Environmental Protection Authority
Te Mana Rauhī Taiao

Below Ground Stationary Container Systems for Petroleum - Operation

HSNOCOP 45

May 2012

APPROVED CODE OF PRACTICE

UNDER THE HAZARDOUS SUBSTANCES AND NEW ORGANISMS (HSNO) ACT 1996

New Zealand Government

Preface

This code of practice HSNOCOP 45 Below Ground Stationary Container Systems For Petroleum – Operation, May 2012 is approved by the Environmental Protection Authority (EPA) as a code of practice pursuant to Sections 78 and 79 of the Hazardous Substances and New Organisms Act (HSNO Act). It is confirmed that the requirements of Sections 78 and 79 have been met.

This publication is approved a means of compliance with clauses 40, 73(3)(b)(iii), 86(1)(a)(i),86(1)(b)(i)and 86(2) of Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004.

Approval of the code is limited to those matters in the document that relate to legislative requirements under the HSNO Act and its regulations

The intended publication date in the Gazette for the Notice of Approval of this Code of Practice is 24th May 2012.

Pursuant to Section 80 (1) (a) of the HSNO Act, a copy of the code may be inspected at the Wellington office of the EPA.

Pursuant to Section 80 (1) (b) of the Act, a copy of the code is available from the EPA website www.epa.govt.nz.

Approved this 21st May 2012.

Rob Forlong

Chief Executive

Environmental Protection Authority

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1 The HSNO Act and the Place of Codes of Practice

The HSNO Act and the regulations made under that act are largely performance based; that is they specify a desired outcome without prescribing how to achieve it. They do not require that a single specific means be used to comply with any regulation and this allows for variations in method.

The HSNO Act, as well as the regulations and transfer notices made under that act provide for codes of practice approved by the Environmental Protection Authority to identify acceptable solutions to comply with the specified regulatory requirements. An approved code of practice provides users with a method of meeting the control requirements with a degree of prescription and assistance.

The purpose of this approved code of practice is to provide a means of operation of below ground stationary container systems for petroleum in order to minimise the possibility of substance releases.

The Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended) and other applicable regulatory controls made under the Hazardous Substances and New Organisms Act 1996 specify requirements for below ground stationary container systems for petroleum.

This publication is approved a means of compliance with clauses 40, 73(3)(b)(iii), 86(1)(a)(i),86(1)(b)(i)and 86(2) of Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004.

1. Summary

The handling of petroleum products involves risk. The hazardous nature of the substances handled and the serious potential consequences of system failure require industries to be accomplished in the management of risk to avoid system failure.

One of the first principles in handling hydrocarbon fuels is to keep the substance within the primary containment system. The principle concern is to engineer, maintain and operate the system to ensure that at all times the substance is contained. The consequences of system failure may then be regarded as the result of exceptional circumstances rather than a hazard associated with normal operation.

The system is to be designed, installed and operated so that the possibility of a substance release into the ground is minimized by:

- A high standard of engineering and installation reflecting currently available and proven technology, and
- The application of regular detailed inventory control so that any product loss will be detected at the earliest stage, and
- A secondary containment system, and
- Prompt physical leak detection, and
- Immediate and appropriate response to substance release

Specifically, the above is accomplished by:

- Careful selection of materials used, and
- Overfill protection, and
- Spill containment for the fill points, and
- Strict supervision and control of installation standards and procedures, and
- Use of trained contractors, and
- Inventory control records maintained and available for inspection, and
- Verification of system integrity:
  - At manufacture, by tank testing, and
  - During installation, by tank testing and line testing, and
  - During operation, by interstitial space testing, monitoring of inventory levels, monitoring of sumps, tank and line testing and by regular confirmation of any supplementary systems.

2. Application of this Code

2.1. Scope

This Code applies to the operation of below ground stationary container systems for petroleum substances, such as automotive, aviation fuels, industrial fuels and solvents, with flammable hazard classifications 3.1A, 3.1B, 3.1C or 3.1D.

This Code applies to systems installed after the date of approval of this Code, designed and constructed in accordance with HSNOCOP 44. It may also be applied to systems that were installed prior to the date of approval of this Code provided they are designed and constructed in a manner that is similar in principle to HSNOCOP 44.

Requirements for below ground stationary container systems constructed prior to 1 April 2004 are in the approved code of practice *HSNOCOP 13-2 Management of Existing Stationary Container Systems up to 60,000 litres Capacity* but the daily management of them may be undertaken in accordance with the provisions of this code.

2.2. Application

Those choosing to use this Code as their means of compliance shall operate, inspect, test, repair, maintain, decommission and dispose of their below ground stationary container system for petroleum in accordance with this Code.

Compliance with this Code does not obviate the requirement to comply with other obligations of the HSNO Act, or other legislation such as the Health and Safety in Employment Act 1992 and the Resource Management Act 1991.

This Code is not limited to any specific industry type. It is applicable to service stations, industrial applications, emergency fuel supplies etc.

The operation, inspection, testing, repair and maintenance of below ground stationary container systems for petroleum must be undertaken by competent persons who have been trained for the specific tasks they undertake. This Code cannot serve as an instruction manual for untrained operators.

Section 16 Change of Ownership or Use is not a requirement of the HSNO Act. It has been included for guidance.

2.3. Limits of this Code

This Code does not apply to:

1. Structures such as sumps, separators, storm water or wastewater collection systems.
2. Pipework that is not connected to a below ground stationary tank, and pipework on wharves and jetties even where it originates from an underground tank.
3. Stationary container systems for hydrocarbon substances with a class 2 hazard classification i.e. Liquefied Petroleum Gas (LPG), liquefied natural gases (LNG) or compressed natural gas (CNG).

This code does not include design and installation of the stationary container system. This is referenced in the code of practice *HSNOCOP 44 Below Ground Stationary Container Systems for Petroleum – Design and Installation.*

2.4. Further guidance

The operation of below ground stationary container systems, and in particular those for the storage and dispensing of fuels, are referenced in relevant standards and codes. Further guidance may be sought from the publications in Appendix A of this Code.

2.5. Terminology

For users of this Code, the terms “shall” and “must” have the meaning that the provision is mandatory. The term “should” has the meaning that the provision is a recommendation and therefore is advisory.

The terms “normative” and “informative” have been used in this Code to define the application of the appendix to which they apply. A “normative” appendix is an integral part of this Code, whereas an “informative” appendix is for information and guidance.

2.6. Checklists

Checklists are included in the appendices to assist the person in charge with meeting the requirements of this Code.

3. Definitions

Where any term used is not defined in this section, the meaning of that term shall be as defined by Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended). Where there is a conflict in the meaning of a term the definition in the Transfer Notice shall prevail.

As-built drawings means the drawings that represent the system post construction and which show the dimensions, and location of all elements of the completed works.

Below ground stationary tank means a below ground stationary tank as defined by the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (As Amended) that is capable of storing hydrocarbon substances.

Code means this approved code of practice for Below Ground Stationary Container Systems for Petroleum – Operation.

EPA means the Environmental Protection Authority.

Emergency response plan has the meaning given to it by Hazardous Substances (Emergency Management) Regulations 2001. It is a single plan which includes information for foreseeable emergencies and the actions to be taken, identifies persons responsible for taking particular actions, contact details for emergency service providers, how to obtain information about the hazardous substances, location and purpose of equipment to manage the emergency.

Hazardous atmosphere zone is a three dimensional area in which an explosive atmosphere is present or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of potential ignition sources. The hazardous atmosphere zone is established in accordance with the requirements of Regulation 58 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001.

Hazardous substance location has the meaning given to it by Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001. In relation to a class 3 substance this:

a. means an area where an amount of the substance that is in excess of the threshold quantity is located for more than—

   i. 18 hours, in the case of a substance that is not subject to the tracking provisions of the Hazardous Substances (Tracking) Regulations 2001, or

   ii. 2 hours, in the case of a substance subject to the tracking provisions of those regulations:

b. does not include a vehicle, ship, or aircraft while it remains under the direct control of its driver, master, or pilot and under the jurisdiction of the Land Transport Rules, the Maritime Rules, or the Civil Aviation Rules, as the case may be.

Location test certificate means a test certificate for the location where the hazardous substance is present in accordance with the provisions of Regulation 81 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001.

Monitoring Well means a well installed at a distance from a below ground stationary container system for petroleum that is used to detect and monitor any loss of hydrocarbons from the system.

Observation Well means a well installed within the excavation for a below ground stationary container system for petroleum that is used to detect any loss of hydrocarbons from the system.

Person in charge has the meaning given in Regulation 3 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001. As used in this code of practice it is the person who, at the relevant time, is in effective control or possession of the below ground stationary container system for petroleum. This person could be the owner, operator, lessee or sub lessee of the site or stationary container system.

Relevant Authority means the organisation(s) including the authority which has statutory control, or an obligation to control any aspect of a below ground stationary container system for petroleum

Secondary containment system means the systems referred to in Hazardous Substances (Emergency Management) Regulations 2001 i.e. means a system or systems:

a. in which pooling substances held in the place will be contained if they escape from the container or containers in which they are being held; and

b. from which they can, subject to unavoidable wastage, be recovered.

Site means that portion of the property at which the stationary container system is located and which may reasonably be considered to be associated with the stationary container system and the operation thereof.

Stationary container system has the meaning given to it by clause 2, Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended); that is the whole system used for below ground storage of hydrocarbon substances comprising below ground stationary tanks, secondary containment, all associated pipe work, fittings, vents, fill points and dispensing equipment.

Test certifier means a person who has been approved to issue a test certificate in accordance with the requirements of sections 83 and 84 of the Hazardous Substances and New Organisms Act 1996.

Transfer Notice means the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004.

4. Responsibilities

The engagement of skilled professional persons is a vital factor to ensure the stationary container system is compliant, certifiable and that failures are avoided. The ability to recognize and react to unexpected, abnormal conditions requires experience as well as skill.

Experience has shown that poor workmanship causes failures. To ensure that high standards are achieved, only engage contractors who are knowledgeable and capable in the type of work required. Persons taking action under this Code must be competent and have relevant training and experience of these systems. They must have:

- theoretical and practical knowledge, and
- practical experience, and
- relevant qualifications, certificates and licences, and
- knowledge of this Code, and
- knowledge of Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended)

Methods of gaining these competencies may include attendance at courses offered by suppliers (e.g. tank fabricators and pipeline suppliers) and working in conjunction with persons who are already competent in this field.

There shall be a person in charge who is responsible for ensuring that the hazardous substances under their control are correctly managed and that the environment and health and safety of people are not adversely affected. The specific requirements are detailed throughout the hazardous substances regulations. The person in charge must ensure that the relevant test certificates required by the Hazardous Substances and New Organisms Act are in place. At the time installation works or maintenance are undertaken, the impact of these activities must be taken into account.

5. Drawings and Specifications

Drawings and specifications should be available for all components of a below ground stationary container system for petroleum. They form part of the "Records" described in section 13 of this Code.

The drawings shall detail:

- the site, adequately describing the property,
- the size and location of the stationary tanks and substances they store,
- the location of the pumps, piping, protection systems and cabling,
- areas of high intensity land use and areas of low intensity land use,
- hazardous substance locations

5.1. As-Built Drawings

As-built drawings of below ground stationary container systems for petroleum, supplemented by photographs taken during construction should be retained to show all relevant details and dimensions including the:

- Location and size of all stationary tanks, including any decommissioned stationary tanks;
- Location and size of all piping, valves, pumps and dispensers;
- Pump to stationary tank interconnections including the location of pipework connections to the stationary tanks;
- Substance stored in each stationary tank;
- Location of all electrical conduits, wiring and all below ground services within or adjacent to the area occupied by a below ground stationary container system for petroleum;
- Location and details of any observation and/or monitoring wells;
- Details of any cathodic protection system provided, including locations of anodes;
- Date the installation was commissioned;
- Date of any modification or relocation:
- Equipment and fittings

These drawings should be updated whenever there are any alterations or repairs.

5.2. Site Plan

In addition to the above drawings, site plans should be retained to indicate in relation to a below ground stationary container system for petroleum:

- Site legal boundaries.
- Hazardous atmosphere zones
- Buildings
- Other stationary tanks

- Storage areas containing any hazardous substances
- Secondary containment systems for stationary tanks
- Fire protection systems including any fire walls and vapour barriers
- Fill points and vents and vapour recovery
- Pumps, pipe runs and dispensing equipment
- Observation wells
- Below ground services..

The site plan should include the proximity of any environmentally sensitive areas.

Each stationary tank shall be identified with its size, the contained substance and the fill point(s) and dispensing equipment to which it is connected.

The site plan should include its date of preparation and the drawing scale.

The site plan should be updated whenever there is any alteration, repair or relocation of a below ground stationary container system for petroleum.

5.3. Photographs

Photographs provide a good record and should be taken if any repairs or alterations are made. For items that are underground they provide a valuable record and are frequently the only means of identifying items without excavation.

6. Safety of Works

6.1. General

All work shall be carried out so that all persons are safe; it shall be performed in accordance with all statutory regulations, including the Health and Safety in Employment Act, pertaining to safe work practices.

Particular care must be taken on sites that continue in operation whilst work is being carried out. Equipment, materials and work processes shall be organised so that all persons on the site are safe.

6.2. Permits

All work shall be carried out in accordance with all applicable statutory requirements whether or not they require a permit to be issued.

6.3. Safety of Personnel

All work shall be carried out in accordance with the requirements of the Health and Safety in Employment Act and regulations made under that Act as well as the HSNO Act and regulations made under that Act.

6.4. Safety of Third Parties

All practicable steps shall be taken to ensure that the operation of below ground stationary container systems does not compromise the safety of other parties such as customers, staff or the general public.

6.5. Safe Handling of Petroleum Substances

Brief notes of general safety precautions are covered in Appendix C. Refer to the relevant Safety Data Sheet (SDS) for further information.

6.6. Hazardous Atmosphere Zones

Petroleum substances can emit flammable vapours. Electrical and sparking equipment can be a source of ignition and can ignite these vapours. Hence where petroleum substances are stored, the location and boundaries of hazardous atmosphere zones must be established in accordance with AS/NZS 60079.10 and any activities or equipment used in these zones must be compatible with the zonal classification.

7. Stationary Tanks

7.1. Typical Installation of Tanks

Typical configurations of tank installations including ancillary systems are shown in figures 8.1(1), 8.1(2), 8.1(3) and 8.1(4).

7.2. Secondary Containment

Secondary containment systems are intended to retain any liquids released from the primary container. They must be monitored to determine whether there is any leakage from the primary container or into the secondary container from outside.

The principal form of secondary containment for a tank is a “double skin tank”, that is a tank with a secondary or outer skin. Whilst this Code is directed towards this form of construction, it may also be used for other forms of secondary containment systems such as a tank within a pit.

7.3. Observation Wells

Observation wells are typically installed where tanks are single skinned and located in a pit or located without secondary containment (tanks installed prior to 1 April 2004). They are installed within the excavation alongside the stationary tanks or groups of stationary tanks (Figure 8.1(2)). The toby box lid over the well is to be identified. Typically this is by a solid black marking in the form of an equilateral triangle having a 50 mm side on a pale background, a triangle cast in the lid or the words observation well cast in the lid.

The observation wells are typically located in diagonal corners of the excavation, the lowest point of tank excavation or, if the water gradient is known, at a down-gradient point.

Fig 8.1(1) Tank Installation (Typical)

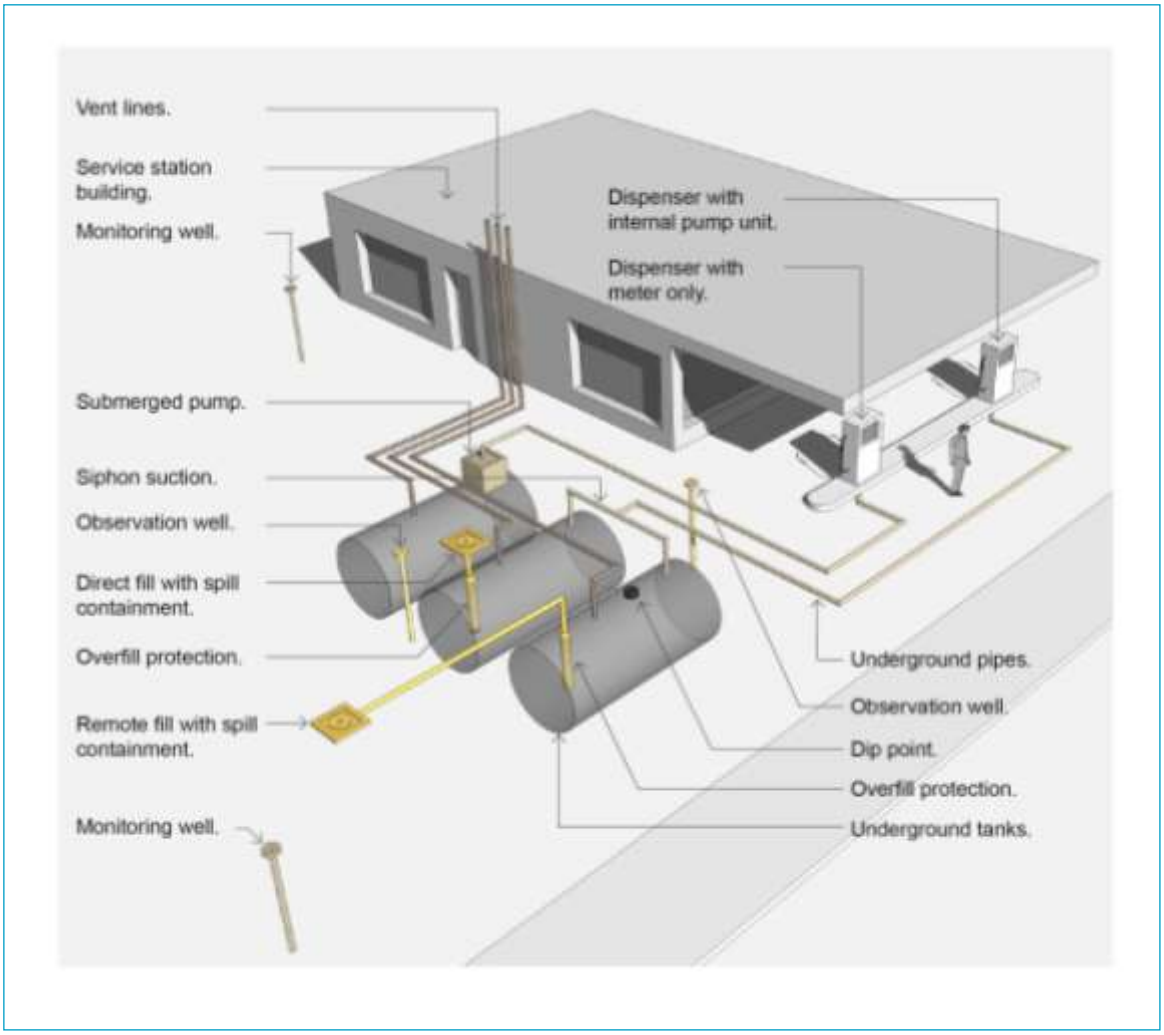


Fig 8.1(2) Observation Well (Typical)

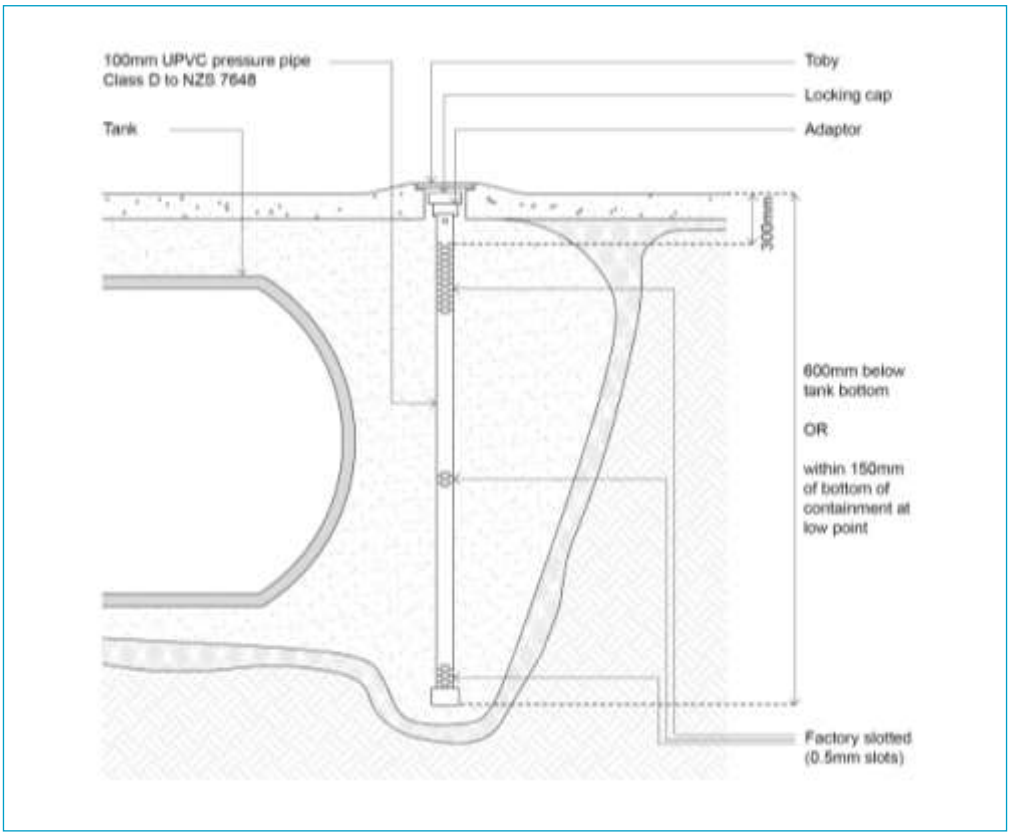


Fig 8.1(3) Double Skin Tank with Interstitial Monitor and Level Gauge

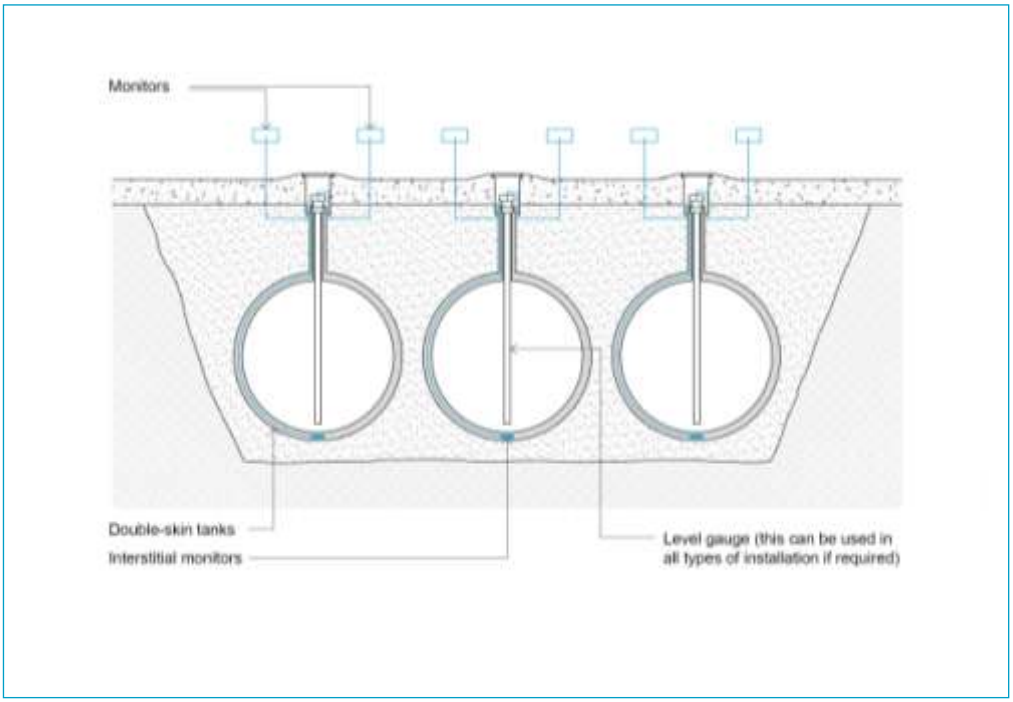
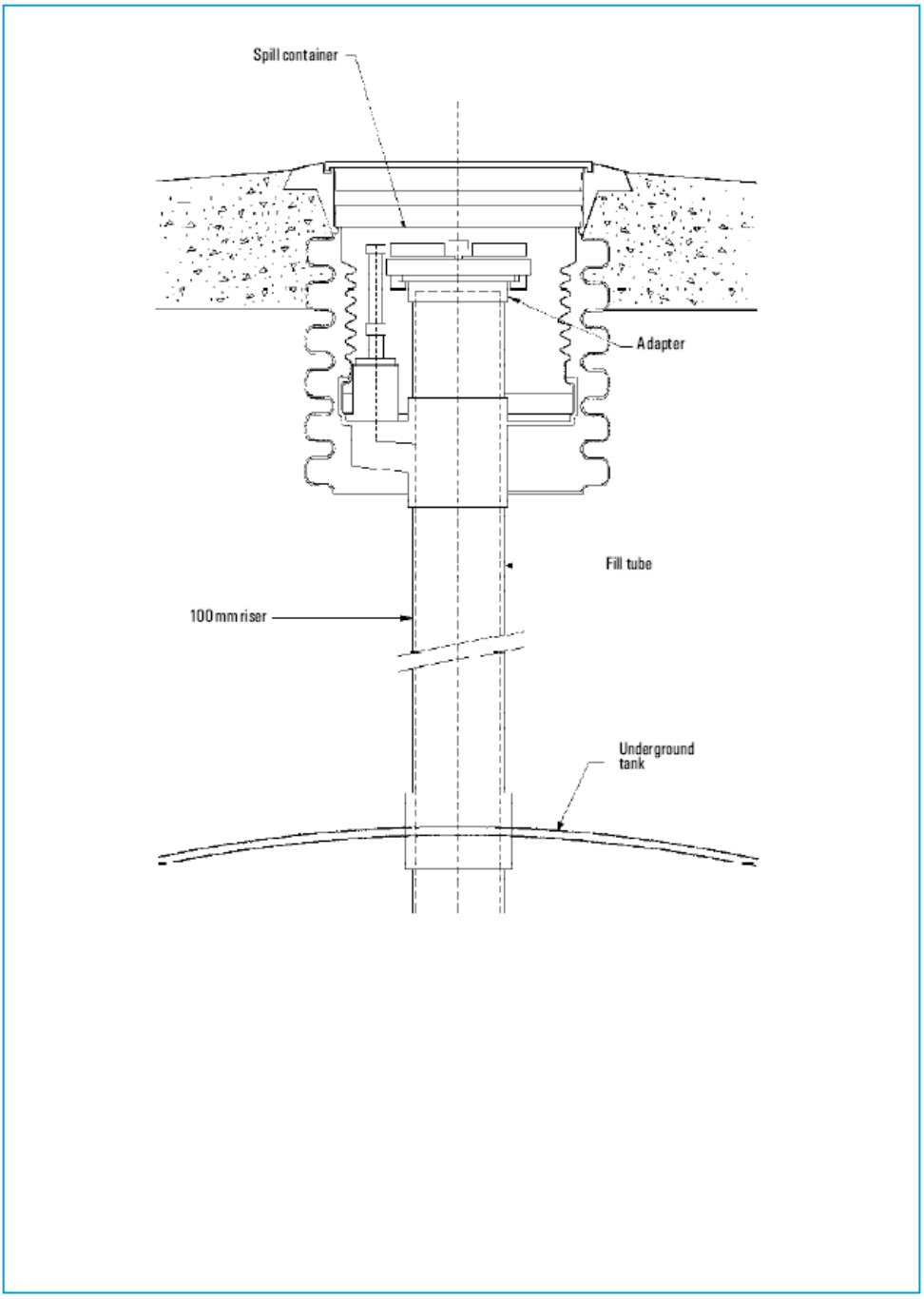


Fig 8.1(4) Spill container (Typical)



8. Operation

8.1. Inventory Control

The person in charge shall be responsible for ensuring that an inventory control system is established and maintained. Inventory control is an ongoing stock accounting system.

The system shall include a stock reconciliation process which covers sales, use, receipts and stock-on-hand together with monthly reviews of cumulative variances. The system shall comply with the principles described in Appendix D.

Any petroleum storage installation that has a properly administered inventory control system will display a regular pattern of stock variation particular to that installation.

Reconciliations outside of tolerance shall be investigated and remedial plans put in place.

8.2. Pressurised Pipelines

Pressurised pipelines shall have an automatic line leak detector. These may be mechanical or electronic devices. They shall conform to the US EPA requirement for such devices and be able to detect a leak of 11.4 litres per hour (3 gallons per hour) at a line pressure of 69 kPa (10 psi).

Automatic line leak detectors must be checked for correct operation at least annually.

8.3. Leak Detection

8.3.1. General

Leak monitoring is additional to inventory control. The person in charge shall ensure a system is provided that can detect a leak from any portion of the tank, pipework and secondary containment system. The principal form of leak monitoring is monitoring of the interstitial space for “double skin” tanks and monitoring of the secondary containment for pressurised pipework. For single skin tanks within a pit, the low point in the pit where an observation well is located is to be monitored. This enables the integrity of both the primary container and its secondary containment system to be verified.

The results are to be recorded. If any water or petroleum is detected, this must be investigated to determine the cause.

If there is an installed system with sensors, checks such as self diagnostic checks must be performed at least annually to verify the integrity of the system.

The principles of leak monitoring include:

Component	Monitoring provisions
Tank/secondary containment	Monitor interstitial space. Alternatives may be quiet period monitoring or statistical inventory reconciliations, in which case periodic monitoring of the interstitial space should still be undertaken annually.
Suction pipework	Safe suction does not require the pipeline to be monitored
Pressure pipework	Pipework must be monitored
Vent, vapour and fill lines	Not required to be monitored
Pump/dispenser sumps	Monitor the sump

8.3.2. Interstitial Monitoring

Monitoring systems for the interstitial space of below ground tanks and below ground pressurised pipelines shall detect possible leaks in both the inner and outer walls of the tank and pipeline.

Typical methods of monitoring the interstitial space of a below ground tank include:

- a dipstick in the interstitial space.
- sensing the liquid level in an interstitial space that has been filled with a non hazardous liquid under hydrostatic pressure.
- automated sensing of vapour or liquid.
- sensing the pressure/vacuum in the interstitial space.

Typical details for an interstitial tank monitoring system utilizing a non hazardous liquid in the interstitial space are included in Appendix F.

The system must be at least capable of meeting the US EPA criteria of a precision tank test. These require that a system be capable of detecting a leak as small as 0.76 litres per hour with a 99.9% probability of detection and less than 1.2% probability of a false alarm.

The different systems commercially available require different procedures, for example the sumps which the secondary containment of pressurised pipework drain to may be equipped with sensors that provide an immediate alarm (preferred). In the absence of such sensors, the monitoring must be undertaken no less frequently than:

- quarterly on a busy site and
- six monthly on other sites, or
- annually for those sites that have:
    - intermittent use such as stationary tanks supplying stand by generators or
    - seasonal use such as stationary tanks supplying burners used for seasonal heating.

If the site was constructed prior to 1 April 2004 and consists of a single skin tank equipped with an observation well, this well must be monitored no less frequently than the above.

When interstitial monitoring of double skin tanks or pipework utilizes a calibrated instrument, it shall include an annual inspection program to ensure that:

- the system is active, and
- the measurements are within the accuracy of the manufacturers tolerances, and
- the measurements are recorded, and
- any losses outside the manufacturer's tolerance are reported to the person in charge.

8.3.3. Quiet Period Monitoring

Quite period monitoring occurs where stationary tanks equipped with an electronic sensing system, such as an automatic tank gauging system, continually monitors the tank during quiet periods.

The system must be capable of detecting a leak as small as 0.76 litres per hour with a 99.9% probability of detection and less than 1.2% probability of a false alarm.

8.3.4. Pressurised Pipework

Pressurised pipework requires a substance release detection method that is in addition to an automatic line leak detector. This may include (non exclusive):

- Interstitial monitoring (preferred)
- Statistical inventory control
- Electronic leak monitoring
- Vapour monitoring

8.3.5. Non pressurised pipework

Suction lines and delivery lines that are below ground do not require leak detection provided:

- The suction line operates at less than atmospheric pressure
- The delivery line is supplied by gravity only
- The pipework is sloped so that the contents drain into the below ground tank. In the case of suction lines this can only occur when suction is released.
- Only one check valve is included in the suction line and it is located directly below and as close as possible to the suction.

If the pipeline does not meet these criteria it must have leak monitoring. This may include (non exclusive):

- Monitoring a secondary containment barrier (preferred),
- Statistical inventory control
- Piping tightness test every three years.

8.3.6. Pump/dispenser sumps

Options for monitoring the pump/dispenser sumps include:

- Dipstick
- Float sensor
- Visual inspection.

As these can only be inspected by removal of the pump/dispenser panels, they should be inspected at each pump/dispenser service.

8.3.7. Statistical Inventory Reconciliations

If Statistical inventory reconciliation (SIR) is used as a leak monitoring system, it must:

- comply with a method that is certified by the SIR equipment supplier as meeting the requirements of US EPA/530/UST-90/007, or an equivalent standard in terms of protection to the environment, human health and safety
- be calibrated and commissioned such that it is capable of detecting a leak of 0.76 litre/hour, with a probability of detection at least 0.95 and a probability of false detection no greater than 0.05
- be operated in compliance with the SIR equipment manufacturer's written instructions, and
- be conducted at least monthly.

8.4. Equipment Checks

In addition to inventory control, the components of a below ground stationary container system for petroleum should be regularly checked.

Above ground pumps and dispensers should be visually inspected weekly for signs of substance loss. A small leakage may thus be corrected before it becomes of sufficient magnitude to create an inventory shortage.

Hesitation in the delivery from a pump may indicate a leak in the suction piping.

Stationary tanks should be checked for the presence of water. This may not necessarily be due to leakage but it is nevertheless a most undesirable situation. Water should be removed as soon as practicable and the cause of water ingress investigated.

Regular inspections should be made to ensure the elements of the stationary container system are in sound condition. A checklist of items that should be inspected is included in Appendix E of this Code.

8.4.1. Automatic Shut-off Valves:

Emergency automatic shut-off valves shall be tested at least annually.

8.5. Observation and Monitoring Wells

Where observation and monitoring wells are installed they should be arranged to enable prompt confirmation of any suspected leakage. The number of wells required depends upon site conditions.

For both types of well, the well liner must terminate in a secure cap designed so that it is impossible to connect a hose coupling to the well. The wells must be clearly marked.

It must be possible for a well to be readily examined at any time by the person in charge or the relevant authority. Should a leak be suspected, the wells shall be inspected and records kept of the test results and any consequential remedial action.

A bailer, low flow pump or portable gas analyzer may be required to detect the presence of fuel or vapour.

8.5.1. Observation Wells

Observation wells are used to check for loss into the tank pit.

8.5.2. Monitoring Wells

Monitoring wells may be used to monitor the ground water table for water-borne hydrocarbons in the general area of below ground stationary container systems for petroleum. They are suitable as a back-up only and must be used in conjunction with other leak monitoring systems.

8.6. Automatic Line Leak Detectors

These may be mechanical or electronic devices and they shall be suitable for use with pressurized pipelines. They shall conform to the US EPA requirement for such devices and be able to detect a leak of 11.4 litres per hour (3 gallons per hour) at a line pressure of 69 kPa (10 psi).

Line-leak detectors must be installed on all pressurized below ground pipelines, including those with secondary containment. Leak detectors must be checked for correct operation at least annually.

8.7. Automatic Tank Gauges (ATG)

Automatic tank gauges (ATG) are an acceptable alternative to using a dipstick for purposes of inventory control provided they have sufficient accuracy and repeatability. They consist of a probe permanently installed in the tank connected to a monitor to provide information on the level of the contained liquid. These systems measure the changes in product volume. Output data may be manually recorded for inventory control purposes or the system may be integrated with the pump/dispenser meters to provide automatic calculation of changes in product volume.

The requirements of the US EPA for any system used for leak detection is for it to be able to detect a leak of 0.76 litres per hour with a 99.9 percent probability of detection, and less than a 1.2 percent probability of a false alarm. In order for automatic tank gauges to be used as an alternative to a dipstick, they must meet these criteria. They should be periodically reconciled with a dipstick to ensure they remain within calibration.

The manufacturer's instruction and specifications should be consulted to ensure the automatic tank gauge is appropriate to the specific installation and is correctly installed, programmed and calibrated.

Ensure that the Ex safety rating for electrical equipment is maintained, and the tank gauge is installed in accordance with regulatory requirements and the manufacturer's instructions. Where an earth is required, this must be installed.

8.8. Response to Substance Release

Below ground stationary container systems for petroleum shall be operated so that the likelihood of a substance release is minimised. Notwithstanding this, a response plan must be in place so that if a release occurs, its effect will be minimised by prompt and appropriate action.

The response plan shall have a procedure for dealing with substance release and should include the following steps:

- Assess the situation.
- If possible, stop the release at source.
- Isolate the area and if necessary close the site.
- Isolate ignition sources.
- If there is a fire or spillage that cannot be controlled on the site, call the Fire Service.
- Report the release to the relevant authorities.
- Respond to any emergencies.
- Contain any release where possible.
- Assess the degree of contamination.
- Do not reopen a site until it is safe to do so and appropriate authorities have given the all clear.
- Clean up the released substance.

Decide on corrective action in conjunction with the regulatory authorities and the owner.

8.9. Filling a below ground stationary tank

Below ground stationary tanks shall not be filled with a hazardous liquid to a level that exceeds its safe fill capacity.

8.9.1. Filling from a tank wagon

Below ground stationary tanks must not be filled with a hazardous liquid of class 3.1A or 3.1B from any tank wagon other than a refuelling unit except by gravity and through a line having all connections gas tight and liquid tight unless –

(a) Another means of delivery had been approved under regulation 17 of the Dangerous Goods (Class 3 – Flammable Liquids) Regulations 1985; or

(b) The tank is filled in accordance with a code of practice approved by the EPA.

9. Substance Loss Investigation

9.1. General

Losses will usually become apparent due to inventory variation. The following steps should be undertaken:

- Review the site reconciliation data to ensure the calculations are correct, including meter returns, re-dipping of tanks, meter readings in comparison to point of sale data.
- If this review does not identify the loss, then undertake a site investigation that shall include:
  - Equipment checks
  - Meter checks
  - Interstitial space (tank and pipework)
  - Observation wells (where fitted)
  - Monitoring wells (where fitted)
  - Leak detection systems
  - Sumps
  - Interceptor/drainage
  - Delivery verification

If a physical loss is confirmed, then undertake a full environmental investigation to determine the extent and nature of the loss together with a remedial action plan.

9.2. Inventory Check

A common cause of an apparent shortage of inventory is error in the calculation of stock on hand. Calculation errors can be minimized by installing an electronic data capture and recording system. Inventory records should be carefully reviewed to ensure that the discrepancy has not been caused by record keeping error. If no error in the records is found, an independent calculation of apparent loss should be made by an experienced person, starting from the point where the records indicate satisfactory results.

The objectives of the audit should be:

- To confirm an actual substance loss or reconcile an apparent loss.
- To prescribe improvements to inventory control procedures appropriate for the site in question.
- To prescribe appropriate improvements to substance security measures at the site.

If the audit does confirm a substance shortage, and adequate inventory control procedures are in place, the audit should indicate, which individual stationary tank, or group of siphon-connected stationary tanks, is the likely source of loss.

9.3. Meter Calibration Checks

The most common causes of substance shortage are associated with meters and totalisators.

The first step after confirming that an apparent inventory shortage is not the result of accounting error is to have an experienced person check the calibration of all the meters on the site. Should this check show that meters are inaccurate; a person competent in maintenance and calibration of these systems should carry out an adjustment and calibration.

9.4. Dispenser Leakage Checks

The dispenser cover panels should be removed and the area below each dispenser inspected for signs of obvious leakage. If leakage is detected, the dispenser shall be taken out of service and locked, and a person competent in the maintenance of dispensers shall carry out repairs.

9.5. Delivery Checks

Another possible cause of substance shortage is that the amount of substance actually delivered to the site is less than the amount invoiced.

A check should be made that the amount invoiced has in fact been delivered. If this does not correspond, the recipient should take the necessary measures to reconcile the difference.

10. Pipework Testing

10.1. Testing Pipework

10.1.1. Pressure/vacuum test

Pressure/vacuum testing of pipework is undertaken when the stationary container system is being installed. It is not normally required during the operation of the system but must be undertaken when a site is re-commissioned after being out of service.

All testing must be undertaken by a competent person[1].

10.1.2. Distribution Pipelines:

Pressurised pipework must be tested in accordance with the specifications of the supplier or otherwise at 150% of the working pressure, whichever is the greater. In all cases the test pressure must not be less than 400 kPa gauge.

Non-pressurised pipework must be tested in accordance with the specifications of the supplier or otherwise at a pressure not less than 35 kPa gauge, whichever is the greater.

Pipework secondary containment is to be tested in accordance with the manufacturer's instructions. Typically the pressures are 25 kPa or 70 kPa gauge.

During testing, the stationary tanks shall be isolated from their pipework and vented so that they are not subject to the test pressure.

The valve or plug in the underside of the secondary containment is to be removed so that any leakage into the secondary containment can be readily detected.

In service pipework may be tested with the contained substance in the line, unless a leak is suspected, in which case, the lines should be tested with an inert gas such as nitrogen. Otherwise there is a risk of product loss beyond the system.

10.1.3. Fill and Vent Lines:

Fill and vent pipework shall be tested in accordance with the specifications of the supplier or otherwise at a pressure not less than 35 kPa gauge.

In service pipework may be tested with the contained substance in the line, unless a leak is suspected, in which case, the lines should be tested with an inert gas such as nitrogen. Otherwise there is a risk of product loss beyond the system.

During testing the stationary tanks shall be isolated from their fill and vent lines so that they are not subject to the test pressure.

[1] A person who is skilled and experienced in this activity.

10.1.4. Test Records:

The person in charge or their nominee shall record all the test procedures used for testing and the results of all tests.

Records of testing of pipework system shall be kept in accordance with the requirements of section 13.

10.2. Automatic Leak Detection and Interstitial Monitoring

All below ground pressurised piping shall have automatic leak detection systems in accordance with the design standard and section 8.6 of this Code, as well as interstitial monitoring in accordance with the design standard and Section 8.3.2 of this Code.

10.3. Test Procedures for Pipelines

10.3.1. Test procedure for pipeline where the primary pipe can be soaped (i.e. exposed by excavation)

Attach a pressure gauge to the pipe system. Raise the pressure in the pipe to the test pressure and hold for at least one hour. Apply a soap solution to all fittings and joints and inspect for any leaks as indicated by the formation of bubbles.

During this testing, pipework pressure is to be monitored. Check for any leaks by a fall in pressure. Any loss of pressure indicated by the pressure gauge is to be investigated.

10.3.2. Test procedure for primary pipe where the primary pipe cannot be soaped.

Attach a pressure gauge to the primary pipe. Where secondary containment is fitted ensure the interstice is sealed and install a pressure gauge to monitor the pressure in the interstitial space. Raise the pressure in the primary pipe to the test pressure and hold for at least one hour.

A leak is indicated if:

- the pressure falls in the primary pipe, or
- where secondary containment is fitted, the pressure rises in the interstitial space.

Any leak indication is to be recorded and investigated.

10.3.3. Test procedure for secondary containment of pipelines

Attach a pressure gauge to the interstitial space. Raise the pressure in the interstitial space to the test pressure and hold for at least one hour.

A leak is indicated if:

- the pressure falls in the primary pipe, or
- the pressure falls in the interstitial space.

Any leak indication is to be recorded and investigated.

The test pressure is to be that prescribed by the manufacturer. This is typically 70 kPa but may be 35 kPa where flexible termination fittings are used or flexible secondary containment is used.

11. Cathodic Protection

11.1. General

The majority of below ground stationary container systems constructed after 1 April 2004 do not require cathodic protection. However some of these may have cathodic protection and many older systems may have cathodic protection. The cathodic protection systems must be maintained.

This section is provided for information and reference for those circumstances where cathodic protection is installed.

11.2. Corrosion Protection

The cathodic protection system, sacrificial anode or impressed current, installed must be suitable for the individual installation, taking into account:

- the number of stationary tanks to be protected;
- the length of pipework requiring protection;
- soil resistivity
- other corrosive characteristics of the soil; and
- presence of stray currents

11.3. Testing and Monitoring

Periodic testing shall be carried out, on cathodic protection systems to confirm that they are functioning correctly and that corrosion protection is being given.

Should any testing reveal the need for remedial work (such as additional anodes), the system shall be upgraded without delay and periodic testing and monitoring recommenced.

For sacrificial anode systems, annual checks shall be carried out.

For impressed current systems, quarterly checks of the rectifiers must be made to verify that the units are operational. Annual surveys of the system must also be carried out to ensure continued satisfactory operation.

Cathodic protection systems must have permanent test points to facilitate the testing.

11.4. Isolation

The components being protected by a cathodic protection system must be electrically isolated from components to which they are physically connected and for which cathodic protection is not intended. Isolating bushes must be installed at the connection between pipework and pumps, and special care taken to maintain isolation where such equipment as submersible pumps or electronic contents gauges are used.

Where cathodic protection systems are in use, a protected below ground stationary container system shall be isolated from electrical earth. A minimum of 300 mm separation must be maintained between protected stationary container system components and other metal conduits on the site. Where this 300 mm separation cannot be achieved, suitable insulating material must be placed between protected and unprotected items so that the current path between is at least 300 mm. Where shielding insulation is used, anode positions should be reviewed and adjusted if necessary.

11.5. Records

Cathodic protection system records shall include readings obtained during commissioning tests. These records shall also include readings taken during normal operation so that any need for remedial work may be immediately recognised during periodic testing of the system.

Records must also include the results of periodic testing and details of any remedial works carried out.

Records of cathodic protection system testing shall be kept in accordance with the requirements of section 13.

11.6. Practitioners

Site tests, installation works, commissioning and monitoring tests shall be carried out by or under the direct supervision of a competent person[2].

[2] A person skilled and experienced in corrosion control of buried metallic equipment.

12. Leak Testing

12.1. General

Leak testing of stationary tanks and pipework must be carried out prior to commissioning of the site. Once a below ground stationary container system for petroleum is in use, a leak test may be necessary when the systematic checks have been completed and there is the possibility of a leak from stationary tanks or pipework. Experience with substance loss investigation has shown system leakage to be the least likely cause.

Free substance suddenly appearing in trenches, drains, etc., near a below ground stationary container system for petroleum does not necessarily indicate stationary tank leakage. Such incidents may be the result of accidental spillage during delivery. An immediate check of deliveries should be made, the time of the last delivery determined, enquiries made and quantities reconciled. These checks should be carried out within four hours of the substance being detected, by which time all free substance should have been recovered and a determination made as to whether further substance is continuing to appear. When this fails to suggest an explanation for the substance release, a leak test may need to be arranged.

Where there is substance shortage and all the above possibilities have been investigated, the stationary tank(s) involved, together with associated pipework, must be tested for any leakage.

Where leakage is detected, the stationary tank and pipework system shall be tested and either repaired or removed from service if it is found to be leaking.

Refer also to Section 10 Substance Loss Investigation.

12.2. Leak testing procedure for Tanks in Service

Leak testing should be undertaken by personnel competent[3] in this particular field using proven equipment and processes. Leak testing procedures are not casual operations and are not able to be successfully undertaken by persons who are inexperienced in this activity.

Leak testing procedures test the below ground tank together with the related pipelines.

The testing procedure for the stationary tank typically entails drawing a vacuum or introducing a slight pressure and monitoring the tank with transducers/ hydrophones/water sensors.

The testing procedure for pipelines typically uses calibrated equipment with the pipeline under pressure. The extent of pressure is dependent upon the nature of the pipeline.

During the process all apertures i.e. the fill and vent and dip fittings will need to be securely capped.

A stationary tank that is found to be leaking shall be immediately emptied and removed from service unless the leak can be rectified (for example sealing a tank top fitting).

[3] A person who has been trained in leak testing procedures and who is experienced in this activity.

12.3. Records

Records of any leak testing that has been undertaken shall be retained as specified in section 14 of this Code.

13. Records

13.1. General

The following records shall be maintained by the person in charge and shall be readily available for inspection.

13.1.1. As-built drawings

The “as-built” drawings and photographs.

13.1.2. Site lay-out drawing

The site layout drawing.

13.1.3. Equipment List

Record details of installed equipment.

These records are to include:

Equipment Item	Details Required
Below Ground tanks	Material, manufacturer, capacity, installer, serial number, fuel.
Below Ground Piping	Material, manufacturer, sizes, installer
Above Ground piping	Material, manufacturer, sizes, installer
Vents	Size, manufacturer, catalogue no.
Dispensers	Manufacturer, type, fuel being dispensed, serial number. EPA Register approval number if for retail sale.
Dipstick	Capacity (in litres)
Pumps (if separate from dispensers)	Manufacturer, type, fuel being dispensed, serial number
Tank Gauging	Manufacturer, type, fuel being dispensed, serial number
Cathodic Protection	Manufacturer, type
Over fill protection	Manufacturer, type
Interceptor	Manufacturer, type, capacity
Earthing/Bonding	Installer

13.1.4. Secondary Containment Systems

Details of the secondary containment systems, including photographs

13.1.5. Records of Tests

13.1.5.1. Backfill

The certificate for the material used for backfilling around the stationary tank and pipework.

13.1.5.2. Leak tests

The records of all stationary tank and pipework tests carried out at the time of installation and any subsequent tests.

13.1.5.3. Cathodic protection tests:

The results of the commissioning tests and ongoing routine tests of the cathodic protection system.

13.1.6. Observation Wells

The location of observation wells and the results of any observations.

13.1.7. History of any Substance Releases

Records of any substance release that has occurred.

13.1.8. Repairs

Details of any repair work that has been carried out to the stationary tanks and associated pipework

13.1.9. Inventory control

Records of inventory control and stock reconciliation

13.1.10. Recommended inclusions

It is recommended that records include:

- the direction of groundwater flow (if known).
- the proximity of any environmentally sensitive areas, including the distance to any surface water bodies or potable water within 100 metres.
- the location of monitoring wells.
- Consents or permits relating to the stationary container system, including details of conditions

13.2. Retention period

Records of initial installation are to be retained for the lifetime of the stationary tank and records of periodic tests, periodic inspections, inventory control and stock reconciliation are to be retained for at least 2 years.

14. Marking

14.1. General

The markings on the stationary tank and pipework must be maintained and renewed as often as necessary to ensure they are legible.

14.2. Stationary Tank

The markings on the stationary tank and pipework must be maintained and renewed as often as necessary to ensure they are legible. These markings include:

- The specification to which the tank was designed
- The date on which the tank was manufactured
- The materials used in the construction of the tank
- The name or mark as well as the address of the fabricator
- The maximum and minimum design pressure of the tank
- The maximum and minimum design temperature of the tank
- The maximum permitted density of any liquid that may be contained in the tank
- The maximum safe fill level of the tank and the capacity of the tank
- A unique identifier that links the stationary tank to its records and test certificate.

14.3. Pipework and Fill Points

Fill points and above ground pipes such as vent pipe risers must be permanently marked. A marker secured by a cable tie to the vent pipe is not considered to be a permanent marker.

The marking at the fill point shall identify the substance.

15. Change of Ownership or Use

15.1. General

When a below ground stationary container system for petroleum changes ownership, both the vendor and the purchaser of the system should ensure that the environment and their interests are protected regarding the potential for petroleum hydrocarbon contamination.

The vendor and purchaser should agree an integrity test programme to prove that all components are leak-tight. This should be undertaken within 30 days prior to the transfer of ownership. If any leaks are detected, they must be repaired and proved leak-tight, or the below ground stationary container system must be removed. In addition, the site should be examined for petroleum hydrocarbon contamination. If contamination is found, the Relevant Authority[4] must be informed.

15.2. Site Assessment

15.2.1. Stationary tank and Pipework Integrity Test:

Stationary tanks and pipework should be tested by the methods detailed in this Code or other equivalent test methods. Where practicable, the purchaser of the system should be given the opportunity to witness the testing.

15.2.2. Presence of Contamination:

Where a stationary container system is being sold as an operating facility, bore holes should be excavated to allow the collection of representative soil samples. Groundwater monitoring wells should be installed for the purpose of collecting groundwater samples. The environmental assessment should be completed in accordance with the relevant Ministry for the Environment Guidelines.

Samples of soil should be analysed by an accredited testing laboratory for the presence of petroleum hydrocarbon, and the results recorded.

A soil test should be carried out upon change of ownership of a below ground stationary container system for petroleum and on the removal of an existing below ground stationary tank.

15.3. Site Records

The vendor of the below ground stationary container system for petroleum must pass on to the new owner, at the time of sale, all available site records described in Section 13 of this Code.

[4] The authority which has jurisdiction.

16. Compliance

16.1. Inspection and Enforcement

Responsibility for the relevant inspection and enforcement under the HSNO Act is as follows:

- Inspection and certification is conducted by independent test certifiers approved by the EPA. A register of these test certifiers is on the EPA website at http://www.epa.govt.nz/search-databases/Pages/testcertifiers-search.aspx
- Enforcement in workplaces is carried out by the Department of Labour.

16.2. Certification

The person in charge must ensure that all test certificates are obtained and are current. This includes stationary container system test certificates and where relevant, a location test certificate. No person shall put a hazardous substance into a stationary container system unless the stationary container system is issued with a test certificate by an approved test certifier

16.3. Location Test Certificate

To obtain a location test certificate for a new below ground stationary container system for petroleum the information provided to the test certifier will need to include evidence that:

1. At least thirty days notice has been given to an enforcement officer of the Department of Labour advising that the site containing the stationary container system is to be commissioned.
2. An approved handler is available on the site, unless the site is for diesel.
3. All substances in the stationary tanks are secure and can only be accessed by authorised persons using the appropriate keys or tools in the locks securing access.
4. The location and boundaries of all hazardous atmosphere zones and controlled zones have been established and detailed on the site plan.
5. Any electrical equipment within hazardous atmosphere zones complies with the Electricity Regulations and be able to demonstrate by inspection that there are no other ignition sources present within hazardous atmosphere zones.
6. All fill points and vents on the below ground stationary container system for petroleum are separated from any LPG stationary storage stationary tanks or, other storage stationary tanks for class 2.1.1 gases, by not less than 6 metres.
7. All site signage is in place.
8. Unless it is an unattended dispensing station, there are at least two fire extinguishers located within 30 metres of the stationary container system. These must have a capacity of at least 30B.

9. An emergency response plan has been prepared, made available to all affected persons and tested at appropriate times.
10. Secondary containment for the stationary container system has been provided.
11. Relevant site plans and drawings have been prepared including:
    a. A drawing showing the relationship between the hazardous substance locations and the site legal boundaries.
    b. A drawing showing the hazardous atmosphere zones.
    c. A drawing plan showing the controlled zones.

16.4. Stationary Container System Test Certificate

In order to achieve this certification, the test certifier is required to be assured of the integrity of the system. This includes:

1. stationary tanks
2. pipework and vents
3. secondary containment; and
4. dispensers.

In order to achieve this, the test certifier should be involved for the duration of the installation project. The test certifier should be involved no later than completion of the construction drawings.

There are several checkpoints during the installation process and the test certifier may require to be directly involved at these points or may require information to be provided from a competent person. Typical checkpoints include:

- completion of design
- checking a tank prior to installation in the ground
- anchoring/hold down arrangements of a tank
- checking the tank in ground prior to being covered up
- seeing the bedding material, compaction and back fill provided about the tank, particularly in the region indicated by 5:00 to 7:00 o'clock about tank
- pipework prior to being covered over
- pressure held in pipework for the duration of the installation
- vents and fill points
- concrete
- dispensers and above ground equipment, and
- as built drawings.

16.4.1. Validity of Stationary Container System Test Certificate

All parts of the below ground stationary container system must be maintained in a manner that ensures they continue to meet the approvals, standards and codes they are designed, constructed and installed to. This includes repairs, inspections and tests.

The test certificate becomes invalid if:

- Repairs or alterations (other than minor repairs or alterations) are carried; or
- The tank is relocated; or
- Reconstructed, or
- There is a change in service, or
- Where there is a cathodic protection system fitted, this cathodic protection system no longer provides effective protection from corrosion, or
- The tank coating system no longer provides effective protection from corrosion, or
- There is evidence that the tank is leaking.

16.4.2. Maintenance

All parts of the stationary container system must be maintained in a manner that ensures they continue to meet the approvals, standards and codes they are designed, constructed and installed to. This includes repairs, inspections and tests.

17. Disused Stationary Tanks

Any below ground stationary container system that has not been in use for three months must be decommissioned and removed. Where a tank is not able to be removed, or it is intended to re-commission the tank at a later date, an application can be made to the EPA to leave the tank in the ground.

The decommissioning process shall ensure that the disused stationary container system is safe and will not be an environmental hazard.

Sites of decommissioned systems should be checked for residual contamination as per clause 15.2.

Where one or more stationary tanks forming part of a stationary container system are to be taken out of service, the stationary tank and connected pipework shall be removed from the system unless the EPA agrees that it may remain in place until the entire system is decommissioned.

An application form is available from the EPA website www.epa.govt.nz.

Stationary tank and pipework decommissioning and removal must be carried out in accordance with applicable statutory requirements, this Code, and accepted standards of industry practice.

Care must be taken to ensure that any potential for escape of hydrocarbon vapours or liquid is eliminated or, if this is not practicable, minimised and contained. Any escape of hydrocarbons is to be isolated from potential sources of ignition and from ground or surface waters.

17.1. Disused tanks on farms

While the preferred action is to remove disused below ground stationary tanks, small tanks may be left on farms, due to the remoteness of the locations, minimal activities in the immediate vicinity and the costs of removal. In this situation, the tanks are to be emptied and must comply with the code of practice HSNOCOP 19-1 *Disused Below Ground Stationary Tanks on Farms*.

17.2. Removal Process

17.2.1. Precautions

The following precautions should, as appropriate for a particular site, be taken when removing below ground equipment:

- erect barriers around the work site
- display “No Smoking/Flammable Atmosphere” signs
- ensure no sources of ignition within 15 metres, or as otherwise determined
- slope or shore sides of excavation if deemed necessary
- minimise amount of equipment moving on site
- do not disturb any equipment that is to remain in place

- avoid undermining driveways, foundations, etc.
- be aware that contaminated backfill can be a fire and an environmental hazard
- no welding or cutting of the tank is to be undertaken, and
- no entry into the tank is to be made.

See also Appendix C: Safe Handling of Petroleum Substances.

17.2.2. Removal of liquid

Remove as much liquid as practicable from the stationary tank. Pumping equipment used shall be flameproof or air-powered. Sludge is not removable, particularly where there are no manholes, and may remain in the bottom of the tank. If there is still substance in the stationary tank when the pumping equipment can recover no more, a thief pump shall be used to remove as much of the remaining substance as is practicable.

Pump motors and suction hoses shall be bonded to the stationary tank or otherwise grounded to prevent the accumulation of static electricity.

17.2.3. Excavation

Excavate to the top of the stationary tank.

17.2.4. Removal of piping

Disconnect and drain all pipe connections, and remove all piping. Where it is not practicable to remove piping it shall be drained and filled with grout.

17.2.5. Removal of fittings

All removable fittings shall be removed from the stationary tank and all opening, except for the vent opening, shall be securely plugged. The vent opening shall have a vent fitted. In the case of tanks that have contained a class 3.1A, 3.1B or 3.1C substance, the vent shall be fitted a brass wire gauze of at least 500 microns and be an updraft vent that complies with the requirements of Code of Practice HSNOCOP 44 *Below ground stationary container systems for petroleum – design & installation.* As an alternative to this, the tank may be inerted with nitrogen and a pressure/vacuum vent fitted.

17.2.6. Removal of tank

Excavate not less than two sides of the stationary tank. Remove it from the ground by lifting on the lifting lugs if sound, or by means of suitable strops passed under the stationary tank. Take particular care not to rupture the stationary tank.

The excavation shall be backfilled to surface level.

17.2.7. Labelling of tank

The stationary tank shall be clearly labelled, on the ends and sides, in letters at least 50 mm high with the following notice:

THIS STATIONARY TANK HAS CONTAINED LEADED PETROL*
IT IS NOT GAS FREE
NO HOT WORK TO BE ATTEMPTED ON THIS STATIONARY TANK UNTIL IT HAS BEEN CERTIFIED GAS FREE.
STATIONARY TANK: NOT SUITABLE FOR STORAGE OF FOOD OR LIQUID FOR HUMAN OR ANIMAL CONSUMPTION

*Where other flammable liquids have been stored, use the applicable designation of the fuel that has been contained in the tank, e.g. DIESEL.

In addition, the stationary tank shall be labelled in at least two clearly visible places adjacent to the above warning with the standard Class 3 hazardous substance diamond label (400 mm x 400 mm).

17.2.8. Transportation

The tank shall be transported the same day from the site to a secure location[5]. The transportation shall be undertaken in accordance with *Underground Petroleum Storage Tanks and Related Wastes – Code for Transportation and Disposal of*.

17.2.9. Records

The location of the decommissioned stationary tank and pipework, and the reason for it being taken out of service, shall be recorded on the “as-built” drawings of the stationary container system.

17.3. Contamination checklist

Refer to the checklist Removal of Petroleum Underground Storage Tanks available on the Ministry for the Environment website:
www.mfe.govt.nz/publications/hazardous/checklist-rem-apr01.pdf

17.4. Storage of Used Stationary tanks

Used below ground stationary tanks shall be stored in a secure location to which access of persons is restricted and which is in accordance with the *Underground Petroleum Storage tanks and Related Wastes - Code of Practice for the Transportation and Disposal of* issued by the Department of Labour.

[5] A location that has controlled access.

17.5. Re-Use of Stationary tanks

If a used below ground stationary tank is removed and sold, the person in charge shall report to the purchaser in writing on the condition and former use of the stationary tank.

When a below ground stationary tank is to be removed and intended to be re-used, it is required to fully comply with current design, construction and installation requirements. New stationary container test certificate is required.

Hence only stationary tanks which:

- are in full compliance with the current nominated design standard, and
- have been fully cleaned, and
- have no corrosion, softening or other damage, and
- have been checked for thickness and have no areas with a thickness of less than 100% of the original thickness, and
- have been tested, and
- have been refurbished and recoated to “as new” condition, and
- have been re-issued with a test certificate by a test certifier, and
- are structurally sound,

may possibly be suitable for re-use as below ground stationary tanks.

17.6. Disposal

A stationary tank shall be taken to a tank disposal facility that is in compliance with the code Underground Petroleum Storage Tanks and Related Wastes – Code for Transportation and Disposal of.

The tank shall be made gas free and rendered unusable prior to its disposal as scrap.

A notice as detailed in Appendix B of this Code should be used to transfer responsibility of the stationary tank to the tank disposal facility.

Appendix A: References and sources of information

(Normative)

References

Hazardous Substances and New Organisms Act 1996

Hazardous Substances (Emergency Management) Regulations 2001

Hazardous Substances (Classes 1 to 5) Controls Regulations 2001

Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended).

Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand (available from MfE website http://www.mfe.govt.nz/publications/)

Underground Petroleum Storage Tanks and Related Wastes – Code for Transportation and Disposal of (available from the Department of Labour website http://www.osh.govt.nz/order/catalogue/index.shtml)

PEI/RP100 - 05 *Recommended Practices for Installation of Underground Liquid Storage Systems* (refer Petroleum Equipment Institute http://www.pei.org)

UL 971 *Nonmetallic Underground Piping for Flammable Liquids*

HSNOCOP 13 Code of Practice for the *Management of Existing Stationary Container Systems up to 60,000 litres Capacity.*

HSNOCOP 19 Code of Practice for *Disused Below Ground Stationary Tanks on Farms*

HSNOCOP 44 Code of Practice for *Below Ground Stationary Container Systems for Petroleum – Design and Installation*

Code of practice for the design, installation and operation of underground petroleum storage systems. Department of Labour, (1992),

Underground Petroleum Storage Tanks and Related Wastes – Code for Transportation and Disposal of. Department of Labour (1995).

Sources of information

The acts and regulations referred to in this Code are available at:
www.legislation.govt.nz

The Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice referred to in this Code is available on the EPA web site at:
http://www.epa.govt.nz/Publications/Transfer-Notice-35-2004.pdf
The group standards are available on the EPA web site at:
http://www.epa.govt.nz/hazardous-substances/approvals/group-standards/Pages/default.aspx

HSNOCOP 13, HSNOCOP 19 and HSNOCOP 44 are available from the EPA website at http://www.epa.govt.nz/publications-resources/publications/codes-of-practice/Pages/Completed-codes-of-practice.aspx

A register of test certifiers can be found on the EPA website at:

http://www.epa.govt.nz/search-databases/Pages/testcertifiers-search.aspx

Further Information on hazardous substances is available on the EPA website at:

http://www.epa.govt.nz/hazardous-substances/Pages/default.aspx or

call the Hazardous Substances Compliance Line: 0800 376 234; or

contact the EPA at:

PO Box 131, Wellington
Tel: 04 916 2426
Email: hsinfo@epa.govt.nz
Website: http://www.epa.govt.nz

You may also contact the Department of Labour at:
Tel: 0800 20 90 20
Contacts: http://www.dol.govt.nz/contact/index.asp

Appendix B: Stationary tank disposal notice and acceptance

(Informative)

Specific consideration is to be given to the circumstances of each case.

TO:

LOCATION:

STATIONARY TANK DESCRIPTION:

We advise you that this stationary tank has held a hazardous substance of hazard Class 3.1 and is liable to contain flammable liquid or vapour. The stationary tank has not been cleaned of such liquid or vapour by steaming or any other approved process.

This equipment may have or may still contain sludge. This sludge must be considered hazardous and may still contain leaded sludge. The equipment shall not be used for the storage of drinking water or foodstuffs.

Furthermore, as the new owner of this stationary tank, you must take notice that the following clauses of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substance) Transfer Notice 2004 (as amended). These extracts are included for informative purposes only - it is your responsibility as the new owner to comply with all statutory requirements.

Clause 87 Test certificate becomes invalid if below ground stationary tank repaired, altered, relocated etc.

A test certificate issued under Part 19 in respect of a stationary container system that includes a below ground stationary tank used to store a hazardous liquid or a gas becomes invalid if-

a. In the case of a below ground stationary tank that is not subject to the Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999, the tank is repaired and altered; or

b. The tank is-
   i. Relocated; or
   ii. Reconstructed ……

Clause 91 Test Certificate required for certain installed stationary container systems

1. No person may put a hazardous substance into a stationary container system of the type specified in sub clause 2) unless the stationary container system is certified in accordance with clause 92.

2. The types of stationary container system are-
   a. A stationary container system that includes a stationary tank intended to contain a hazardous substance if the stationary tank-

      i. Is a below ground stationary tank; or…….

The above notice has been read, understood and accepted by me prior to taking delivery of the stationary tank and I acknowledge receipt of a copy of this notice.

Signed:

(Recipient)

Date:

Appendix C: Safe handling of petroleum substances

(Informative)

It is to be read in conjunction with the Safety Data Sheet of the stored substance.

1. General

All petroleum substances are hazardous. They can cause EXPLOSION or FIRE.

Most petroleum substances are TOXIC when not used with due care.

Reference must be made in the first instance to the Safety Data Sheet.

2. Fire and Explosion

All petroleum substances must be treated as being potentially explosive, even in small quantities.

Petrol, aviation gasoline and most solvents evaporate readily, producing an explosive mixture with air. Kerosene, aviation turbine fuel and the less volatile solvents can also produce explosive vapours, particularly in poorly ventilated areas. All substances can accumulate static electricity which may trigger an explosion — kerosene-type substances are particularly susceptible.

Automotive diesel, fuel oils and lubricating oils can produce explosive conditions if sprayed or heated, even over small areas.

3. Precautions against Fire and Explosion

Keep all SOURCES OF IGNITION away from petroleum substances and their vapour. Sources of ignition include:

- Matches, lighters and cigarettes, etc.
- Any flame or spark.
- Any non-flameproof electrical equipment, including switches, hand torches, electric radiators, vacuum cleaners, power tools and radios.
- Welding sets, leads, connections and hand-pieces.
- Gas welding torches.
- Motor vehicles and all internal combustion engines.
- Tools which can cause a spark if dropped, etc.
- Grinders.

Petroleum vapour is heavier than air and will readily collect in pits, drainage sumps, cellars, and any low areas. Small quantities of vapour can be quickly and safely dispersed by good and rapid ventilation.

- The presence or absence of petroleum vapour can be checked by a Vapour Tester
- Do not enter any stationary tank or pit that has contained or does contain petroleum substances unless it has first been tested and a safety certificate issued by a competent person
- Do not do any hot work (e.g. welding, gas cutting, grinding, drilling or power wire-brushing) on any stationary tank or container that still contains any substance or that has not been tested and certified gas free by a competent person.

- Do not transfer or pour petroleum substances from one container to another, without ensuring that both containers are fully earthed, and that an effective earthing connection is made between hose nozzle and receiving container before any transfer is started, and is maintained as long as the transfer continues.

4. Toxic Hazards

Petroleum vapour can quickly asphyxiate. At lower concentrations, they irritate the eyes and lungs, and may cause nausea, headache and depression.

Petroleum substances will irritate the eyes and skin and may cause dermatitis on prolonged or repeated contact.

In addition, petrols previously contained, and aviation gasoline may still contain, toxic lead compounds. Internal surfaces of stationary tanks which have contained these substances will be contaminated and must be treated as highly toxic, even after all of the substance has been removed.

5. Precautions against Toxic Hazards

- Avoid splashing, or any contact with the eyes or skin.
- Wear PVC gloves and boots, and cotton overalls. Wear goggles or face shield if splashing is possible.
- If clothing gets contaminated with substance, remove under a running shower.
- If eyes or skin contact occurs, treat as under First Aid Treatment on following page.

Notes for Physician

Administration of medicinal liquid paraffin may reduce absorption through the digestive tract. Gastric ravage should only be done after endotracheal intubation in view of the risk of aspiration which can cause serious chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated. Motor gasolines may contain lead compounds; however, the quantities involved are unimportant in the context of the treatment of acute gasoline poisoning.

6. Emergency action

Petroleum Spillage

If a spill occurs, extinguish all naked flames.

Shut down any other potential sources of ignition.

Ensure area is well ventilated.

Small Spill: Absorb spills in enclosed areas. Absorb outside spills using sand, earth, or a proprietary absorbent.

Large Spill: Contain and pump into storage.

Petroleum Fire

- Use dry powder, foam, B.C.F., or carbon dioxide extinguishers.
- Do not use water jets - these will spread the fire.

First Aid Treatment

Petroleum Substances Swallowed:

- Do not induce vomiting! The main hazard following accidental ingestion is aspiration of the liquid into the lungs, and children are more susceptible than adults.
- Give 250 mls (1/2 pint) of milk to drink; if not available, give water.
- SEND TO THE HOSPITAL IMMEDIATELY.

Eye Contact:

- Wash with copious amounts of water for at least 10 minutes.

Skin Contact:

- Drench the skin immediately with cold water.
- Remove contaminated clothing under a running shower and wash all contaminated skin with soap and water.

Inhalation:

- Move victim to fresh air.
- Keep the patient warm and at rest.
- If unconscious, place in the recovery position.
- If patient not breathing, give artificial respiration.
- Give cardiac massage if necessary.
- SEND TO THE HOSPITAL

Appendix D: Stock reconciliations

(Normative)

1. Stock reconciliation

Strict regular and systematic stock control is essential.

Reconciliations must be made no less frequently than:

- daily on a busy site and
- weekly on other sites, or
- monthly or a fill to fill basis for those sites that have:
  - intermittent use such as stationary tanks supplying stand by generators or
  - seasonal use such as stationary tanks supplying burners used for seasonal heating.

2. Main steps in accounting for stock:

1. Measure the substance quantity in each stationary tank at the frequencies above as well as before and after each delivery of substance to the site.
   Each stationary tank should have its own dipstick or gauge, calibrated for that stationary tank.
   Always check that the dipstick matches the stationary tank in which it is being used.
   If the stick is kept in the dip tube of the stationary tank first remove it, check the substance level indication, and wipe the stick dry at and around the liquid level.
   Lower the stick slowly and carefully into the dip tube. Do not plunge, it in as this may create a surge in the dip tube. Pause when the stick is within 50 mm of the bottom of the stationary tank to allow any surge to die down, then slowly lower the stick until it just touches the bottom of the stationary tank and withdraw it immediately.
   Read the liquid level and record it in a notebook.
   Wipe the stick dry at and around liquid level and repeat the measurement. Check that it agrees with the quantity recorded. If it does not agree, repeat the dip until a consistent result (within 1 to 2 mm on the stick) is achieved. Record this quantity.
   If you have difficulty reading the substance level on the stick, substance-finding paste may be smeared lightly on the face of the stick at and around the liquid level. This will give a clear “cut” on the stick.

2. Check how much water (if any) is in each stationary tank. Any water present will lie in the bottom of the stationary tank (motor fuels all float on water, which readily separates and sinks). It can only be identified by using a water-finding paste, which changes colour when immersed in water. Smear a little water-finding paste on the bottom 100 mm or so of the stick and lower it carefully into the stationary tank. Leave it in contact with the bottom of the stationary tank in accordance with the instructions for the water finding paste and withdraw.
   If you have a clear cut, record the quantity of water in the stationary tank. If you find an indication of water, but no clear cut, try again. If no water is indicated, record “nil”.
   Any significant amount of water should be removed from the stationary tank.

3. Check all dispensing equipment meter readings and record. Then check the readings again and make sure they agree with the recorded figures.

4. Enter the figures recorded in the appropriate spaces on the daily stock reconciliation form. Following the instructions on the form, calculate the overs (gains) or unders (losses) for the reconciliation period, taking into account any deliveries received, substance used in meter calibration and returned to the stationary tank, any meter replacements, and any other substance movement into or out of the stationary tank that might affect the result.

5. Transfer daily overs and unders to the Reconciliation Summary and keep the reconciliation graph up to date.

6. Maintain continuous review of the loss trend. If the trend indicates that losses are consistently in excess of 0.5 percent, you must investigate further. If you find a sudden large loss or gain, check your arithmetic. If the arithmetic is correct, check the stationary tank dips, and the delivery dockets that record the amounts delivered. If there is still a sudden large loss recorded, it may be theft or a major failure of stationary tank or, more probably, pipework. Are all stationary tank openings sealed and locked? Has there been any recent heavy traffic movement or construction work done in the vicinity of the stationary tank or pipework? If a stationary tank shows a consistent gain in water, it may be getting in via the stationary tank fittings. Check dip caps and both stationary tank-top and remote fill points to make sure that cap washers are seating properly, and that caps are tight. However, where the water gain is large and sudden, it may have been inadvertently delivered along with a substance delivery. If a water gain persists, investigate further. If there is a significant change in the normal pattern of losses and gains this should be investigated and resolved.

7. Typical reconciliation forms are attached.

8. Retain records.

3. Meter/Stationary tank Dip Reconciliation

Wait for a quieter time, e.g. for a service station when there are less customers on the forecourt, or the end of a shift when you may have extra personnel available.

1. Read meters and take stationary tank dips.

2. Enter the meter readings under the appropriate substance heading and add them down the column. The total of each column becomes the Total Closing Meters.

3. Refer to the previous day's reconciliation and take the Total Closing Meters amount and enter it in today's Total Opening Meters.

4. Any pump testing or meter alterations should be entered in the Meter Testing box. Supporting dockets should be attached.

5. Subtract Total Opening Meters and Meter Testing amounts from the Total Closing Meters. The balance should be entered in the Total Meter Sales box. Total Meter Sales is the actual amount of substance that has passed through the pumps.

6. Refer to the previous day's reconciliation and take the Total All Stationary tanks amount and enter it in today's Total Opening Dips.

7. Enter any deliveries received since the last reconciliation in the Today's Deliveries box. Add Total Opening Dips and Today's Deliveries together and enter this figure as the Sub Total.

8. Enter Total Meter Sales figure from above and subtract from the Sub Total. Calculated Closing Dips are the theoretical amounts that should be in the stationary tanks.

9. Enter today's stationary tank dip readings and the time the dips were recorded. Add them down the column and enter the figure in the Total All Stationary tanks box.

10. Enter Calculated Closing Dips amount from above and subtract from Total All Stationary tanks. Enter this amount in Today Over/ (Under) box. (If the figure is a negative, it is an under and should have brackets around it to indicate this.) Today Over/ (Under) is the difference between the amounts of fuel that should be in your stationary tanks compared with what is actually in your stationary tanks.

11. Refer to the previous day's reconciliation and take the Year to Date Over/ (Under) and add/subtract it to Today's Over/ (Under).
    Enter this figure in the Year to Date Over/ (Under) box.
    This is the total loss or gain year to date on your site for each substance.

4. Meter/Stationary tank Dip Reconciliation Form

Must be completed between 8 and 24 hours after each delivery or when a pump or the tote is changed. Meter testing, pump or tote changes should be supported by fitter's documentation.

Site **Date**

Time Dips Recorded:

(Important: Dips and meters must be read at the same time)

		Fuel Grade	Fuel Grade	Fuel Grade
Pump	1			
	2			
	3			
Meters	1			
	2			
	3			
	4			
	5			
	7			
Total Closing Meters				
less Total Opening Meters (These will be 'Total Closing Meters' from previous day's reconciliation)				
less Meter Testing (or any substance returned to stationary tanks)				
= Total Meter Sales				

CALCULATED STATIONARY TANK DIPS			
Total Opening Dips (These will be "Total All Stationary tanks from previous day's reconciliation)			
plus Today's Deliveries			
= Sub Total			
less Total Meter Sales (as above)			
= Calculated Closing Dips			

(What should be in the stationary tanks)			

ACTUAL STATIONARY TANK DIPS			
Stationary tank 1			
2			
3			
4			
Total all tanks for each fuel grade.			
less Calculated Closing Dips			
= Today's Over/(Under)			
= Year to Date Over/(Under) Combine previous day's "Year to Date" balance			

Note: Enter Water dip test beside stationary tank Number. Water dips must be taken at least weekly.

Prepared by:

5 Reconciliation Summary

This form should be updated each day in conjunction with the Meter/Stationary tank Dip Reconciliation form.

1. Enter the date, Total Meter Sales and Today Over/ (Under) figures from the reconciliation sheet.
2. At the end of each seven-day period, total each column and enter this amount in the Weekly Total box.
3. At the end of the month, add down the column each amount in the Weekly Total boxes, and enter this figure in the Monthly Total.
   Note: Remember that amounts appearing as an (under) are a negative amount, and should be subtracted.
4. At the end of each week, plot the Weekly Over/ (Under) Variance total figure on the graph at the appropriate place.

The resulting monthly graphs will provide an easy-to-see summary of the Overs/Unders for the site.

6. Reconciliation Graph

Substance Grade: Weekly Overs/Unders:

Site: Month:

More than 500						
500						
400						
300						
200						
100						
0						
-100						
-200						
-300						
-400						
-500						
Less than -500						
	Week 1	Week 2	Week 3	Week 4	Week 5	

Reconciliation Period

7. Reconciliation Summary Form - 96 Motor Gasoline

Site: Month:

Date	Daily Total Meter Sales	Daily Over (Under) Variance
Weekly Total		
Weekly Total		
Weekly Total		
Weekly Total		
Part Week Total		
Monthly Totals		

Stock Variance

Prepared by: Notified to:

Date:

Appendix E: Operation and maintenance

(Informative)

Owner/Operator Checklist

Action	Frequency
Fill point spill containment Check/empty any hazardous substance/water into container Store for appropriate waste disposal	Before and after tank fill
Inventory control Dip tanks Record dip measurements Reconcile	As per Appendix D clause 1
Investigate discrepancies	When discrepancies emanate
Leak detection Check and record	Best practice is monthly (busy site), and upon stock reconciliation discrepancy. Otherwise annually.
Stationary Tank vents Check for/remove blockages	Annually
Dip points for water If water present, remove	Monthly
Check tank pit observation wells If water present, use bailer to obtain sample If no water present but vapour is present, investigate for leaks	Best practice is monthly (busy site), and upon stock reconciliation discrepancy. Otherwise annually.
Monitoring wells Obtain sample and check for presence of hazardous substance If present, investigate for leaks	Upon stock reconciliation or interstitial space discrepancy
Dipstick Check for wear	Monthly
Dispensers Check calibration	Annually
Leak detection equipment Service	As per instructions of manufacturer.
Cathodic protection systems (if fitted) Service	At least annually

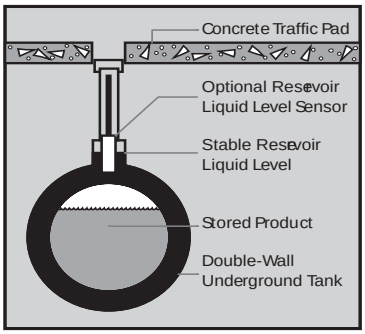
Appendix F: Typical interstitial monitoring operation instructions

(Informative)

The interstitial space between the primary and secondary tanks is filled with a liquid up to and including a stand pipe on the tank “reservoir” that can be accessed from ground level and the stability of the liquid column checked.

A typical example of a wet annular space is:

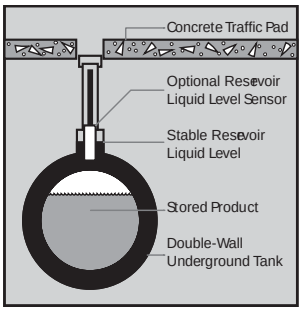
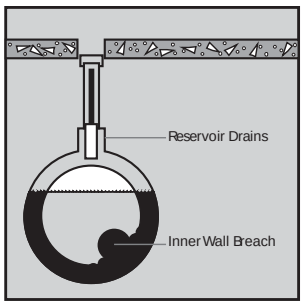
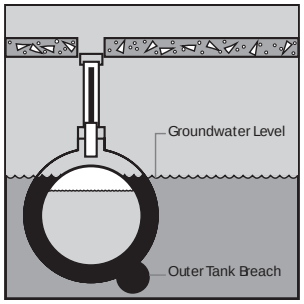
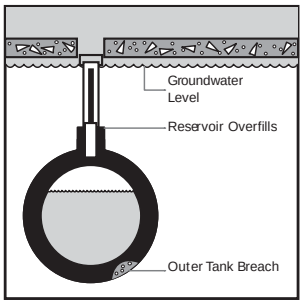
1. Use antifreeze solution in cold climates
2. Maximum burial depth from tank top is 2.1m below grade unless advised by manufacturer’s engineer.
3. Monitoring cavity must be vented to the atmosphere at all times
4. After installation, set the liquid level in the reservoir so the reservoir is half full
5. A reservoir sensor, if installed will alarm for preset events



In order to carry out a tank tightness test the following steps are carried out:

1. Remove the access cover over the stand pipe and ensure there is liquid in the standpipe up to a convenient level and that it is stable at that level (i.e. allow the liquid time to settle after filling – usually about 3 hours).
2. Measure the liquid level with a tape or dip stick, wait 4 hours and re-measure the liquid level.
3. If after 4 hours the liquid level is within 25 mm of the original liquid level, the tank has passed the tightness test.
4. Some variation of the liquid level may occur between tests due to evaporation etc. If this occurs liquid (water) may need to be added to return the liquid to the required level.

Typical conditions that may occur are shown on the next page:

Normal Conditions	Inner Wall Breach	Outer Wall Breach Groundwater Below Tank Top	Outer Wall Breach Groundwater Over Tank Top
The reservoir liquid level will be stable if both the inner and outer tanks are tight. A reservoir sensor, if fitted, will activate an alarm if the reservoir drains or overfills.	Interstitial fluid drains into the primary tank causing the reservoir liquid level to drop. No petroleum product escapes from the primary tank to contaminate the annular space.	If the groundwater is below the tank top, the interstitial fluid drains into the ground, causing the reservoir liquid level to drop.	If the groundwater is over the tank top, the reservoir will fill up with groundwater.
			

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