

Risk Management Outline to Petrol Operations
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RISK MANAGEMENT OUTLINE TO PETROL OPERATIONS



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RISK MANAGEMENT OUTLINE TO PETROL OPERATIONS

Owner Duties

If you are an owner of a petrol station, you have duties to identify hazards and assess and control risks arising from the storage and handling of dangerous goods. You also have duties to consult with employees and health and safety representatives, and provide employees and other affected people on the premises with induction, information, training and supervision.

You have a responsibility to ensure that people carrying out duties under the Regulations on your behalf have the appropriate competencies to enable them to perform tasks correctly. The competencies may be acquired through training, education or experience or through a combination of these.

You must consult with employees and their health and safety representative(s), and any other people you engage to carry out work at the premises who are likely to be affected by the dangerous goods, regarding:

- hazard identification, risk assessment, risk control;
- induction, information and training; and
- any proposed changes likely to affect their health or safety arising from the dangerous goods.

The site operator will need to ensure that proper supervision of the forecourt is achieved particularly during busy times or when the site is taking delivery of petrol or other provisions.

In carrying out his assessment of the ability of staff to supervise the dispensing operations he will need to consider:

- Appropriate staffing levels
- Other duties expected of staff (ie. re-stocking shelves, sales, petrol deliveries) during times the forecourt is open for business.
- Management of forecourt staff
- Training of forecourt staff

You must, before you employ a young person, carry out a risk assessment which takes certain matters into account regarding their inexperience and immaturity, layout of the premises, exposure to chemical agents, use of work equipment, risks from process activities, the extent of safety training.

You must inform non-employees, such as temporary or contract workers, of the relevant risks to them, and provide them with information about who are the nominated competent persons, and about the fire safety procedures for the premises. You must co-operate and co-ordinate with other responsible persons who also have premises in the building, inform them of any significant risks you find and how you will seek to reduce/control those risks that might affect the safety of their employees.

You must provide the employer of any person from an outside organisation who is working in your premises (e.g. an agency providing temporary staff) with clear and relevant information on the risks to those employees and the preventive and protective measures

taken. You must also provide those employees with appropriate instructions and relevant information about the risks to them.

You must consider the presence of any dangerous substances and the risk this presents to relevant persons from fire.

You must establish a suitable means of contacting the emergency services and provide them with any relevant information about dangerous substances.

You must provide appropriate information, instruction and training to your employees, during their normal working hours, about the fire precautions in your workplace, when they start working for you, and from time to time throughout the period they work for you.

You must ensure that the premises and any equipment provided in connection with fire-fighting, fire detection and warning, or emergency routes and exits are covered by a suitable system of maintenance and are maintained by a competent person in an efficient state, in efficient working order and in good repair.

Your employees must co-operate with you to ensure the workplace is safe from fire and its effects, and must not do anything that will place themselves or other people at risk.

Properties of Petrol

Petrol is a mixture of many organic substances and presents fire, explosion, health and environmental hazards. Its precise physical properties can vary depending on source, product specification and additives.

Fire and explosion hazards

Petrol is a volatile liquid, which gives off flammable vapor at very low temperature, down to about minus 400C. This vapor, when mixed with air in certain proportions, forms a highly flammable atmosphere, which can burn or explode if ignited.

A mixture containing between about 1%-8% of petrol vapor is flammable.

Petrol vapor is heavier than air. It does not disperse easily in still air conditions and tends to sink to the lowest level within its surroundings. It may accumulate in tanks, cavities, drains, pits or other depressions. Accumulations of vapor in enclosed spaces or other poorly ventilated areas can persist for a long time, even where there is no longer any visible sign of the liquid itself.

Flammable vapors will be released when petrol is handled, or transferred between storage tanks and containers [without the provision of vapor emission control equipment], and whenever petrol is spilt or exposed to the air. A flammable atmosphere may exist above the liquid in tanks containing petrol and in those where petrol has been removed. A flammable atmosphere may also occur near clothing or other absorbent materials or substances, which have been contaminated with petrol.

Petrol floats on water and, if it is spilt or leaks into the ground, can be carried long distances by watercourses, ducts, drains or groundwater. This can lead to a fire or explosion hazard some distance from where the petrol was actually released.

Health hazards

Excessive exposure to petrol vapor can be harmful. Swallowing petrol, or getting it on skin, may pose other health hazards.

Exposure should be minimized and this should be taken account of when petrol stations are designed as well as during normal operations.

Environmental concerns

Environmental protection requirements, such as those covering drinking water contamination, are increasingly influencing equipment standards, petrol station design and operation. The risk your site presents to the environment should also

be assessed; you should contact the Environment Agency for advice. It makes sense to think about safety and environmental risks at the same time.

Safety measures to prevent leaks and spills of petrol will also reduce contamination of the air, land and waterways. Where different standards apply for safety and environmental matters, you will need to apply the higher standard. Take care, however, that environmental protection measures do not compromise safety and vice-versa.

What is Risk?

The words 'risk' and 'hazard' are given a precise meaning in law and in this guidance.

It is impossible to explain what the term 'risk' means without first understanding what a 'hazard' is. A 'hazard' is anything that can cause harm. Risk is the likelihood, great or small, that a person or persons may be harmed by the hazard.

Activities involving petrol are potentially hazardous because the vapors given off by the substance are highly flammable and, therefore, easily ignited. In the case of petrol filling stations, the risks arising from petrol and who may be harmed are linked to the activity that is being carried on at the time.

The main factors to control are the presence or leaks of petrol and its vapor, and ignition sources. The control of ignition sources can be more difficult, and the potential for an incident greater, at petrol stations which the public use, or where

there are other activities on the site. The level of risk can be affected by factors such as:

- The frequency and method of delivery of petrol to the site;
- The capacity and method of storage;
- The number of vehicles passing through the site and dispensing operations taking place;
- The number of employees and members of the public regularly on or around the site;
- The age and type of the equipment and whether the site is operated on an attendant, attendant self service or unattended
- self service basis;
- The siting of the petrol equipment (dispensers, fill points, tanks, pipework etc) in relation to other activities and fixtures on the site such as a car wash, shop, fast food restaurant, vehicle repair garage or radio-frequency (r.f.) transmitting equipment/mast;
- The location of petrol equipment with respect to off-site features, such as proximity to other occupied buildings, underground tunnels, public thoroughfares, basements;
- The layout of the site in relation to the maneuvering of vehicles and the supervision of dispensers;

- Site-specific factors such as ground conditions and watercourses; and
- Vandalism.

What is risk assessment?

For the purposes of this document, risk assessment means a careful examination of how petrol could cause a fire and explosion. It enables you to decide whether you have already enough precautions in place (control measures) to ensure people's safety or whether you need to do more. You do not have to remove the risk, in fact it is not possible to have 'zero' risk, but you must make sure it is as low as is reasonably practicable.

Managing The Risk

Under the proposed regulation, owners must assess the risks from activities involving petrol) to employees and anyone else, such as members of the public. Apart from contributing to the overall safety of the petrol station, this makes good sense and business.

THE DUTY TO CONTROL RISK

You have a duty to ensure that any risk associated with the storage and handling of dangerous goods at your premises is controlled.

- The primary duty is to eliminate the risk.
- If this is not practicable, the risk must be reduced so far as is practicable.
- The Regulations also place some specific duties on you to control risks associated with particular aspects of storage and handling of dangerous goods. Giving effect to these specific duties does not displace your general obligation to control risk.
- The duty to control risks can be met for many identified risks by applying the risk controls that are specified in those documents.
- The use of the risk controls is subject to the conditions of storage and handling at the premises being the same or sufficiently similar that the specific and generic controls in the documents are applicable to those situations.
- In many instances the documents will provide specific risk controls that are able to address many of the risk control duties in the Regulations.

Do all petrol stations have to take the same safety precautions?

No. The chance of an incident and its consequences vary between sites. Similarly, the action needed to prevent incidents will vary. Fire and explosion risks at petrol stations can be managed by:

- engineering controls/physical safeguards (also known as hardware), such as the installation of an overfill prevention device;
- management controls, which minimize risk by using systems of work - for example at a site where a tanker has to manoeuvre on site, a system of supervision will reduce the risk of collision and possible spill;

- or commonly, a combination of both engineering and management controls.

Reduction of risk by engineering controls or physical safeguards is a particularly effective way of ensuring people's safety because these measures are always present and less likely to go wrong. However the time, trouble, financial cost and physical difficulty of installing engineering controls may mean that it is only reasonably practicable to introduce them when a new site is being built or an existing site is being materially changed.

New sites

The owner's obligations include ensuring that the workplace is designed, constructed and maintained so as to reduce risk.

When a site is being designed and constructed, it should be possible to build-in engineering controls so that less reliance is placed on management controls and systems of work. For example, installing double skin tanks with interstitial leak monitoring, and locating the fill points so that a delivery tanker will be able to enter the site, unload, and leave without having to reverse.

Existing sites

If you have assessed the risks and decided that your current controls adequately ensure people's safety, then you might not need to introduce any further measures. However, if you conclude that current controls are inadequate, you must introduce further measures. If the risk is low, the overall costs of introducing engineering controls might be grossly disproportionate, and effective management controls might be enough. However, if the risk is high, you may need to consider engineering controls, regardless of the overall cost. Remember that your ability to pay for additional measures is not a deciding factor as to whether they should be introduced.

For example, if a tanker has to reverse or manoeuvre onto or within a site to correctly position itself at the fill points, one or more measures may be necessary to reduce the risk of collision, which could lead to a spill of petrol. You would need to look at the relative costs and the degree of control each option provides. The options could include:

- relocating the fill points or obstructions and obstacles (engineering control);
- creating new entry points to the site to provide better access (engineering control);
- closing the site whilst the tanker is on the site (management control – system of work);
- arranging for deliveries to be made during quiet periods when fewer people are on or around the site (management control);
- or arranging for a competent member of staff to help the driver manoeuvre the tanker safely (management control - system of work).

Risk control

What is risk control?

Risk control is the process of determining and implementing appropriate measures to control the risks associated with the storage and handling of dangerous goods.

- When planning and implementing risk control measures you must consult with your employees and any other people you engage to carry out work at your premises that are likely to be affected by the dangerous goods.

What does ‘practicable’ mean?

“Practicable” does not just mean the cost in dollar terms. To determine what is practicable, you, as a duty holder, must take into account:

- Severity of the hazard or risk in question: How likely is it that the storage and handling of the dangerous goods will result in injury to people or the likelihood of damage occurring to property? How serious are the injuries and property damage likely to be and how many people could be affected?
- State of knowledge about that hazard or risk and any ways of removing or mitigating that hazard or risk What is known about the hazards or risks associated with the storage and handling of the dangerous goods, and the ways to control the risk? What do manufacturers and suppliers of dangerous goods know about the hazards and risks? What do workplaces dealing with similar dangerous goods do to control the risk? What information can industry professionals and organisation, unions and government agencies provide?
- Availability and suitability of ways to remove or mitigate that hazard or risk Are the risk controls that you have identified readily available? Are they suitable for the premises and the employees involved?
- Cost of removing or mitigating that hazard or risk. Are the costs of implementing the risk control commensurate with the benefits gained? Time and money invested in selecting and implementing risk controls should result in the elimination or significant reduction in risks from using dangerous goods.

DESIGNING OUT RISK

You must not use premises for the storage and handling of dangerous goods unless the premises, plant, processes, systems of work and activities have been designed to eliminate risks associated with storage and handling of dangerous goods, or, if this is not practicable, reduce the risk so far as is practicable.

Design of the premises

Good design is the most effective tool you have to reduce risk. It means:

- reduced establishment costs;
- avoiding high operational costs caused by poorly set-out premises; and
- avoiding complex systems of work to cope with the constraints of poorly set-out premises.

An effective design process means that problems can be anticipated and solved before they become real “bricks and mortar” problems.

Take account of any external factors in the layout of the premises, such as whether the location and type of fire protection system meets with operational requirements of the emergency services authority.

Designing a process with low risk

- You must design out risk associated with a chemical or physical process by adopting the most appropriate work method or system of work. If a chemical process is involved, you may need to consider reaction pathways.
- Complexity, equipment, efficiency, by products, cost, reliability and energy demand will influence the selection of a particular reaction pathway.
- Where a physical process is involved, consider the range of alternatives. For example, evaporation may be preferable to freeze drying, which involves the reduction of temperatures and pressures.
- You must identify the hazards and assess risks associated with each of the work processes being considered. Select the process that eliminates the risk. If it is not practicable to do so, adopt the process that most effectively reduces the risk.
- Once a process has been selected, you must identify, assess and control any hazards that may be associated with the use of dangerous goods in that process.

Elimination

The most effective method of risk reduction is the elimination of risks at the source. This includes eliminating either the dangerous goods or the activity which gives rise to the risk. If you store and handle dangerous goods and the dangerous goods are essential to the operation of the premises (for example, where your principal business is contract storage of dangerous goods) then elimination of all risks associated with the dangerous goods is not likely.

Examples of eliminating an activity which gives rise to risk include:

- replacing a forklift (possible ignition and mechanical damage to the packages) to move flammable packaged dangerous goods around with a system of conveyors. In this case an activity that is dependent on the driver's skill and care has been eliminated and replaced by a handling method that does not depend on the skill and care of an operator.
- replacing the manual filling of a large open vat mixing and reacting flammable and toxic dangerous goods (principal risks being fire, explosion, toxic release or spillage) with an enclosed continuous process utilising "in the pipe" mixing and reaction (principal risk spillage). In this case the activity of hand filling is eliminated but the process (chemical) is not altered.
- wet mixing of a friction-sensitive dangerous goods powder instead of a hazardous dry mixing process.

Engineering controls

Engineering controls are controls which use engineering measures to change the physical characteristics of structures, plant, equipment and processes to reduce the risk associated with the storage and handling of dangerous goods. They achieve this in a number of ways, by:

- minimising the generation of dangerous goods;
- containing or suppressing dangerous goods, including their vapours and dusts;
- eliminating, confining or controlling hazardous processes, plant or equipment that may pose a risk to the dangerous goods;
- protecting dangerous goods and installations from external hazards and/or environmental factors such as rain or sunshine; or

- limiting the area of contamination in the event of spills or leaks.

Engineering controls that should be considered include:

- totally or partially enclosing the dangerous goods or external hazard;
- providing adequate spill control to deal with the largest foreseeable spill (refer to section 19.6);
- specifying and installing appropriately rated electrical circuitry, fittings and equipment to minimise ignition hazard (refer to section 19.8);
- providing adequate ventilation, including local exhaust ventilation, to eliminate flammable or harmful atmospheres (refer to section 19.9);
- automating processes to eliminate human exposure and error;
- fitting sensors and controls for liquid levels, pressure and/or temperature, to minimise loss and formation of hazardous atmospheres, and eliminate overflow and uncontrolled reactions;
- fitting safety critical control devices, alarms and critical condition shut-down devices;
- installing lighting which provides ample illumination for the tasks to be performed (refer to section 19.10);
- installing fire detection systems and fire control systems (refer to section 23); and
- incorporating suitable protective devices to protect installations from external hazards, such as crash barriers to protect from moving vehicles.

HOW DO I CARRY OUT A RISK ASSESSMENT?

Identifying hazards is an essential first step. This book helps you to identify the most significant hazards and gives you guidance on how to deal with them. It does not set out specific or prescriptive ways of achieving safety but suggests a general approach, which can be followed at any petrol station.

The following five steps provide a systematic approach to identifying hazards and managing risks at petrol stations:

STEP 1 IDENTIFY - take a fresh look at your site and identify where fire and explosion hazards may exist.

STEP 2 CONSIDER - think about what could go wrong and who could be affected.

STEP 3 EVALUATE - look at your findings and decide if the precautions you have already taken are enough to prevent anything going wrong or to reduce the consequences if something does happen, or if you need to do more.

STEP 4 RECORD - make a note of your findings.

STEP 5 REVIEW - consider when you will next need to review the assessment.

STEP ONE – Look for the areas where a fire or explosion hazard may occur.

To identify hazards you need to know about your site, how it operates, its surroundings, and the age, make and type of equipment installed. Employees or safety representatives may be able to help fill in any gaps in your knowledge. A site

plan may also prove useful when carrying out the risk assessment. Looking for areas where petrol vapor may accumulate is a way of determining where vapors may occur and is a legal requirement.

STEP TWO - Think about what could go wrong and who might be harmed.

For each activity, decide whether and how petrol could escape. Think about how much could spill or leak, what route it might take and where it would collect. Look for possible sources of ignition. Take account of human error and the fact that people do not always follow instructions or behave in a responsible way. For example, customers may park badly and obstruct delivery tankers or emergency escape routes. They may also attempt to fill unsuitable containers with petrol, or smoke when filling their cars. Consider all activities including cleaning, maintenance etc, and those, which only take place infrequently. Think about the greatest number of people who could be affected by a fire or explosion. Include those who:

- work at the petrol station;
- come to the site to buy petrol;
- visit the site for other reasons, such as contractors or customers using a forecourt shop or car wash;
- occupy adjacent property; and
- share and/or operate another business on your site.

In each case, think about what could happen or what could go wrong and include the most and least likely events to occur.

Include the worst events that could happen and those where you may have no visible sign or warning. Make a written note of your findings and the measures you already have in place to deal with the hazard. This will help you later in the assessment.

STEP THREE – Evaluate your findings and decide whether further precautions are necessary.

Have you done all that the law requires to ensure people's safety? Look at the precautions you already have in place.

Although the probability of a particular occurrence may be small, you will need to consider the consequences, if something does go wrong. If the risks are already low enough you should not have to introduce any further measures.

But if you conclude that you should do more, you must explore other options for controlling or minimizing the risk.

No two sites are the same, so it is not possible to provide a straightforward list of what you should do. Seek advice if necessary, and remember that you are responsible for seeing that the risk assessment is adequately done. Some changes, such as relocating vent pipes, may take time to achieve and require interim steps to be taken to minimize the risk.

When you have decided what to do and taken the appropriate action, you need to check that the measures work. How you do this will vary according to the nature of the changes you have made.

STEP FOUR – Recording the findings.

You must keep a record of the significant findings of the risk assessment. The type of information recorded should include:

- the significant hazards, i.e. those which pose a serious risk to workers or the public whose safety might be affected if something goes wrong;
- the people who may be affected; and
- existing control measures and the extent to which they control the risk – this need not replicate details more fully described in documents such as manufacturers' instructions, health and safety policy statement or procedures, company rules etc but you should refer to them if you intend to rely on them.

STEP FIVE – Review your assessment.

Risk assessment is not a once and for all activity. You need to review your assessment if you suspect that it may no longer be valid or needs to be improved. Any change to the site or the operating procedures could affect the level of risk, so

the effect should be assessed and understood. Although individual or small changes may not in themselves affect the assessment, a number of changes together may have a cumulative and significant effect. It is good management practice to plan to review risk assessments at regular intervals – the time between reviews will depend on the nature of the risks, the control measures put in place, and plans for future change.

PETROL LEAKS AND SPILLS

Leaks and spills can be caused in a variety of ways. These include failure of tanks or pipework, accidents during offloading, damage to or misuse of dispensers, and dispensing petrol into unsuitable containers. You need to take steps to prevent incidents like these and to identify the source of any or suspected leaks so that corrective action can be taken in good time. Evidence of leaks can come from, for example, monitoring of fuel stocks or excessive petrol odors at or near the petrol station.

Petrol is more likely to leak from tanks and pipework if equipment is poorly installed, inadequately maintained, or old. Where the integrity of the storage system cannot be ensured, for example by the provision of secondary containment, it can be

augmented in a number of ways such as: wetstock measurement and reconciliation (manual or automatic) or by fitting a leak detection system. Additionally, periodic testing for the presence of water in underground tanks may indicate (through water ingress) a failure in the tank shell, gaskets sealing the tank lid or pipework connections. The method(s) you use will depend on the level of risk at the petrol station.

Spillages should be cleared up quickly. You can deal with small leaks and spills by applying dry sand or other absorbent materials. Remember that materials used in this way will be contaminated with petrol so make sure they are disposed of safely, if necessary by a hazardous waste disposal specialist. If you intend to store contaminated material prior to disposal, use a safe place like a closed bin or other container, which has been suitably labelled. Treat any other materials contaminated with petrol, such as clothing, rags or soil, in a similar way.

Accidents involving employees and customers becoming splashed with petrol are foreseeable events. Incidents where employees are splashed with petrol during road tanker deliveries and

customers being sprayed with petrol when dispenser hose couplings suddenly fail can and do occur. The provision of disposable coverall suits and a changing room with washing facilities is a control measure that can be taken to reduce both the health and safety risks arising from wearing clothing that is contaminated with petrol.

CONTROL OF IGNITION SOURCES

Hazardous area classification

Three ingredients are needed for a fire: a fuel (in this case petrol); oxygen; and a source of ignition. If you control or eliminate any or all of these factors, fire can be prevented. To run a site safely you should know where flammable or

explosive concentrations of petrol vapor might occur and keep sources of ignition out of these areas.

Zone 0	in which an explosive air-gas mixture is continuously present, or present for long periods.
Zone 1	in which an explosive air-gas mixture is likely to occur in normal operation; and
Zone 2	in which an explosive air-gas mixture is not likely to occur in normal operation and, if it occurs, it will exist only for a short time
Areas outside these zones are defined as non-hazardous.	

The law imposes a requirement to classify areas where explosive atmospheres may occur into zones based on their likelihood and persistence. Areas classified into zones must be protected from sources of ignition by selecting equipment and protective systems listed or marked for use in explosive atmospheres.

Where employees work in zoned areas, they should be provided with appropriate work clothing that does not create a risk of an electrostatic discharge igniting the explosive atmosphere. In order to comply with this statutory duty, the work (on the forecourt) that staff are employed to undertake in the course of the day-to-day operation of the site or in accordance with the site's emergency procedure will have to be evaluated. For instance, if the site receives "driver assisted deliveries" and the member of staff assisting the tanker driver is expected to dip the tanks, remove covers to access chambers or remove/replace fill pipe caps, then (like the tanker driver) they should be provided with anti-static footwear. Anti-static weatherproof or outer clothing will not normally be necessary for work activities carried out by forecourt staff provided they do not remove such (ordinary) clothing in any high risk areas.

Verification

Before a petrol station is used for the first time, the employer shall ensure that a competent person verifies its overall explosion safety.

What parts of the site require verification? Parts of the site that need to be considered during verification are those parts of the site where explosive atmospheres may occur and which have been designated as hazardous areas. It will also be necessary to take into account any

equipment or facilities that may give rise to hazardous areas or are needed to limit the extent of any hazardous areas.

When should verification be carried out? The main requirement is to carry out verification procedures before a site is put into use, i.e. during commissioning, but as there is an on-going requirement to review the facilities it will also be necessary to verify that any significant changes on the site or any new equipment will not give rise to an unacceptable explosion risk. A like-for-like replacement or repair, however, should not require further verification.

What is the purpose of verification? Verification is an assessment of the measures that are needed to ensure that the fire and explosion risks will be properly controlled. It will include consideration of the measures to:

- prevent explosive atmospheres forming;
- control the fire and explosion risks from explosive atmospheres.
- mitigate the effects of a fire or explosion.

What does verification include? Verification includes an assessment of the design of the petrol station to prevent fire or explosions and checks and tests to show that the completed facility is in accordance with the design standards and specifications. Checks will include:

- inspection of records to show that the storage tanks and all associated product and vapor pipework are leak tight.
- ensuring that a hazardous area classification drawing has been prepared and a visual inspection that equipment is of the correct type and category for the zone where it has been installed. See Note below.
- confirmation that the equipment in the hazardous areas has been installed correctly and has been tested.
- all warning and information notices are in place.
- all electrical and other ducts from hazardous areas are properly sealed.
- vapor emission control systems have been tested for integrity and operate correctly.
- gauging and leak detection/leak monitoring systems operate correctly.
- drainage systems, including oil separators, are complete and tested.
- all emergency equipment installed and in working order.

Some parts of the verification checks can be carried out at an early stage, for example during the design, but other parts can only be carried out during commissioning or even after the first petrol delivery.

Who is competent to carry out the verification? The site operator has the duty to ensure that a competent person carries out the verification. The site operator may be the competent person but he may need to enlist the help of others such as the site designer, the installer of the equipment, test companies or an independent person or organization. The person or persons involved must have practical and theoretical knowledge of the fire and explosion hazards arising at petrol filling stations, which may have been obtained, from experience and/or professional training.

Electrical equipment in hazardous zones

Where possible, electrical equipment should be excluded from hazardous areas. Where this is not possible, for example electrical components in petrol dispensers, they must be constructed

or protected so as to prevent danger arising from exposure to petrol vapor. Dispenser components like the pump and junction boxes will be marked with the sign (right).

Other ignition sources, which may be introduced into hazardous areas by customers, employees or contractors, should also be controlled or, preferably, excluded, these include:

- people smoking/using smoking materials such as lighters;
- tools or equipment which may cause sparks if rubbed or knocked against metal, concrete or brick;
- vehicle engines still running while petrol is being dispensed;
- equipment transmitting radio- frequencies (r.f.) (such as radios fitted to the emergency services vehicles);
- fixed electrical equipment (such as car vacuum cleaners)
- portable electrical equipment (such as mobile phones and power drills);
- hot surfaces (such as turbo-chargers and catalytic converters fitted to vehicle engines);
- naked flames;
- static electricity; and
- thermite reaction (friction sparks from aluminium/rusty steel impact).

On-site storage and sale of other flammable substances

Most petrol stations sell commodities other than petrol. If your shop sells flammable liquids such as cigarette lighter fuel, barbecue lighter fuel, anti-freeze or other similar goods, be aware of the safety precautions to follow. These may be found on the packaging or labelling of the products. Any goods on display on the forecourt should be stored safely and should not cause an obstruction to traffic or emergency escape routes.

Other on-site activities

When looking for potential sources of ignition remember other on-site activities such as shops, workshops, fast-food restaurants and car washes. Even if these facilities are not in a hazard zone, people may need to cross such a zone to get to and from them, possibly bringing ignition sources into the area. Good site design can help to eliminate this.

Where changes to a site are planned, they may represent a material change to the 'approved arrangements' requiring the written approval the Petroleum Licensing Authority.

OPERATING AND EMERGENCY PROCEDURE

Operating Procedures

Why have operating procedures?

- People are an essential part of the operating life of a petrol filling station, so good systems of work and procedures are important ways of preventing incidents and minimizing the consequences of any that happen.
- Make sure that procedures are easily understood and that everyone working on the site knows about and uses them.

- Regularly check to see that procedures are being followed and that they work. Revise them if circumstances change.

What activities should be covered?

Your risk assessment will help you to identify where operating procedures are necessary. These may include:

- offloading petrol (before, during and after the offloading process);
- wetstock reconciliation, including loss investigation and reporting;
- dispensing activities;
- cleaning up petrol spills;
- general site maintenance and housekeeping;
- dealing with contractors;
- dealing with customers; and
- maintenance of site records.

Emergency procedures

You must have procedures for emergency situations and train any employees who will need to take action in an emergency.

They must be in no doubt about their responsibilities. Emergency or shutdown procedures, like any other kinds of operating instructions, should be reviewed regularly and updated to reflect any changes. You will need to ensure that your emergency procedures work when called upon. As well as testing and maintaining equipment, make sure people know and understand the procedures; practice helps to do this. If the response to an incident involves the use of equipment, such as a fire extinguisher, employees expected to use it must be properly trained.

In the event of a serious petrol spillage the following are obvious precautionary steps to take:

- switch off the electricity supply to forecourt equipment (note that the public address system and, at night, the canopy lights may need to be kept operational);
- raise the alarm and ensure all customers and non-essential employees leave the site;
- contact the fire brigade (by telephoning 999) to report the spillage. Depending on the circumstances you may also need to contact other emergency services, such as the police. If the situation is potentially highly dangerous offsite, you should also alert the police;
- check for sources of ignition;
- do not allow any vehicles parked near the spillage to be started;
- prevent anyone from driving onto the site;
- take all practical steps to prevent fuel flowing off the forecourt into buildings, public drains, sewers or other water courses and try to direct the spillage into the forecourt interceptor system, for example by using temporary bunding and absorbent materials;
- place all fire extinguishers in a readily available position upwind of the incident area; and
- alert occupiers of properties on the boundary of the site.

In the event of a dispenser or other electrical apparatus being damaged, for example by being hit by a vehicle, switch off the electrical supply to the equipment and take the relevant steps from the above list. It should be remembered that the safety features built into modern petrol pumps and dispensers (fed from submersible or remote pumps) should prevent any significant releases of petrol if the pump/dispenser is damaged or knocked-over by a vehicle.

Once an incident is under control, you will need to determine the cleaning-up procedures necessary to ensure the safety of employees and the public on and off the site. Remember that where petrol has entered a site interceptor, you will have to make arrangements to remove the petrol and charge the interceptor with fresh water.

You will also need to have emergency procedures in place to deal with:

- any serious leakages that may occur in the storage tanks and/or pipework; and
- vehicle, petrol and other fires.

Record Keeping

Maintaining up-to-date written procedures is good management practice. It will also help employees to understand what is required of them and will be useful when staff need to be trained.

You may find it helpful to keep this type of information in a site register. This could also be used as a central point to keep other information, such as:

- details of the equipment on site (type, age, location);
- the results of commissioning and installation work;
- testing, maintenance and repair records;
- petrol inventory/stock records (including ullage and delivery records);
- training records;
- company safety policies and practices;
- the results of the risk assessment;
- a schematic diagram of the storage tanks, pipework and pump layout; and
- a schematic diagram of the surface water drainage system, including all gullies, and the position of the oil separator or any
- other spillage retention/treatment system; e.g. a constructed wetland; and
- a diagram(s) of the hazardous zones.

Note: Wet stock monitoring/reconciliation can be a ‘centralized function’ carried out remotely at a company’s head office or by a specialist contractor. Where this is the case, records will be made quickly available to Petroleum Inspectors by fax or e-mail should this be necessary.

Maintenance

Equipment related to the offloading, storage and dispensing of petrol must be maintained in efficient working order and in good repair.

A maintenance programme should be in place to ensure the integrity of the plant and equipment on site. This should include: tanks; pipework; vapor emission control equipment; manhole chambers; dispensers; interceptors; cable ducts and drains; gauges and other product

monitoring equipment; electrical equipment (see below); and emergency equipment. Maintenance includes examination, servicing, cleaning, repair, or testing. The periods between these activities will depend on several things like the recommendations of manufacturers, suppliers or installers, conditions at the site, and the advice of the person who last carried out an examination. Accepted industry practice and the results of your risk assessment should also be taken into account. Only contractors that are competent to do what is necessary should carry out maintenance work at the site.

Electrical equipment

Electrical equipment must be maintained in a safe condition, so far as is reasonably practicable. This means that inspection and testing of electrical equipment should be carried out, with particular attention to equipment and wiring installed in hazardous areas. Electrical work should be carried out by someone competent to work on electrical equipment in hazardous areas and who is aware of the required standards for such equipment.

The electrical contractor will need to switch off supply to part of the site to carry out testing, maintenance or repair work. You may therefore need to agree times when the site or part of it may be closed to allow the work to proceed safely.

Visual examinations

Periodic visual examinations of your site, for example to check access chambers, fill points and dispensers, can help ensure that it is in a satisfactory operating condition.

Certain equipment that is more vulnerable to abrasive, impact or malicious damage needs to be inspected on a more frequent basis. For example, dispenser hoses can suddenly fail due to:

- the gradual weakening of the section of the hose where it chafes against the ground;
- impact damage if the hose is crushed against the pump island by the wheel of a vehicle: or
- malicious damage by vandals. This type of damage is more likely to occur when the site is closed.

A daily inspection of the hoses should reduce the risk of spillages resulting from bursts or cuts etc.

A suggested visual inspection programme is given in Appendix 3.

Maintenance records

Written records of maintenance history, faults detected and repairs or modifications carried out at your site will help you monitor your maintenance programme effectively, and also provide good evidence that you have a programme in place.

The following sub-sections of this guidance document identify six key activities that take place at petrol stations. These are:

- **Commissioning**
- **Unloading and venting**
- **Storage**
- **Pipework**
- **Dispensing**

- **Decommissioning**

1. COMMISSIONING

Commissioning is the process of bringing plant and equipment into use.

This sub-section contains guidance to help you ensure that:

- new sites;
- those which are subject to a material change; and
- any new equipment installed or refurbished;

are safe to use.

It also includes guidance on physical checks of the site to ensure that emergency equipment and information notices are adequate and effective. You will also need to consider what operational, management and emergency procedures are necessary and make arrangements for initial staff training.

Plan of the premises

The purpose of the plan of the premises is to identify the places, buildings and structures on the site where dangerous goods are stored and handled. It should be easy for emergency services authority personnel to read.

The plan of the premises should be on a scale that adequately illustrates the details required by the Regulations.

The following information is required:

- locations and identification number or code of:
- bulk containers and bulk storages; and
- storage areas for packaged dangerous goods and dangerous goods in IBCs; and
- areas where dangerous goods are manufactured; and
- areas where dangerous goods in transit may be located
- legend for the identification numbers and codes for the above areas; and
- main entrance and other entry points to the premises; and
- location of essential site services including fire services and isolation points for fuel and power; and
- location of the manifest for the premises; and
- location of all drains on the site; and
- nature of the occupancy on adjoining sites or premises.

In addition, the following information may be relevant:

- the location of all buildings, amenities, structures and internal roadways on the premises and their uses;
- areas of public access adjacent to the site and parking (if any);
- public street names adjacent to the premises and evacuation routes; and

- nature of fences (if any).

Commissioning hardware

For new petrol stations, testing and checking of equipment may have been carried out before you take over the site. People competent to do the job should carry out this work. Satisfy yourself that these tests and checks have been completed satisfactorily. If new hardware is being installed at your existing petrol station, ask for evidence that the necessary tests and checks have been properly carried out before bringing the equipment into use.

Some procedures, such as initial testing of electrical circuits, are carried out more effectively before petrol is delivered and introduced into the system. Others, such as checking the operation of a dispenser, cannot be tested until petrol has been introduced into the system.

Storage tanks

The integrity of each tank or compartment, its internal fittings (e.g. drop pipe and overflow prevention device etc) including the manhole and any connections to it should be determined, where possible, before petrol is offloaded. This can include

checking that monitoring systems are operating and testing tanks without monitoring systems. The tank manufacturer should provide a certificate of examination and testing carried out before the tank left the factory.

Note: The leak testing of the drop tube and associated fittings may need to be carried out after petrol has been introduced into the tanks.

Pipework

New pipework and joints should be tested before petrol is offloaded. Obtain information about the type of tests that have been carried out and the results. Where double-skin pipework has been installed, check that tests on the monitoring system have been carried out according to the manufacturer's instructions. The contractors installing the pipework should provide you with a certificate detailing the test method used and the result. All the pipework, including the ventilation/vapor recovery system, that forms an integral part of the petrol installation should be leak tested and certified in the commissioning procedure.

Note: there are some (final) joints in pipework that can only be tested after petrol has been delivered into the storage tanks. These joints should be 'wet tested' by the contractor when the pipework is primed with petrol.

All dispensing equipment, including pumps, valves, hoses and nozzles should be checked for leaks and correct operation after installation.

Electrical installation

Any new, extended or modified installation should have a valid certificate of electrical inspection and testing.

Other commissioning procedures

Before petrol is delivered to the site it will be necessary to check that:

- safety signs or notices are in place;

- all means of escape are clear of obstructions;
- emergency equipment has been installed and is in working order;
- any combustible material is removed;
- fill points, tanks and pipework (where visible), and dispensing equipment have been clearly marked;
- where drainage systems have been installed, they are connected, leak tested and free from the debris and the interceptor
- has been charged with its water seal; and
- cable ducting has been properly sealed to prevent petrol/vapors migrating into buildings and non-hazardous areas.

Receiving the first delivery of petrol

In order for a manifolded vapor recovery system to operate correctly and safely, there has to be a liquid (petrol) seal between the bottom of the drop tube and the ullage space of all the (manifolded) tanks. Clearly this situation is not possible with a new installation or where tanks have been temporarily decommissioned for maintenance purposes etc.

It is, therefore, important that the first delivery of product is carried out with great care so as to avoid the release of large volumes of vapor through the fill pipe openings of the tanks. A safe method of introducing petrol into the tanks is to (individually) unload a quantity of 1000 litres of petrol into one tank at a time until all the tanks are charged with sufficient petrol to provide a liquid seal at the drop tube. The vapor recovery hose must, of course, be connected at this initial commissioning stage of the delivery and the fill pipes caps of the tanks not being filled must be in the closed position. After this stage of the commissioning procedure has been completed, the remainder of the product on the tanker can then be unloaded in the normal manner.

2. BULK UNLOADING

The bulk unloading of petrol is inherently hazardous. Petrol may escape from the tanker, for example if it collides with another vehicle, or because of a leak during unloading. The volume of petrol that could be spilt is potentially very large, with a consequent serious threat to the safety of people on and near the site. The guidance in this section will help you ensure that petrol is unloaded safely.

The engineering and management controls at your site will determine the method of unloading you are able to use and the precautions you and the tanker driver need to take to ensure people's safety. *Make sure that your operating procedures reflect what is necessary to ensure people's safety.*

The risks can be reduced if a dedicated tanker unloading stand is provided or if petrol is delivered at quiet times when fewer people are on or around the site. This is not always possible and your operational procedures will need to ensure that petrol can be delivered safely, whenever it is done. In some cases, this may require closing part of, or the whole all of the site if this is the only way to control the risks sufficiently.

You should establish procedures for the unloading of petrol; ensure that everyone involved is familiar with them and that they are followed. Failure to do so can have serious consequences.

Tanker access

It is important that the driver can manoeuvre a tanker onto and around the site as easily as possible. The likelihood of an incident increases if the driver has to make difficult maneuvers, or drive close to obstacles or other vehicles.

Try to provide and maintain a clear, unobstructed entry and exit route at all times. If this is not possible, ensure that the route is clear when a tanker enters or leaves the site. On some sites this may involve cordoning off the route or closing down some or all dispensers or other equipment, such as a car wash. In the event of a fire a tanker needs to be able to leave the site quickly and safely. This is achieved most easily if it can drive off the site in a forward direction. Where it is not possible to drive onto and off the site without reversing, you should arrange for the tanker to reverse into position to access the fill points and then drive away in a forward direction if this is possible. If this cannot be achieved, it is important to have good arrangements in place to ensure that the tanker can manoeuvre safely. These could include positioning mirrors to aid visibility, or clearly marking the route to be taken by the tanker, other vehicles and pedestrians. Where necessary, provide supervision or assistance for the driver using pre-arranged signals, and make sure that who ever you select is competent to carry out this role.

Tanker standing areas

The standing area should be maintained in a good condition. If the area is not well-located you may need additional control measures to ensure that petrol can be unloaded safely. These could include hardware changes, where reasonably practicable, such as the construction of a firewall to act as physical barrier between the unloading area and adjacent buildings or public areas. Alternatively you may look to introduce management procedures.

For example, if a tanker cannot be accommodated wholly on the site during unloading, you may need to provide some form of cordon between the tanker and off-site traffic to avoid a collision. Warning notices can be used to good effect to advise members of the public and others that unloading is taking place and of any precautions they may need to take.

Driver/Operator Training

The competence of the tanker driver will also determine how safely a vehicle moves around the site. Drivers and their employers must ensure that tanker operations are carried out safely. But you should always satisfy yourself that whoever drives the tanker onto your site can do so competently and safely. If you have any doubts, ask your petrol supplier to provide you with evidence of driver competence.

Lighting

Routes to and from the tanker standing area, and the area itself, must be adequately and safely lit to enable people engaged in the unloading operation to carry out their tasks properly and safely. Drivers need a clear view of their way onto and around the site and the fill points. Illumination of the road tanker's valves and the site's control panel (if there is one) at the fill point may also be necessary. Lighting must be maintained to ensure that it is kept in working order.

Fill points

The exclusion of potential ignition sources from the hazard zone is easier if fill points are at least 4 metres from site boundaries, as this is generally the extent of the hazard area associated with them. At existing sites this may not be the case but moving the fill points will not normally be a reasonably practicable option. In these circumstances your operating procedures should ensure that unloading is not carried out while there are potential sources of ignition in the hazardous area.

Mitigating Fire Risk

Vapors can accumulate near the fill point during unloading. The chance of an incident increases if ignition sources are not controlled, putting members of the public or employees near the area at risk. You can mitigate the consequences of vapor emission, spills or leaks by:

- controlling ignition sources in and around the unloading area;
- excluding non-essential people from the unloading area, this should be done whenever unloading is taking place,
- regardless of the location of the fill point;
- separating people from the unloading area by a safe distance or by erecting a fire wall;

Note: A fire wall is an option where a safety distance cannot be achieved.

- providing adequate spillage control i.e. drainage and interceptor;
- ensuring warning and information notices are in place and legible;
- providing properly maintained fire extinguishers; and
- providing an adequate supply of dry sand or other absorbent material.

Special controls and procedures may be needed if the fill point is in or near a building or public thoroughfare.

It may be necessary to restrict deliveries to when the building is unoccupied or at quiet times.

Warning signs or arrangements for someone to monitor the area for ignition sources during unloading may be needed.

All fill point connections should be designed and installed for easy use. Some may need protection against impact and vandalism.

They must be well maintained and the unique identification markings must be kept clear and legible.

Vent pipes

The primary function of vent pipes is to allow the tanks to breathe by providing an inlet for air to enter the tanks when petrol is being dispensed and to enable petrol vapor displaced from storage tanks during unloading to be either returned to the road tanker or dispersed into the atmosphere. They should be positioned to minimize the build up of vapor around the pipes and be remote from sources of ignition. For example, the location should take account of nearby buildings and their effect on airflow, and areas where vapor could accumulate.

Vent pipes, which are above ground should be included in the site's inspection and maintenance programme and examined for corrosion or damage, particularly at or around ground level, and for stability.

A flame arrester should be fitted to the outlet of vent pipes and vapor return connections for a Stage 1b vapor recovery system so that, if vented vapors are ignited, the arrester will prevent the fire spreading from the atmosphere to the inside of the tank. Flame arresters should be included in the site's maintenance programme to ensure that they continue to be effective.

Overfill prevention

As well as marking fill point connections, further controls are needed to prevent tanks or compartments being overfilled.

These include marking measuring devices, dip sticks and gauges with the same unique identifier as the tank they serve.

Pressures inside the storage tanks have affected simple contents measuring systems (dipsticks and hydrostatic gauges) leading to inaccurate wet stock control;

Many tanks have overfill prevention devices which automatically stop the flow of petrol when a predetermined level is reached. Where these devices are installed, they must be maintained in a safe working condition. They should be set so that, when triggered, any petrol remaining in delivery hoses can safely drain into the storage tank.

Storage tanks can also be fitted with high-level alarms to warn when petrol has reached certain levels.

Alarms and overfill prevention devices are meant to be used as a backup to accurate stock control to ensure that tanks receive the correct amount of petrol. You need to be able to accurately determine the ullage in your tanks and only order the quantity of petrol the tanks can accept.

Static electricity

Conditions that cause static electricity to be generated are present on petrol filling stations from:

- the road tanker, which can become electrically 'charged' during the journey to the filling station;
- the flow of petrol through the delivery hose to the storage tanks; and
- personnel involved in the delivery process becoming charged with static electricity.

The inadvertent ignition of flammable vapors by a spark from a static discharge can be avoided by ensuring that:

- the forecourt surface on and around the road tanker stand does not have a high electrical resistance and allows the static charge to go to earth via the road tanker's tires or the footwear of personnel. High resistance surfaces such as asphalt and certain impervious sealants should be avoided.
- the storage tanks and delivery pipework are adequately earthed. This is particularly important at sites provided with non-metallic off-set fill pipework.

The driver and the person assisting with the delivery are provided with anti-static footwear.

Thermite reaction

The widespread use of aluminium couplings on road tanker delivery and vapor recovery hoses together with the prevalence of fittings/equipment made from steel in the immediate fill

point area of a filling station, access chamber covers and frames etc, creates the conditions for an incendive spark to be generated if a coupling makes a sharp impact with rusty steel.

In order to reduce the likelihood of a coupling being dropped or coming in contact with rusty steel, the following precautions need to be taken:

- Safety platforms, made from non-ferrous materials, should be fitted in direct fill chambers where the chambers are deep.
- A capture device should be fitted to attach the fill pipe cap to the fill pipe.
- Any steel drainage channels in close proximity to where the delivery/vapor recovery hoses are handled should be replaced with non-metallic gratings when any redevelopment works take place.
- Any fixed steel items, e.g. above ground fill pipe protection posts, should be treated so as to prevent/remove rust.

Dealing with spillage

The number of road tanker compartments unloaded simultaneously into tanks should not be more than:

- the number that can be safely managed at any one time; or
- the maximum number allowable to achieve correct vapor balancing.

Even if you have taken reasonable steps to prevent an incident, a spillage can still occur, for example, if a delivery hose connection catastrophically fails. You must have procedures to follow and equipment available if something goes wrong. The procedures should be in writing and available at all times to staff on site, including the delivery driver.

Tanker standing areas should have design features to deal with spillages, such as diversionary curbs, slope to a safe area, drainage grids/channels and interceptor or constructed wetland systems. Where such features are provided it is important that they have the capacity to collect/retain a sudden release of up to 3000 litres of petrol or diesel. It is also important that they are properly maintained; for example, make sure drainage channels are regularly cleared of debris like leaves or mud.

If you do not have permanent physical features of this type you may have to rely on temporary equipment, such as moveable bunds, supported by operational procedures and management controls. You must always provide suitable absorbent material for mopping up small spills during unloading.

3. TANK STORAGE

Site Owners are responsible for ensuring that petrol is stored safely. A range of control measures, from the initial suitability and integrity of storage tanks, to ongoing management and maintenance, can all help to ensure that the risk of a leak

of petrol, and therefore the safety of people on and around the site, is as low as possible.

Selection of tanks

Where new tanks are being installed, your risk assessment should identify the level of control required for your site and hence the type and standard of tank that is appropriate. Some sites require higher standards than others because of the risks from a leak. For example, a high standard of containment might be needed for a tank at a new or re-developed site in a

residential or urban area where the filling station is surrounded by domestic and commercial properties, or where there are nearby cellars or basements into which petrol could leak. You should also take account of environmental requirements and may need to consult the Environment Agency before deciding what type of tank to install.

You should always take steps to ensure that a suitable type of tank is selected and installed.

Underground tanks

Underground tanks should be selected, sited and installed so that the risk of leakage is reduced to the lowest level that is reasonably practicable.

Tanks should be suitable for the prevailing ground conditions and suitably protected from corrosion and premature degradation by chemical attack.

Above-ground tanks

The immediate risk of fire and explosion from a leak from an above ground tank is greater than from an underground tank.

Where tanks are installed, or are planned to be installed, above ground, an assessment should be carried out to determine the risks from the unloading process, a leak of petrol from the tank, a fire or explosion, site traffic arrangements which could lead to a vehicle colliding with the tank, other types of impact, and vandalism.

Marking of tanks/compartments

Tanks and fill points, which are connected, must be uniquely marked. Markings on tanks/compartments and associated equipment, including dipsticks and contents gauges, should be clear and legible at all times to help avoid confusion or errors. Incorrect marking could result in petrol being transferred into a tank that has insufficient ullage or contamination of product leading to expensive and hazardous procedures to remove the contaminated product from the tank.

Detecting leaks

Leaks from underground tanks cannot usually be observed directly and are, therefore, more difficult to detect than leaks from tanks installed above ground. At one petrol station in an urban area, 50 year old tanks were found to have leaked petrol into the basement of nearby flats. Fortunately, the petrol was discovered before the vapor had built up to a dangerous level. Sources of ignition were removed and the flats evacuated. An evaluation of the risks of the tanks leaking should have been made which, together with a suitable inventory or leak detection system, could have found the leak before it became a risk to the public.

The results of a risk assessment will enable you to decide the level of control needed to identify and deal with petrol leaks.

A number of leak prevention and leak detection methods exist. To be effective, the method you select needs to either prevent a release of petrol or provide early warning of a leak to enable remedial actions to be taken quickly so that people are not put at risk. You will also have to consider risks to the environment from a petrol leak. If your site is located in an area where a leak of petrol would be a serious risk to public safety or a serious contamination risk to groundwater, you will need to install leak prevention controls instead of leak detection as the latter will only give warning after petrol has escaped from the containment system.

Continuous Inventory Monitoring

Whilst it is good business to control wetstock, continuous (daily) inventory monitoring is also the most basic and simple form of leak detection. Consistent and accurate monitoring of the amount of petrol unloaded, stored and dispensed can allow leaks from tanks and pipework systems to be identified. Manual inventory checking is usually only suitable as the sole method of leak detection at sites, which have a low throughput of petrol where information about gains and losses is likely to be more reliable.

The simplest way to manually carry out inventory checking is to use dipsticks. Automatic stock reconciliation systems can provide an instant display of any discrepancy and might be a more reliable control method at sites having more than a

very low throughput. Whatever method is selected, the record should show all gains and losses for each tank or compartment and connected pipeline system. This will allow you to detect unusual trends of stock variation, which could indicate a leak.

The effectiveness of inventory monitoring as a method for detecting leaks depends on a number of factors:

- the reliability of the measurement i.e. the accuracy of the contents gauge or dip;
- accurate recording of sales and deliveries; and
- a competent assessment of trends indicated by the results.

Competent assessment means comparing results over a period of time, taking into account the possible effects of significant temperature variations on volumetric measurement, the loss of petrol through vapor release, for example during tank or compartment filling, and examining the results of checks for the presence of water. Assessments should be carried out by someone who is competent to analyze the figures and produce results and trends (this could be the site operator or someone contracted to assess the information or the use of specialist computer software). Small daily discrepancies, which, over a period tend to vary around a norm, are likely to arise from factors other than leakage.

Significant leaks are soon apparent; it should be possible to identify smaller leaks from trends established over a period of days rather than months.

A second source of vapor emissions from service stations is underground tank breathing. Breathing losses occur daily and are attributable to gasoline evaporation and barometric pressure changes. The frequency with which gasoline is withdrawn from the tank, allowing fresh air to enter to enhance evaporation, also has a major effect on the quantity of these emissions. An average breathing emission rate is 120 mg/L of throughput.

Statistical Inventory Reconciliation (SIR)

SIR systems establish acceptable stock reconciliation profiles by statistical analysis of the daily losses and gains for each tank. As well as considering daily stock variances, SIR systems also consider the cumulative variances as a percentage of the cumulative sales in order to identify trends and anomalies. They can be operated by independent third parties or by in house personnel

Checks for water

If a tank fails, variations in the water table may mean that petrol could escape or, conversely, that water could enter the tank. Where practical, inventory checking should be supported by

periodic checks for water in each tank or compartment, which might be affecting inventory results. Water can be detected with water detecting paste on the dipstick. Automatic water detection is included in some tank gauge systems. A certain amount of water will be present in the bottom of a storage tank due to condensation. However, the amount should be negligible and any increase in water levels would indicate that the tank has developed a leak.

Wetstock Control for Petrol Filling Stations

Many petrol filling station operators rely on a manual petrol stock reconciliation system to detect leaks from the storage tanks and pipework. The basic idea is that by finding how much petrol has come out of a tank through the dispensers (by checking the totaliser readings, for example) and taking into account how much has been put into the tank, you can calculate how much should be left in the tank. If you then measure how much petrol actually is in the tank you know if there has been a loss or gain that could indicate a leak.

This method of leak detection relies on consistent measurements of the tank contents, the accuracy of the measurements, and knowledge of the pattern of apparent losses and gains for your site.

A lot of sites still use dipsticks or pump-up (hydrostatic) gauges to measure the contents of tanks. Pump-up gauges and dipsticks can only be read to a certain accuracy, not usually better than 50 to 100 litres either way. The readings are still useful because over a period of time they can be analyzed and in some cases very small leaks can be detected by using special methods. Even without specialist analysis the readings can be sufficient to detect leaks before a lot of petrol has been lost.

Stock losses are to be expected due to evaporation, shrinkage and the displacement of vapor during the road tanker unloading process. Typically, an average stock loss of some 0.2% to 0.3% can be expected. However, at some sites average stock losses can be as high as 0.5% or 0.6%. Although most sites tend to experience stock losses, occasional stock gains can occur.

NOTES: For the purposes of detecting a leak, it is essential that the quantities of petrol delivered, stored and dispensed are accurately monitored and recorded on a daily basis.

Leak detection systems

Proprietary leak detection systems constantly monitor for petrol in locations that would indicate a leak from the tank. Such systems remove the need for inventory checking as the primary means of detecting leaks.

Leak detection systems are appropriate at sites with a larger throughput of petrol where frequent changes in the volume of petrol stored make inventory checking more difficult and less reliable, thus presenting a greater risk to the safety of people on or around the site if a leak is undetected.

Leak detection systems work in different ways and have different levels of sophistication. The Blue Guide² gives guidance in selecting an appropriate class of detection system

Tank testing

When a leak is suspected, for whatever reason, it should be thoroughly investigated. This may involve taking a tank out of service and inspecting it or carrying out a precision tank test. A variety of testing methods exist; volumetric, vacuum and low pressure.

The investigation should take into consideration reasons other than leaks, which may cause wet stock discrepancies before tank testing is carried out. A recommended investigation sequence is:

- Check the reconciliation figures to ensure the arithmetic is correct and that all deliveries and other stock movements have been accounted for;
- Check the wet stock control procedures are carried out correctly and whether forecourt staff require additional training;
- Check for any obvious leaks from pipe joints in manhole chambers, electrical ducts, drainage systems and around the dispenser base;
- Check for any increases in petrol smells. Take into account any reports or complaints from neighbors;
- Have the dispensers checked for accuracy;
- Check the tank contents measuring system. Check the dip stick for damage or the gauging system for correct operation.
- Check whether tank gauges need to be recalibrated or serviced;
- Check the tanks for water ingress;
- Have the pipework tested for leak; and
- Consider fraudulent activities or short deliveries

Testing may also be appropriate when someone takes over the operation of an existing site. You may also want to consider periodic testing where there are nearby structures, such as underground railways or basements, in which people could be at risk in the event of a leak.

The most appropriate test method will depend on the type of installation at your site. Before selecting a particular test find out whether:

- the test has third party accreditation, if so for what fill levels, tank sizes and ullage volumes;
- the test takes account of the water table;
- the ullage space is tested;
- there are any safety features; and
- the operators have been properly trained.

Tank tests should be supported by documented procedures and you should ensure that the test is carried out by people who are competent in the operation of the particular test used. Depending on ground water levels it is possible for tests to give false assurances, i.e. a tank may leak but pass the test.

Note: It should, however, be borne in mind that periodic leak testing is not an alternative to having a recognized and appropriate method of leak detection in operation.

Tanks and their associated equipment, including leak detection and overfill prevention systems, fill pipes including the drop tube, access chambers and their covers, are key areas where maintenance is vital. This will help to ensure the effectiveness of the tanks and safety and emergency devices.

Work on petrol tanks is inherently dangerous and precautions should take account of the flammable contents, particularly when the tank or compartment is nominally empty. Maintenance, modifications and repairs should be carried out only by people who are competent to carry out this type of work.

Repairs involving hot work should not be considered on underground tanks. Explosion hazards exist from petrol that has leaked out of a tank and which returns either as liquid or vapor while hot work is in progress.

Tank repair companies should provide well-documented procedures covering safety, the standard to which the work is to be completed, and the means of monitoring that this is done. All tanks should be leak tested following repairs and before being brought back into use.

Pipework

Pipework includes:

- direct and off-set fill pipes between the unloading point and the storage tank;
- pipes to transfer fuel from the tank to the pump or dispenser by means of suction or pressure;
- siphon pipes linking storage tanks;
- vapor recovery system and ventilation (vent) pipes; and
- fittings and valves associated with pipework.

Pipework needs maintaining to ensure its integrity, that it is safe to use, and is in a good state of repair. Leaks from pressurized systems have the potential to be particularly severe because of the way petrol can be forced out of the pipe under pressure.

Underground pipework

Pipework, with the exception of part of the filling and vent systems, is generally installed underground. This gives greater flexibility over forecourt design and removes the need to protect the pipework from fire or impact damage.

However, underground pipework is the source of the majority of petrol leaks in petrol installations. Ground conditions and differential movement between the pipework and the tank, can cause corrosive and mechanical damage that result in

leaks. Some leaks can find migration paths, which allow the petrol or vapors to escape from the site and affect neighboring properties (especially those with basements) and other below ground features like tunnels and drains/sewers.

The possibility of off-site migration increases the possibility of an undetected build-up of petrol, and more importantly its vapor, with the potential for significant risks to people's safety.

The surface of the ground above pipework should be adequately reinforced to protect it from the weight of traffic. Where possible, pipework should not be located under buildings or other obstructions, which could hinder or prevent access for repairs or modifications.

Above ground pipework

Pipework installed above ground needs to be firmly supported and adequately protected against fire and corrosion, and from impact where it is adjacent to traffic areas. Above ground pipework should be constructed of materials resistant to light degradation.

Types of pipework

Pipework must be compatible with petrol or petrol vapor, have sufficient structural integrity to withstand operating conditions and be suitable for prevailing environmental conditions. It is commonly made of steel, glass reinforced plastic or other non-metallic material (e.g. polyethylene).

When pipework is installed at a new site or during changes to an existing one, select whichever type will best suit the circumstances of the site and therefore effectively keep the risks to people's safety as low as reasonably practicable. If you operate an existing site, find out what type of pipework has been installed and how old it is so that you can take account of it in your risk assessment. Use the results of the assessment to check whether you need to take any further precautions. Where safety and environmental factors require different standards, the higher standard will generally be needed.

Marking

All pipework, valves and fittings should be clearly and permanently marked to make identification easy and to reduce the risk of error or confusion, which might create a risk. For example, direct or off set fill pipes and valves should indicate to which tank or compartment they are connected and working capacity of the tank or compartment. You may also want to show the type and grade of fuel.

Leak detection

All sites should have some method for detecting leaks from pipework.

Continuous Inventory Monitoring

Continuous Inventory Monitoring may be an appropriate method of leak detection. Discrepancies, which cannot be accounted for elsewhere, may indicate a leak from pipework.

However, it is unlikely that simple dipstick methods would detect leaks from pipes unless there was major damage to the pipework.

Monitoring and leak detection systems

Some systems are suitable only for double-skin pipework, such as those, which constantly monitor the vacuum or pressure of the interstice or secondary containment area. Others, including those, which detect petrol or vapor in the surrounding soil or water, or changes in the conditions of a pressurized line, are suitable for double or single skin pipework. Seek advice from the manufacturer, a competent contractor or a qualified engineer if necessary. Whichever system you select should be installed and used in accordance with the manufacturer's instructions and be adequately maintained.

Additional safety controls are necessary for pipework, which is part of a pressurized system. Pressurized pipework should have secondary containment and should be fitted with a continuous leak monitoring system, which will isolate the pump if a leak is detected. Additionally impact check valves positioned at the base of each dispenser will prevent the flow of petrol if the dispenser is struck or subject to intense heat. If it is not reasonably practicable to install this equipment, the system should be converted to suction operation.

Pipework testing

Pipework testing has an important role to play in the operation of petrol filling stations and leak testing will be necessary when:

- prior to the commissioning of new or repaired pipework.
- when developing an in-house reconciliation system in order to confirm the integrity of the petrol containment system.
- prior to bringing back into use any sections of pipework that have been out of operation for more than 12 months
- for the periodic testing pipework where there is no recognized or suitable leak detection systems available. For example, vapor pipework and where applicable off-set fill pipework.
- where a risk assessment identifies a specific need for periodic testing.

Note: It should, however, be borne in mind that periodic leak testing is not an alternative to having a recognized and appropriate method of leak detection in operation.

Where testing is necessary, appropriate test methods include:

- nitrogen gas pressure testing of non-pressure lines;
- hydrostatic pressure testing on suction lines;
- hydraulic pressure testing for pressure lines;
- vacuum testing;
- gas low pressure testing using a helium/nitrogen mix in association with a helium sensing device; and
- any other suitable pipework testing system with an acceptable performance capability.

Valves and other associated equipment should be tested in accordance with the manufacturer's instructions.

Maintenance, repairs and modifications

Maintenance, repairs and modifications work should be undertaken by people competent to carry out this type of work.

Pipework, including fittings, valves and any associated monitoring equipment, should be included in the site maintenance scheme. As most pipework is below ground there is little that can be visually inspected. However access chambers will

allow the conditions of valves and joints to be checked for signs of corrosion, damage or leaks.

Any defective pipework should be taken out of use pending repair or replacement. Pipework to be extended or modified should be tested to ensure its integrity before any work is carried out. Similarly, it should be tested after work has been completed and before it is brought back into operation.

Keep a record of any work carried out on pipework. Amend the site plan to reflect any extensions or modifications to the pipework system. This information will be useful when you carry out your risk assessment and will help you to decide when pipework, fittings and valves should next be examined or tested.

4. DISPENSING

Misuse or failure of equipment, damage to dispensers, hoses or nozzles, or attempting to fill unsuitable tanks or containers can result in petrol being spilt. The amount that could be spilt during dispensing is small compared to bulk unloading,

but the number of dispensing operations is considerably higher. It is also likely that members of the public will be in the hazardous area. In order to comply with the requirements of this regulation, site operators will need to ensure that petrol is dispensed safely.

Methods of operation

The dispensing arrangements can operate in a variety of ways; from attended service, where site staff refuel customers' vehicles through to sites that are unmanned and where customers refuel their own vehicles without any on-site supervision or assistance from the site operator. Some filling stations now function on an alternating system where the site is operated as attended self-service at busy periods and unattended self-service at quiet periods (i.e. late evening and through the night).

The decision as to the mode of forecourt operation is one for the site operator to take on a commercial basis but after taking safety concerns into account. The safety considerations must be based on a site-specific risk assessment. Irrespective of the mode of operation, forecourt attendants should not be under the age of 16 years and no one under the age of 18 years should be left in sole charge of a filling station.

Location of dispensing area

A clear route for vehicles to and from dispensers can reduce the chance of a collision. If vehicles can refuel wholly on site there is less chance of them (or a person dispensing petrol) being hit by another vehicle. If this is not possible, operating procedures will need to be tailored to the circumstances and for example, only allow refuelling by attendants and providing warning signs to alert other road users. The exclusion of potential ignition sources from around dispensers is easier if they are at least 4 metres from site boundaries, as this is generally the extent of the hazardous area surrounding dispensers. Where this is not the case, and moving your dispensers is not a reasonably practicable option, your operating procedures should ensure that

dispensing is not carried out while there are potential sources of ignition in the hazardous area.

Dispensing should be carried out away from potential sources of ignition and in the open air so that vapors can disperse easily and quickly. Dispensing equipment including the nozzle and hose should be protected from potential impact with vehicles, for example by mounting dispensers on a plinth which is designed in the shape of a dog bone or is sufficiently wide and high to prevent collisions, or by using fixed barriers.

Types of dispensers

All dispensers have certain safety features to prevent releases of petrol. Modern dispensers are designed and certified to a higher standard than older ones with features such as cut-off or limiting devices and breakaway couplings.

Mobile Telephones

Generally mobile telephones are not designed and certified for use in explosive atmospheres. Their use can also create a serious distraction for people carrying out dispensing activities. Radio transmissions from individual mobile telephones are generally too low to induce dangerous electric currents in nearby equipment and the risk of incendive sparking from the battery is low, however, they should not be used in the hazardous areas that exist when actually dispensing petrol. Neither should they be used in the hazardous areas around the fill and vent pipes during petrol deliveries.

Rather than applying a total prohibition on the use of mobile telephones on petrol forecourts which has resulted in some anomalies and frequent abuse to staff, the following controls are recommended:

- Mobile telephones should not be used by customers or forecourt staff whilst actually dispensing petrol into fuel tanks or containers;
- During petrol deliveries mobile telephones should not be used on those parts of the site that have been designated as hazardous areas by the site operator or the driver;
- Mobile telephones should not be used during other petrol handling operations or during the maintenance of petrol equipment unless a specific assessment shows the risks are negligible;
- There is no need to restrict the use of mobile telephones, with respect to the safe keeping of petrol, at other times or in other areas of the forecourt. This includes in the shop, in motor vehicles parked on the forecourt or in other non-hazardous areas.
- Note: Site operators may, however, wish to use their discretion and put a total ban on the use of mobile telephones on the forecourt if that provides a more manageable arrangement.

The use of radio equipment fitted on emergency vehicles and citizen band (CB) radios may create an ignition risk. These types of transmitting equipment do have a power out-put sufficient to induce dangerous electrical currents in nearby fixtures and they should not be allowed to be used at the dispensing points or in the vicinity of the road tanker when unloading. It should be noted that the radio equipment mounted on most emergency vehicles is under automatic interrogation from the base station. This means that radio messages are being received and transmitted without

anyone speaking into a hand set.

Management of the Forecourt

The site operator will need to ensure that proper supervision of the forecourt is achieved particularly during busy times or when the site is taking delivery of petrol or other provisions. In carrying out his assessment of the ability of staff to supervise the dispensing operations he will need to consider:

- Appropriate staffing levels;
- Other duties expected of staff (i.e. re-stocking shelves, sales, petrol deliveries) during times the forecourt is open for business;
- Management of forecourt staff
- Training of forecourt staff

Where the forecourt layout gives rise to poor visibility of dispensers, additional methods of work will need to be introduced for the forecourt staff. It may be necessary to delay

authorization (or to cancel the pre-authorization) of a specific pump until a temporary obstruction to vision has moved away or instructions may be given over the public address system for the customer to move to an alternative pump. When portable containers to be filled are out of the attendant's line of vision it may also be necessary to use the public address system to ask the customer to show the container, prior to filling, so that it can be identified as being suitable.

Training of Forecourt Attendants

It is a requirement to provide adequate training and relevant information for all employees involved in the storage and handling of any dangerous substances. It will, therefore, be necessary to identify the training and retraining needs of forecourt staff by an assessment of the risks relating to fire and explosion.

Training in matters relating to the dispensing operation should include:

- Procedures for activating and controlling dispensers;
- Safe dispensing procedures;
- Use of customer information systems, e.g. public address systems;
- Safe filling of petrol containers;
- Dealing with customers' enquiries on safety matters;
- Spillage control and emergency procedures during dispensing including the practical use of the types of fire extinguishers provided;
- Recognizing the circumstances when it is not safe to authorize a dispenser and when pre-authorization should be over-ridden; and
- Understanding customer behavior and unacceptable customer practices.

It is the responsibility of site management to instruct forecourt attendants not to authorize (or to over-ride the pre-authorization of) a pump when a situation of poor visibility arises.

Safe dispensing of petrol

Particular attention needs to be paid to the following points to ensure that petrol is dispensed safely:

- petrol should only be dispensed into the fuel tank of a vehicle, motorbike or motorboat, a suitable container or demountable petrol tank;
- no-one should smoke or use smoking materials in the hazardous area around the dispenser;
- the engine of the vehicle to be filled should be switched off before dispensing begins. Dispensing equipment should be operated in accordance with the manufacturer's instructions (e.g. equipment designed to be operated by an attendant should only be operated by an attendant). Delivery hoses should not be kinked or stretched. After dispensing, nozzles should be firmly stowed in their housings to switch-off metering pumps and dispensers or, in the case of centralized pump systems, to isolated hoses from sources of pressure. If appropriate, hoses should be draped to avoid damage by moving vehicles;
- motor cyclists and their passengers should dismount from their machines;

- portable and CB radios, mobile telephones and other electrical equipment should not be used in hazardous areas;
- the dispensing area should be kept clear of obstructions to allow easy access and exit; and
- petrol should not be dispensed by persons under 16 years of age. This restriction should not preclude young persons (e.g. teenagers) from operating dispensers to refuel motor vehicles provided this activity is carried out under the supervision of an adult.

Portable petrol containers

Petrol should be dispensed into appropriately marked or labelled portable containers suitable for keeping petrol. The definition of a suitable container is a United Nations approved container for the carriage of petrol. Where portable containers are to be filled they should be removed from inside vehicles and be placed on the forecourt and filled with the nozzle-operating lever held open manually. Containers should be securely closed as soon as dispensing finishes. Pedestrian customers should be discouraged from bringing full containers into the shop when paying for petrol.

Portable containers must be:

- suitable for the purpose of storing petrol;
- suitably labelled to identify the highly flammable nature of the contents;
- constructed and maintained so that they are reasonably secure against breakage and leakage (of petrol and vapor); and
- fitted with a secure closure, i.e. a screw or clamp tight cap.

Filling of More Than Two Petrol Containers

In considering the numbers of suitable containers that can be filled at one time you need to take into account the risks to the person filling the container and also to other people who may be using or working on the forecourt at the time. You also have duty of care to your customers to enable them to comply with the legal requirements for any subsequent carriage or storage of the petrol.

A limit of two containers is generally accepted as providing a reasonable level of safety on the forecourt and also allows for compliance with the majority of storage conditions applicable to petrol supplied to the general public for their private/domestic use. This does not mean that greater numbers of containers cannot be legally filled but it will be for you to decide on the appropriate numbers based on a risk assessment and a review of your hazardous area classification.

The risks from vapor release, spills and accidental ignition increase with the number of containers being filled; as do the consequences of any ignition. Where for example >10 containers are to be filled at any one time, it is important that in addition to the normal dispensing control measures, the following controls are incorporated into a 'written' filling procedure:

- Electrostatic ignition risks must be effectively controlled by ensuring that all containers are placed on the ground when being filled and that the person or persons filling the containers are provided with anti-static footwear;
- The build-up of dangerous concentrations of vapors in vans or on high-sided vehicles must be avoided.

- Consideration should also be given by the customer to the method of securing the containers in place in/on the vehicle.
- Removing the containers from the vehicle prior to filling together with a procedure to ensure that container caps are only removed when the container is actually be filled should provide an effective measure to prevent vapor accumulation in/on the carrying vehicle.
- All containers should have their caps securely replaced immediately after filling;
- After filling, containers should remain on the ground for a short period to allow for the safe dispersal of vapors from any wetting caused by petrol splashes or outflows;
- Containers should be filled one at a time. The caps of the other containers, both empty and full, should remain securely closed. This control measure will prevent the escalation of a fire should an ignition occur; and
- The place used for the multiple filling of containers will need to be provided with some form of barrier to prevent members of the public entering the hazardous area when filling is in progress.

In order to implement effective control measures where the multiple filling of containers is to take place, you must enter into an agreement with the contractor or person requiring the petrol so as to ensure that the procedure is understood and followed by the person or persons filling the containers. This agreement should also include the number of persons required to safely fill the containers and a time of day when the containers are to be filled.

Supply of Petrol to Children

Petrol or any other dangerous substance should not be sold to children under 16 years of age.

Static Electricity

Conditions that cause static electricity to be generated prior to, and during the dispensing operation are:

- the customer's motor vehicle can become electrically charged during the journey to the filling station;
- the customer becoming charged with static electricity whilst in the vehicle or on the forecourt;
- when large portable containers (> 5 litres capacity) are filled with petrol.

The inadvertent ignition of flammable vapors by a spark from a static discharge can be avoided by ensuring that:

- The forecourt surface does not have a high electrical resistance, thereby not inhibiting earthing of the charge via the motor vehicle's tires or the footwear of customers.
- High resistance surfaces such as asphalt and certain impervious sealants should be avoided; and portable containers are placed on the forecourt when being filled.

Lighting

Vehicle entry and exit routes and the area around the dispensing equipment need to be sufficiently lit to allow people to dispense petrol safely. This means not just providing adequate lighting but also maintaining it.

EMERGENCIES

Whatever type of petrol station you operate, you need procedures to deal with emergencies and ensure that your employees are trained to deal with them. An example procedure would be:

- stop fuelling operations and return nozzles to their housings;
- isolate the electrical supply from faulty equipment;
- clear up spills promptly;
- contact the emergency services where necessary; and
- do not resume dispensing until faults affecting safety have been corrected or other incidents properly dealt with.

Dealing with Spillages

Spillages of petrol when dispensing activities are taking place are foreseeable events and control measures and equipment should be in place to deal with such occurrences. Experience has shown that spillages can be put into the following

three general categories in the order of frequency:

- Blow-backs from the fuel tank or container when the liquid level is reaching full capacity. Due to the safety features designed into the dispenser nozzle, this type of spillage will normally only involve a small quantity of petrol; most of which will quickly evaporate on the forecourt surface;
- A leak from a defective fuel tank of the vehicle being refueled. This type of spillage can arise from the sudden and catastrophic failure of the fuel tank resulting in the full contents being discharged onto the forecourt. The quantity can be in the region of 50 litres if the failure occurs when the tank is full; and
- The failure of a hose coupling or a leak from a hose that has been cut or stabbed by vandals. This is, potentially, the most serious type of leak as it can result in the customer being splashed with petrol. In a worst-case scenario, there is the possibility of a customer being 'showered' with petrol if, for example, there is a coupling or hose failure on a 'high hose' dispenser.

Spillage loss is made up of contributions from prefill and postfill nozzle drip and from spit-back and overflow from the vehicles's fuel tank filler pipe during filling. The amount of spillage loss can depend on several variables, including service station business characteristics, tank configuration, and operator techniques.

Staff should be trained in how to deal with such a situation and there should be facilities available for a customer to wash the affected parts of their body and remove contaminated clothing.

EMERGENCY PREPAREDNESS

Emergency Plans

The purpose of the emergency plan is to minimise the effects of any emergency that occurs at premises where larger quantities of dangerous goods are stored and handled.

The emergency plan should be capable of dealing with the worst-case credible scenario. However, detailed planning should concentrate on the more likely events. The emergency plan should also be sufficiently flexible to ensure that an emergency response can be varied according to the severity and type of dangerous occurrence or near miss.

Emergency Plan Contents:

Site and Hazard Detail

- Name, location, address and nature of operations
- Detailed map of the facility and surrounding area
- Maximum/minimum number of persons expected at the facility
- Infrastructure likely to be affected by an incident
- Emergency planning assumptions
- Description of measures to control the consequence of each hazard and major incident

Command Structure and Personnel

- Details of emergency contact personnel
- Allocation of personnel for implementing the plan

Notifications

- Procedures for providing early warning of an incident
- Details of on-site and off-site warning systems
- Contact details for the emergency services
- Details of on-site communications systems

Resources

- Details of emergency resources on-site
- Arrangement for obtaining additional external resources

Procedures

- Procedures for safe evacuation and muster of personnel
- Details of control points and procedures for essential services
- Procedures for containment of any incident
- Procedures for decontamination following an incident

“Emergency” means an event that exposes a person or property in the vicinity of the event to an immediate risk through:

- an explosion, fire, harmful reaction or the evolution of flammable, corrosive or toxic vapours involving dangerous goods; or
- the escape, spillage or leakage of any dangerous goods.

Development and consultation

In developing the emergency plan, you must request the written advice of the emergency services authority and have regard to that written advice. If an emergency may impact beyond the perimeter of your premises, you should also consult with people in control of adjacent premises and the local counter-disaster organisation.

Implementing, communicating and maintaining the plan

The contents of emergency plans must be communicated to all people who may be exposed to a risk as a result of an emergency, including:

- employees;
- contractors and sub-contractors; and
- people in control of adjacent premises.

The emergency plan should be tested when first devised, after each modification and at regular intervals. Simulated emergencies and other exercises should systematically attempt to involve all people likely to be involved in a dangerous occurrence or near miss. These exercises should include practical drills.

Emergency plans must be updated whenever:

- there is a change of circumstances on or off the premises;
- updated information becomes available;
- a deficiency in the plan is identified.

Accessibility

The emergency plan should be in a readily accessible and understandable form. This could be either a hard copy or in a computer format.

The location of the emergency plan should be well known to supervisors and employees and discussed with the emergency services authority whenever there is a review or update. It is recommended that a copy be made available to the emergency services authority.

Emergency procedures

Emergency procedures should cover all foreseeable emergencies such as fire, spillage of dangerous goods, vapour release and uncontrolled reaction as well as external risks to dangerous goods.

Emergency procedures will vary depending on the requirements of the premises, but should contain as a minimum:

- the means of raising the alarm;
- contact details of the emergency services authority and/or EPA; and

- actions to be taken by employees in an emergency.

Emergency equipment

Equipment required to contain and clean up escapes, spills or leaks of dangerous goods must be kept on the premises and be accessible at all times. The equipment will vary with the types and quantities of dangerous goods. Examples include:

- overpacks such as oversized drums for containing leaking containers;
- absorbent material suitable for the substances likely to be spilled;
- booms, plates and/or flexible sheeting for preventing spillage from entering drains and waterways;
- neutralising agents such as lime or soda ash;
- suitable pumps and hoses for removal of spilled material;
- hand tools such as mops, buckets, squeegees and bins; and
- suitable PPE.

You should establish a procedure for the regular maintenance of emergency equipment to ensure that the equipment is in serviceable condition.

Responding to an emergency

You must respond to any emergency by ensuring that immediate action is taken to assess and control any risk associated with the emergency. Only people who are essential to the tasks of assessing and controlling the risk associated with the emergency are permitted to remain in the vicinity of the emergency. Your emergency procedures should specify those essential personnel.

Investigating incidents

You must investigate all incidents. These include dangerous occurrences – commonly referred to as “near misses” – which could have exposed people or property to a risk. The investigation of incidents should be an integral part of the system for managing safety at the premises. The aim should be to ensure that incidents are prevented in the future.

“Incident” means:

- an emergency; or
- an unintended event that, but for the intervention of a risk control measure or human intervention, is likely to have resulted in an emergency.

The investigation must determine the cause or likely cause of the incident that has occurred at the premises. Further, the risk assessment must be reviewed having regard to the results of the investigation, and risk control measures revised accordingly.

The system for investigating incidents should:

- be prepared in consultation with employees and any health and safety representatives;
- be documented so that it is readily understood by people who may be affected; and
- inform supervisors, employees, health and safety representatives and other relevant people

- of the results of the investigation.

Recording incident investigations

You must make a record of the incident investigation and keep it for at least five years. The record must be readily available to WorkCover.

The following should be considered in recording a dangerous occurrence:

- Were the on-site or off-site emergency plans activated?
- Did the leak or spill have the potential to cause fire, explosion or release of toxic or corrosive materials?
- Did the leak or spill have the potential to cause any of the following effects: acute or chronic human health effects?
environmental harm?
damage to property?
- Would the leak or spill affect the quantity or quality of effluent discharged into sewers?
- Did the leak or spill need to be reported to the Environment Protection Authority under a site-leak or spill-reporting plan?

OBSERVATION AND CONTROL

Attendant operated sites (AS)

Whenever an attendant service filling station is open for business, a trained attendant should be available to operate the dispensing equipment. The attendant should not allow customers to operate the equipment with or without supervision.

Trigger latching mechanisms are acceptable on petrol pump nozzles operated by an attendant. However, site operators should be aware that latched nozzles have been implicated in a number of forecourt fires. Static charge is able to build up on users if they let go of the earthed nozzle during dispensing and this can subsequently cause an incendive discharge when they make contact with the nozzle again to complete the transaction.

Where trigger-latching mechanisms are installed the site operator should ensure that attendants are provided with, and wear, appropriate anti-static footwear whilst carrying out dispensing operations.

Attended self-service sites (ASS)

At these sites control over the dispensing is exercised by one or more attendants located at a control point or points. The location and design of the control point should allow, as far as is reasonably practicable, the attendants a clear and unrestricted view of all the dispensers so that they can prevent unsafe practices and if necessary switch-off the dispenser, if for instance:

- inappropriate containers are being filled with petrol, or containers are not placed on the forecourt when being filled with petrol (static discharge hazard);
- sources of ignition are present (i.e. smoking, vehicle engine still running, radio transmitting equipment operating);

- inappropriate use of the dispenser (i.e. devices being used to hold open the trigger mechanism on the nozzle, the hose being over-stretched/damaged due to the vehicle position; and
- children (under 16) operating the dispenser or attempting to obtain petrol.

Note: Latching mechanisms on nozzles should be removed or disarmed.

In practice the attendant will not always be able to observe all details of self-service operations even at well-designed sites.

Observation of the nozzle actually being placed into the vehicle fuel tank or container will frequently be restricted because of the configurations of vehicles, dispensers and customers relative to the control point. The attendant often needs to make judgments of the customer's intentions based on what can be observed from the control point. What it is reasonable to observe from the control point will vary from site to site, from dispenser to dispenser, and from situation to situation and will not always include a complete view of various nozzle positions.

Knowledge that a customer is being observed directly from the control point is likely to ensure customer adherence to commonly accepted practices and instructions.

Other Observation Aids

Mirrors may provide some improvement in vision at specific dispensers. Generally, however, their use will be restricted because the small and distorted image will not provide sufficient detail if installed with a total viewing distance (i.e. from control point to dispenser via a mirror) greater than about 10 metres. The effectiveness of a mirror to improve supervision can only be determined by practical trials at specific locations.

Supervision of the dispensing operation is likely to be improved as a result of a direct attendant service or by the presence of staff on the forecourt.

Use of Closed Circuit Television Equipment (CCTV)

CCTV should not normally be required at sites that are designed in accordance with accepted good practice to maximize the visibility of the dispensers from the control points. Such designs will include locating the control point so that an attendant can see the forecourt and dispensers clearly when no vehicles are present and also arranging the dispensers so they are aligned with the attendant's line of vision rather than at right angles to it. Additionally road tankers or other delivery vehicles properly parked for unloading should not obscure the view from the control point.

CCTV can be used as a supervisory aid at existing sites in order to overcome visibility problems at specific islands. For example CCTV may have applications in the following circumstances when alternative solutions have been explored

and found not to be practicable:

- When the dispenser cannot be viewed directly from the control point. For example, a building, car wash or a large stanchion obstructs the view; or
- Large multi-hose dispensers are installed so that their long side is at right angles to the line of vision from the control point; or
- Following change of use from attendant to self-service operation where the dispensers are not easily seen from the control

- point; or
- For dispensers installed at the extremities of very large sites that cannot be easily seen because of their distance or angle
- of vision from the control point.

New or redeveloped sites that have been designed without adequate visibility of the dispensers will require CCTV as an aid to supervision. These sites include those where the control point is located at the rear of a convenience store and the

presence of customers, goods on display or the distance of the attendant from the viewing panel restricts vision of the forecourt. The CCTV system will require high-resolution equipment providing sufficient definition so that the activities occurring at the dispensers can be clearly identified. In addition the monitors should be interlinked with the control panel so that each dispenser is automatically displayed on the screen before it can be authorised by the attendant. It is recommended that a touch-screen system be adopted so that the attendant has to look at the actual screen before authorising the pump.

6. DECOMMISSIONING

Where equipment used for storing or dispensing of petrol is taken out of use, the Dangerous Substances & Explosive Atmospheres Regulations 20021 require operators to ensure that the work is carried out safely and that the equipment is left in a safe state.

Taking equipment out of use is a specialist activity and, as a site operator or owner, you are unlikely to carry out the work yourself. Seek advice from a contractor, the enforcing authority or, if necessary, the site owner about:

- whether you should take equipment out of use permanently or temporarily;
- what methods will be necessary and appropriate for the circumstances of the site and the equipment, the results of a risk assessment will help to answer this; and
- how the work should be carried out.

Methods of taking redundant or condemned equipment out of use

Taking equipment out of use permanently

If there is no intention to use equipment in the future, either for economic reasons or because it is damaged and cannot be repaired, it should be taken out of use permanently.

Taking equipment out of use temporarily

Equipment may be taken out of use temporarily for a variety of reasons. For example, a storage tank may be taken out of use for cleaning, modification or during reconstruction of a petrol station, but will remain in place for future storage of petrol or alternative substances such as diesel or heating fuels. Before expiry of a lease, a site may stop storing and dispensing petrol, but it may need to be returned to the owner with equipment in situ, functional and safe. In this case, suitable and appropriate measures will need to be taken to bring equipment safely back into use.

Safe systems of work

A systematic examination of all the tasks associated with the decommissioning works should first be carried out for the purposes of identifying all the hazards associated with the decommissioning works. The system of work should be a formal process that defines safe methods of work so as to ensure that hazards are eliminated or that risks are minimized. The Approved Code of Practice and Guidance on 'Safe Maintenance, Repair and Cleaning Procedures' provides further information.

Method statement

A suitable method statement should be prepared by the person carrying out the work. The statement should be comprehensive for example, a method statement for taking a tank out of use should include information on how the supply lines, vent pipes and other related equipment will be made safe.

Where the proposed work is a high-risk activity, stricter controls will be required and the work should only be carried out against previously agreed safety procedures by implementing a permit-to-work system.

Storage tanks and pipework

Tanks (and individual compartments, where appropriate) and pipework taken out of use permanently may be removed from the site and disposed of safely, or made safe and left in place. If they are to remain in the ground, they should require no future maintenance.

When taking tanks, compartments or pipework out of use temporarily, the method you select should take account of the condition of the equipment, the length of time it is likely to be out of use, and why. Depending on the method chosen, you will need to know what maintenance may be required in the interim. For example, when tanks or compartments are temporarily filled with water, the water level can drop to leave a flammable sludge or vapor. You will need to make frequent and regular checks to ensure that the water level is not falling, and, where necessary, arrange for petrol to be removed from the surface of the water.

Tanks, compartments and pipework that are taken out of use for a very short time but still contain petrol, such as during a temporary surplus of resources, should remain subject to the same operational procedures and maintenance regime as other similar equipment still in use on the site. Tanks taken out of active use temporarily but still holding a quantity of residual petrol will remain subject to the licensing regime.

Electrical installation

The supply to equipment taken out of use should be isolated by someone competent to carry out such work. If the site is being vacated, this should be the electricity supply company.

Other equipment

Work to take dispensers, the interceptor and drainage systems, and manhole chambers out of use should be carried out safely, and the equipment left in a safe condition. For example, after dispensers have been made safe, they can be removed from the site or left in place, provided they have sufficient protection from vandalism, such as by enclosure in a sturdy encasement.

Conversion to other products

Work carried out to convert petrol equipment to other products, such as diesel and heating fuels, should take account of the effects of cross-contamination of the new substance with petrol. Other precautions, such as re-labelling the fill points and posting warning notices, may also be necessary. The Institute of Petroleum's 'Code of practice for a product identification system for petroleum products'³⁷ give further advice on the marking of pipework.

Record keeping

You should keep records to show how equipment has been taken out of use and made safe. Where appropriate, the equipment itself should be clearly marked to show that it is no longer in service. The location of abandoned underground tanks or pipework should be recorded and brought to the attention of anyone who subsequently becomes responsible for the site.