

UNDERGROUND STORAGE TANKS FOR LIQUID HYDROCARBONS

Code of Practice for Installers, Owners and Operators of Underground Storage Tanks (& Pipelines)

Water Environment (Controlled Activities)
(Scotland) Regulations 2005

Version 1 May 2006

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EXECUTIVE SUMMARY

Concise Summary

This Code of Practice provides practical guidance to the owners and operators of underground liquid hydrocarbon storage tanks and pipelines in order to minimise the risks to the water environment, including groundwater. The Code of Practice is relevant to any facility which stores petroleum hydrocarbons in underground storage tanks (USTs), or distributes such in buried pipelines. It is for use by site owners and managers (of both operational and abandoned facilities) and people involved in the design, construction, maintenance and decommissioning of UST facilities. It is also for use by SEPA staff involved in evaluating the pollution threat from these facilities and may be considered by the Petroleum Licensing Authority in evaluating a site's operational licence.

Following the code should prevent releases to and pollution of the water environment as a result of the storage of liquid petroleum hydrocarbons (including petroleum spirit, diesel and all heavier oils) in USTs, partially buried storage tanks and related pipework, but not those tanks and that pipework sited wholly above ground. Although the generic principles of the code may apply, it does not deal with the storage of liquefied natural gas or liquefied petroleum gas. The Code of Practice is not a prescriptive list of procedures. It is intended to provide a framework for best practice, the scope of the various elements of which can be adjusted for individual UST facilities.

This Code of Practice converts the Scottish Executive's September 2003 (Paper 2003/27) Code of Practice under the Groundwater Regulations (1998) into a document consistent with the Water Environment (Controlled Activities) (Scotland) Regulations 2005, referred to hereafter as CAR (2005). From 1st April 2006, CAR (2005) supersedes both the Groundwater Regulations (1998) and the Control of Pollution Act (COPA, as amended). The update deals with this legislative change and the need to consider the water environment as a whole rather than just groundwater. Otherwise the best practice provided is largely unchanged from the previous (September 2003) version.

The Code applies to activities which, if carried out in accordance with good practice, should not normally cause pollution of the water environment, i.e. preventing the non-intentional (accidental or associated with acts of vandalism) loss of product. It is not relevant where intentional (deliberate) discharges or disposals are made. Intentional discharges or disposals are subject to separate prior authorisation requirements under CAR (2005), with further details obtained through discussion with SEPA. The Code focuses on operational and management practices, and whilst engineering is equally important, refers the reader elsewhere for guidance on this.

The Code first gives an introduction into its use and application and the need to protect the water environment. The next section explains how the Code applies to different types of facility, discusses the four key elements (risk assessment, engineering requirements, operational management systems and controls and emergency plans and procedures) necessary to ensure protection of the water environment; and how to demonstrate compliance with the Code. Sections are then provided on good practice related to commissioning, operation and decommissioning of facilities. Appendices provide the legislative background, a list of facilities to which the code should apply, guidance on environmental risk assessment of UST facilities, guidance on good engineering design and advice on training.

What is the Purpose of this Code of Practice?

The purpose of this Code of Practice is to minimise the potential for UST facilities to result in a detrimental impact on the water environment, primarily through preventing and containing any loss of product.

The water environment includes both surface water and groundwater. Surface waters include all water courses (rivers, streams, burns and canals), lochs, lakes, and coastal waters. These are the visible parts of Scotland's water environment, which provide an invaluable national source of drinking water as well as supporting ecosystems important for fisheries, farming, sport and recreation.

Groundwater is also a valuable natural resource, of vital importance to both Scotland's economy and environment. An estimated 23 Mm³ of drinking water is provided by groundwater, particularly in the South West and in rural communities. Groundwater also helps to keep streams, burns and rivers flowing and wetlands replenished with often high quality water during dry weather.

Any pollution of the water environment can have serious consequences for human health, the environment and economic wealth.

The Code of Practice provides straightforward guidance on good practice to prevent releases and pollution of the water environment, and in particular groundwater, as a result of the storage of liquid petroleum hydrocarbons (this includes petroleum spirit, diesel and all heavier oils) in underground storage tanks (USTs), including partially buried tanks, but not those sited wholly above ground. The Code of Practice is not a prescriptive list of procedures. It is intended to provide a framework for best practice, the scope of the various elements of which can be adjusted for individual UST facilities.

Who should use this Code?

The Code of Practice is relevant to any facility which stores petroleum hydrocarbons in USTs, or distributes such in buried pipelines, and contains advice specifically aimed at the following persons:

- the owners of UST facilities;
- persons involved in the operational management of UST facilities;
- persons involved in the maintenance of UST facilities;
- persons involved in designing and constructing UST facilities;
- persons involved in decommissioning UST facilities; and
- persons responsible for abandoned facilities.

The Code of Practice does not have statutory status but compliance with the Code of Practice will be used by the Scottish Environment Protection Agency (SEPA) in determining whether or not to issue an Enforcement Notice under Regulation 28(2) of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, referred to hereafter as CAR (2005), to prevent pollution of the water environment. However, compliance with the Code will not act as a defence in the event of water pollution occurring.

The persons responsible for complying with the Code of Practice might not necessarily possess all the appropriate knowledge and expertise. Therefore, responsible persons are urged, as appropriate, to consult relevant guidance or seek expert advice.

What is the Basis of this Code?

The Code of Practice outlines good operational and management practices which should be adopted by UST facilities. With regard to engineering issues it provides guidance towards the appropriate technical standards that should be adopted. The Code of Practice identifies four key elements which will help to prevent pollution of groundwater. These are:

- the undertaking of an *Assessment of Risk* to the water environment;
- the provision of appropriate *Engineering Requirements*;
- the implementation of appropriate *Management Systems and Controls*; and
- the preparation of suitable *Emergency Plans and Procedures*.

The four key elements apply to UST facilities at all stages of their lifetimes. That is, they should be addressed during:

- commissioning (design and construction);
- operation; and
- decommissioning.

For each of these stages, the Code of Practice highlights the potential risks to the water environment and outlines the types of good practices to be developed and followed. **The release of petroleum hydrocarbons can occur not just from the storage tank itself but also from ancillary equipment and during the movement of product to and from the storage facility.**

An **Assessment of Risk** should be carried out to identify the potential for product loss and understand the potential impacts. The findings of this assessment can then be used to establish engineering and management controls to minimise the potential for loss and emergency response procedures for use in the event of loss.

The risk assessment will establish the optimum **Engineering Requirements** necessary to both prevent and contain any loss of product. The integrity of engineering measures will be compromised if insufficient attention is paid to Construction Quality Assurance (CQA) and adherence to regular maintenance procedures.

Operational Management Systems and Controls complement the use of engineering requirements and form a major part of risk mitigation. Even the most stringent engineering controls can be compromised if operational management controls are not in place to ensure correct use. If appropriate management systems and controls are developed and followed correctly, the risk of a pollution incident occurring will be reduced dramatically. This includes adherence to appropriate maintenance programmes and procedures.

In the event of a failure of engineering or management controls leading to a loss of product, the environmental impact and damage will be minimised if appropriate **Emergency Plans and Procedures** have been developed and are followed.

Following the Code of Practice will not only help prevent loss of product and pollution, but should also have an economic benefit.

Other Codes of Practice

This Code is the third in a series produced under CAR (2005). Currently also available on the SEPA website or are:

- Sheep Dipping: Code of Practice for Scottish farmers, crofters and contractors (May 2006);
- Mineral Extraction: Code of Practice for the owners and operators of quarries and other mineral extraction sites (May 2006).

In the event of an incident which results in product entering watercourses or infiltrating the ground, SEPA should be informed immediately by contacting 0800 80 70 60

Where product enters drains or sewers, Scottish Water should be informed by contacting 0845 600 8855

1 PURPOSE OF THE CODE

This section explains:

- What the Code is;
- Why it is important; and
- Who the Code is aimed at.

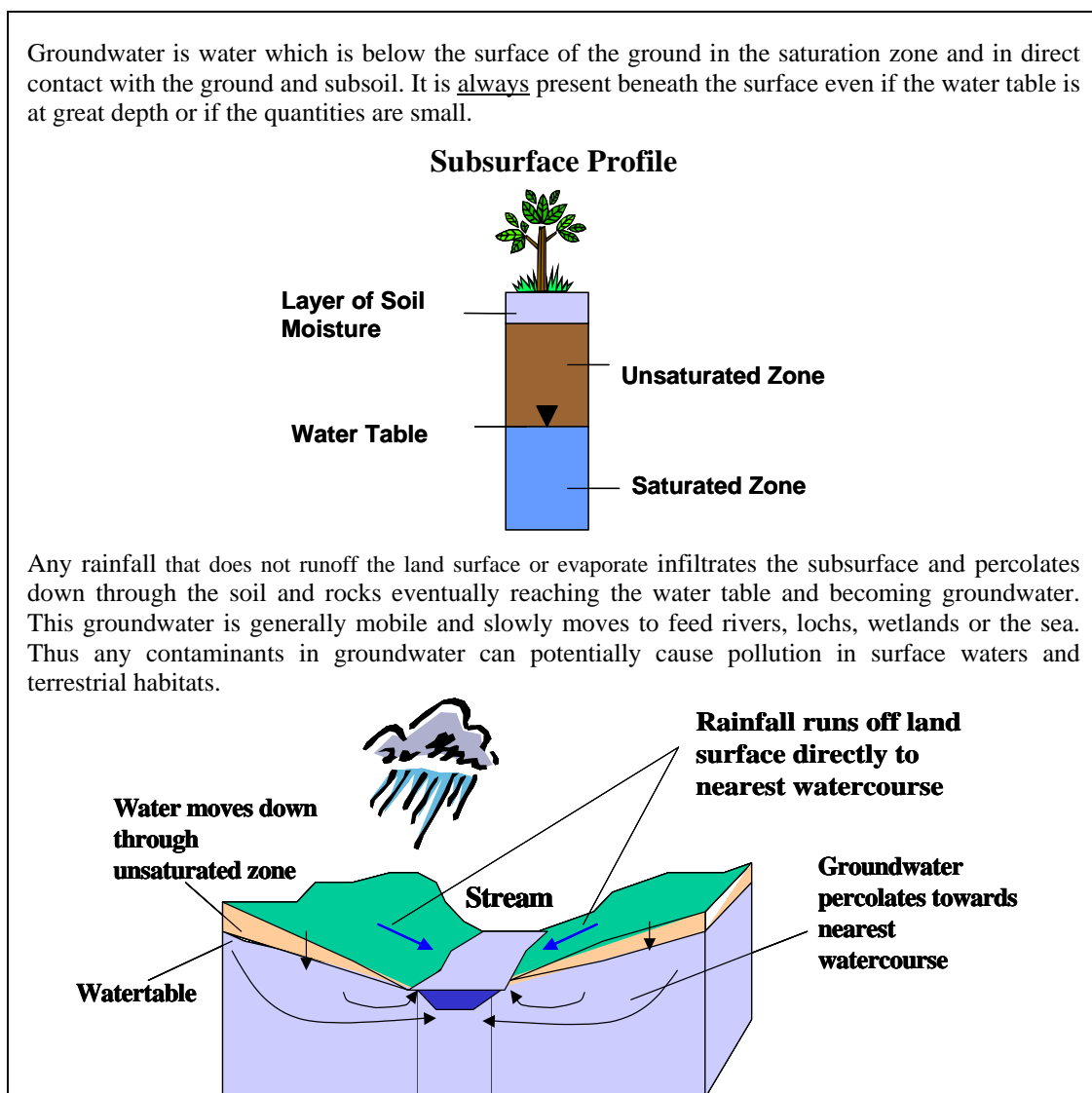
Nature of the Code

- 1.1 This Code provides a source of advice on how to prevent the loss of product and the subsequent pollution of the water environment when storing liquid petroleum hydrocarbons in **underground** (or partially buried) **storage tanks** (USTs), or when carrying out associated activities. The Code is a means of helping operators of USTs prevent pollution of the water environment and applies only in Scotland.
- 1.2 The Code is concerned with encouraging good practice and preventing the non-intentional (accidental or associated with acts of vandalism) loss of product. It is not relevant where intentional (deliberate) discharges or disposals are made. Intentional discharges or disposals are subject to separate prior authorisation requirements under CAR (2005), with further details obtained through discussion with SEPA.
- 1.3 The Code outlines operational and management practices, relevant to USTs and related facilities, which are necessary for protection of the water environment, and in particular groundwater. Whilst engineering is equally important, guidance on this is available elsewhere, for example in the Association of Petroleum and Explosives Administration/Energy Institute (formerly the Institute of Petroleum - IP) (APEA/IP) and Health & Safety Executive (HSE) publications referenced in this code.
- 1.4 The storage of liquefied natural gas or liquefied petroleum gas is outside the scope of this code though some of the general principles in this Code may apply. Similarly the Code does not cover storage of hydrocarbons in above ground tanks; regulations concerning the use of above ground storage tanks are to be provided in the Water Environment Oil Storage (Scotland) Regulations 2006 which came into force on 1st April 2006 (see paragraph 1.11 below). The Code is not intended to replace existing codes or guidance covering, for example, health and safety issues, but to complement them.
- 1.5 The Code of Practice does not have statutory status but, when deciding whether to serve an Enforcement Notice under CAR (2005), the Scottish Environment Protection Agency (SEPA) will consider whether or not the guidance in the Code has been, or is likely to be, followed. Such circumstances will be limited to situations where regulatory control needs to be applied to prevent or control indirect discharges of hydrocarbons to the water environment. However, compliance under the Code will not operate as a defence in the event of water pollution occurring.

- 1.6 The principles of protection of the water environment, as set out in the Code, will continue to apply until the Code is revised or revoked. The technical references, and references to legislative regimes, are for guidance purposes only and could be subject to change. Users of the Code will therefore need to keep abreast of technical and legislative developments subsequent to the date of this Code. All documents referenced in this code and appendices are listed after Appendix 5.

Legal Requirement to Protect the Water Environment

- 1.7 The water environment includes both surface water and groundwater. Surface waters include all water courses (rivers, streams, burns and canals), lochs, lakes, and coastal waters. These are the visible parts of Scotland's water environment, which provide an invaluable national source of drinking water as well as supporting ecosystems important for fisheries, farming, sport and recreation.
- 1.8 The term groundwater refers to all water which is below the surface of the ground in the saturated zone and which is in direct contact with the ground or subsoil. The saturated zone is where all the cracks of the rock and all the spaces between the grains of rock or within the soil are filled with water. The upper limit of the saturated zone can be thought of as the water table. The zone above the water table, where the pore spaces contain both vapour and water, is known as the unsaturated zone.



- 1.9 Groundwater is a valuable natural resource, providing drinking water (potable water) and feeding into rivers and wetlands which support a wide abundance of ecological systems. Approximately 5% of the total drinking water supply for Scotland is provided by groundwater abstractions, especially in rural areas and the South West. Groundwater is also important in terms of Scotland's economic wealth, with groundwater abstractions being utilised by both agriculture and industry, including the commercial bottling of mineral water. Any pollution of groundwater can have serious consequences in terms of health, environmental, economic and resource issues.
- 1.10 Once polluted, the water environment, and in particular groundwater is difficult and expensive - sometimes impossible - to restore to its former unpolluted condition. For this reason, there is national (Scotland & UK) and European (EC) legislation to protect both groundwater and surface water. These include the EC Water Framework Directive⁽¹⁾, which was transposed into Scottish law by the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act), and subsequent EC daughter directives. The WEWS Act (2003) gave powers to make regulations to control activities which could pollute the water environment and from 1st April 2006, the **Water Environment (Controlled Activities) (Scotland) Regulations 2005** (CAR (2005)) provides such regulations. CAR (2005) supersedes much of the Control of Pollution Act (COPA) 1974 (as amended) for the control of potentially polluting discharges to controlled waters and the Groundwater Regulations (1998) for the protection of groundwater and implementation of the EC Groundwater Directive (80/68/EEC).
- 1.11 Petroleum hydrocarbons can cause serious pollution. Anyone allowing these substances to pollute groundwater or surface water risks penalties under CAR (2005) and significant remediation costs.
- 1.12 Pollution risks can arise from either above ground or below ground storage of hydrocarbons and from associated activities such as delivery and fuel dispensing. The Water Environment Oil Storage (Scotland) Regulations 2006 are intended to prevent pollution of the water environment from above ground storage tanks. The Building (Scotland) Regulations 2004 (SSI 2004 No 406) cover all new oil storage tanks of more than 90 litres, used solely to serve a fixed combustion appliance installation providing space heating or cooking facilities in buildings. Protection of the water environment from underground storage tanks (USTs) is primarily covered by CAR (2005). SEPA has powers under those Regulations to prohibit, or control, any activity - including the storage of hydrocarbons - which might risk polluting the water environment. SEPA also has powers to prosecute where pollution has occurred.
- 1.13 Circumstances can arise whereby facilities have been, or could be, abandoned without having been subject to appropriate decommissioning. In some instances, product could remain in USTs. Due to lack of on-going maintenance, and the fact that engineering might not be to modern standards, such facilities can present a high risk to groundwater. Abandoned facilities continue to be subject to CAR (2005). Either former operators or current tenants/landowners can be held responsible for preventing pollution of the water environment.

- 1.14 The release of petroleum hydrocarbons also poses a risk of fire or explosion, and if hydrocarbons are allowed to come into contact with water pipes they can directly contaminate drinking water supplies. Such matters are subject to other legislative regimes and guidance. More detailed information on the Regulatory Framework is given in Appendix 1 and useful guidance and publications are given at the end of the Code.

Who the Code is Aimed At

- 1.15 This Code is relevant to any facility, including farms, which stores petroleum hydrocarbons (e.g. petrol, diesel, heating fuel, waste oils) in **underground** storage tanks and contains advice specifically aimed at the following persons:
- the owners of UST facilities;
 - persons involved in the operational management of UST facilities;
 - persons involved in maintaining UST facilities;
 - persons involved in designing and constructing UST facilities;
 - persons involved in decommissioning UST facilities; and
 - persons responsible for abandoned facilities.
- 1.15 Following the Code will not only help prevent releases and pollution, but should also have an economic benefit.
- 1.16 The Code will also apply to distribution networks which utilise underground pipelines, for example long distance pipelines transporting crude oil to refineries and shipping facilities. Further advice on relevant facilities is given in Appendix 2.
- 1.17 It is acknowledged that persons responsible for complying with the Code of Practice might not necessarily possess all the appropriate knowledge and expertise. Therefore, responsible persons are urged, as appropriate, to consult relevant guidance or seek expert advice.

2 USING THE CODE

This section explains:

- How the Code applies to different types of facility;
- The four key elements necessary to ensure protection of the water environment; and
- How to demonstrate compliance with the Code.

Using the Code Appropriately for a Particular UST Facility

2.1 This Code applies to a wide range of facilities, and the appropriate degree and means of environmental protection will vary for each individual facility. In determining what is required for any individual facility, it is necessary to take into account the following:

- the location and environmental setting of the facility;
- the age of the facility;
- the storage and throughput volumes of the facility;
- practical engineering options and control mechanisms;
- operating practices, maintenance schedules; and
- the likely costs and benefits of upgrading the facility

2.2 In defining the environmental setting of a facility it is necessary to consider in particular the types of underlying soils and depth to groundwater as well as the proximity to any surface water course. This will help in assessing the potential impacts of a loss of product. Whilst the best practicable environmental option should be adopted for a particular facility, it is not expected that all facilities would meet, or need to meet, the highest degree of engineering design or operational and management systems. All facilities would, however, be expected to meet the minimum industry standards for the selected degree of engineering.

2.3 It is not practical for the Code to be a prescriptive list of procedures to be followed in all cases. Instead, the philosophy adopted here is to provide a framework, the scope of the various elements of which can be adjusted to reflect the size, type and environmental context of individual UST facilities.

Four Key Elements Necessary to Ensure Protection of the Water Environment

2.4 In order to protect the water environment from potential pollution as a result of loss of product, the following four key elements should be implemented:

- the undertaking of an *Assessment of Risk* to the water environment;
- the provision of appropriate *Engineering Requirements*;
- the implementation of appropriate *Operational Managements Systems and Controls*; and
- the preparation of suitable *Emergency Plans and Procedures*.

2.5 These four elements are basic good practice. The issues associated with each of them are summarised in this section. Further supporting information is provided elsewhere in this Code and in the referenced documents and suggested additional reading.

2.6 The four key elements apply to UST facilities at all stages of their lifetime, from initial design to ultimate decommissioning. The sources of risk and the methods of managing it will vary slightly for differing stages. Sections 3, 4 and 5 of the Code highlight the issues that need to be considered in addressing the four elements during the following stages of the lifetime of a UST facility:

- commissioning;
- operation (including maintenance); and,
- decommissioning

2.7 In order to follow the Code, an operator should take into account the guidance contained in this section and whichever of Sections 3 to 5 are appropriate. Where an operational facility is being upgraded, it is also necessary to consider whether this will involve any issues raised with regard to commissioning or decommissioning.

(i) Assessment of Risk to the Water Environment

2.8 The undertaking of an appropriate risk assessment is important in identifying the risks to the water environment and preventing pollution. The risk assessment should consider the potential for loss of containment of product and implications of these losses. The outcome of the risk assessment will indicate the optimum engineering and operational control systems required to mitigate the identified risks.

2.9 Any risk assessment should identify the potential for loss of product (e.g. from tanks, pumps and pipework, as a result of activities etc) and possible pathways to groundwater (e.g. percolation through the ground, drainage etc) and surface water (e.g. wash off of sediment during the construction phase or of surface spillages of hydrocarbons during operation, or via groundwater) and possible entry into the sewage system. The assessment should also identify potential significant impacts that could result from pollution of the water environment e.g. the possible effects on downstream fisheries and sensitive aquatic environments, or water supply abstractions from water courses or boreholes.

2.10 The risk assessment should not be seen as a ‘once and once only’ process, but should be re-addressed at regular intervals, and revised to take into account any significant changes to the site engineering and operation, and any alteration to the environmental context of the facility. With regard to the latter, an example would be development on adjacent land; this could result in the provision of additional migration pathways and receptors.

2.11 The findings of the risk assessment should be used to draw up a risk management action plan for the facility. This management plan should include measures to prevent loss of containment (i.e. risk avoidance and risk control) and should not rely only on measures to mitigate the impact once losses have occurred.

- 2.12 Furthermore, in determining risk management measures, preference should always be given, if possible, to risk avoidance rather than risk control. For example, risk avoidance would be the location of activities with a high potential to pollute groundwater above low vulnerability strata. Risk control, for example, would involve the use of appropriate standards of engineered containment and operating practices.
- 2.13 The risk management action plan should outline the engineering and operational control measures that are required to protect the water environment. This should include the most suitable means of checking for spills and leaks during filling and leakage during storage and preventing corrosion failure. The action plan should differentiate between risks which warrant immediate attention and those that can form part of a longer term improvement programme.
- 2.14 The risk assessment will form a vital part of the development of an environmental management system (EMS) for an operational facility and the risk management action plan should be included as part of the EMS. Normally, an EMS would be expected to identify all environmental impacts, not just those to the water environment. This would include impacts to soils and the potential for the generation of hydrocarbon vapours.
- 2.15 The risk assessment should be prepared in accordance with the general guidelines set out in Appendix 3 of the Code and should take into account the specific risk issues highlighted in Sections 3, 4 and 5. A risk assessment should be prepared not just for operational facilities, but also as part of the design and planning process for new facilities, and prior to any decommissioning works. A discussion of risk assessment procedures is included in Appendix 3.

(ii) Engineering Requirements

- 2.16 The risk assessment process will indicate the optimum engineering measures for environmental protection that would be required at a UST facility. It would be expected that new facilities would implement these requirements in full. A discussion of specific issues associated with the commissioning of new facilities is contained in Section 3. In assessing whether engineering standards comply with the Code, use should be made of appropriate HSE and industry guidance. Appropriate guidance is contained in relevant APEA/IP⁽²⁾ (the 'Blue Book') and HSE publications^(3,4).
- 2.17 It might not always be practical for existing operational facilities to implement retrospectively the engineering requirements (identified from the risk assessment) in full. Where economic reasons are the main factors preventing immediate upgrades, it would be expected that operators develop a plan to phase in such improvements.
- 2.18 The Rural Petrol Stations Grant scheme can, under certain circumstances, provide assistance with the cost of replacing tanks, pumps and pipework and addressing groundwater protection needs. Scottish Enterprise (0845 607 87 87/network.helpline@scotent.co.uk) and Highlands and Islands Enterprise (01463 234 171/hie.general@hieent.co.uk), on behalf of the Scottish Executive, administer the grant scheme through their network of Local Enterprise Companies, to whom queries on eligibility should be referred. The qualifying criteria for the scheme have restrictions and grants will not be available to all facilities.

- 2.19 If significant changes are proposed to an existing facility (e.g. the installation of new tanks, pumps or pipework) it would be expected that the requirements highlighted by the risk assessment would be adopted at that time.
- 2.20 In situations where there is an on-going leak, the necessary remedial engineering measures must be undertaken as soon as practicable. Immediate actions should include minimising the leakage, e.g. by stopping relevant operations.
- 2.21 Whilst the use of leak detection controls is seen primarily as an operational matter, the installation of such measures is related to the engineering of a facility. As for other engineering measures, the leakage controls identified by the risk assessment would be expected to be installed in any new facility. For existing facilities, it might not be possible to retro-fit some of the more sophisticated systems to existing tanks and pipework. However, operators would be expected to adopt the best practicable leakage detection option that is appropriate for the environmental setting of the facility; this is most likely to be a type of wetstock monitoring. Further information on the types of leakage detection systems available is summarised in Appendix 4. Under no circumstances should a situation be allowed to develop because indications of leakage are ignored as false alarms.

(iii) Operational Management Systems and Controls

- 2.22 Whilst adherence to engineering good practice is necessary, it is ultimately the use and correct maintenance of engineering features which will dictate their effectiveness. Therefore appropriate management systems and controls should be developed and correctly implemented. This is of particular relevance to operating facilities, although management of closed facilities will also need to ensure that they are not presenting an unacceptable risk to the water environment. The issues associated with management systems and controls are discussed in Section 4. Section 5 discusses those associated with the decommissioning of facilities.
- 2.23 One of the main methods of demonstrating that a facility is being operated in an environmentally responsible manner would be the incorporation of the operational control procedures outlined in Section 4 in an EMS for the facility. The main elements of an EMS should include:
- establishing an environmental policy;
 - planning the implementation of the policy;
 - implementation and operations;
 - monitoring and responding to abnormal conditions;
 - review and audit;
 - emergency procedures.
- 2.24 In addition to including details of operating procedures, an EMS should include information on site staff training and emergency response procedures. Plans for upgrading the engineering requirements of the facility should also be included in any EMS.

- 2.25 Certification of an EMS may be obtained through organisations accredited by the United Kingdom Accreditation Service (UKAS). There are cost implications in the production and implementation of a certified EMS and a fully certified EMS might not be appropriate for some small scale facilities. Nevertheless, it could be expected that the main components of a system would be in place, even if not constituting a formal EMS.
- 2.26 As discussed with regard to engineering requirements, the operator of a UST facility will need to demonstrate that means are in place to identify and respond to leakage or potential leakage as soon as possible. The requirements for a leak detection system would be part of the output from the risk assessment process. A further discussion of leak detection systems is contained in Section 4 and Appendix 4.
- 2.27 Records should be kept to prove that the leak detection system is being operated and maintained properly. It should also be demonstrated that the system is being monitored regularly and in an appropriate manner, and that response procedures are in place in the event that leakage is detected.
- 2.28 An important part of any management system is training. Staff training needs should be identified and up-to-date records kept of that provided. Training is discussed further in Appendix 5.

(iv) Emergency Planning and Procedures

- 2.29 In the event of a loss of product, or other emergency, the environmental impact will be minimised by prompt and appropriate action. The best way of ensuring this is for each facility to draw up its own Pollution Incident Response Plan (PIRP), building on the findings of the risk assessment. Indeed, the preparation and regular review of such a plan is normally required as part of any well designed EMS. Regular procedural drills should be carried out to familiarise staff with the drills and to test their effectiveness. To a large extent, the PIRP will contain much of the same information as an emergency plan for fire risk.
- 2.30 Guidelines on how to draw up some elements of a pollution incident response plan are outlined in the SEPA Pollution and Prevention Guideline PPG21⁽⁵⁾ and Lees 1996⁽⁶⁾. General guidance on spillage control methods is also contained in PPG22⁽⁷⁾. Scottish Water also provides leaflets giving guidance on oil storage. Set out below is a brief summary of the type of information which should be included in a PIRP. Although the use of generic response plans can be helpful, facilities must develop response plans which are site specific.

2.31 As a minimum, a typical PIRP should include the following:

- details of the plan owner and procedures for keeping it up to date;
- emergency contact details for site operators etc and for all holders of the PIRP;
- emergency contact details for third parties (e.g. Fire Brigade, SEPA, specialist contractors, Scottish Water [for both supply and foul and surface water drainage] etc);
- product inventory and site layout plan;
- site drainage plan;
- emergency procedures;
- location of emergency response equipment (e.g. fire extinguishers, absorbents, emergency bunding, temporary fencing etc); and
- location of buried services, including water supply pipes.

2.32 In developing emergency procedures, separate procedures should be prepared for large scale incidents and small scale incidents. Typical large and small scale incidents are listed in the box below. Large scale incidents could also present a high risk of fire and explosion and emergency procedures must be integrated with those for health and safety issues.

Typical large scale incidents:

- Catastrophic or significant failure of underground tanks;
- Split hose during delivery;
- Product appears off-site.

Typical small scale incidents:

- Small spillage during uncoupling of delivery hose;
- Small spillage at dispenser;
- Leak from vehicle fuel tank.

2.33 The PIRP should contain a variety of procedures for dealing with potential pollution incidents identified as typical for that specific facility. This should include measures to lessen the off-site impacts of pollution (as identified by the risk assessment); this could include evacuation of nearby properties, placement of bunding and oil absorbent materials in drains and surface waters or treatment of abstracted groundwater. The plan should also include for the disposal of wastes (including liquids) which may arise from a pollution incident and the subsequent containment and clean up.

2.34 In the case of a large scale incident involving considerable loss of product, the PIRP might only be able to ensure that environmental impact is minimised, and not achieve a full clean-up of lost product. In such cases, a longer term remediation strategy will be required.

2.35 Copies of the PIRP should be kept not only on-site, but also at convenient off-site locations which allow rapid access. Facilities which employ specialist contractors to deal with incidents should consider lodging copies with these contractors. A list of all persons/organisations holding the PIRP should be held and kept up-to-date. If there are any changes in the retained contractors the PIRP should be issued again.

- 2.36 All incidents that have the potential to cause damage to the environment should be recorded in site records, and taken into account when updating the facility's risk assessment. (Several UK petrol station retailers also undertake routine investigations of petrol filling sites. This information - e.g. surface drainage evaluations, borehole logs, depth to groundwater, previous quality monitoring - should be centrally stored and accessible by staff and specialist contractors and should be available (e.g. on a central server) out of hours). Records should also be kept of actions undertaken in response to an incident. If any incident results, or has the potential to result, in lost product entering watercourses or infiltrating land, SEPA should be informed (see below). There is no need to inform SEPA where incidents are successfully contained and the product recovered e.g. within a separator.
- 2.37 Notification of incidents to SEPA should occur in conjunction with, and not instead of, the necessary notifications to the Petroleum Licensing Authority and the local Environmental Health Department. For some facilities, it might also be necessary to inform the Health and Safety Executive (HSE). If lost product enters sewers or other surface water drainage systems then Scottish Water must be informed. However, for major incidents where there is a serious risk of fire or explosion, the priority must be to make immediate contact with the Fire and Police Services.

In the event of a pollution incident contact:

SEPA POLLUTION HOTLINE

(24 hrs a day/7 days a week)

0800 80 70 60

Demonstrating that this Code is being followed

- 2.38 In summary, in order to demonstrate that the Code is being followed and to minimise the likelihood of SEPA serving an Enforcement Notice under CAR (2005), documentary evidence should be available to indicate that all four of the key elements of the Code have been addressed. In addition, it will be necessary to show that, not only have the key elements been addressed, but that they have been done so in a manner that is appropriate to the facility and in accordance with accepted good practice. It will also be necessary to demonstrate that the integration between engineering and operational controls is sufficient, given the environmental setting.

2.39 In particular, for operational facilities, a commitment to follow the Code can be demonstrated if an appropriate EMS is in place and if records detailing leak detection and environmental monitoring are readily available for inspection.

Key factors in demonstrating that the Code is being followed during the commissioning, operation and/or decommissioning of UST facilities are:

- A Risk Assessment process has been used to identify site specific risks and to indicate the appropriate engineering and operational controls required to prevent release of product and protect the water environment;
- The Engineering Measures identified by the risk assessment have been implemented or will be implemented as soon as reasonably possible;
- Operational Management Systems and Controls are in place, including the keeping of records regarding site operation, and including leak detection and environmental monitoring;
- Emergency Plans and Procedures are in place, including an appropriate Pollution Incident Response Plan which should form part of the environmental management system.

3 COMMISSIONING OF FACILITIES

This section explains:

- General planning issues;
- Risks to the water environment during design and construction;
- Good practice when commissioning UST facilities; and
- Operational measures which should be developed when commissioning UST facilities.

3.1 This section focuses primarily on new facilities, but the principles involved are equally applicable to major refurbishments of existing facilities, and to a large extent to minor upgrades. Hence most of the guidance in this section will also apply to operational facilities.

Planning Issues

3.2 The construction of new facilities, and any significant alteration to existing facilities, will be subject to the granting of planning permission by the Planning Authority. Developers should open discussions with the Planning Authority prior to formal submission of an application. It is also good practice to open discussions with other relevant regulatory authorities (such as Building Standards), or in particular where a licence to operate may be required from bodies such as the Petroleum Licensing Authority (PLA) and SEPA and maintain these discussions throughout the whole of the planning period..

3.3 As part of the planning process, the Planning Authority will require the applicant to consider the environmental context of the facility and its potential impact on the environment. This can be demonstrated by the submission of an environmental risk assessment as part of the planning application.

3.4 There is a statutory requirement under the Town and Country Planning (General Development Procedure) (Scotland) Order 1992 (as amended) for the Planning Authority to consult SEPA on any applications involving the storage of mineral oils or other derivatives; this provides SEPA with a formal opportunity to comment on the risk assessment and provide advice on the measures required to protect the water environment. It should be noted that the Scottish Executive proposes significant amendments to planning application procedures in the wake of the current Planning Bill. There are no plans, however, to amend the previously mentioned requirement to consult SEPA. SEPA has prepared a Groundwater Protection Policy For Scotland⁽⁸⁾ which would be relevant to any UST development. UST developments which present an unacceptable risk to groundwater resources, in particular those above vulnerable aquifers or in proximity to specific receptors, would be at greatest risk of running counter to this policy.

3.5 Based on advice from SEPA, planning consents could include specific conditions relating to the protection of the water environment. The Planning Authority would require evidence that these conditions have been discharged. The fact that planning approval has been gained and all relevant conditions met does not preclude possible future use of powers available to SEPA, including an Enforcement Notice under CAR (2005), in the event that a risk to the water environment is identified during the operation of the facility.

- 3.6 For some proposed facilities an Environmental Impact Assessment (EIA) may be required in accordance with the provisions of The Environmental Impact Assessment (Scotland) Regulations 1999 (SI1999/1) (see Scottish Executive Circular 15/1999 for general guidance on these regulations). For example, an EIA will be required for any facility with a proposed storage capacity of 200 000 tonnes or more, and would be required for any smaller facility which is likely to have a significant environmental impact. If an EIA is required, the Planning Authority is required to consult with the public, SEPA, Scottish Natural Heritage and other relevant statutory bodies.

Risks to the Water Environment during Design and Construction

- 3.7 Whilst no loss of product can occur during the design and construction of a facility, failure to consider potential environmental risks at this stage of the process could ultimately result in a significant pollution incident. General risks to the water environment from construction sites are covered in *PPG6: Working at Construction and Demolition Sites* available on SEPA's website.

Design

- 3.8 Assuming that the construction of a facility gains planning permission, it is important that it is designed in a manner that will reduce the potential for pollution of the water environment by preventing and containing any loss of product. Factors which should be taken into account include the general site location, site drainage, geology, hydrogeology (local and regional), proposed site layout, operating practices and equipment requirements. All of these issues should have been addressed in a risk assessment.

Factors which should be considered during the design of a UST facility in order to minimise the potential loss of product and hence risk to the water environment include:

- Are the proposed tanks and pipework appropriate for the environmental setting of the site, i.e. are measures in place to prevent and contain loss of product?
- Do ground conditions require any specific foundation type?
- What is the depth to groundwater?
- Are ground conditions likely to result in corrosion of below ground construction materials?
- Are there any specific risks resulting from site layout?
- How will any rainwater entering the facility be dealt with?

- 3.9 It is a legal requirement to minimise health and safety risks, and this should be a primary concern in design and site layout. Whilst health and safety should never be compromised, addressing those issues must not result in an unacceptable risk to the water environment. Generally, however, measures to ensure health and safety and environmental protection would be compatible and complementary.

- 3.10 When assessing foundation requirements, it is necessary to consider both the physical (engineering) properties and the corrosion characteristics of the ground (see paragraph 3.18). Advice on assessing corrosion characteristics is contained in Appendix 3.

Construction

- 3.11 Loss of product could arise during the operation of the facility as a result of inadequate construction methods. Incorrect construction could result in unsealed joints or areas of potential future weakness, such as loss of integrity of hardstanding or catchpits.

Factors during construction that might influence the future integrity of an operational UST facility include:

- Tank and pipework handling;
- Ground preparation;
- Installation procedures;
- Incorrect site layout and set-up;
- Supervision and quality control;
- Commissioning procedures.

Good Practice When Designing and Constructing a UST Facility

- 3.12 The main guidance document on the construction and operation of filling stations is the APEA/IP 2005⁽²⁾ 'Blue Book'⁽²⁾. There are a number of occasional circulars (PETELs) which update the above guidance and as noted above SEPA's PPG6 provides general guidance on preventing pollution from construction sites.
- 3.13 The risks to the water environment presented as a result of the commissioning phase of a UST facility should be addressed through the use of correct engineering design and strict construction quality control.
- 3.14 When designing the facility, emphasis must be placed on hazard prevention rather than risk management, i.e. avoid the problems in the first place rather than attempt to control them via engineering and operational solutions.

Engineering Design

- 3.15 The engineering issues which should be addressed during the design of a UST facility can be summarised as the design and construction of the following:
- storage tanks (including any secondary containment);
 - pipework and pipe trenches;
 - corrosion prevention systems;
 - fuel delivery and dispensing systems;
 - delivery facilities (e.g. overfill prevention, drainage of tanker standing area);
 - site drainage systems (including interceptors); covered by the Building (Scotland) Regulations 2004 of which details may be found on the Scottish Building Standards Agency website: www.sbsa.gov.uk/current_standards/tbooks.htm

- leak detection and environmental monitoring systems

3.16 A summary of the good engineering design is given in Appendix 4. The use of leak detection and environmental monitoring is discussed further in Section 4 and Appendix 4.

Construction Quality Control

3.17 The safest designs and procedures can be of no consequence if the subsequent works are not carried out in the appropriate manner. Good quality construction is essential, and should only be carried out by suitably experienced and appropriately qualified persons. The quality of all materials and equipment should be checked prior to their installation or use. Strict quality assurance (QA) during construction should be maintained. Rigorous inspection and checking of a completed storage system is vital.

3.18 Prior to placement in the ground, all tanks and pipework must be handled in accordance with manufacturer's instructions and kept in a safe environment to avoid damage to the tank or pipes due to punctures and any damage to protective coatings etc. Care must also be taken to prevent damage during installation. In reality, it is often difficult to prevent damage to protective coatings during construction, and such coatings should not be relied upon as the sole means of preventing corrosion. Other measures would include effective leak detection systems and, where appropriate, cathodic protection.

3.19 Good foundations are required. In addition to their physical competency, founding strata must be assessed for its corrosion characteristics, which might affect structural integrity of below ground equipment. Not only should the potential for corrosion of metals be considered, but also the potential for sulphate to cause deterioration of below ground concrete. Corrosion issues are more likely to be significant on brownfield sites where past industrial use could have resulted in the presence of corrosive substances in the ground.

3.20 All excavations should be level and compacted to form sound founding strata and prevent potential differential settlement which might damage tank structure and pipework. The ground preparation should be appropriate to the type of tank and pipework being installed. For example, GRP tanks should be underlain by a selected backfill or cushioning material, to prevent puncturing when filled with product. With regard to the pipework, care must be taken to ensure that joints are correctly formed and sealed to prevent leakage.

Issues to Consider at Commissioning Stage

3.21 The commissioning of a facility is the stage when appropriate operational control measures should be developed. Guidance on current good practice at the commissioning stage is contained in the APEA/IP 2005⁽²⁾. 'Blue Book'.

3.22 Prior to the facility becoming operational, appropriate measures should be taken to ensure that all valves, fill pipes, vent pipes etc are readily identifiable and cannot be confused; this should also include monitoring wells where installed. The importance of operational control measures is outlined further in Section 4 of the code.

3.23 Prior to operation the following checks should be carried out:

- Testing of manhole chambers for integrity;
- Drainage systems, including separators, to be completed and tested (these must be in compliance with the relevant Technical Standards);
- Separators to be charged with water to make them operational;
- Electrical and other ducts sealed;
- Emergency equipment to be installed and operational;
- Tanker stands and forecourt areas to be complete;
- All tanks, pipework, dispensers and pressure relief systems to be tested, as appropriate to demonstrate their integrity and safety.

3.24 On facilities storing petrol, integrity testing would be required prior to granting of a petroleum storage licence by the relevant authority (see Appendix 1). Certificates relating to this testing should be kept on site for inspection by all relevant regulatory authorities. It is good practice to keep records of testing for all facilities, not just for those where there is a regulatory requirement.

4 OPERATION OF FACILITIES

This section explains:

- Operational activities which pose a risk to the water environment;
- Factors which need to be considered during each operational activity; and
- Good practice for general operational control procedures, product loss detection and maintenance.

- 4.1 This section has been written primarily with regard to petrol filling stations but the risks that could arise from other types of facilities are generally similar. Facilities would only be expected to address those issues which are relevant, and not necessarily all of the issues which are highlighted below. Further information concerning the operation of facilities, and the risks arising from operations is contained in APEA/IP 2005⁽²⁾, PETEL 65/34⁽⁹⁾, Environment Agency⁽¹⁰⁾ and Institute of Petroleum⁽¹¹⁾.

Operational Activities Which Pose a Risk to the Water Environment

- 4.2 During the operation of a UST facility, release of petroleum hydrocarbons can occur not just from the storage tank itself but also from pipework and other ancillary equipment and during the movement of product to and from the storage facility. The release of product could occur during any of the following activities:
- Delivery;
 - Storage;
 - Dispensing;
 - Drainage, and
 - Maintenance and repair.
- 4.3 The degree of risk to the water environment posed by the release of product during these activities will depend on the engineering and operational control measures in place, and on the location of the facility.

(i) Delivery

- 4.4 Spillages might occur during delivery of product to a UST facility. These range from minor loss during uncoupling of delivery pipes to major loss, for example a split hose or leaking offset fill pipework or tank overflow. Spillages must not enter the sewage system. Particular care is needed when the person responsible for the delivery is unfamiliar with the UST facility.

Factors to be considered in assessing the potential risk to the water environment resulting from the possible loss of product during delivery include:

- Does the site have a separate tanker stand area with impermeable hardstanding?
- Will the site drainage system capture any delivery point spill and is the capacity of the interceptor sufficient?
- Is the area contained so as to prevent entry into the drainage system of an adjacent property?
- Are there overflow prevention systems?
- Are the delivery pipes clearly labelled?*
- Are the correct delivery procedures being followed?*

* These are requirements under petrol vapour recovery conditions included in the permit under The Pollution Prevention and Control Act 1999 (and associated regulations).

- 4.5 Operators of UST facilities should satisfy themselves that the person responsible for delivery is competent, e.g. are qualified to Level 2 N/SVQ in 'Transporting Goods by Road'.

(ii) Storage Systems

- 4.6 Failures in the integrity of the tanks and associated pipework could result in a significant loss of product. Older tanks are most likely to be single skinned and constructed from steel. The integrity of the tanks could be compromised by damage or corrosion. This could occur where tanks are at shallow depth (i.e. where there is insufficient protection from traffic), have only been partially buried and therefore are more prone to damage above ground or have not been installed in such a way as to prevent settlement. Similarly, damage could occur if bricks, timber or other sharp objects are left in excavations prior to tank installation. The degree of risk is increased further if storage tanks are located below groundwater level; this practice is strongly discouraged.

Factors to be considered in assessing the risk to the water environment, and in particular groundwater as a result of the possible loss of product from storage tanks include:

- What is the age of the storage tanks and pipework?
- Where is groundwater in relation to the base of the tanks?
- What type of ground are the tanks installed in?
- What type are the storage tanks and pipework (i.e. single or double skinned)?
- Which types of materials are the tanks and pipework constructed from?
- How were the tank and pipework installed?
- Is there a potential for damage to have occurred to the tanks and

pipework?

- Has corrosion protection of tanks and pipework (e.g. cathodic protection) been used?

(iii) Dispensing

- 4.7 During dispensing, loss of product can occur either from the pipework connecting USTs to the dispensing system or during the dispensing process. Fuel is transferred from USTs to the dispenser by means of either a suction or a pressure system. The potential for leakage is increased with the number of joints along the pipework. A particular risk is posed in situations where spillage is likely to be directly to the water environment, e.g. during refuelling of boats.
- 4.8 There are both disadvantages and advantages associated with the use of pressure and suction systems. The most significant difference is that if there is a leak in a line, a greater volume of product could be lost over a given time period from a pressure system. A pressure system has an advantage in that leaks are usually detected at an early stage, and it is possible to fit the system with an automatic shut down system.
- 4.9 During the dispensing process itself, there is potential for spillage to occur. While modern pumps on retail filling stations are fitted with nozzle shut-off valves, this will not necessarily be the case on all UST facilities. A significant loss of product could occur if a dispensing system is accidentally left open. A similar situation could occur in the event of vandalism. Operators should ensure that adequate measures are taken to prevent unauthorised access (e.g. vandals) and that pumps and valves are closed or locked when not in use. There is also a risk of spillage during dispensing operations where improper use is made by customers.

Factors to be considered in assessing the risk to the water environment as a result of the loss of product during dispensing include:

- Do the dispensers conform to modern standards?
- Are the dispensers fed by a suction or a pressure system?
- Can vehicles be refuelled within the site area?
- Are the dispensers regularly calibrated and serviced?
- Are the dispensers fitted with nozzle shut-off valves?
- Are pumps (on suction system) fitted with under pump check valves?
- Is there security against damage or vandalism?

(iv) Drainage

- 4.10 A significant risk to the water environment can occur if appropriate surface and subsurface drainage is not incorporated into the design and construction phase of the facility. Every new drainage system within the curtilage of a building must comply with The Building (Scotland) Regulations 2004. The relevant mandatory standards are 3.6: Surface water drainage which requires that facilities for the separation and removal of silt, grit and pollutants are provided and 3.7: Wastewater drainage which requires that facilities for the separation and removal of oil, fat, grease and volatile substances are provided. A building warrant must be obtained from the local authority Verifier prior to any work starting on site.

Depending on the ownership of the drainage system it is important that prior approval is also obtained from either Scottish Water or SEPA before any discharge is made to a sewer.

Factors to be considered in assessing the risk to the water environment arising from on-site surface water drainage systems include:

- What is the age and condition of the drainage system?
- Is the drainage intact and does it effectively deal with fuel spills?
- Does the drainage cover the whole site?
- Where does the site discharge waste materials/effluents?
- Are there any soakaways on-site? (and, if so, are they authorised by SEPA and should they be decommissioned? A building warrant will be required if a soakaway is removed and replaced with some other method of disposal).
- Is the forecourt oil/water separator clean and functional and maintained to ensure effectiveness, and where does it discharge to?
- If the separator discharges to a foul sewer has prior approval been obtained from Scottish Water?
- If the separator discharges to a surface water sewer, has prior approval been obtained from Scottish Water and has there been consultation with SEPA?
- Are appropriate dispensing and monitoring procedures employed?
- What is the linkage between drains and receptors?
- Do vehicle washing facilities drain through a separate dedicated system?

4.11 Effluent from vehicle washing facilities contains detergents which increases the solubility of hydrocarbons. Hence effluent from washing facilities should not pass into the same drainage system as the general surface water but should connect to foul sewer with prior approval of Scottish Water. The Sewerage (Scotland) Act 1968 stipulates that all such washing facilities must have a 'Trade Effluent' consent. This activity will require treatment prior to entering the foul sewer. Scottish Water may also require that a separator be installed and/or trade effluent consent is obtained.

(v) ***Maintenance and Repair***

4.12 Significant environmental risks to the water environment could result during the course of maintenance and repair works undertaken during the lifetime of the storage facility.

Factors to be considered in assessing the risk to the water environment that could occur during maintenance and repair activities include:

- Have the pipelines/tanks been drained sufficiently to minimise the potential for fuel spills to the environment prior to repair works?
- Are procedures in place to avoid accidental damage to tanks and associated pipe work during maintenance works?
- Are procedures and materials in place to deal with any small spillages that occur?
- Is there monitoring and checks in place to ensure that all repairs have been performed to a satisfactory standard?
- Are those undertaking maintenance work properly trained/equipped to undertake the tasks?
- Will materials (including waste waters) containing waste fuels, which arise during the course of repair works, be disposed of to suitably licensed waste disposal facility? (Disposal to landfill of waste in liquid form was banned in July 2002).

Good Practice for Operation, Leak Detection and Maintenance

4.13 Just as the degree of risk to the water environment depends on the engineering and operational control systems, so both are also important factors in mitigating any identified risks. It will not always be practical, or economic, to mitigate identified environmental risks by engineered means alone. Therefore, appropriate risk mitigation measures are likely to require a careful integration of both engineering and operational control systems.

4.14 Issues associated with engineering standards have been discussed with regard to the commissioning of UST facilities and are not considered further in this section. The important components of appropriate operational control systems include:

- general operational control procedures;
- leak detection and environmental monitoring; and
- maintenance.

4.15 All of the issues highlighted above could be expected to form part of an Environmental Management System (EMS) for the facility, as discussed previously in Section 2. Indeed, all of the above would be required as part of any EMS designed in accordance with ISO 14001:2004⁽¹²⁾. Any EMS would also require the identification of staff training needs and emergency response procedures. Both of these are important in mitigating environmental risks.

4.16 It must be stressed that measures adopted to mitigate risks to the water environment will overlap considerably with those to control fire hazard, and every effort must be taken to ensure that there is full integration between the two. Furthermore, any measures which prevent the significant loss of product will have economic benefits for the operator.

(i) General Operational Control Procedures

4.17 Correct operational procedures form a major part of risk mitigation. If appropriate procedures are developed and followed correctly, not only will the risk of a pollution incident occurring be reduced dramatically, but also the damage caused by an incident can be minimised.

4.18 Significant activities for which the development of operational control procedures should be considered include:

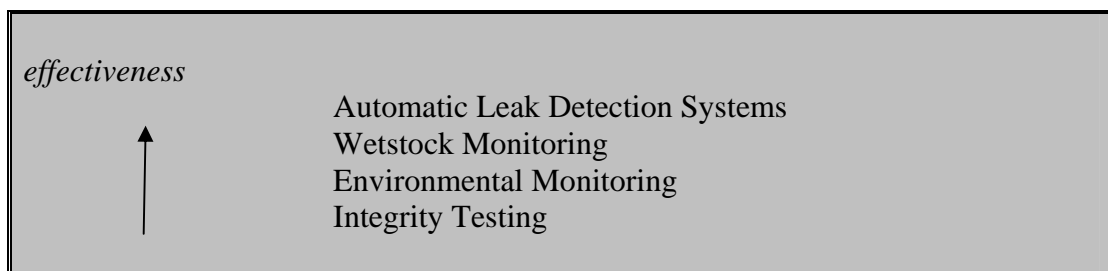
- product delivery (including driver controlled activities);
- dispensing;
- product volume monitoring;
- regular and one-off maintenance activities;
- the control of visiting contractors;
- staff awareness and training;
- response to major and minor spillages; and
- response to alarms and other indications of leakage.

(ii) Detecting Loss of Product

4.19 Methods for detecting loss of product include leak detection systems and wetstock monitoring, environmental monitoring and integrity testing. Monitoring practices will be influenced by petrol vapour recovery requirements. Details on the monitoring and testing of USTs can be found in APEA/IP 2005⁽²⁾ and PETEL 65/34⁽⁹⁾. There is a British Standard (BS EN 13160: 2003, Parts 1–7) for leak detection systems. Guidance on wetstock monitoring has also been prepared by the Environment Agency for use in England and Wales⁽¹³⁾.

4.20 On-going automatic leak detection without loss of product is only possible with double skinned equipment; this should provide warning of failure prior to release of product to ground. Wetstock monitoring has taken various forms ranging from statistical inventory reconciliation (SIR) to manual monitoring using a dipstick. Whilst wetstock monitoring will not detect a leak before product is lost to ground, the more sophisticated systems should provide a relatively rapid indication (i.e. within days) that a leak is occurring. A brief summary of leakage detection and wetstock monitoring systems is included in Appendix 4.

- 4.21 Besides visual inspection of surface drainage and interceptors, environmental monitoring utilises boreholes to monitor for the presence of vapours, dissolved product or free phase product in the ground. Leakage will only be detected at a late stage once product has migrated through the ground and reached the boreholes. Depending on the location of the boreholes and the sensitivity and frequency of monitoring, leakage might have been on-going for a relatively lengthy period (i.e. weeks) before being detected by this method. Additionally, there is a risk that, if not located properly, the boreholes could fail to detect a contamination plume. It must be remembered that the boreholes themselves can act as preferential pathways for the migration of pollution into an underlying aquifer. To ensure that any near-surface contamination is not transferred to any deeper aquifers, appropriate methodologies should be used when drilling boreholes on petrol filling stations.
- 4.22 Integrity testing based on pressurising tanks and pipework to detect any leaks or faults is usually carried out before a facility is brought into service. Thereafter integrity testing based on precision tank or line tests is only normally carried out in support of a monitoring system or if a leak is suspected. Integrity testing could include the use of environmental tracers. If integrity testing alone is used to monitor for loss of product, leakage could be on-going for very long periods (i.e. years or decades) before being detected.
- 4.23 Overall, based on effectiveness, the preferred hierarchy for detecting the loss of product is as follows:



- 4.24 On facilities located in environmentally sensitive areas, leak detection controls should be capable of detecting leakage almost immediately that it occurs. The use of monitoring wells as the sole means of detecting the loss of product should not be relied on. The minimum detectable leak that can be identified by the leakage detection system should be considered as part of the environmental risk assessment for the facility.

(iii) Maintenance

- 4.25 A regular maintenance and inspection programme is the most effective method of ensuring that everything is in good working order, and that environmental risk is being managed effectively. Such procedures would be required as part of an EMS in accordance with ISO 14001:2004⁽¹²⁾. The production of method statements and operating procedures for maintenance activities should form part of an EMS, to ensure that work is properly planned and that all changes are adequately documented. It is vital that a detailed plan of works is adhered to when any maintenance or repair work is carried out on an UST or associated pipework. Regular maintenance can prevent the need for costly remedial action if a leak occurs at a later date.

5 DECOMMISSIONING OF FACILITIES

This section explains:

- The risks to the water environment when decommissioning; and
- Good practice when decommissioning.

Scope of this Section

- 5.1 Decommissioning activities range from the complete closure and removal of a UST facility as a whole, to the replacement of individual tanks or lengths of pipework. Set out in this section is a brief indication of how risks to the water environment could occur during decommissioning, and the best practices that should be undertaken to mitigate such risks.
- 5.2 In contrast to the type of risk prevention measures associated with commissioning and operation of UST facilities, the measures to be adopted for decommissioning are unlikely to vary much between facilities, just the scale to which they need to be carried out.
- 5.3 For some historic or abandoned facilities, it might not be possible to identify or trace the original owner or former operator. In cases where there is a risk of pollution to the water environment (or other environmental receptors), it is probable that the site would be subject to the provisions of Part IIA of the Environmental Protection Act 1990 and associated Contaminated Land (Scotland) Regulations 2005 (SSI 2005/658). The primary regulatory role under Part IIA rests with the Local Authorities - although, if so requested by the Local Authority, SEPA may become the regulating authority for special sites, as defined in the Regulations. It is a matter for the regulating authority to establish who should bear responsibility for remediation of the site. Where the owners/polluters of the land cannot be traced or cannot pay for remediation measures, the regulating authority has powers to carry out the work itself.

Potential Sources of Pollution to the Water Environment

Factors to be considered in assessing the risk to the water environment during decommissioning activities on a UST facility include:

- Will the proposed decommissioning methods result in the release of product to ground?
- Could any product so released discharge to the sewage network?
- Will any below ground equipment remain after decommissioning?
- Will the proposed decommissioning methods result in product remaining in-situ in below ground structures (i.e. tanks, pipework, and drainage)?

If the answer is “yes” to any of the above, the decommissioning proposals should be re-addressed to mitigate the potential risk.

- 5.4 During the decommissioning of storage facilities, product could be lost to ground as a result of either deliberate or accidental release during dismantling and removal of tanks and pipework. In addition, a risk could arise off-site if contaminated tanks and pipework are not disposed of in an appropriate manner. Regulation 10 of The Building (Scotland) Regulations 2004 covers demolition work. The removal of an oil storage tank of more than 90 litres, used solely to serve a fixed combustion appliance installation providing space heating or cooking facilities in buildings therefore will require a building warrant before any work starts on site.
- 5.5 It would be preferable to remove all redundant tanks and pipework. If tanks are left in-situ, a risk could arise if any residual product remains in the tanks. As the integrity of the equipment would no longer be maintained or monitored, the potential risk posed might be greater than during the operational lifetime of the site. There should be no connection or pathway between any decommissioned tanks or pipework and the sewage network.

Good Practice When Decommissioning USTs

- 5.6 On closure of a UST facility, works should be undertaken to ensure that the facility will not present an environmental or health and safety risk. Measures should also be taken to ensure that decommissioning of only small parts of a facility do not result in an unacceptable risk.
- 5.7 Guidance on the current good practice to be adopted during the decommissioning of UST facilities is contained in APEA/IP 2005⁽²⁾, PETEL 65/3⁽¹⁴⁾ and PETEL 65/19⁽¹⁵⁾. Set out below is a brief summary of the most important issues with regard to prevention of pollution to the water environment.
- 5.8 Any residual product should be removed from the tanks. This process is known as bottoming. Care must be taken to ensure that no product is lost to ground. Following bottoming, the tanks need to be made safe by the removal of any explosive vapours. One method involves filling the tanks with inert gases, inert foam or water. All tanks must be bottomed and made safe before removal from the ground. Similar methods should be employed prior to removal of pipework. Once removed from the ground all tanks and pipework should be made safe for transport, e.g. by cold cutting to allow free venting. If water is used during bottoming, it must be removed prior to transport. As the water will be contaminated with the residual product, a risk of contamination of the water environment could arise if it is not disposed of in a manner appropriate to the degree of hydrocarbon contamination. Typically this would involve consignment to a suitable waste treatment facility.
- 5.9 It is normal good practice to remove tanks, pipework and dispensers. If tanks are being left in-situ, they must be made safe. Following bottoming and making safe, tanks should be filled with either:
- a sand and cement slurry;
 - hydrophobic foam, or
 - foamed concrete.
- 5.10 Tanks (and associated pipework) that are no longer considered suitable or safe for the storage of petroleum spirit should not be used for the storage of diesel (or other hydrocarbon fractions) without ensuring their integrity.

- 5.11 Wherever practicable, oil/water separators should be removed for off-site disposal. Otherwise they should be filled in a similar manner to tanks. Regardless of the fate of the oil/water interceptor, all residual liquid and sludge should be removed (for off-site disposal) and all inlet and outlets should be sealed. Any drainage systems that are to remain active should be modified to ensure that they do not present a significant migration pathway for pollutants to reach surface waters or groundwater. Scottish Water should also be informed where drainage systems on decommissioned facilities are connected to foul or surface water sewer systems.
- 5.12 If sites are decommissioned temporarily, it is possible to leave product or water in tanks. In this case, all monitoring procedures must be continued as if the facility remained operational. If for any reason monitoring cannot continue, the tanks should be emptied and made safe. Temporary decommissioned tanks containing petroleum spirit remain subject to the same licensing regime as those on operational facilities.
- 5.13 Tanks (and pipework etc) could be present on old former sites that have been decommissioned to much less stringent standards, or even abandoned without any attempt at decommissioning. As discussed earlier (see paragraph 1.13), these sites can present a high risk to the water environment, and in particular to groundwater. Even if the bulk of the product has been removed, pollution could still occur. For example, rainwater infiltrating into cracked tanks could leach out hydrocarbons from sludge residues.
- 5.14 Persons involved in the decommissioning of a UST facility must be aware of and meet their obligations with regard to waste disposal in accordance with the duty of care imposed by Part II of the Environmental Protection Act (i.e. the current waste management licensing regime in the United Kingdom).

APPENDIX 1 - REGULATORY FRAMEWORK

The Water Environment (Controlled Activities) (Scotland) Regulations 2005

- A1.1 The Water Framework Directive (2000/60/EC)⁽¹⁾, which aims to protect the quantity and quality of water in the whole water environment, was transposed into Scottish Law by the Water Environment and Water Services (Scotland) (WEWS) Act (2003). The WEWS Act (2003) gave powers to make regulations to introduce controls on a number of activities that could affect the water environment and from 1st April 2006, **the Water Environment (Controlled Activities) (Scotland) Regulations 2005** (CAR (2005)) provides controls on a number of activities including point source discharges. As such CAR (2005) supersedes both the Control of Pollution Act (1974, as amended) in terms of consented discharges to controlled waters and the Groundwater Regulations (1998) in terms of implementing Directive 80/68/EEC, the Groundwater Directive⁽¹⁵⁾, to protect groundwater.
- A1.2 Under CAR (2005), activities which cause the direct or indirect discharge of substances in Schedule 2 (List 1 of the Groundwater Directive) or are likely to have a significant adverse impact on the water environment, e.g. pollution of groundwater by List II substances, must be authorised. SEPA may request any such additional information in relation to an application as it reasonably requires, i.e. prior investigation.
- A1.3 Section 10 of CAR (2005) indicates that SEPA, when considering an application for authorisation of an activity which falls within the scope of the Groundwater Directive, may impose on an application for authorisation any condition it deems necessary to ensure compliance with that Directive.
- A1.4 A variety of activities utilise pollutants but do not make deliberate discharges to the environment. CAR (2005) authorisation of such activities will not normally be required. In spite of this, any discharge of polluting substance, whether deliberate or accidental, that causes the direct or indirect discharge of substances in Schedule 2 or a significant adverse impact on the water environment automatically becomes a controlled activity as defined in the Regulations and such a discharge is an offence. CAR (2005) provides SEPA with powers to serve Enforcement Notices to control any such activity. These Enforcement Notices can either prohibit the activity or impose conditions under which the activity can be carried out. Failure to comply with an Enforcement Notice is an offence with penalties on conviction.
- A1.5 In considering whether to issue an Enforcement Notice, SEPA would take account of this Code of Practice, having regard to individual site circumstances, and whether or not the Code is being, or is likely to be, complied with. On this basis, therefore, compliance with the Code may be of assistance in ensuring that SEPA does not need to issue an Enforcement Notice. However, the fact that the Code is being followed does not mean that a notice cannot be served, and adherence to the Code could not be relied upon as a defence in any criminal proceedings taken in relation to an alleged breach of the Regulations. For example, a notice with conditions might be required where the UST is in a sensitive location, or where inherent risks need to be managed through conditions designed to prevent pollution to the water environment.

Other Legislative Controls

A1.6 In addition to general health and safety, and environmental protection legislation, more specific legislation which could be applicable (at the date of this code) to UST facilities includes:

- The Public Health (Scotland) Act 1897 (as amended);
- The Petroleum (Consolidation) Act 1928 (as amended);
- The Sewerage (Scotland) Act 1968;
- The Water (Scotland) Act 1980;
- The Civic Government (Scotland) Act 1982;
- The Environmental Protection Act 1990;
- The Pollution Prevention and Control Act 1999 (and associated regulations);
- The Water Environment and Water Services (Scotland) Act 2003;
- The Notification of Installations Handling Hazardous Substances Regulations 1982 (SI 1982/1357);
- The Carriage of Dangerous Goods by Road Regulations 1996 (SI 1996/2095) (as amended);
- The Control of Major Accident Hazard Regulations 1999 (SI 1999/743);
- The Planning (Control of Major Accident Hazards)(Scotland) Regulations 2000 (SI 2000/179);
- The Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002/2776);
- Water Environment Oil Storage (Scotland) Regulations 2006 (these relate to above ground oil storage);
- The Town and Country Planning (Scotland) Act 1997 and related secondary legislation (including the Town and Country Planning (General Development Procedure (Scotland) Order 1992 (the GDPO), as amended);
- The Planning (Hazardous Substances) (Scotland) Act 1997;
- The Planning (Hazardous Substances) (Scotland) Regulations 1993, as amended;
- The Building (Scotland) Regulations 2004

A1.7 Much of the legislation covering the health and safety aspects of the storage and handling of petroleum products has recently been revised. This issue was discussed further in PETEL 65/44⁽¹⁷⁾. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) now control workplace storage of petrol in can stores etc. The requirements for petrol vapour recovery which were introduced under Part 1 of the Environmental Protection Act 1990 will be transferred to regulation under The Pollution Prevention and Control Act 1999. Set out below is a summary of the legislative position current at the date this Code was drawn up.

A1.8 The storage of petroleum spirit (petrol) at petrol filling stations is regulated by The Petroleum (Consolidation) Act 1928 (as amended). This legislation requires the storage of petroleum spirit to be authorised by licence. The unloading of petrol from road tankers at licensed premises is controlled, from 5 May 2003, by a Health and Safety Commission Approved Code of Practice (ACOP), Unloading Petrol from Road Tankers⁽¹⁸⁾.

- A1.11 Section 94 of the Civic Government (Scotland) Act 1982 places a duty on the occupiers of premises on which tanks used for the storage of petroleum spirit to ensure that the tanks are made safe. The Local Authority has powers to require the occupier to do so. The removal of tanks is regulated by health and safety legislation.
- A1.12 Petroleum spirit is defined as petroleum which when tested in accordance with the Petroleum Consolidation Act 1928 (as amended), has a flash point of less than 21°C. The volatility of diesel and other heavy petroleum fractions are such that they do not qualify for regulation under this act. However, diesel and other hydrocarbon fuels are defined as a 'dangerous substance', and thus subject to regulation, under DSEAR 2002.
- A1.13 The issue of licences for storage of petrol is the responsibility of Petroleum Licensing Authorities (PLAs). Petroleum Officers acting for the PLAs have responsibility for the enforcement of licence conditions and regulations. They are empowered to inspect sites and take enforcement action as required. Licences issued by the PLA will include conditions referring to the construction, maintenance and operation of a facility in respect of measures to control risks of fire and explosion; and require that permission be obtained before undertaking any proposed alterations. The PLA is the relevant local authority department, usually the Trading Standards department in Scotland. Fuel storage on MoD sites is licensed by a bulk fuels storage department within the MoD itself and is also regulated by HSE.
- A1.14 Sites which are subject to the Notification of Installations Handling Hazardous Substances Regulations 1982 (SI 1982/1357) (NIHHS sites) and Control of Major Accident Hazard Regulations 1999 (COMAH sites) are exempt from petroleum licensing, but are subject to regulation by the HSE and SEPA. The Planning (Hazardous Substances) (Scotland) Act 1997; the Planning (Hazardous Substances) (Scotland) Regulations 1993, as amended; the Control of Major Accident Hazard Regulations 1999; The Planning (Control of Major Accident Hazards)(Scotland) Regulations 2000 only apply to facilities where hydrocarbon fuels are stored in large quantities (e.g. 5 000 tonnes for COMAH). Petrol retailers are therefore generally exempt from these. Agricultural fuel stores are subject to the Water Environment Oil Storage (Scotland) Regulations 2006 which came into force on the 1st of April 2006.
- A1.15 The Water Environment Oil Storage (Scotland) Regulations 2006 which came into force on 1st April 2006, cover the storage of all oils, in above ground tanks. The regulations will apply to containers (above a certain size) which are stored above ground. These regulations will also cover associated pipework whether above or below ground. They do not apply to dwellings where oil storage is 2500 litres or less, located above or below ground and used solely to serve a fixed combustion appliance installation providing space heating or cooking facilities in the dwelling. These installations are covered by The Building (Scotland) Regulations 2004.
- A1.16 Where the release of product has resulted in the contamination of land, this may result in the commission of an offence in terms of Part IIA of the Environmental Protection Act 1990 and associated Contaminated Land (Scotland) Regulations 2005 (SSI 2005/658).
- A1.17 The disposal of any waste materials contaminated with petroleum hydrocarbons is subject to the appropriate waste management legislation.
- A1.18 The Scottish Water Authority Bylaws 2000 made under the Water (Scotland) Act 1980 place a duty on Scottish Water to ensure that water supplies are not tainted or polluted on passing

through contaminated ground. This includes the protection of drinking water supplies in plastic pipes from percolation of hydrocarbons in the soil through the plastic.

Integration of the Code of Practice with Existing Regulatory Regimes

- A1.19 There will be overlap between the requirements outlined in this Code of Practice and that of the other regulatory frameworks indicated above. The main responsibilities for regulating day-to-day activities remains with those authorities who are primarily concerned with health and safety issues, i.e. the HSE, Local Authority Building Standards and Petroleum Licensing Authorities (PLAs).
- A1.20 In Scotland, SEPA is the main regulator in regard to the protection of the water environment. However, under normal circumstances, SEPA is not the principal regulator for UST facilities. SEPA will become more involved in the event of a pollution incident, or if it is likely that one could occur. In such cases, SEPA will take into account the contents of this code.
- A1.21 One of the main audiences for this Code is the operators of retail filling stations. Activities on these facilities are regulated primarily by the PLAs. SEPA maintains liaison with the PLAs to ensure that, in discharging their duties, individual petroleum licensing officers continue to be aware of the need to control potential risks to groundwater and the environment in general.
- A1.22 For some facilities, it is possible that the measures required to satisfy health and safety issues and regulation might not provide sufficient protection to the water environment. In such circumstances, it would be expected that additional measures be adopted to ensure adequate protection. If necessary, SEPA could enforce the necessary higher standards of engineering and operation by means of an Enforcement Notice issued under Regulation 28(2) of CAR (2005). Under no circumstances should the fact that there is a low risk to health and safety lessen the measures to protect the water environment, or vice versa.
- A1.23 New facilities, and any significant alteration of existing facilities, will be subject to planning permission by the Planning Authority (PA). Developers should check transport related Scottish Planning Policies (SPPs), National Planning Policy Guidelines (NPPGs) and Planning Advice Notes (PANs) and local plans for any planning policies relating to servicing development or environmental protection. Of particular relevance is PAN 51 on Planning and Environmental Protection⁽¹⁹⁾ which makes reference to protection of the water environment and explains the roles of land use planning and pollution control regimes.

APPENDIX 2 - FACILITIES TO WHICH THE CODE WILL BE RELEVANT

- A2.1 The most common use of underground tanks for the storage of petroleum products is on petrol retail stations. However, underground or partially buried storage facilities are also utilised on a variety of other sites, both large and small. These include: airports and airfields; farms; industrial, commercial and domestic properties (especially fuel oil for heating); ports, dockyards and marinas; railway depots; refineries and oil storage depots; retail and non-retail filling stations, scrapyards; telephone exchanges; vehicle fleet depots; and, vehicle maintenance facilities.
- A2.2 Whilst large-scale storage on refineries and distribution or wholesale depots is generally in above ground tanks, underground tanks have been used. For example, use has been made of tanks which, whilst located partially above the original ground surface, have subsequently been covered by earthworks.
- A2.3 Fuels, in particular diesel, are stored for use on farms and in other operations utilising earthmoving and similar equipment (e.g. quarries and landfill sites). In general these operations will be relatively small scale and will utilise above ground tanks. However, for large-scale operations, where it is more economically viable, underground storage facilities might be constructed.
- A2.4 Redundant tanks could be utilised for the storage of a variety of liquids. One potentially significant example could be the storage of waste oils from motor vehicle repair and servicing.
- A2.5 The Code is also relevant to long distance distribution networks which utilise buried pipelines, even if these networks connect to above ground storage tanks. Examples include large diameter long distance cross country pipelines which are used to transport crude oil and refined products to and from refineries and chemical plants. These pipelines, which are pressurised, can be over 1 m in diameter and are generally not less than 1 m below ground level to prevent damage from surface activities. As for any pipelines, the points of potential weakness are joints and valves.

APPENDIX 3 - ENVIRONMENTAL RISK ASSESSMENT FOR UST FACILITIES

General Introduction to Risk Assessment

- A3.1 The storage of petroleum hydrocarbons in USTs represents a hazard source. The release of hydrocarbons into the environment could result in significant detrimental affects on a wide variety of receptors. These receptors could be human (e.g. residents of nearby properties) or environmental (e.g. water quality). The potential impacts onto receptors will depend on the magnitude and properties of the hazard source, the likelihood of loss of product and the sensitivity of the receptor. The process whereby potential impacts (or risks) can be identified is called risk assessment.

Hazard - An event or situation (including a pollution source) which has the potential to cause harm to receptors or targets.

Risk - A combination of the probability, or frequency, of the occurrence of a defined hazard and the magnitude of the resulting consequences.

Risk Assessment - A process to determine the potential for a receptor to be adversely affected by a hazard and to assess the magnitude of the impact.

- A3.2 The purpose of this Code of Practice is to minimise the potential for UST facilities to result in a detrimental impact on the water environment and associated receptors. The primary means of ensuring this is through the use of control measures to prevent loss of product. Further, additional environmental protection is provided by an appropriate response in the event of loss of product. In order to determine both the control measures necessary to prevent product loss and the appropriate remedial actions and emergency response, it is necessary to identify the potential for product loss and understand the potential impacts.
- A3.3 The basic model for assessing environmental risk is to consider the source, pathway and receptor. For UST facilities the source is the petroleum hydrocarbons stored and handled on the site. For the purposes of complying with this Code, the primary receptor is the water environment. There are likely to be a number of pathways between the source and the water environment. A basic representation of typical pathways and receptors associated with UST facilities is shown in Figure 1.

Source (or hazard) - a substance capable of causing pollution or harm.

Receptor (or target) - something which could be adversely affected by the contaminant.

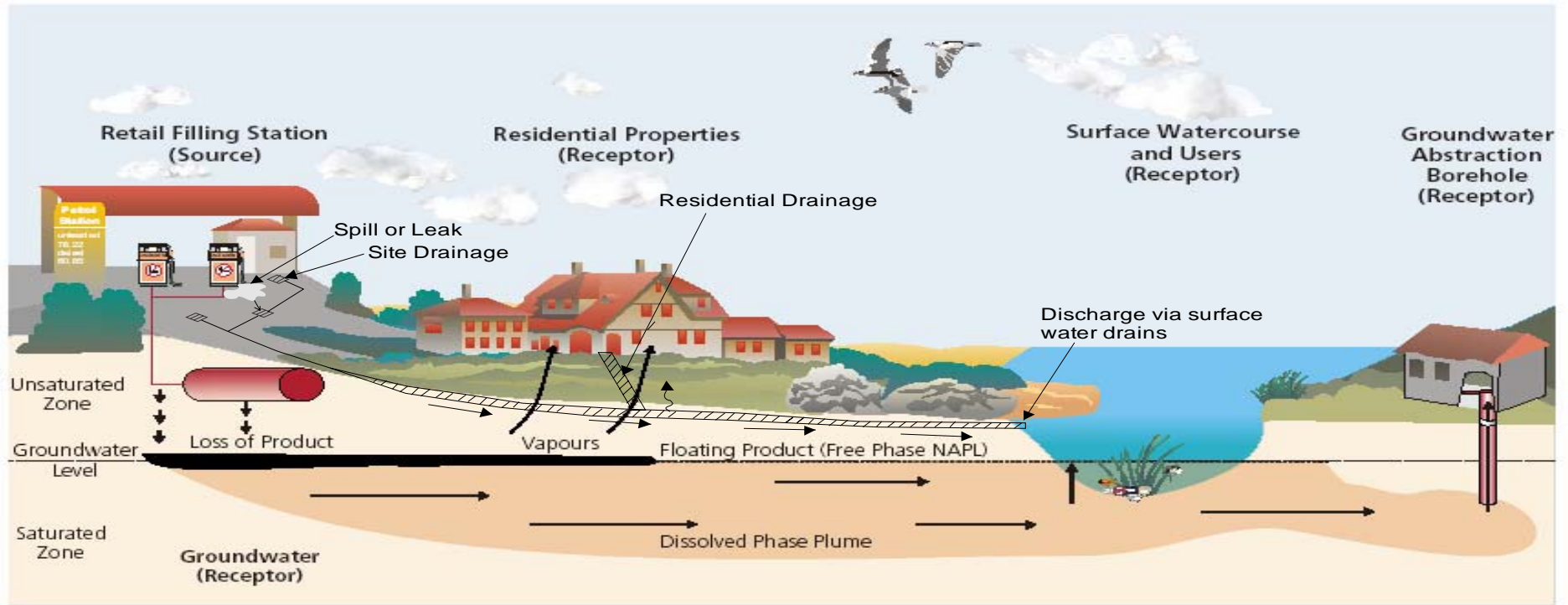
Pathway - a route by which contaminants can reach the receptor.

- A3.4 Once the significant risks have been identified, measures can be taken to prevent detrimental impact. Primary measures would be aimed at preventing the release of product. In some circumstances, secondary measures aimed at removing migration pathways could be justified.
- A3.5 The purpose of the assessment is to identify potential risks. It should not be necessary to utilise quantitative risk assessment techniques, which use mathematical models to estimate the degree of risk. Such models are more likely to be used in the event of a pollution incident in order to determine the necessary extent of remedial action.
- A3.6 Further guidance on the background and general framework for environmental risk assessment is provided in DETR⁽²⁰⁾ guidance. More specific advice with regard to fuel stations is contained in guidance from the Institute of Petroleum^(21, 22).

Issues To Be Considered in Risk Assessment For UST Facilities

- A3.7 Petroleum hydrocarbons present both an environmental risk and a risk of fire and explosion. Thus with regard to hazard sources, an environmental risk assessment would utilise much the same data required for the assessment of fire risk. For sites with a long history of use, the possibility of old redundant tanks being present should also be considered.
- A3.8 As indicated above, for the purposes of this Code, the primary receptor of concern is the water environment. The risk assessment process must establish the surface water and groundwater regime in the vicinity of the facility and their vulnerability to pollution. A starting point for this would be topographical maps and site drainage plans, geological maps, maps indicating groundwater vulnerability and the SEPA Groundwater Protection Policy for Scotland⁽⁸⁾. Additional information may be available from the British Geological Survey Scotland at a fee.
- A3.9 The risk assessment should consider all the potential pathways by which product could reach the water environment. This could include wash off of spills / leaks into surface drains, percolation through unsaturated ground, along service runs, or via drainage systems. Potential routes to groundwater could include a number of individual pathways. On reaching groundwater, petroleum hydrocarbons will dissolve into groundwater (dissolved phase contamination). Due to relatively low solubility, if relatively large volumes of product are involved, product will also form a layer 'floating' on top of the groundwater (free phase contamination).
- A3.10 It must be remembered that groundwater can provide a pathway towards other sensitive receptors. These can include groundwater abstractions (e.g. for potable, agricultural or industrial use) and surface watercourses (either through baseflow or springs). The volatilisation of product from groundwater can also present risks. The risk assessment process must identify any secondary receptors which could be affected by hydrocarbon contaminated water, and in particular groundwater.

Figure A3.1: Source Pathway Receptor Model from the UST Release



- A3.11 As the product migrates away from source (e.g. tank or pipework) it is subject to a range of influences including adsorption onto stream sediment or soil/strata particles, dispersion, dilution, volatilisation and biodegradation. The cumulative affect of these influences is a process called attenuation. Whilst attenuation can be taken into consideration in assessing the significance of identified pathways, it is generally of more relevance in assessing the requirements for remedial measures following a pollution incident.
- A3.12 Petroleum hydrocarbon fractions typically contain a wide range of individual hydrocarbon compounds. Whilst the general environmental behaviour of the majority of these compounds will be similar, variations in physiochemical properties such as volatility and solubility need to be taken into consideration when considering the importance of attenuation. For example, Methyl Tertiary Butyl Ether (MTBE) is one of several oxygenates which may be added to petrol and is currently added by some refineries. The maximum MTBE level allowed by the European Fuels Directive 2003/17/EC is 15% however its use in the UK is usually much lower than this, on average around 1%, although individual blends may be higher. MTBE is soluble in water (~40 g/l). Toluene is a constituent of Petroleum Spirit (~8%) and Diesel (~2%). It is not very soluble in water (~0.5 g/l). MTBE can travel considerable distances to sensitive receptors at high concentrations in groundwater. The majority of Toluene remains in the free phase.
- A3.13 As well as identifying the potential risks associated with the release of petroleum hydrocarbons, a risk assessment for a UST facility must also consider the likelihood for failure of containment due to corrosion. This is most likely to be an issue where steel tanks or pipework are used.
- A3.14 Usually the corrosion of buried steel occurs as a result of electrochemical reactions with constituents of the enclosing soils. In order to assess the risk of corrosion failure, it is necessary to ascertain soil conditions such as moisture content, electrical conductivity, pH, sulphide concentration and chloride concentration. This data, once collected, can be analysed using a standard method to determine the probability of a leak caused by corrosion, both at present and in the future. Assessment of corrosion probability will help to decide if urgent action is required, e.g. the fitting of cathodic protection, tank lining or the replacement of a tank. On partially buried tanks there is the risk of corrosion to the parts of the tank exposed above ground.

APPENDIX 4 - SUMMARY OF GOOD ENGINEERING DESIGN FOR UST FACILITIES

A4.1 Set out below is a summary of design issues that can be used to control risk to the water environment, and in particular groundwater at UST facilities. This summary is based on current guidance and practice.

Storage Tanks

A4.2 Storage facilities can make use of different types of USTs, which are listed below:

- single skinned mild steel tanks;
- single skinned glass reinforced plastic (GRP) tanks;
- double skinned steel tanks;
- double skinned GRP tanks;
- double skinned composite tanks

A4.3 Traditional practice has been to install single skinned steel tanks surrounded by concrete. The concrete is not intended to contain any product lost from the tank, but might delay its release into the surrounding ground if it is not cracked or jointed.

A4.4 Double skinned tanks have an obvious advantage over single skinned tanks, in as much as two walls would have to be breached in order for leakage to occur. Furthermore, the interstitial space can be monitored to provide warning of a leak before product is lost to the environment. Generally, double skinned tanks should be installed on any new or redeveloped sites.

A4.5 Where steel tanks are to be utilised, these should be protected using anti-corrosion paint in conjunction with effective leak detection and, where appropriate, cathodic protection.

A4.6 USTs should be designed, constructed, inspected and tested in accordance with the appropriate British Standards or other international equivalents.

Pipework

A4.7 Dispensing pipework and delivery apparatus are designed to prevent leakage. Historically, pipework has been constructed from steel laid in a concrete surround. Current good practice would be to utilise double skinned pipework. The use of non-metallic pipework is now common. Such pipework should be laid in granular material or sand in order to protect it from damage by larger stones or uneven settlement.

A4.8 Both glass reinforced and plastic pipes have been used. As plastic pipes are permeable to hydrocarbon vapours, it is now common to use pipes manufactured from specially developed thermoplastic composites or plastic/metal composites which are not vapour permeable. Other advantages of composite pipes are flexibility, and a reduced need for joints.

A4.9 Whichever type of pipework is used, the most significant potential points of leakage are joints. Hence, it is strongly recommended that the number of joints is kept to a minimum. Additional information on the choice of pipework is contained in APEA/IP guidance⁽²⁾. The Institute of Petroleum have also produced a performance specification for pipework⁽²²⁾.

Dispensing Systems

A4.10 The main issues with regard to dispensers are their location and use, and control systems. The dispenser should be located in such a way that it cannot be easily damaged. Dispensers could be operated by dedicated personnel, or by anyone (i.e. the public at self-service filling stations). Dispensers should be fitted with appropriate nozzle and under pump-valves to prevent uncontrolled release of product.

A4.11 There are a number of British standards related to dispensing systems; these are described further in APEA/IP 2005⁽²⁾.

Delivery Areas

A4.12 A delivery area should be designed such that there is sufficient room for the delivery vehicles to unload without disturbance. The delivery systems should be designed to prevent spillages and overfilling of tanks. Overfill protection involves limiting the amount of fuel that can be delivered into the storage tank by the use of automatic shut off valves or electronic alarms.

Drainage Systems

A4.13 Drainage systems should be designed such that surface spillages are contained and there is no direct loss to sewers, ground or to surface watercourses or soakaways for surface water drainage. Typically, this involves the use of low permeability surfacing in any areas which could be contaminated with product. All run-off from these areas should pass through an oil/water treatment system such as a separator. Advice on the use and design of oil/water separators is contained in PPG3⁽²³⁾. Scottish Water should also be informed if it is intended that the interceptors discharge to foul or surface water systems. Drainage systems serving a building or a paved surface within the curtilage of a building must comply with the Technical Standards for compliance with the Building (Scotland) Regulations 2004.

A4.14 The drainage system should also be constructed of materials, which are resistant to attack by hydrocarbons. This should include both hardstanding and drainage pipework.

A4.15 Some more recent facilities have made use of constructed wetlands rather than the installation of on-site interceptors. If properly constructed, such wetlands can improve water quality and require less maintenance in the long term than a traditional interceptor. Constructed wetlands can discharge to either surface water or foul sewer depending on the water quality achieved and the granting of a consent from the appropriate regulatory authority. Advice on the use of constructed wetlands is contained in PETEL 65/45⁽²⁴⁾ and in CIRIA⁽²⁵⁾ which provides guidance on Sustainable Urban Drainage (SUD) Systems. Under the Water Environment and Water Services (Scotland) Act 2003, public SUD Systems will come under the responsibility of Scottish Water. . Private SUD Systems are covered by The Building (Scotland) Regulations 2004 and will require a building warrant before work can start. All SUD Systems will require CAR (2005) authorisation.

A4.16 Constructed wetlands make use of bacteria contained in reed beds to degrade hydrocarbons. They must be constructed such that there is complete hydraulic containment of the drainage effluent prior to ultimate discharge of the treated water. To discharge surface water drainage from a UST facility to a naturally occurring wetland would not be acceptable and would be an offence under CAR (2005).

A4.17 A further issue could be the potential for any leakage from below ground apparatus to enter the drainage system. This would be best addressed by locating the drainage system so that it is not adjacent to the storage tanks and dispensing pipework.

Leakage Detection and Wetstock Monitoring Systems

A4.18 The main types of leak detection and wetstock monitoring systems can be split into a number of classes numbered from 1 to 7, with decreasing effectiveness⁽²⁾. The operation and effectiveness of these systems are summarised in Table 7.1 below.

Table A4.1 Summary of Leakage Detection and Wetstock Monitoring Systems

Class	Equipment Monitored	Method Of Operation	Effectiveness
1, 2 & 3	Tanks and pipework	Monitor interstitial spaces in double skin equipment	Indicates failure before loss of product to environment
4a	Tanks and pipework	Analyses change in tank contents with volume dispensed (automatic monitoring)	Leak is not detected until product is lost to environment
4b(1) & 4b(2)	Tanks	Analyses rates of change in tank contents (automatic monitoring)	Leak is not detected until product is lost to environment
5	Tanks and Pipework	Monitoring wells around storage area	Leak is not detected until product is lost to environment
6	Tanks and Pipework	Manual monitoring of product volumes and sales	Leak is not detected until product is lost to environment
7	Pipework	Measures pressure in pipework	Leak is not detected until product is lost to environment

- A4.19 It should be noted that the most effective systems, i.e. those which detect a failure before loss of product into the soil, can only be used in conjunction with double skinned systems. Furthermore, a catastrophic failure could occur before leakage is detected by monitoring wells or wetstock monitoring. Whilst the provision of leakage detection will alert an operator to leakage, or potential leakage, it will not prevent a catastrophic failure.
- A4.20 There are a number of potential inaccuracies inherent in product monitoring (i.e. classes 4a & 4b and 6). A result of this is that small scale leakage could go undetected for a considerable period of time, leading to a significant cumulative loss of product to the environment. Third party statistical inventory reconciliation (SIR) as carried out by independent contractors on behalf of facility operators (i.e. classes 4a & 4b) has become an increasingly sophisticated technique which has proved effective at indicating loss of product. Nevertheless, product will have been lost to ground before leakage is identified. The volume of product lost, and hence the environmental impact, will depend on the period over which SIR is carried out. A significant issue for SIR would be what is considered to be the inherent error in the reconciliation process and whether this could lead to non-identification of leakage. Whilst SIR can be an efficient technique for detecting loss, manual product monitoring (i.e. class 6) is subject to much greater potential inaccuracies, and thus offers a lesser degree of environmental protection. The latest wetstock monitoring technology uses broadband communications systems to allow continuous remote reconciliation.
- A4.21 In wetstock monitoring, errors can arise as a result of miscalibrated dispensers. This can result in the masking of leaks. Therefore, it is important that dispensers are regularly re-calibrated. If they are found to be out of calibration, the potential for a leak to have been masked must be addressed.

APPENDIX 5 - TRAINING REQUIREMENTS AND SOURCES

Introduction

A5.1 As noted earlier in the code, protection of the water environment at UST facilities is dependent on both engineering and operational control measures. Assuming that engineered systems are properly installed and maintained, it is the operation of the site that presents the greater risk. Such risks can arise as a result of inadequate training or operator error at a facility. Training requirements would form an integral part of any EMS in place at a facility. The key issues to be addressed by training are:

- an understanding of the need for environmental protection;
- an awareness of the risks posed by a UST facility; and
- the implementation of risk management procedures and controls.

A5.2 At the present time, there are no statutory requirements with regard to training in environmental awareness for personnel designing, constructing, or operating storage facilities. However, the current regulatory regime for petroleum spirit requires proof that site staff have received training with regard to the safe storage and dispensing of petrol. Additionally, there are general legal requirements to provide appropriate and sufficient training to ensure the health and safety of personnel working on or visiting UST facilities. Requirements on the management of health and safety are set out in the Management of Health and Safety at Work Regulations 1999 and other relevant legislation.

General Training Requirements

A5.3 The specific health and safety issues to be addressed on UST facilities is summarised in Appendix 2 of HS(G)146⁽⁴⁾. This guidance indicates that the issues on which training should be provided include:

- on-site hazards and risks;
- risk management measures and procedures;
- emergency procedures; and
- control of visiting contractors.

A5.4 All persons working on the site should be given training commensurate with their responsibilities and a record of the training provided maintained. Training should be provided for all new staff, and refresher training provided for existing staff.

Specific Training for Environmental Awareness

A5.5 Most of the issues covered by health and safety training would be equally applicable to environmental protection, and can be readily expanded to cover this. Particular issues which should be covered by training on environmental issues include:

- the water environment, groundwater and general environmental sensitivity;
- the consequences of pollution of the water environment;
- facility specific risks;
- facility specific environmental protection measures; and
- an individual's specific role and responsibility.

A5.6 All of the above should be detailed in the environmental risk assessment and risk management action plans for the facilities and form part of any EMS that is in place. These documents should have been read and understood by all personnel involved in the operation of a UST facility. As a minimum, all persons involved in the operation of the facility should be aware of the existence of these documents and of the issues detailed in such. (For retail filling stations it could not be expected that this would include the public using such a facility.)

Sources of Training

A5.7 Health and Safety training courses and materials are provided by a number of industry bodies including;

- the Association for Petroleum and Explosives Administration (APEA);
- the Forecourt Contractors Safety Association (FCSA);
- the Institute of Petroleum (IP);
- the Sector Skills Council for the Oil and Gas Extraction, Chemicals Manufacturing and Petroleum Industries (Cogent); and
- the Petroleum Retailers Association (PRA).

A5.8 Relevant in-house training courses are also run by the larger oil companies.

A5.9 A number of courses run by these organisations already include, or are planned to include, awareness of environmental protection issues. Attendance at a suitable course could provide evidence that training requirements are being met.

REFERENCES AND OTHER USEFUL GUIDANCE AND PUBLICATIONS

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The documents listed below have been referenced in the Code of Practice.

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21. Regulation 10 of The Building (Scotland) Regulations 2004
22. DETR, 2000, *Guidelines for Environmental Risk Assessment and Management*.
23. Institute of Petroleum, 1999, *Guidance Document on Risk Assessment for the Water Environment at Operational Fuel Storage and Dispensing Facilities*.
24. Institute of Petroleum, 2001, *Performance Specification for Underground Pipework Systems at Petrol Filling Stations*, 2nd edition.
25. SEPA, Pollution Prevention Guidelines, PPG3, *Use and Design of Oil Separators in Surface Water Systems*.
26. Hela Lacots PETEL 65/45, November 2001, *Petrol Filling Stations Surface Water Drainage: Constructed Wetlands*.
27. CIRIA, 2000, *Sustainable Urban Drainage Systems: Design Manual for Scotland and Northern Ireland*.
28. Hela Lacots PETEL 65/14, June 2000, *Petroleum - Local Authority Circulars and other Published Guidance Including Codes of Practice*.
29. Water Environment and Water Services (Scotland) Act 2003.
29. Water Environment (Controlled Activities) (Scotland) Regulations 2005.

General Industry Related Advice

APEA/IP 2005⁽²⁾ provides advice on engineering issues and contains references to other appropriate standards, codes of practice and guidance.

The industry bodies listed in Appendix 5 are valuable sources of advice. The Institute of Petroleum should be able to provide contact details for appropriate people within these organisations. The Energy Institute (formerly the Institute of Petroleum (IP)) are located at 61 New Cavendish Street, London W1G 7AR, and can be contacted on 0207 467 7100 or via the Energy Institute website (www.energyinst.org.uk).

The current co-ordinating body for PLAs is the Petroleum Enforcement Liaison Group (PELG) which is part of the HSE Local Authority Unit Group. A series of guidance circulars known as Hela Lacots PETELS (PETroleum Enforcement Liaison Circulars) are issued on behalf of this body. Whilst intended principally for the dissemination of advice to enforcement officers, these circulars provide useful guidance on health and safety and engineering issues. For example, PETEL 65/14⁽²⁶⁾ addresses published codes of practice and PETEL 65/44⁽¹⁷⁾ discusses proposed changes to the regulatory regime. Other potentially useful PETELS are either referenced or listed below. Copies of PETELS can be obtained from the HSE (Local Authority Unit) on 020 7717 6442, or downloaded from the HSE website (www.hse.gov.uk/spd/content/petel).

PETEL 65/29, April 2000, *Petrol Dispensers and ATEX*.

PETEL 65/33, April 2000, *Status of HSE's Guidance Document HS(G)41 Following the Introduction of APEA/IP Guidance Document*.

Advice on Environmental Issues

General advice concerning environmental protection is contained in SEPA Pollution Prevention Guidelines (PPGs). A list of potentially useful PPGs is included below. Copies of PPGs are available (free of charge) from SEPA local offices, or can be downloaded from the SEPA website (www.sepa.org.uk). The website also provides details of other available SEPA guidance documents.

PPG1	<i>General Guide to the Prevention of Pollution.</i>
PPG2	<i>Above Ground Oil Storage Tanks.</i>
PPG3	<i>The Use and Design of Oil Separators.</i>
PPG5	Works in, near or liable to affect Watercourses.
PPG6	<i>Working at Construction and Demolition Sites.</i>
PPG7	<i>Fuelling Stations Construction and Operation.</i>
PPG8	<i>Safe Storage and Disposal of Used Oils.</i>
PPG10	<i>Highway Depots.</i>
PPG11	<i>Preventing Pollution on Industrial Sites.</i>
PPG13	<i>High Pressure Water & Steam Cleaners.</i>
PPG14	<i>Marinas and Craft.</i>
PPG18	<i>Control of Spillages and Fire Fighting Run-off.</i>
PPG19	Garages and Vehicle Service Centres.
PPG21	Pollution Incident Response Planning.

PPG22 Dealing with Spillages on Highways.

PPG27 Installation, Decommissioning and Removal of Underground Storage Tanks.

Local SEPA Officers can provide more specific advice. Contact details for local SEPA offices are included at the end of this document.

Advice on Planning Issues

The Scottish Executive publishes a number of documents providing planning advice. The Executive is in the process of replacing National Planning Policy Guidelines (NPPGs) with a new series of Scottish Planning Policies (SPPs). Existing NPPGs have continued relevance to decision making, until such time as they are replaced by a SPP. SPPs/NPPGs are available at www.scotland.gov.uk/about/planning/policy.aspx. Relevant SPPs/NGGS could include:

SSP1 *The Planning System.*
NPPG 15 *Rural Development.*
NPPG 17 *Transport and Planning.*

Planning Advice Notes (PANs) provide advice on good practice and other relevant information and are available at www.scotland.gov.uk/about/planning/policy.aspx
Relevant PANs could include:

PAN 33 *Development of Contaminated Land.*
PAN 51 *Planning & Environmental Protection* scheduled to be revised to *Planning, Environmental Protection and Regulation* later in 2006.
PAN 58 *Environmental Impact Assessment.*

Advice on Environmental Management Systems and Risk Assessment

Details of organisations who can advise on the production and certification of Environmental Management Systems can be obtained from the United Kingdom Accreditation Service (UKAS), who can be contacted on 020 8917 8400 or through their website (www.ukas.com).

Details of organisations who can provide advice on the production of an environmental risk assessment can be obtained from Environmental Data Services (ENDS), who can be contacted on 020 8267 8100 or through their website (www.ENDS.co.uk).

Neither the Scottish Executive nor the Scottish Ministers endorse Companies or organisations recommended by ENDS or UKAS. The use of a third party Company or organisation to develop an EMS or environmental risk assessment would not provide a defence in the event of criminal proceedings being commenced as a result of pollution of groundwater occurring.

Other Useful Publications

HSE Publications

Health and Safety Executive (HSE), HS(G)176, *The Storage of Flammable Liquids in Tanks.*

Health and Safety Executive (HSE), HS(G)191, *Emergency Planning for Major Accidents. Control of Major Accident Hazards Regulations 1999.*

GLOSSARY

APEA: the Association for Petroleum and Explosives Administration.

Aquifer: geological strata capable of storing and allowing migration and abstraction of groundwater.

Bottoming: the removal of residual product from USTs prior to decommissioning.

Controlled waters: includes burns, rivers, estuaries, canals, lochs, ponds, groundwaters and territorial waters within the three mile coastal limit (*Control of Pollution Act 1974*).

CAR (2005): The Water Environment (Controlled Activities) (Scotland) Regulations 2005, Scottish Statutory Instrument 2005 No. 348.

CoPA: Control of Pollution Act 1974 (as amended).

Direct discharge: the introduction into groundwater of any substance without percolation through the ground or subsoil.

DSEAR: The Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002/2776).

DWQS: drinking water quality standard.

EMS: environmental management system.

Enforcement Notice: a legally enforceable notice made under Regulation 28(2) of CAR (2005) which provides SEPA with powers to serve Enforcement Notices to control any activity which might lead to pollution of the water environment or lead to a direct or indirect discharge of a Schedule 2 substance to groundwater.

GRP: glass reinforced plastic.

Groundwater: all water below the subsurface of the ground in the saturation zone and in direct contact with ground or subsoil (Water Environment and Water Services (Scotland) Act 2003)

Hazard: a property or situation that in particular circumstances could lead to harm (*DETR 2000*).

HSE: Health and Safety Executive.

Indirect Discharge: the introduction into groundwater of any substance after percolation through the ground or subsoil.

List I substances: the most harmful substances to the aquatic environment, selected on the basis of their toxicity, persistence and bioaccumulation. (List I is defined in the Groundwater Directive⁽¹⁶⁾). List I is replicated by Schedule 2 of CAR (2005).

List II substances: substances which are less harmful (than those on List I) but which have a deleterious effect on the aquatic environment. (List II is defined in the Groundwater Directive⁽¹⁶⁾).

NPPG: National Planning Policy Guidelines.

PA: Planning Authority.

PAN: Planning Advice Note.

PETEL: PETroleum Enforcement Liaison Circulars.

Petroleum hydrocarbons: chemical compounds containing carbon and hydrogen which are produced by the refining of crude oil and which are generally used as fuels.

PIRP: Pollution Incident Response Plan.

PLA: Petroleum Licensing Authority.

Pollutants: means any substance or heat liable to cause pollution, including those listed in Schedule 1 of CAR (2005), and for the purposes of this definition "substance" includes bacteria and other pathogens.

PPG: Pollution Prevention Guidelines.

PPPG: Policy and Practice for the Protection of Groundwater.

Product: generic term within the petroleum industry for hydrocarbon fractions.

Risk: a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of consequences of the occurrence (*DETR 2000*).

Schedule 2 substances: substances for which the direct or indirect discharge into groundwater is prohibited and which are listed in Schedule 2 of CAR (2005).

SEPA: Scottish Environment Protection Agency.

SNH: Scottish Natural Heritage.

SPP: Scottish Planning Policy.

SIR: Statistical Inventory Reconciliation.

SSI: Scottish Statutory Instrument.

SUD: Sustainable Urban Drainage.

Surface Waters: inland water (other than groundwater), transitional water and coastal water (Water Environment and Water Services (Scotland) Act 2003).

UKAS: United Kingdom Accreditation Service.

UST: underground storage tank.

Wetland: an area of ground the ecological, chemical and hydrological characteristics of which are attributable to frequent inundation or saturation by water and which is directly dependent, with regard to its water needs, on a body of groundwater or a body of surface water (Water Environment and Water Services (Scotland) Act 2003).

WEWS (2003): Water Environment and Water Services (Scotland) Act 2003.

USEFUL CONTACT DETAILS

Scottish Environment Protection Agency (SEPA)

EMERGENCY HOTLINE 0800 80 70 60 (Available 24 hours a day, 7 days a week)

CORPORATE OFFICE

Erskine Court
Castle Business Park
STIRLING
FK9 4TR
Tel: 01786 457700
Fax: 01786 446885

Email: Info@sepa.org.uk

HIGHLANDS, ISLANDS & GRAMPIAN OFFICES

Aberdeen Office

Greyhope House
Greyhope Road
Torry
ABERDEEN
AB11 9RD
Tel: 01224 248338
Fax: 01224 248591

Dingwall Office

Graesser House
Fodderty Way
Dingwall Business Park
DINGWALL
IV15 9XB
Tel: 01349 862021
Fax: 01349 863987

Elgin Office

28 Perimeter Road
Pinefield
ELGIN
IV30 6AF
Tel: 01343 547663
Fax: 01343 540884

Fort William Office

Carr's Corner Industrial Estate
Lochybridge
FORT WILLIAM
PH33 6TL
Tel: 01397 704426
Fax: 01397 705404

Fraserburgh Office

Shaw House
Mid Street
FRASERBURGH
AB43 9JN
Tel: 01346 510502
Fax: 01346 515444

Orkney Office

Norlantic House
Scott's Road
Hatson Industrial Estate
Kirkwall
Orkney KW15 1RE
Tel: 01856 871080
Fax: 01856 871090

Shetland Office

The Esplanade
LERWICK
SHETLAND
ZE1 0LL
Tel: 01595 696926
Fax: 01595 696946

Thurso Office

Thurso Business Park
Thurso
CAITHNESS
KW14 7XW
Tel: 01847 894422
Fax: 01847 893365

Western Isles Office

2 James Square
James Street
STORNOWAY
ISLE OF LEWIS
HS1 2QN
Tel: 01851 706477
Fax: 01851 703510

SOUTH EAST OFFICES

Arbroath Office

62 High Street
ARBROATH
DD11 1AW
Tel: 01241 874370
Fax: 01241 430695

Edinburgh Office

Clearwater House
Heriot Watt Research Park
Avenue North
Riccarton
EDINBURGH
EH14 4AP
Tel: 0131 449 7296
Fax: 0131 449 7277

Galashiels Office

Burnbrae
Mossilee Road
GALASHIELS
TD1 1NF
Tel: 01896 754797
Fax: 01896 754412

Glenrothes Office

Pentland Court
Saltire Centre
GLENROTHES
KY6 2DA
Tel: 01592 776910
Fax: 01592 775923

Perth Office

7 Whitefriars Crescent
Perth
PH2 0PA
Tel: 01738 627989
Fax: 01738 630997

Stirling Office

Bremner House
The Castle Business Park
STIRLING
FK9 4TF
Tel: 01786 452595
Fax: 01786 461425

SOUTH WEST OFFICES

Ayr Office

31 Miller Road
Ayr
KA7 2AX
Tel: 01292 294000
Fax: 01292 611130

East Kilbride Office

Redwood Crescent
Peel Park
EAST KILBRIDE
G74 5PP
Tel: 01355 574200
Fax: 01355 574688

Lochgilphead Office

2 Smithy Lane
LOCHGILPHEAD
PA31 8TA
Tel: 01546 602876
Fax: 01546 602337

Dumfries Office

Rivers House
Irongray Road
DUMFRIES
DG2 0JE
Tel: 01387 720502
Fax: 01387 721154

Glasgow Office

Law House
Todd Campus
West of Scotland Science Park
Maryhill Road
GLASGOW
G20 0XA
Tel: 0141 945 6350
Fax: 0141 948 0006

Newton Stewart Office

Penkiln Bridge Court
Minnigaff
NEWTON STEWART
DG8 6AA
Tel: 01671 402618
Fax: 01671 404121

Environment Agency of England and Wales

EMERGENCY HOTLINE 0800 80 70 60

North East Region

Northumbria Area Office
Tyneside House
Skinnerburn Road
Newcastle Business Park
NEWCASTLE UPON TYNE
NE4 7AR
Tel: 08708 506506
Fax: 0191 2034004

North West Region

Northern Area Office
Ghyll Mount, Gillan Way
Penrith Business Park
PENRITH
CA11 9BP
Tel: 08708 506506
Fax: 01768 865606

Scottish Water

EMERGENCY HOTLINE 0845 600 885

Headquarters
Castle House
6 Castle Drive
Carnegie Campus
DUNFERMLINE
KY11 8GG
Customer Helpline 0845 601 8855
Business Helpline 0845 602 885
Email: customer.service@scottishwater.co.uk

Health and Safety Executive in Scotland

Belford House
59 Belford Road
Midlothian
EDINBURGH
EH4 3UE
Tel: 0131 247 2000
Fax: 0131 247 2121

Pegasus House
375 West George Street
Lanarkshire
GLASGOW
G2 4LW
Tel: 0141 275 3000
Fax: 0141 275 3100

Out of hours telephone number: 0151 922 9235

Scottish Executive

Environment Rural Affairs Department
Water Environment Unit
1-H North
Victoria Quay
EDINBURGH
EH6 6QQ
Tel: 0131 244 7844
Fax: 0131 244 0245

Email : waterenvironment@scotland.gsi.gov.uk

Scottish Building Standards Agency
Denholm House
Almondvale Business Park
Livingston
WEST LOTHIAN
EH54 6GA
Tel: 01506 600 400
Fax: 01506 600 401

e-mail: info@sbsa.gsi.gov.uk

