



# Fire & Explosion Risks in Service Stations

## Petrol Vapour

Petrol gives off highly flammable vapour even at very low temperatures. Because of the flammability of petrol vapours, service stations carry a risk of fire or explosion not common to other types of retail outlets. Ignition of petrol vapours can happen if vapour comes into contact with a heat source capable of igniting it. An ignition spark might come from an electrical switch, a cigarette or a static electrical discharge. Petrol vapour is heavier than air and tends to sink to the lowest possible level of its surroundings and may gather in tanks, cavities, drains, pits or other low points and will travel across the ground due to gravity (down-hill) or may be carried in the direction of the wind.

## Hazardous Area Zoning of Service Stations

In order to prevent the risk of ignition, the service station must be zoned on the basis of the probability of an explosive vapour mixture forming.

Hazardous areas, as found around a service station, are classified into three categories as illustrated opposite:



### Zone Classification for Vapours

- |               |  |
|---------------|--|
| <b>Zone 0</b> | That part of a hazardous area in which a flammable atmosphere is continually present or present for long periods.  |
| <b>Zone 1</b> | That part of a hazardous area in which a flammable atmosphere is likely to occur in normal operation.  |
| <b>Zone 2</b> | That part of a hazardous area in which a flammable atmosphere is not likely to occur in normal operation and, if it occurs, will exist for a short period. |



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The zoning of a service station should be carried out by someone who is competent to do it. The zones should be marked clearly on drawings of the service station which should be available at any time at the station.

The zones are in 3 dimensions so the drawings will need to indicate plans and elevations, to show their full extent. These zoning diagrams should be contained in a document called an **Explosion Protection Document (EPD)**.

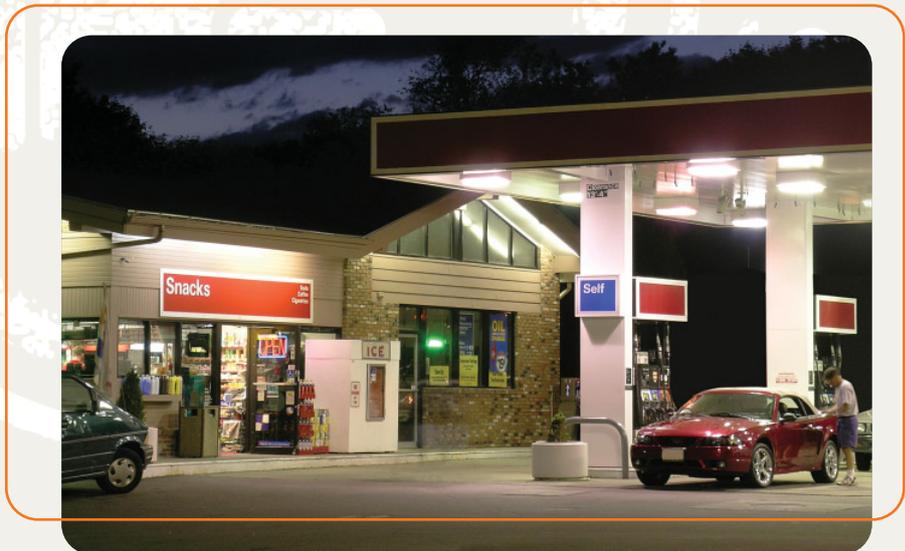
Any electrical equipment (or mechanical equipment capable of generating enough heat to cause ignition) must be suitably rated and certified before they can be installed in a hazardous zone within the station. To ensure the quality of the electrical installation, all service stations must have their electrical installation tested and certified every 3 years by a competent electrician familiar with explosive atmospheres.

## Fuel Delivery

Regulations require that petrol storage operators supervise all petrol deliveries. However, where the local licensing authority gives prior consent, a petrol store may be modified to allow deliveries under the control of the road tanker driver only.

## Fuel Leaks in the Environment

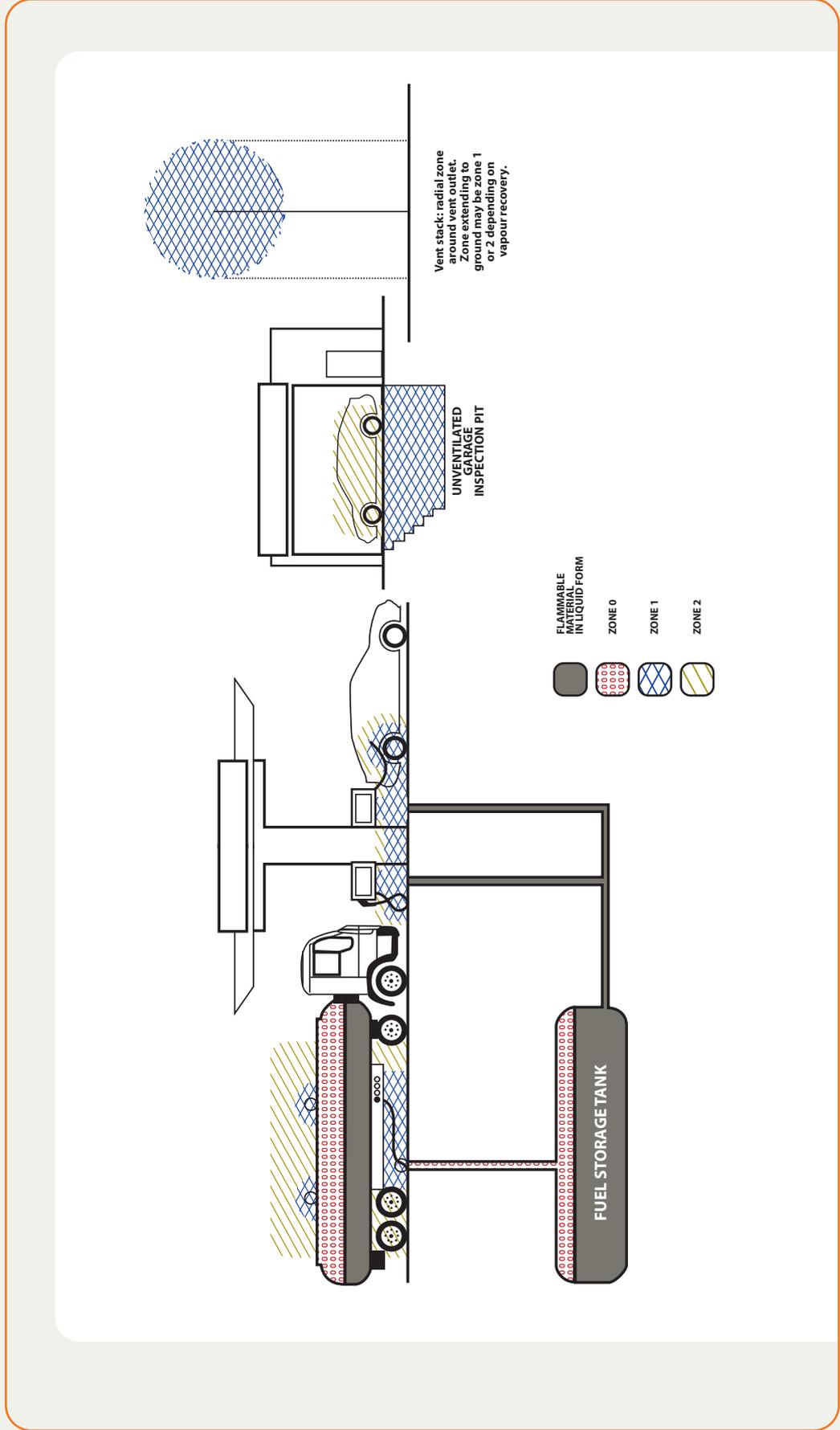
If released into the environment, petrol and diesel pollute the soil and water supplies. Whenever petrol escapes from an underground storage tank or pipelines, it can travel significant distances. Petrol vapours can find their way into basements of buildings and public drains with serious consequences should the vapours come into contact with an ignition source. The level of risk associated with fuel leakage means early detection of leaks is essential. Immediate corrective action must be taken when leaks are detected. Therefore there is need for consistent and accurate monitoring of fuel delivered, stored and dispensed at any service station in order to detect leaks from each underground tank and connected pipeline.



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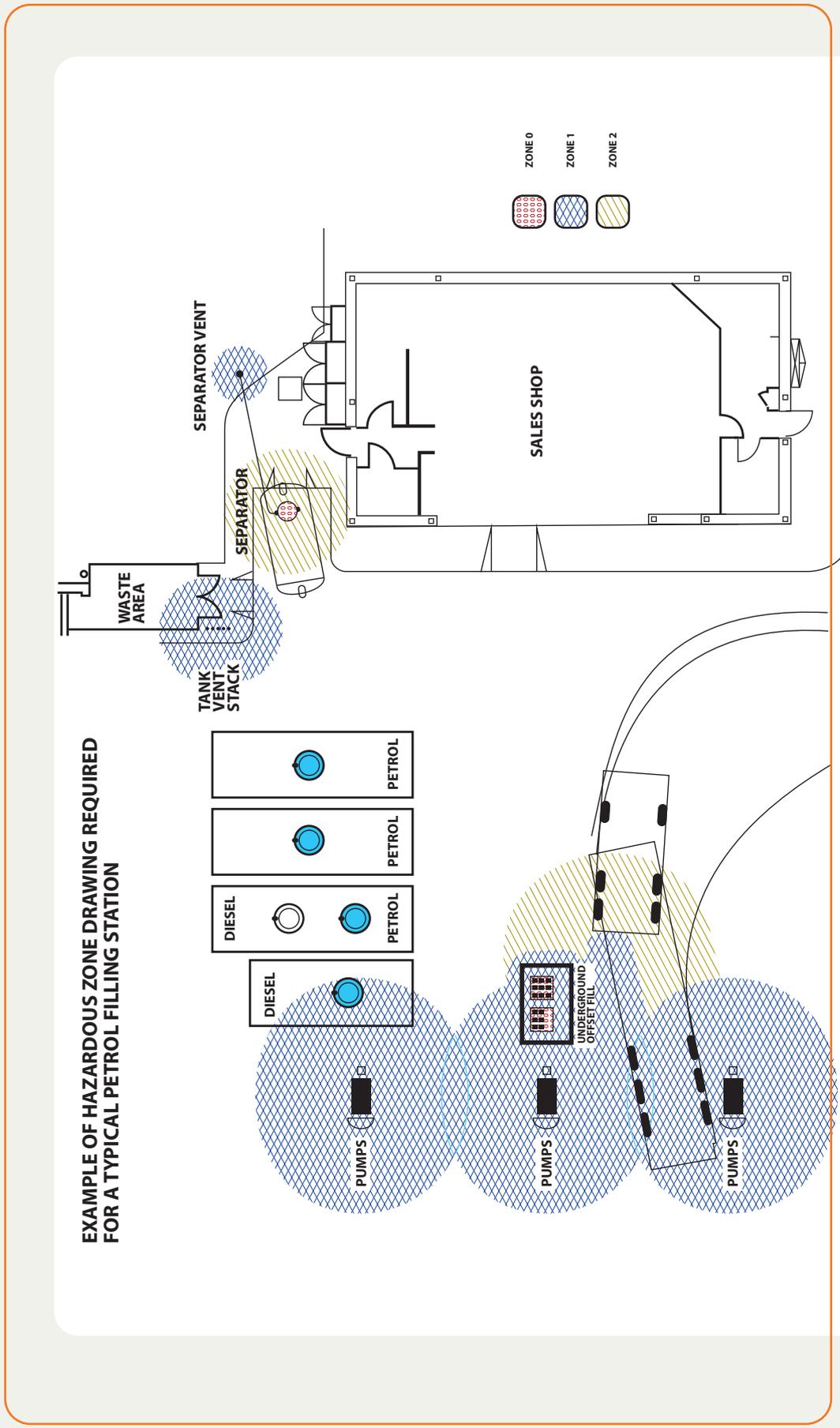
Graphic 1:

Example of side elevation of a petrol station illustrating hazardous area zones – EX rated equipment required in all identified zones. Each site must carry out a site specific assessment.



Graphic 2:

Example of a plan view of a petrol station illustrating hazardous area zones – EX rated equipment required in all identified zones. Each site must carry out a site specific assessment.



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## NOMINAL AREAS OF HAZARDOUS ZONES TO BE INDICATED ON THE HAZARDOUS ZONE DRAWING: ~

### Zone 0

- ❑ Within any access chamber or pit in which there are tanker delivery hose connection point(s).
- ❑ Within an oil separator (petrol interceptor).

### Zone 1

- ❑ 1m radius around the road tanker delivery and vapour return hose connections extending down to ground level.
- ❑ 1m radius along the delivery hose route from the tanker connection point(s) to the tank connection point(s).
- ❑ 1m radius from a tank fill point (above ground).
- ❑ 1m radius from the edge the chamber if fill point is below ground.
- ❑ Within petrol tank access chambers which do not have tank fill points.
- ❑ 2m (1.5m) radius around tank venting point(s) which do not have a stage 1b vapour recovery system, radial zone extending to ground as zone 2 (Graphic 1: vent stack).
- ❑ 1m radius around a venting point of an oil separator (petrol interceptor), radial zone extending to ground as zone 2 (Graphic 1: vent stack).
- ❑ Within the access chamber of an oil separator (petrol interceptor).
- ❑ Within, hose length plus 0.5m (4.25m) radius of a petrol delivery hose connection on a dispenser (without stage 2 vapour recovery) and extending to 1.2m from ground.

### Zone 2

- ❑ 4m radius of tanker delivery hose connection point(s).
- ❑ 4m (4.25m) radius of above ground off set fill connection(s) and (4.25m from the centre point of a manhole opening – direct fill point).

- ❑ 1 m radius around vapour return hose connection point.
- ❑ 2m radius around tank venting points where the site has stage 1b vapour recovery installed extending to ground.
- ❑ 2m radius from the edge of an oil separator (petrol interceptor) access chamber.
- ❑ Within, hose length plus 0.5m (4.25m) radius of a petrol delivery hose connection on a dispenser (with stage 2 vapour recovery in operation) and extending to 1.2m from ground.

### Note:

Additional hazardous zones to those identified in this guide may be present and must be identified on site drawings e.g. where LPG or other highly flammable motor fuels are stored and dispensed. The hazardous area zone guidance above is based on the EI/APEA "Blue Book", however some distances may vary slightly according to national legislation, S.I. 311 of 1979. National legislative provisions are indicated in brackets above, these must be applied in practice, but where the guidance suggests a larger zone, this may also be applied.

Convention dictates that zones are marked in black and white for clarity. In this guidance document colour has been used to highlight the different zones and it is for illustrative purposes only.

### Further Information:

For examples of hazardous zoned areas on forecourts refer to the industry "Blue Book", EI/APEA publication on Design, Construction, Maintenance and Decommissioning of filling stations (3rd edition) available at [www.apea.org.uk](http://www.apea.org.uk)

Driver controlled deliveries are subject to additional controls, a copy of these provisions can be obtained from the Health and Safety Authority web site, [www.hsa.ie](http://www.hsa.ie) along with other guidance material specific to petroleum storage.