the provisions of Ordinance on the Limitation of Hydrocarbon Emission Resulting from the Fuelling of Motor Vehicles – 21, BImSchV (section 3, paragraph 6)
	• Hydrocarbon capture efficiency: a hydrocarbon capture efficiency of not less than 85% vapour recovery to liquid dispensed by volume as measured using a test for active vapour recovery systems in EN 16321-1:2013 Petrol Vapour Recovery During Refuelling Of Motor Vehicles At Service Stations – Part 1: Test Methods For The Type Approval Efficiency Assessment Of Petrol Vapour Recovery Systems (or equivalent standard); or in VDI specification 4205 (see Appendix 2).
	• The certification obtained must certify that the Stage 2 vapour recovery system achieves 85% vapour recovery and must specify the test used.
		subclause 72(a)

	Is installed in accordance with the manufacturer's specifications by a duly qualified person.	subclause 72(b)
	Before commissioning, is tested by a duly qualified person in the manner specified in section 5.4.1.	subclause 72(c)
	A duly qualified person means a person who has such competence and experience in relation to the activity as is recognised in the relevant industry as appropriate to carry out that activity.	clause 59
automatic monitoring system (mandatory for petrol stations with an annual throughput of more than 7 million litres)	The automatic monitoring system must be certified by the manufacturer in accordance with the provisions of Ordinance on the Limitation of Hydrocarbon Emission Resulting from the Fuelling of Motor Vehicles – 21, BImSch V (section 3, clause 5) [2002] with the exception that the number of days until the automatic system shuts off the flow is to be seven days. The test procedure for demonstrating the correct function of the automatic monitoring system is VDI specification 4205. Automatic monitoring systems must provide a visual indication of the operational status of each fuelling point.	subclause 74(1)

Log book requirements

Any relevant information relating to the prescribed control equipment or its installation, necessary for its correct and efficient operation and management, must be recorded in a log book.

Clause 77 (3) requires the following items to be recorded or stored in the log book:

- the name, address and contact details of the person with overall responsibility for the petrol service station vapour recovery system
- a description of the installed prescribed control equipment, including types, serial numbers (if any) and the manufacturer's or supplier's equipment certificates
- the name and address of the person with overall responsibility for installing and commissioning the vapour recovery system
- a description of the testing of the operation of the prescribed control equipment including the type of test, all test results and the name and address of the person with overall responsibility for carrying out the test
- details of repairs and maintenance
- weekly check results for manual monitoring
- a description of any incidences involving faults with or malfunction of the vapour recovery system and the measures taken to investigate and respond to the incident
- the date of the last report to the EPA.

Details of anything done prior to commencement of the amended Regulation do not need to be recorded. The records need to be kept for three years, even if the petrol service station is decommissioned.