

# INSTALLATION, DECOMMISSIONING AND REMOVAL OF UNDERGROUND STORAGE TANKS: PPG27

## POLLUTION PREVENTION GUIDELINES

*These guidelines are intended to help those who plan or undertake the installation, decommissioning and removal of underground storage tanks and their associated pipework. They have been jointly produced by the Environment Agency for England and Wales, the Scottish Environment Protection Agency and the Environment and Heritage Service for Northern Ireland, referred to as the Agency or Agencies. Consultation with your local Agency office is advisable before starting work. Contact details can be found at the end of these guidelines.*

### 1. INTRODUCTION

There is a high risk of pollution during the installation, decommissioning and removal of underground storage tank (UST) systems. This pollution prevention guidance covers all USTs, including those containing petroleum, diesel, fuel oil, aviation fuel, waste oil, domestic heating oil and other potentially polluting materials such as organic solvents. It does not cover operational issues and should be read together with guidance issued by the Department for Environment, Food and Rural Affairs (DEFRA) to protect groundwater at sites where fuel is stored underground (see Reference 1).

For the purpose of the guidance, a UST system is any tank, associated underground pipework and ancillary equipment that is completely or partially below ground level. This definition includes any tank that is partially above ground but covered with earth, and any tank in a vault or basement where its base and sides cannot be inspected. If it is possible to inspect all the base and walls, the tank is considered to be an above ground storage tank and separate Agency guidance applies (see Reference 2). For the purposes of pollution prevention, it is best to store potentially polluting substances above ground.

Other guidance from the Agencies may be relevant to those using underground tanks (see References 3-6).

### 2. CONTROLS ON PETROLEUM STORAGE

Most of the UST systems in the UK are used to store petrol and diesel. Petrol storage systems are regulated by the local petroleum enforcement authority (PEA), which apply strict controls to installations. If petrol storage tanks are to be installed, decommissioned or removed from a site, then the PEA should be informed **before work commences**.

Operators of UST systems containing flammable or explosive products must ensure that they comply with the relevant health and safety requirements at all times.

Comprehensive guidance on the design, construction, modification and maintenance of petrol filling stations is given in a publication known as the 'Blue Book' (see Reference 7). This guidance covers many aspects of design and construction, and is often applicable to the underground storage of other liquids.

The Blue Book should be consulted for detailed technical information on the installation, decommissioning and removal of USTs. This pollution prevention guidance note merely provides advice on those aspects that may give rise to pollution and how to prevent this pollution. It should be read in conjunction with the Blue Book or other guidance specific to chemical storage. Operators working with petrol **must** also liaise with the local petroleum licensing officer, who may provide advice on the technical requirements of the specific system.

### 3. POLLUTION POTENTIAL OF INSTALLATION, DECOMMISSIONING AND REMOVAL ACTIVITY

A number of serious pollution incidents have occurred as a result of damage caused to UST systems during installation, inappropriate decommissioning or during the removal of systems which have not been decommissioned properly. These incidents have caused serious soil and groundwater contamination and, in some cases, have contaminated surface waters.

The Agencies are responsible for the protection of controlled waters from pollution. Controlled waters include all watercourses, lakes, lochs, coastal waters, and water contained in underground strata ('groundwater'). In addition, the Groundwater Regulations 1998 ban the discharge of more toxic substances (known as List I substances) such as hydrocarbons, mineral oils and chlorinated solvents into groundwater and require measures to be taken to prevent the pollution of groundwater by less toxic substances (List II substances) such as methyl tertiary butyl ether (MTBE). The Groundwater Regulations also allow the Agencies to serve notices to control or ban activities that could give rise to groundwater pollution by listed substances.

Measures to prevent pollution by maintaining the integrity of the tank and pipework system should be considered throughout the design, installation, decommissioning and removal of a UST system. Measures to prevent pollution during the operation of a UST system are described in Reference 1.

#### 4. PLANNING AND PRE-INSTALLATION

Appropriate choices at the design stage will reduce the risk of pollution from a UST system. Before installing a UST, careful consideration should be given to:

- the environmental sustainability of the site, the tank design, the tank contents and the materials used to construct the tank and associated pipework;
- environmental measures to be incorporated.

The Agencies and other appropriate bodies, such as the local PEA for petrol storage, should be consulted on the siting of USTs before installation. Planning permission is needed to install a UST system.

During site selection, consideration should be given to:

- the proximity of the installation to watercourses
- the site's geology and hydrogeology
- subsurface pipes and structures
- historical site activities (including the presence of existing USTs)
- the corrosive nature of soil
- groundwater conditions such as high acidity, sulphate content or saline conditions.

The Institute of Petroleum (see Reference 8) provides guidance on some of the factors to consider when siting USTs.

Where groundwater resources are considered to be sensitive or vulnerable (see Reference 9 and 10) and particularly in groundwater source protection zones, the Agency will seek to ensure adequate environmental controls either through the planning process or by using notices issued under the Groundwater Regulations. In certain circumstances, the Agency may oppose the installation.

##### a. Tank design and materials

Regardless of the product stored, the Agency recommends that all new USTs should:

- be double-skinned (that is, have an inner and outer skin);
- have an interstitial monitoring device with automatic alarms.

Such a design means that, in the event of either skin failing, the stored product is prevented from entering the surrounding subsurface and the monitoring system will alert the operator to the problem so that it can be corrected immediately.

It is also important that the access chamber is provided with some form of containment so that any leak or spillage into this area is contained while remedial action is arranged and implemented. All USTs must be provided with overflow prevention.

Underground tanks are usually manufactured from glass reinforced plastic or steel. Each material has its advantages and disadvantages for pollution prevention, although appropriate measures can be incorporated into tank designs to reduce these disadvantages. If steel tanks are used, the Agencies require the use of effective and durable anti-corrosion measures.

##### b. Pipework

Pollution incidents involving USTs are often associated with pipework and particularly failure at joints. Joints should therefore only be used where necessary.

The Blue Book and other Institute of Petroleum guidance (see Reference 8) describe the various types of pipework systems available and give extensive guidance on the installation of pipework systems for USTs. Guidance provided by OFTEC should be followed when installing underground pipework for domestic heating oil tanks (see Reference 11). The most suitable type of pipework for the particular UST system should be selected.

Double-skinned pipework with interstitial monitoring protects the environment by alerting the operator to a leak before the product escapes into the surrounding soil. However, the cost of such systems can be high and they are not often used.

The Agencies recommend double-skinned pipework with interstitial monitoring at sites where groundwater is particularly vulnerable or where the product is distributed using a pressurised system as this allows leaks in the line to be detected quickly. If a line leak goes undetected, then the pressurised product will escape rapidly into the environment with the potential for serious pollution.

##### c. Leak detection systems

A leak detection system is vital for all UST systems. Comprehensive information on the different types of leak detection systems is given in the Blue Book. The operator should choose a system that provides the level of protection required at the site. The main factor in deciding the nature of the system is the vulnerability of the environmental setting. Local Agency staff can provide information on the vulnerability of a particular site.

The Agencies expect the chosen leak detection system to have a robust and accurate means of monitoring wetstock (fuel), with associated systems to carry out wetstock reconciliation. These systems must be managed by people who are trained to operate them effectively.

At sites where the underlying groundwater is vulnerable, the Agencies may require more responsive wetstock reconciliation systems to be installed to ensure that the groundwater resource is fully protected from potential pollution. Such systems may include statistical inventory reconciliation, which enters wetstock figures into a statistical model every day and thus allows small leaks of a few litres a day to be identified. As well as routine wetstock reconciliation, boreholes for groundwater monitoring should be installed around USTs in vulnerable environments. These should be sampled regularly.

## 5. INSTALLATION

To ensure the system is installed as agreed with the regulatory authorities, on-site works must be supervised at all times by an experienced person. Detailed technical guidance for the installation of USTs is given in the Blue Book.

It is essential that any protective coating applied to the tanks and pipework is not damaged during installation. The coating must be inspected during and after installation, and any damage must be repaired immediately and before the excavation is filled in again.

## 6. KEEPING RECORDS

Records must be kept of how the UST system was built for future reference during site construction work and the decommissioning or removal of the equipment. These records must include technical drawings of the installation showing the location and orientation of the tanks and pipework, their dimensions and the materials used.

It is recommended that:

- all records are dated and maintained during the life of the UST;
- the records are kept on-site for future reference (for example, in the event of a leak or spillage) in a place from where they can be retrieved quickly.

## 7. DECOMMISSIONING

USTs are decommissioned on either a permanent or a temporary basis. Many tanks are temporarily decommissioned and then forgotten about. To avoid the risk of pollution, the Agencies recommend removal of tanks that are unlikely to be used again.

The Blue Book contains comprehensive technical guidance on the decommissioning of USTs. Although it refers to the storage of fuels, the advice is often applicable to other products stored underground. Operators are particularly advised to refer to the Blue Book for information about the health and safety issues associated with decommissioning USTs.

The Agencies are particularly concerned about the removal and disposal of the remaining product in the tanks and pipelines. All product and tank bottoms must be removed and disposed of correctly (see below). Once this has been carried out, the risk of pollution is much less, as the pollution matter has been removed.

The operator must also ensure that there is no residual contamination of the site such as petrol contamination of the soil and groundwater.

### a. Subsurface sampling

Once the tank has been removed, samples of soil and groundwater (if present) should be taken to check for subsurface contamination. The samples should be analysed for the parameters appropriate to the type of product stored. Advice on soil and groundwater sampling is available from a number of sources including the Institute of Petroleum, the Agency and the British Standards Institution.

If soil or groundwater contamination is found, additional investigations (possibly including a risk assessment) should be carried out to determine the need for remediation.

### b. Waste management

Tanks and pipework used to store hydrocarbons or chemicals, together with residual product, wastewater, sludge and decommissioning fill may be classed as special waste under the Special Waste Regulations 1996. Special wastes must be disposed of according to the procedure drawn up by the Agencies (see Reference 12), who can provide further advice on the management of special waste. Disposal of all wastes must be in accordance with the Duty of Care (see Reference 13).

If the tank has been used for the storage of flammable or explosive materials, then the operator must ensure that the waste disposal contractor is aware of all appropriate health and safety guidance.

If a tank used for storing petrol is removed intact, its transport off-site will be governed by the Carriage of Dangerous Goods by Road Regulations 1996 (amended 1999). The HSE can advise on the measures that need to be taken.

## 8. REFERENCES

1. Draft groundwater protection code for petrol stations and other fuel dispensing facilities involving underground storage tanks, 2001: Department for Environment, Food and Rural Affairs (DEFRA), [www.defra.gov.uk/environment/consult/ground-petrol.index.htm](http://www.defra.gov.uk/environment/consult/ground-petrol.index.htm)
2. PPG2 : Above ground oil storage tanks
3. PPG7 : Fuelling stations construction and operation
4. PPG8: Safe storage and disposal of used oils
5. PPG19: Garages and vehicles service centres
6. Pollution prevention guidelines: private, commercial and military airfields: Environment Agency
7. Guidance for the design, construction, modification and maintenance of petrol filling stations, 1999, ISBN 0 85293 217 0: Association for Petroleum and Explosives Administration/Institute of Petroleum
8. Guidance document on risk assessment for the water environment at operational fuel storage and dispensing facilities, 1999, ISBN 0 85293 256 1: Institute of Petroleum
9. Policy and practice for the protection of groundwater, 1998, ISBN 011 3101457: Environment Agency, The Stationery Office
10. Groundwater protection strategy for Scotland: Scottish Environment Protection Agency
11. TI/134 Installing oil supply pipes underground: Oil Firing Technical Association for the Petroleum Industry (OFTEC), Tel: 01737 373311
12. A Guide to the Special Waste Regulations 1996: Environment Agency  
A Guide to the Special Waste Regulations 1996: Scottish Environment Protection Agency  
A Guide to the Special Waste Regulations (Northern Ireland) 1998: Environment and Heritage Service
13. Waste management, the Duty of Care, A code of practice (revised 1996), ISBN 0 11 753210X: The Stationery Office

References 2, 3, 4, 5, 6 and 12 are available free of charge from the Agencies  
References 7 and 8 are available from the Institute of Petroleum, Tel: 020 7467 7100  
References 9 and 13 are available from the Stationery Office, Tel: 0870 600 5522

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All the Agencies' pollution prevention guidance notes are available on the web sites listed below.

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