Arup Consulting Engineers

Department of Enterprise, Trade and Employment

Review of the Regulation of Petroleum Handling and Storage Facilities

Final Report

Issue 5

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APPENDICES

EXECUTIVE SUMMARY

Arup Consulting Engineers was commissioned by the Department of Enterprise, Trade and Employment to provide advice and recommendations to the Department in support of its review of the Dangerous Substances Acts 1972 and 1979 and related Regulations. To this end, the following work was carried out:

- Survey of petroleum retail stores, oil jetties, petroleum bulk stores and LPG installations;
- Qualitative risk assessment of the above installations;
- Review of legislative controls applying to suppliers of petroleum and LPG in selected other countries;
- Consultation with stakeholders.

Arising from the above scope of work, a number of options are presented to the Department with regard to means of ensuring safety of employees and members of the public and protection of the environment at facilities storing and dispensing petroleum products. These options are presented under the following headings:

- Risk assessment of Retail and Private Petroleum Stores (RPPSs);
- Other Safety Issues at RPPSs;
- Specification of Technical Requirements;
- System for Enforcement;
- Competent Authority for Enforcement;
- Powers of Enforcing Authorities;
- Alternative Fuels.

1. INTRODUCTION

Arup Consulting Engineers were commissioned by the Department of Enterprise, Trade and Employment to provide advice and recommendations to the Department in support of its review of the Dangerous Substances Acts 1972 and 1979 and related Regulations.

This report has been prepared in accordance with agreed phasing for the work. It presents the findings of the surveys and qualitative risk assessments carried out by Arup on retail petroleum stores, oil jetties, bulk petroleum stores, and Liquid Petroleum Gasoline (LPG) installations. A literature review of legislative controls applying to petroleum spirit and LPG in the following countries was undertaken:

- Australia
- Canada
- France
- Germany
- United Kingdom
- USA

The survey results and legislation review are summarised in Section 4 and Section 5. Recommendations are provided in Sections 7-9.

2. OUTLINE OF EXISTING REGULATORY FRAMEWORK

Separate regulations apply to:

- retail and private petroleum stores (RPPSs)
- petroleum bulk stores
- oil jetties
- liquefied petroleum gasoline (LPG) activities

Storage and supply of liquefied natural gas (LNG), compressed natural gas (CNG), hydrogen and biofuels are not subject to regulations specific to these materials.

2.1 Materials

The definitions for the different classes of petroleum given in the current Regulations made under the Dangerous Substances Acts are outdated.

The European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances) Regulations, 2003 S.I. No. 116 of 2003 and European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances) (Amendment) Regulations, 2006 S.I. No. 25 of 2006 are intended to protect human health and the environment from the harmful effects of dangerous chemicals. These Regulations implement a number of European Union directives.

The classification of flammable substances under these Regulations is shown in Table 1.

Table 1: Classification, Packaging and Labelling System

Risk Phrase Code	Meaning	Classification
R12	Extremely flammable	Boiling point ≤35ºC and flash point <0ºC
R11	Highly flammable	Boling point >35ºC 0ºC ≤ flash point < 21ºC
R10	Flammable liquid	21ºC≤ flash point <55ºC
-	Not classified for supply	Flash point > 55ºC

This approach would "future-proof" the regulatory regime with respect to new hazardous substances, as they would be automatically covered by their risk phrase.

It is planned to update the Classification, Packaging and Labelling (CPL) legislation with a new European Globally Harmonised System (GHS) of Classification Labelling and Packaging Regulation in the near future.

2.2 Retail and Private Petroleum Stores

The Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979 (S.I. No. 311 of 1979) apply to any retail store for the sale of petroleum Class I and private stores for the keeping of petroleum Class I for use in the propulsion of a vehicle, boat, aircraft or any type of engine. A retail or private store is required to be licensed by the local or harbour authority or, under the amendment Regulations, the Health and Safety Authority where the premises is owned by the local or harbour authority. Each licence must be renewed every 3 years. The Regulations also set out the requirements for the design, construction, installation and maintenance of underground tanks; separation distances and specification for ventilation pipes; specifications for dispensing pumps and provisions for training of staff and fire-fighting.

The Dangerous Substances (Retail and Private Petroleum Bulk Stores) Regulations have been amended five times since their publication in 1979. The amendment Regulations are listed below:

- The Dangerous Substances (Retail and Private Petroleum Stores) (Amendment) Regulations, 1988 (S.I. No. 303 of 1988);
- The Dangerous Substances (Retail and Private Petroleum Stores) (Amendment) Regulations, 1999 (S.I. No. 424 of 1999);
- The Dangerous Substances (Retail and Private Petroleum Stores) (Amendment) Regulations, 2002 (S.I. No. 624 of 2002);
- The Dangerous Substances (Retail and Private Petroleum Stores) (Amendment) Regulations, 2004 (S.I. No. 860 of 2004); and
- The Dangerous Substances (Retail and Private Petroleum Bulk Stores) (Amendment) Regulations, 2006 (S.I. No. 630 of 2006).

Each set of amendment Regulations has deferred the date by which petroleum stores have to comply with the 1979 Regulations in order to allow the continued operation of stores, constructed before the commencement of the 1979 Regulations. The most recent set of amendment Regulations (S.I. No. 630 of 2006) provides for retail petroleum stores constructed before the commencement of the 1979 Regulations to be licensed to operate until 31 December 2008.

2.3 Oil Jetties

The Dangerous Substances (Oil Jetties) Regulations 1979 (S.I. No. 312 of 1979) apply to every petroleum ship in any harbour or any moored, anchored or berthed petroleum ship at an oil jetty for the purpose of carrying out loading or unloading operations. According to these Regulations it is the duty of every person carrying out the loading or unloading operations to apply for written consent from the Harbour Master. The application form is provided in the first schedule of the Regulations. A form of written consent can be valid for a maximum period of 3 years and must be renewed thereafter. The Regulations also *inter alia* set out requirements relating to the operational safety procedures and practices to be observed in loading or unloading of petroleum ships; the construction, testing and certification of pipelines; training of competent people; safety information; personal protective equipment and the monitoring, testing and evaluation of dangerous atmospheres.

2.4 Petroleum Bulk Stores

The Dangerous Substances (Petroleum Bulk Stores) Regulations, 1979 (S.I. No. 313 of 1979) apply to any distribution store or private bulk store storing petroleum. The storage of petroleum Class I is required to be licensed by the local or harbour authority. The storage of Petroleum Class II and Class III do not require a licence but the owner of the store is required to submit plans and drawings in accordance with the provisions set out in the Regulations. The Regulations also *inter alia* set out the requirements for the design, construction and installation of storage tanks and pipelines; monitoring, testing and assessment of the working environment where petroleum vapours might be present; fire alarm systems, fire prevention and fire fighting and staff training in fire-fighting techniques.

2.5 LPG Stores

The Dangerous Substances (Storage of Liquefied Petroleum Gas) Regulations, 1990 (S.I. No. 201 of 1990) apply to any activities involving LPG gas in quantities greater than 70 kg or 160 L, with the exception of LPG gas in the fuel tanks of vehicles or engines. These Regulations stipulate the storage requirements for LPG. They also place various obligations on occupiers of LPG installations and persons responsible for transfer of LPG relating to the design, construction and installation of equipment, the prevention of ignition of vapours, the minimisation of fire and explosion hazards and the reporting of incidents. LPG stores are not required to be licensed.

2.6 Seveso Sites

The European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. No. 74 of 2006) (also know as the Seveso Regulations) transpose into Irish Law Council Directive 96/82/EC on the control of major accident hazards involving dangerous substances as amended by Directive 2003/105/EC. These Regulations place obligations on operators where dangerous substances are present at or above the application thresholds to take all necessary measures to prevent the occurrence of major accidents and to limit the consequences of accidents for people and the environment.

The Regulations place obligations on operators with regard to safety management systems, preparation of safety reports and emergency preparedness. The Regulations also set out arrangements for the notification of facilities and accidents and appointment of competent authorities (currently the Health and Safety Authority (HSA)). The safety report must be assessed by the HSA. Under the Regulations, the Minister may designate a public authority as a local competent authority. The public authorities which may be designated as such are the Garda Síochána, local authorities and the Health Service Executive.

2.7 Explosive Atmospheres

Part 8 of the Safety, Health and Welfare at Work (General Application) Regulations, 2007 (S.I. No. 299 of 2007) transposes Directive 1999/92/EC on the Minimum Requirements for Improving the Safety and Health Protection of Workers Potentially at Risk from Explosive Atmospheres into Irish legislation. The Regulations require employers to carry out an assessment where a potentially explosive atmosphere may occur in a workplace and to classify areas into hazardous or non-hazardous zones. An explosion protection document which contains the findings of a risk assessment of any work involving flammable or explosive atmospheres must also be prepared. Equipment and protective systems for use in potentially explosive atmospheres must be in compliance with Directive 94/9/EC as transposed in Ireland by the European Communities (Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres) Regulations, 1999 (S.I. No. 83 of 1999). There is no notification or licensing requirement for facilities where explosive atmospheres may occur. The HSA is the enforcing authority for the Regulations. Directives 1999/92/EC and 94/9/EC are commonly referred to as the ATEX Directives.

3. METHODOLOGY

3.1 Survey of Petroleum Product Facilities

A site survey of petroleum product facilities was carried out. The following sites were surveyed:

- 25 No. petroleum retail outlets (8 No. kerbside retail stores and 17 No. forecourt retail stores);
- 1 No. oil jetty;
- 3 No. bulk petroleum stores;
- 1 No. LPG depot and jetty.

25 No. petroleum retail outlets (8 No. kerbside retail stores and 17 No. forecourt retail stores) were surveyed in order to review the status of typical petroleum retail outlets across the country. The survey was designed to assess compliance with the requirements set out under the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979. The number of facilities to be surveyed was agreed with the Department.

An oil jetty survey was also undertaken to establish the number of oil jetties subject to the Dangerous Substances (Oil Jetties) Regulations, 1979. Similarly, a bulk petroleum stores survey was undertaken to establish the number of bulk stores which are licensed under the Dangerous Substances (Petroleum Bulk Stores) Regulations, 1979.

The LPG survey established the number of stores at which LPG is stored and dispensed and other locations at which LPG is stored and made available to which the Dangerous Substances (Storage of Liquefied Petroleum Gas) Regulations 1990 apply. The LPG survey applied to facilities storing LPG in quantities greater than 70 kg or 160 l, with the exception of LPG in the fuel tanks of vehicles or engines.

A list of all facilities obtained from the above surveys which are subject to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 was compiled.

3.2 Qualitative Risk Assessment

A qualitative risk assessment of ten facilities identified as described in Section 3.1 was undertaken. The following facilities were assessed:

- 2 No. forecourt petroleum retail outlets;
- 2 No. kerbside petroleum retail outlets;
- 1 No. oil jetty;
- 1 No. LPG jetty;
- 3 No. petroleum products bulk stores;
- 1 No. LPG bulk store.

The risk assessment was designed to identify serious accident hazards, taking into account the provisions of the Dangerous Substances Act and related Regulations. Accident scenarios were identified and assessed based on published criteria[1].

The likelihood of each potential incident was assessed qualitatively by taking into account the precautions in place to prevent, detect, suppress or mitigate the event. Based on the likelihood, a frequency factor was then applied to each identified incident.

The consequences of each potential incident were also assessed qualitatively with reference to credible hazardous events. A consequence factor was applied to each incident. The overall risk factor was calculated as the frequency factor multiplied by the consequence factor.

3.3 Literature Review of Legislative Controls in Other Countries

A literature review of legislative controls applying to the storage and handling of petroleum and LPG in a number of other countries was undertaken. The review focused on current legislation and applicable standards in six chosen countries. A number of representative petroleum bodies were consulted during the course of the review (refer to Section 3.4). The following countries were selected for review:

- Australia (Queensland);
- Canada (Ontario);
- France;
- Germany (Baden-Württemberg);
- UK (England and Wales);
- USA (Massachusetts).

One state was selected for review in each country where legislation did not exist on a national basis.

3.4 Consultation

The steering committee for this review was made up of representatives from the following authorities:

- The Department of Enterprise, Trade and Employment;
- Health and Safety Authority (HSA); and
- The Department of the Environment, Heritage and Local Government.

[1] *Guidelines for Quantitative Risk Assessment. CPR 18E*. Committee for the Prevention of Disasters. 1999.

In addition, the following were consulted during the course of the review:

- Irish Petroleum Industry Association (IPIA);
- Chief Fire Officers Association (CFOA) Subcommittee for the Review of the Dangerous Substances Acts;
- Association for Petroleum and Explosives Administration (APEA);
- 26 No. Local Authorities;
- 6 No. Harbour Authorities;
- Representatives from industry:
  - Maxol Limited
  - Topaz Energy Limited
  - Esso Ireland Limited
  - Texaco (Ireland) Limited
  - Campus Oil Limited
- European Petroleum Industry Association (EUROPIA);
- Australasian Association of Convenience Stores (AACS);
- Australian Petroleum Agents and Distributors Association (APADA);
- Australian Institute of Petroleum (AIP);
- Queensland Department of Emergency (Chemical Hazards and Emergency Management (CHEM)) Services;
- Queensland Fire and Rescue Services;
- Australian Environmental Protection Agency;
- Arup Consulting Engineers Brisbane;
- Technical Standards and Safety Authority (TSSA) (Ontario);
- Ontario Ministry of the Environment Spills Action Centre;
- Arup Consulting Engineers, Toronto;
- Propane Gas Association of Canada;
- French Petroleum Industry Association (UFIP);
- French Ministry of Ecology and Sustainable Development;
- Association for the Promotion of German Fire Safety;
- Arup Consulting Engineers, Berlin;
- Health and Safety Executive (HSE);
- London Fire Brigade;
- Massachusetts State Fire Marshall Department;
- Oregon Office of State Fire Marshal;
- Oregon Department of Environmental Quality;

- Arup Consulting Engineers, Boston.

4. SURVEY OF PETROLEUM PRODUCT FACILITIES

A survey of petroleum product facilities was conducted in order to determine the broad level of compliance with respect to the Dangerous Substance Acts and associated Regulations (S.I. No. 311 of 1979, S.I. No. 312 of 1979 and S.I. No. 201 of 1990) as they apply to the delivery, storage and dispensing of petroleum spirit and LPG. In order to obtain a cross section of facilities, company-owned sites, private dealer-owned sites, kerbside retail stores, jetties, an LPG bulk store and petroleum bulk stores were surveyed.

4.1 Numbers of Facilities

In order to ascertain the number of facilities involved in the delivery, storage and dispensing of petroleum spirit and LPG, regulator bodies, local authorities, petroleum associations, individual oil companies and Catalist (a company providing marketing data including petrol forecourt data) were contacted. The numbers of each type of facility are presented in Table 2.

Table 2: Numbers of Petroleum and LPG Facilities in Ireland

Type of Facility	Number
Retail outlets	2,033[(1)]
Petroleum Bulk Stores	253
LPG Outlets	87
Upper Tier Seveso Sites involved in storage and dispensing of petroleum and LPG	12
Lower Tier Seveso Sites involved in storage and dispensing of petroleum and LPG	28
Oil Jetties	12

[(1)] Data obtained from Catalist

4.2 Retail Petroleum Stores

Twenty five retail petroleum stores from eight counties were surveyed in order to determine the broad level of compliance with respect to S.I. No. 311 of 1979; of these, seventeen were forecourt retail stores and eight were kerbside retail stores. Nine of the facilities visited held a valid licence, all of which were forecourts. The key findings are presented in Table 3 below.

Table 3: Forecourt/Kerbside Survey Results (25 sites)

Relevant Section in S.I. NO. 311 of 1979	Item	No. of Compliant Sites	No. of Non-Compliant Sites
II (13)	Petroleum leakages[1]	25	0
II (15)	Petroleum transfer >4 m distance to dispensing pumps	12	13
II (15)	Petroleum transfer – maintenance of surface area	18	7
II (15)	Petroleum delivery - safe parking for trucks	16	9
II (24)	Electrical Apparatus	15	10
II (25)	"No Smoking" signs	19	6
II (28)	Underground tanks – weekly inspections of tanks >20 years old	15	10
II (30)	Staff training	16	9
II (31)	Underground tanks – suitable design and pressure testing[2]	17	1
II (31)	Underground tanks – appropriate measuring devices	25	0
II (31)	Manholes - nameplate details	22	3
II (32)	Underground tanks – capacity >40,000 L	25	0
II (32)	Manholes - locations	15	10
II(35)	Colour coded and locked filling/dipping lines [3]	15	3
II (36)	Ventilating pipes - location	20	5
II (36)	Ventilating pipes – rainwater prevention	23	2
II (36)	Ventilating pipes - 4 m height	20	5
II (36)	Ventilating pipes – 6 m to dispensing pumps	21	4
II (36)	Ventilating pipes – building obstruction	22	3
II (36)	Ventilating pipes – flame arresting device[4]	19	2
II (41)	Underground tanks – 250 mm concrete layer [5]	5	0
II (42)	Pedestrian footways	19	6
II (46)	Fire extinguishers	16	9
II (46)	Emergency contact details	5	20
II (46)	Emergency exits	20	5
II (53)	Empty containers	23	2
II (56)	Dispensing pumps - operation instructions	8	17
II (56)	Dispensing pumps – no smoking signs	16	9

[1] Spillages of diesel oil were evident at all sites
[2] Inspection of underground tank layout could not be conducted at 7 sites
[3] Inspection of filling and dipping lines could not be conducted at 7 sites
[4] The presence of flame arresting devices was not known at 4 sites
[5] Inspection of concrete layers could not be conducted at 20 sites

4.2.1 Forecourts

A qualitative risk assessment of two forecourts was undertaken. Both forecourts were located in the Greater Dublin area. In Forecourt No. 1, petroleum spirit, bioethanol and LPG cylinders were stored at the site. Although the owner did not possess a valid licence, a good level of compliance with the Regulations was observed. The owner of Forecourt No. 2 did hold a valid licence. Petroleum spirit and LPG cylinders were both stored at Forecourt No. 2.

A visual inspection was conducted in order to determine compliance with the Dangerous Substances Regulations at both sites. A good level of compliance was noted at both sites.

4.2.1.1 Greatest risk

While less petroleum spirit and LPG are stored at forecourts than at the bulk facilities, access to the site and the pumps is uninhibited thus increasing the potential for misuse of the flammable materials. The highest risk rating identified for both retail stores was a loss of containment from the road tanker - full bore rupture of the loading/unloading hose with consequent serious fire and environmental damage risk.

4.2.2 Kerbside

A qualitative risk assessment of two kerbside retail stores was undertaken. Kerbside No. 1 was located in a small rural village. There were two tanks on-site – petrol and diesel. Dispensing took place approximately 2 m from the roadside, with no crash barrier provided. Petroleum transfer from road tankers was undertaken at a manhole located less than 4 m from the dispensing pump with no provisions for safe parking or adequate lighting for the delivery tanker. Ventilating pipes did not meet all of the minimum requirements set out in the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979. There was no appropriate signage on or around the pumps and both tanks were over 20 years old.

Kerbside No. 2 was a semi-rural kerbside retail store with two underground tanks containing petroleum and one aboveground bunded tank containing diesel at the rear of the shop. The pumps were located approximately 1.5 m from the roadside. A crash barrier was not provided. Road tankers filled the underground tanks from a manhole located approximately 4 m from the dispensing pumps at the front of the shop. The ventilating pipes did not meet all the requirements set out under the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979.

4.2.2.1 Greatest risk

Similarly to the forecourts, while considerably smaller quantities of petroleum spirit are stored at the kerbside retail stores than at the bulk facilities, access to the site and the pumps is totally uninhibited thus increasing the potential for misuse of the flammable materials. The lack of crash barriers is particularly significant as both kerbside retail stores were located directly adjacent to moderately trafficked roads. Though both sites had drains with petrol interceptors it was unclear if the capacity of these would be sufficient to hold the entire contents of a road tanker compartment. The drains in Kerbside No. 1 were in need of repair.

The highest risk rating identified for both retail stores was a loss of containment from the road tanker wagon - full bore rupture of the loading/unloading hose with consequent serious fire risk.

4.3 Jetties

Two jetties - an LPG jetty and a petroleum jetty were visited for the purpose of carrying out the qualitative risk assessment.

4.3.1 LPG Jetty

The LPG jetty is located in a major port. LPG is transferred through a dedicated pipeline. At the jetty both liquefied propane and butane are unloaded. Propane tends to be used in greater quantities due to its higher calorific value and thus is brought into the port in greater quantities. When all the cargo has been discharged, the lines are cleared of LPG, and all isolation valves are shut.

The unloading of an LPG ship falls under the control of the port fire officer. It is a manned operation with two operators walking the line looking for leaks at the flanges during the transfer.

4.3.1.1 Greatest Risk

The properties of LPG and the high pressures involved make LPG potentially the most "dangerous" product on the line. LPG is heavier than air, and thus is capable of migrating to sources of ignition.

When frequency factors and consequence factors were applied to the identified major accident hazards, the following three major accident scenarios had the same risk factor:

- Loss of containment from ship - full bore rupture of the loading/unloading arm;
- Loss of containment from ship - leak of the loading/unloading arm. The outflow is from a leak with an effective diameter of 10% of the nominal diameter, with a maximum of 50 mm;
- External impact, large spill.

4.3.2 Petroleum Jetty

The petroleum jetty was located on a river and was used to import petroleum products into a petroleum bulk store (Petroleum Bulk Store 2). The jetty is also used to off-load LPG to the LPG storage and importation facility adjacent to the petroleum bulk store. Water for fire fighting and tank cooling is supplied from the town mains supply and from river water. Fire fighting foam concentrate and foam making equipment are available on-site.

4.3.2.1 Greatest Risk

When frequency factors and consequence factors were applied to the identified major accident hazards, the following two major accident scenarios had the same risk factor:

- Loss of containment from ship - full bore rupture of the loading /unloading flexible hose;
- Loss of containment from ship - leak of the loading/unloading hose.

4.4 Bulk Stores

Three petroleum bulk stores were assessed for the qualitative risk assessment. At Petroleum Bulk Store No. 1 up to 2,120m³ of petroleum are stored. In addition to this, kerosene and DERV (diesel oil), marked gas oil and small volumes of bioethanol are held at the site. The facility falls under the Seveso Regulations (European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 (S.I. No. No 74 of 2006)) due to the quantities stored. It is located adjacent to a river with a jetty for fuel off-loading. Town water and river water can be used for fire fighting.

Petroleum Bulk Store No. 2 is a regional depot located to the rear of a retail petroleum store. Up to 55 m³ of petroleum is stored. In addition to this kerosene and DERV and gas oil are held at the site.

Bulk Store No. 3 is a major petroleum bulk store located in a port; kerosene and diesel are also stored. The facility falls under the Seveso Regulations due to the quantities of flammable materials stored.

Bulk Stores No. 1 and Bulk Store No. 3 have dedicated on-site fire fighting facilities. In the event of a large fire on-site these would be used along with the fire-brigade. Bulk Store No. 2 relies on the fire-brigade for fighting large fires. All tanks at the three facilities are appropriately bunded.

4.4.1 Highest risk

Operations related to the bulk storage of petroleum spirit and filling of the road tankers were assessed. Similar major accident hazards were identified for all three sites. The highest risk rating identified for all three was a loss of containment from the road tanker - full bore rupture of the loading/unloading arm.

4.5 LPG Facility

LPG (liquefied petroleum gas) is a collective name for a number of petroleum gases consisting of propane, butane or mixtures of these gases that can be condensed to form a liquid. There may be small concentrations of other C_3, C_4 and C_5 hydrocarbons such as propylene, isobutane, butylene, isobutylene and isopentane.

One LPG facility was assessed for the purpose of this report. The site is located in a port with a range of other industrial activities taking place in the vicinity. LPG is transferred from the jetty to the site through a main pipeline. Gas/vapour is returned from the storage tank vents to the ship through a second pipeline.

LPG is stored on-site and withdrawn from the storage tanks for filling gas cylinders or for loading into road tankers for delivery direct to customers. LPG is stored in tanks that are designed to withstand the pressure of the liquefied gas. Refrigeration is not required in normal storage.

LPG tanks at the depot are protected against fire by provision of automatic water drenching for most of the tanks. Four tanks are semi-mounded, so that the majority of the tank is covered by earth, and thus protected against external fires. The exposed parts of the tanks are provided with water drenching in the same way as the unmounded tanks.

4.5.1 Greatest risk

When frequency factors and consequence factors were applied to the identified major accident hazards, the following four major accident scenarios had the same risk factor:

- Loss of containment from a bulk storage tank - continuous release from a hole with an effective diameter of 10 mm;
- Loss of containment from a pipe - leak from a connecting pipeline;
- Loss of containment from compressing pump - full bore rupture of the largest connecting pipeline;
- Loss of containment from a pump - leak from a connecting pipeline or pump seal.

4.6 Risks Summary

A summary of the risk factors is present in Table 4.

The risk factors are identical across all sites surveyed with respect to underground tank leakage because the failure frequencies for the different types of leakage recommended in the TNO Purple Book are the same. The failure frequencies in the Purple Book are default frequencies based on the fact that corrosion, fatigue due to vibrations, operating errors and external impacts are excluded. It should be noted, however, that the likely loss of containment is dependant on the particular type of containment used and the age of the system. Ireland has, to date, predominantly used steel underground storage tanks. Steel may corrode and fail, hence the requirement in Regulation 28 (a) S.I. No. 311 for minimum periodic checks on wet stock for tanks over 20 years old.

Table 4: Results of Qualitative Risk Assessments – Accident Scenario Risk Factors

Description of potential incident	Forecourt No. 1	Forecourt No. 2	Kerbside No. 1	Kerbside No. 2	Bulk Store No. 1	Oil Jetty	Bulk Store No. 2	Bulk Store No. 3	LPG Jetty	LPG Installation
Loss of containment from underground tank - instantaneous release of the complete inventory	9	9	9	9	-	-	-	-	-	-
Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release	9	9	9	9	-	-	-	-	-	-
Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm	9	9	9	9	-	-	-	-	-	-
Loss of containment underground tank - tank overfill	6	6	6	6	-	-	-	-	-	-
Loss of containment from aboveground tank - instantaneous release of the complete inventory	-	-	-	6	-	-	-	-	-	-
Loss of containment aboveground tank - instantaneous release of complete inventory in 10 min at a constant rate of release	-	-	-	9	-	-	-	-	-	-
Loss of containment from aboveground tank - continuous release from a hole with an effective diameter of 10 mm	-	-	-	9	-	-	-	-	-	-
Loss of containment aboveground tank - tank overfill	-	-	-	6	-	-	-	-	-	-
Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund	-	-	-	-	8	-	8	8	-	
Loss of containment from bulk storage tank - instantaneous release of the complete inventory	-	-	-	-	-	-	-	-	-	5
Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release into the bund	-	-	-	-	6	-	6	6	-	
Loss of containment from bulk storage tank -	-	-	-	-	-	-	-	-	-	5

Description of potential incident	Forecourt No. 1	Forecourt No. 2	Kerbside No. 1	Kerbside No. 2	Bulk Store No. 1	Oil Jetty	Bulk Store No. 2	Bulk Store No. 3	LPG Jetty	LPG Installation
continuous release of the complete inventory in 10 min										
Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm	-	-	-	-	9	-	9	9	-	10
Loss of containment from bulk storage tank - tank overfill	-	-	-	-	6	-	6	6	-	
External fire leading to a BLEVE	-	-	-	-	-	-	-	-	-	5
Loss of containment from a pump - full bore rupture of the largest connecting pipeline	4	4	4	4	6	-	6	6	-	10
Loss of containment from a pump – leak from connecting pipeline	3	3	3	3	3	-	3	3	-	15
Loss of containment from a pipe – leak from a connecting pipeline	2	2	2	2	2	-	2	2	5	10
Loss of containment from a pipe - full bore rupture of the largest connecting pipeline	6	6	6	6	-	-			5	5
Loss of containment from a pipe – full bore rupture 75mm ≤nominal diameter≥ 150mm	-	-	-	-	4	-	4	4	-	-
Loss of containment from a pipe – leak 75mm ≤nominal diameter≥ 150mm	-	-	-	-	2	-	2	-	-	-
Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	9	9	9	9	9	-	9	9	-	8
Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	3	3	3	3	3	-	3	3	-	4
Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	12	12	12	12	12	-	12	12	-	8
Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	4	4	4	4	-	4	4	-	8
Loss of containment from road tanker wagon – external impact*	-	-	9	9	-	-	-	-	-	-
Loss of containment from road tanker wagon – fire under vehicle	12	12	12	12	12	-	12	12	-	8
Loss of containment from ship - full bore	-	-	-	-	-	6	-	-	-	-

Description of potential incident	Forecourt No. 1	Forecourt No. 2	Kerbside No. 1	Kerbside No. 2	Bulk Store No. 1	Oil Jetty	Bulk Store No. 2	Bulk Store No. 3	LPG Jetty	LPG Installation
rupture of the loading/unloading flexible hose										
Loss of containment from ship - leak of the loading/unloading arm	-	-	-	-	-	6	-	-	-	-
Loss of containment from ship - leak of the loading/unloading arm - the outflow is from a hole with an effective diameter of 10% of the nominal diameter, with a maximum of 50 mm	-	-	-	-	-	-	-	-	10	-
Loss of containment from ship - external impact, large spill	-	-	-	-	-	5	-	-	10	-
Loss of containment from ship - external impact, small spill	-	-	-	-	-	4	-	-	5	-

*in general this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits.

4.7 Mitigation

4.7.1 Fire and Explosion

Currently, fire and explosion prevention measures at petroleum and LPG stores and jetties are provided for in the Dangerous Substances (Petroleum Bulk Stores) Regulations, 1979, the Dangerous Substances (Storage of Liquefied Petroleum Gas) Regulations, 1990 and the Dangerous Substances (Oil Jetties) Regulations 1979 respectively by specifying *inter alia*:

- Separation distances for ventilating pipes, dispensing pumps, tanker deliveries
- Requirements for electrical equipment
- Control of mobile sources of ignition
- Operating procedures
- Signage
- Storage requirements
- Venting requirements

In the context of forecourts, bulk stores and jetties these measures have been generally effective at preventing fire and explosion hazards. However, many of the requirements cannot be achieved when considering kerbside retail petroleum stores, in particular separation distances and control of mobile sources of ignition. The survey undertaken in Phase 1 of the review showed that all of the kerbsides were located on or in close proximity to main streets and pedestrian routes. It was therefore impossible to achieve the required separation distances for dispensing pumps and tanker deliveries. In addition, there could be no practical control over possible sources of ignition, particularly from the public using the adjacent footpaths and roads.

4.7.2 Spillages

The following measures to prevent and mitigate spillages of petroleum or LPG are currently provided for in the Dangerous Substances Regulations (refer to section 4.7.1):

- Petrol interceptors
- Impervious hard-standing areas
- Supervision of deliveries
- Operating procedures
- Automatic shut-off devices

The larger bulk storage facilities and jetties generally showed good compliance with the relevant regulations and had appropriate mitigation measures and contingency plans in place in the event of a major spill.

The retail outlet survey identified 16 forecourts and 2 kerbsides which had suitable drainage and petrol interceptors in place i.e. in accordance with the requirements set out in the (Retail and Private Stores) Regulations. In all compliant retail petroleum stores, mitigation generally consisted of gullies along the perimeter of the sites which drained to a petrol interceptor.

The capacities of the petrol interceptors were not determined at any of the stores as the inspections were visual only. The Blue Book[2] recommends that the capacity of petrol interceptors should be determined by the following:

- Recommendations provided in EN-858-2[3];
- The drainage area feeding the unit;
- The separator performance required;
- The likely size of the spill (including the possibility of large spillage during road tanker delivery)

It was not determined whether the above recommendations provided in the Blue Book were considered in the design of the various forecourts and kerbsides.

[2] *Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations.* APEA/IP. 2005.
[3] *BS EN 858-2 Separator Systems for Light Liquids (e.g. Oil and Petrol) Part 2 Selection of Nominal Size, Installation, Operation and Maintenance.* 2003.

5. LEGISLATIVE CONTROLS IN OTHER COUNTRIES

A summary of the legislative controls governing petroleum and LPG storage and handling is provided in Sections 5.1 to 5.6 below.

5.1 Australia

The following legislation governs petroleum and LPG handling and storage in the State of Queensland:

- The Dangerous Goods Safety Management Act, 2001;
- The Dangerous Goods Safety Management Regulation, 2001.

The legislation prescribes a risk-based approach to determine an "acceptable level of risk" at a major hazard facility or dangerous goods location and places safety obligations on manufacturers, importers and suppliers of dangerous goods; manufacturers, importers, suppliers and installers of storage or handling systems for use at major accident facilities and dangerous goods locations. The legislation allows for recognised standards to be used as evidence in court proceedings if an occupier fails to achieve an acceptable level of risk as defined in the Dangerous Goods Safety Management Act, 2001.

According to the legislation, dangerous goods locations and major hazard facilities may not operate without a licence. An application for a licence must be made to the chief executive officer (local government). The chief executive officer may appoint an authorised officer for the administration and enforcement of the legislation. The authorised officer is then responsible for enforcing the legislation, for monitoring safety, for inspecting and auditing of premises and procedures and for investigating accidents or near misses. Administrative arrangements covering the implementation of the Act and Regulation are provided in various Memoranda of Understanding (MoUs) which confirm the role of each enforcing and licensing agency. Under these MoUs, the Queensland Department for Emergency Services (DES) becomes the agency responsible for the enforcement of legislation relating to major hazard facilities. Dangerous goods locations are the responsibility of the relevant local authorities.

The Dangerous Goods Safety Management Regulation, 2001 prescribes minimum quantities to determine if a facility is a dangerous goods location, a large dangerous goods location or a major hazard facility.

5.2 Canada

In the province of Ontario, hydrocarbon fuel handling is regulated under the Technical Standards and Safety Act, 2000 which is published by the Government of Ontario. Under the Act, the Ontario Regulation 217/01 - Liquid Fuels, regulates the following aspects of liquid hydrocarbon fuel handling:

- Licensing and registration procedures for petroleum handling and storage facilities, including retail outlets;
- Requirement to register as a contractor;
- Use of approved equipment;
- Accident reporting;
- Safe operating conditions and definition of unacceptable operating conditions.

A licence may granted by the Technical Standards & Safety Authority (TSSA) inspector provided an inspection of the facility shows that it complies with the requirements of the regulation.

Under the Ontario Regulation 211/01 – Propane Storage and Handling, a licence is required in order to operate a facility handling or transporting propane. The regulation also sets out the following requirements for propane:

- Storage, handling, transportation and transfer of propane;
- Installation of appliances, equipment, components, accessories and containers on highway vehicles, recreational vehicles, mobile housing, outdoor food service units, and wash-mobiles when propane is to be used for fuel purposes;
- Installation of containers and equipment to be used for propane in distribution locations and filling plants and on tank trucks, tank trailers, and cargo liners; and
- Conversion of highway and industrial vehicles to propane from gasoline or other hydrocarbon fuels.

Ontario's TSSA is the administrative authority under the Technical Standards and Safety Act, 2000. Responsibilities of the TSSA include:

- Inspection and licensing of petroleum facilities;
- Enforcement procedures against non-compliant sites;
- Incident investigation;
- Contractor registration.

In addition, the TSSA publishes technical guidance documents for use by the petroleum industry.

5.3 France

France is divided into administrative units or *départements*. Each *département* is administered by a general council, and its executive is headed by the president of that council. Enforcement of safety in potentially dangerous facilities, like petroleum and LPG storages, is under the remit of the president of the council (formerly the *Préfect*).

The following legislation governing petroleum and LPG storage and handling in France was consulted:

- The Environmental Code 2008: Sets out the environmental requirements for classified facilities;
- Decree 1434 and/or Decree 1413: Sets out the requirements for facilities which fill or distribute flammable liquids, natural gas or biogas;
- Arrêté du 23 Août 2005: Sets out the requirements for small LPG storage facilities i.e. less than 50 tonnes;
- Decree 1412: Sets out the requirements for large LPG storage facilities i.e. facilities storing greater than 50 tonnes;
- Decree 1414: Sets out the requirements for facilities which fill or distribute flammable liquefied gas;
- Law Nº 2003-669: Reinforces the Seveso II Directive. Sets the requirement for implementation of Technological Risk Prevention Plans and land use planning in the vicinity of Seveso sites.

The owner of a facility storing or dispensing petroleum or LPG is required to declare the facility to the Préfect who determines the safety measures to be taken. This depends on which category the particular facility is classified as under the "Installations Classified for the Protection of the Environment" (ICPE) and the particular hazards associated with the facility.

The legislation also sets out the various requirements applicable to each type of facility for electrical equipment, discharge of water, waste segregation and disposal as well as odour and noise limits. Technical specifications are also given i.e. separation distances, venting requirements, overpressure devices, dispensing pump requirements.

Emergency measures, emergency procedures and alarm requirements are also set out in the legislation. The identification and documentation of hazardous areas is also provided for.

The owner or responsible person must prepare a file of declaration which contains documentation detailing *inter alia* any conditions imposed on the facility, noise measurements, effluent measurements and equipment safety checks

5.4 Germany

The storage of petroleum and LPG is regulated within the legal framework of the Act on the "Reorganisation of the Safety of Technical Work Equipment and Consumer Products". The Act applies to the building and operation of installations subject to mandatory inspection which may endanger employees. These installations include piping under internal overpressure for flammable liquids and installations for the storage, filling and transportation of flammable liquids. For such facilities, the Federal Government is authorised to determine the following:

- That notification be given of the construction of such installations, their commissioning, the implementation of modifications to existing installations.
- That construction, operation and modifications to such installations be subject to permission from the governing authority.
- That facilities meet the conditions for operation and maintenance and pass a type approval test.
- That the facility itself, equipment, operations carried out and materials are state of the art.
- That these installations be subject to pre-commissioning inspection, regular in-service inspections and inspections from the regulatory authorities.

The competent authority may order the facility to cease activity or even demolish an installation which has been constructed, operated or modified without the required permission or if the facility fails to comply with an order for improvement.

The Equipment and Product Safety Act is implemented by numerous regulations, and depending on the circumstances, several of these apply to equipment for storing petroleum and LPG.

Vorschriftensammlung der Gewerbeaufsicht Baden-Württemberg is the body responsible for publication of regulations and technical guidance in the areas of environmental protection, workplace safety and product safety for the State of Baden-Württemberg. TRbF 40 specifies guidance for petrol stations with respect to the following parameters:

- storage of fuels
- delivery of fuels
- flame arresting tank openings
- delineation of potentially explosive atmospheres
- avoidance of electrical sources of ignition
- lightning protection

- fire protection
- marking, prohibition signs
- operating instruction
- cleaning and maintenance
- decommissioning; and
- controls to be implemented by the operator of a petrol station e.g. provision of fire extinguishers, keeping fire exits clear, maintaining hard standing surfaces, ensuring only permissible containers are filled with fuel.

TRD 404 establishes technical guidance for the establishment and operation of LPG filling stations. TRG 280 establishes Technical Rules for Operation of Pressurised Gas Containers.

5.5 United Kingdom

The following legislation governs petroleum and LPG storage and transfer in England and Wales.

- Petroleum (Consolidation) Act, 1928
- Petroleum (Transfer of Licences) Act, 1936
- Regulatory Reform (Fire Safety) Order, 2005
- The Dangerous Substances and Explosive Atmospheres Regulations, 2002 (S.I. No. 2776 of 2002)
- Control of Major Accident Hazards (Amendment) Regulations, 2005

The Petroleum (Consolidation) Act, 1928, requires the operator of a service station to hold a valid petroleum licence issued by the local petroleum licensing authority (currently the fire and rescue authority for that area). The authority may attach conditions to the licence. The Petroleum (Transfer of Licences) Act, 1936 provides for the transfer of licences granted by a local authority under the Petroleum (Consolidation) Act, 1928.

The Regulatory Reform (Fire Safety) Order, 2005 places duties on the owner of a facility where a dangerous substance exists, to provide the relevant fire safety measures and to conduct risk assessments to establish the overall risks associated with the facility. Risks must be eliminated, reduced or mitigated using preventative or protective measures. The Order prescribes the fire fighting and emergency measures, training and procedures needed.

The Dangerous Substances and Explosive Atmospheres Regulations place obligations on owners to identify zones where explosive atmospheres are likely to occur and to categorise these zones based on the potential frequency and duration of the explosive atmosphere. Petroleum and LPG are considered to be dangerous substances.

The Control of Pollution (Oil Storage) (England) Regulations, 2001 apply to the storage of oil, including petrol. The Regulations stipulate safety requirements for storage tanks.

The Control of Major Accident Hazards Regulations, 2005 require the operator of facilities where dangerous substances are present above the threshold quantities to take all measures necessary to prevent major accidents and to limit their consequences. Operators are required to prepare a major accident prevention policy document addressing issues relating to the safety management system. Operators of "top-tier" facilities are also obliged to prepare a safety report. The competent authorities for facilities falling under these regulations in England and Wales are the Health and Safety Executive and the Environment Agency.

There are a number of guidance documents, standards and approved Codes of Practice available in the UK to assist operators and enforcing authorities.

The emergence of biofuels has also prompted the publication of the new APEA guidance document "APEA/IP Guidance on Storage and Dispensing of High Blend Ethanol Fuels including E85 at Filling Stations".

5.6 USA

The State of Massachusetts was selected as being representative of the USA. The following legislation governs petroleum and LPG handling and storage in the state of Massachusetts:

- The General Laws of Massachusetts (MGL);
- The Code of Massachusetts Regulation.

The General Laws of Massachusetts provide for the establishment of a Department of Fire Services which must be set up within the Executive Office of Public Safety. The Department of Fire Services is under the supervision and control of the state fire marshal. The Department must appoint a Board of Fire Prevention Regulations (the Board) who are responsible for the making of rules and regulations governing storage, use, sale, transportation and handling of crude petroleum and any of its products. According to the MGL, no building or structure may be used for storage or sale of petroleum and its products unless the local licensing authority (city council) has granted a license to the applicant. The marshal or head of department may direct that appropriate measures are taken to ensure public safety in the event of a fire or explosion hazard at the facility. The city council or head of the fire department must ultimately report to the marshal.

The MGL provides for the publication of the Code of Massachusetts Regulations (CMR). Chapter 4.00 of the CMR adopts the NFPA standards and makes a few modifications to NFPA 58, 2001 edition for LPG, and NFPA 54, 2002 edition for fuel gas.

The following Chapters of 527 CMR set out the technical requirements for petroleum and LPG storage and handling:

- 527 CMR 1.00 Administration and Enforcement.
- 527 CMR 5.00 Operation and Maintenance of Buildings or Other Structures Used as Garages, Service Stations and the Related Storage, Keeping and Use of Gasoline or Other Motor Fuel.
- 527 CMR 6.00 LPG Containers and Systems.
- 527 CMR 8.00 Transportation of Flammable and Combustible Liquids.
- 527 CMR 9.00 Tanks and Containers.
- 527 CMR 10.00 Fire Prevention, General Provisions.
- 527 CMR 14.00 Flammable and Combustible Liquids, Flammable Solids or Flammable Gases.
- 527 CMR 15.00 Keeping, Handling and Transportation of Flammable and Combustible Liquids, and the Disposition of Crude Petroleum or any of its Products in Harbours or other Waters of the Commonwealth.
- 527 CMR 18.00 Flammable Liquids in Bulk Plant Loading and Unloading Facilities.

5.7 Overall Summary

A summary of the legislation is presented in Table 5 and discussed in Sections 5.7.1 to 5.7.6.

5.7.1 System – licensing/permitting, registration, unregulated

Of the six countries reviewed, five had a licensing system in place while one (France) operated a notification system whereby the owner of the facility is obliged to notify the competent authority of the facility. The competent authority must then determine the safety measures to be taken.

5.7.2 Consideration of Risk

Australia and the UK were the only countries to adopt a risk based approach to the licensing system. In Australia, the regulations stipulate that an "acceptable level of risk" must be achieved at a major hazard facility or dangerous goods location. An acceptable level of risk is achieved when risk is minimised as far as reasonably practicable. An acceptable level of risk may be prescribed in a regulation or may simply involve compliance with a recognised standard. The owner of a major hazard facility is also obliged to undertake a systematic risk assessment of the facility. A licence will not be granted or renewed or may be revoked where an acceptable level of risk has not been achieved.

In the UK, the Dangerous Substances and Explosive Atmospheres Regulations place obligations on the owner to carry out a risk assessment of the facility to establish the risk posed by the presence of dangerous substances. The information to be contained in the risk assessment includes *inter alia* the hazardous properties of the substance, safety data provided by the supplier, activities likely to give rise to high risk, the likelihood of occurrence of an explosive atmosphere and the likelihood of ignition sources being present. No work activity involving dangerous substances is permitted to commence until the risk assessment is complete.

5.7.3 Licensing / Enforcing Authorities

In Queensland, administrative arrangements covering the implementation of the Act and Regulation are provided in the Memoranda of Understanding (MoUs) which confirm the role of each enforcing and licensing agency. Under these MoUs, the Queensland Department for Emergency (Chemical Hazards and Emergency Management (CHEM) Services) Services becomes the agency responsible for the enforcement of legislation relating to major hazard facilities. Large Dangerous Goods Locations and Dangerous Goods Locations are the responsibility of the relevant local authorities. CHEM Services aims to visit each Major Hazard Facility at least annually. For Dangerous Goods Locations, the frequency of inspection is much less – once every 5-10 years. Reports of unlicensed facilities are a regular occurrence[4].

Ontario's Technical Standards & Safety Authority (TSSA) is the administrative authority under the Technical Standards and Safety Act, 2000. The TSSA is a non-governmental authority. Responsibilities of the TSSA include inspection and licensing of petroleum facilities, enforcement procedures against non-compliant sites, incident investigation and contractor registration. Licenses are issued subject to an initial inspection by the TSSA. The frequency of inspections thereafter is determined on a risk basis.

In France facilities are classified according to the level of risk. In each case, the facility declares its activities to the Préfect of the area who determines the safety measures to be taken. In order to define the level of danger applicable to the site, the nomenclature "ICPE" (installations classified for the protection of the environment) is used.

[4] Personal Communication with CHEM Services

In Germany, inspections of facilities are carried out by approved inspection bodies. An approved inspection body is any inspection body named by the competent State Authority to the Federal Ministry of Economics and Labour. To qualify as an inspection body the organisation has to undergo an accreditation procedure. According to the regulations "mandatory inspection sites" require a permit. Permitting falls under the remit of the governing authority for that area.

In the UK, licensing and enforcement of petroleum retail outlets is conducted by the local fire and rescue authority for that area. It is estimated that approximately 25-50% of the 139 licensing authorities undertake regular inspections[5]. Enforcement of the COMAH Regulations falls under the remit of the HSE and the Environment Agency (EA).

In the US, the municipal licensing authority is responsible for granting a licence to store or handle petroleum following a public hearing. Inspections are the responsibility of the municipal fire departments. Some additional inspections are carried out by the Massachusetts State Fire Marshal Department.

5.7.4 Fees and penalties

Each of the countries which had a licensing system in place also required a fee, usually to be produced with the application for a licence. Each country also applied penalties for contravention of the regulations. More often, these penalties consisted of a fine or imprisonment. In Australia, a system of penalty units has been implemented whereby each unit represents a fine of AU$75 (the dollar amount can be increased through regulations). Penalty units are assigned within the legislation.

5.7.5 Standards

The legislation applicable to storage and handling of dangerous goods in Queensland provides for the use of recognised standards as evidence in court proceedings where an occupier fails to achieve an acceptable level of risk. According to the Act, the minister may make standards stating ways to achieve an acceptable level of risk. The minister must also notify the making of a recognised standard.

Chapter 248 of the Code of Massachusetts Regulations governs the Board's adoption of the NFPA-54-2002 National Fuel Gas Code and NFPA 58 Liquefied Petroleum Gas Code, 248 CMR 7.00 Massachusetts Code for Gas Utilization Equipment in Large Boilers and the modifications of 248 CMR 4.00 and 248 CMR 5.00 which comprise the Massachusetts Fuel and Gas Code.

In the remaining countries the use of recognised standards and guidance documents is not mandatory under legislation. However enforcing authorities often consider them best practice and by following them, the operator of a facility will normally be doing enough to comply with the relevant legislation.

5.7.6 Unattended Retail Petroleum Stores

Unattended retail petroleum stores are prohibited in Massachusetts but are in use in the UK, France, Germany and Ontario. However, in Ontario the regulations only refer to unattended petroleum stores not used by the general public e.g. bulk stores. Unattended retail petroleum stores are not referenced in the Queensland Dangerous Goods Safety Management Act. Furthermore, the Queensland Department of Emergency Services is of the opinion that they are not in existence in Queensland[6].

In Germany, the technical guidance document TRbF 40 provides some guidance in relation to vending units, operating instructions lighting and display of emergency contact details at unattended retail petroleum stores.

[5] Personal communication with London Fire Brigade
[6] Personal Communication with Chemical Hazards and Emergency Management (CHEM) Services, Queensland Department of Emergency Services

In the UK, the Blue Book[7] provides recommendations for unattended retail petroleum stores in relation to control measures and emergency requirements.

[7] *Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations*. APEA/IP. 2005.

Table 5: Summary of Legislation in Selected Other Countries

Country	Ireland	Australia	Canada	France	Germany	UK	USA
System	Licensing	Licensing	Licensing	Declaration	Licensing	Licensing	Licensing
Does legislation provide for risk assessments to be carried out?	No	Yes	No	No	Not determined	Yes	No
Enforcing / licensing authority (retail outlet, small storage facility)	Local council	Local government	Technical Standards and Safety Authority	Local council	Local council	Local fire and rescue service	Local council
Enforcing / licensing authority (large storage facility)	HSA	Department of Emergency (Chemical Hazards and Emergency Services) Services	Technical Standards and Safety Authority	Local council	Local council	HSE and EA	Local council
Licensing fee?	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Penalties	Fine / imprisonment	Penalty units / imprisonment	Fine / imprisonment	Fine / imprisonment	Criminal prosecution	Fine / imprisonment	Fine
Are standards referenced in legislation?	Not referenced in legislation	Legislation references the use of recognised standards to achieve an acceptable level of risk	Not referenced in legislation	Not referenced in legislation	Standards and technical specifications referred to in legislation	Not referenced in legislation	Legislation adopts NFPA Standards
Unattended Retail Petroleum Stores?	One operational in the State	Not referenced in legislation	Regulations only refer to unattended service stations not used by the general public	Operational	Operational	Operational	Prohibited

6. DISCUSSION OF ISSUES

6.1 Current Legislation Applying to the Regulation of Petroleum Storage and Handling Facilities

The current legislation in Ireland, as it applies to retail outlets, jetties and bulk stores is prescriptive. There is no flexibility in line with advances in technology, safety and alternative fuels without first amending the regulations. In Queensland, the legislation is non-prescriptive and makes reference to the use of recognised standards in order to achieve an "acceptable level of risk". Similarly, the legislation adopted in the UK is non-prescriptive and adopts a risk-based approach to reduce or eliminate risk as far as is reasonably practicable. The UK legislation does not reference recognised standards. However, there are a number of codes of practice and guidance documents published by the HSE which are not mandatory but by adhering to them the owner could be considered to be complying with the regulations. In the US, the legislation is prescriptive in so far as it adopts NFPA standards, albeit modified NFPA standards. These systems allow greater flexibility than the current system in Ireland as the standards are updated and amended in line with recent developments in technology, safety and alternative fuels.

6.1.1 Safety, Health and Welfare at Work Act 2005

A number of the provisions in the Safety, Health and Welfare at Work Act 2005 that are relevant to the enforcement of the DSA and related Regulations are described below.

Competent Person

A person is deemed a 'competent person' in Part 1 of the Act 'where, having regard to the task he or she is required to perform and taking account of the size or hazards (or both of them) of the undertaking or establishment in which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken'

General Duties of Employer

Under Section 8 of the 2005 Act 'every employer shall ensure, so far as reasonably practicable, the safety, health and welfare at work of his or her employees'. General duties of employers also include 'ensuring, so far as it is reasonably practicable, the safety and prevention of risk to health at work of his or her employees relating to the use of any article or substance'. In addition to an employer's duties towards his or her employees, under section 12 of the Act 'Every employer shall manage and conduct his or her undertaking in such a way as to ensure, so far as is reasonably practicable, that in the course of the work being carried on, individuals at the place of work (not being his or her employees) are not exposed to risks to their safety, health or welfare'.

It should be noted that this duty to protect safety, health and welfare does not extend to people and property outside the workplace or to the environment. RPPSs, petroleum bulk stores, oil jetties and LPG storage sites make 'use' of petroleum products according to the definition of the Act 2005. Under this Act, use is defined as 'in the case of a substance, the manufacture, process, operation, storage, treatment, mixing, packing, conveyance, supply, handling, filling or emptying, loading and unloading of the substance'.

Hazard Identification and Risk Assessment

Under section 19 of the 2005 Act 'Every employer shall identify the hazards in the place of work under his or her control, assess the risks presented by those hazards and be in possession of a written assessment…of the risks to the safety, health and welfare at work of his or her employees'.

Delegation of Functions

The functions of the HSA may be delegated by the Minister of Enterprise, Trade and Employment to other persons under section 33 of the Act 'in respect of the implementation of any of the relevant statutory provisions'.

Appointment of Inspectors

Inspectors of the HSA are primarily authorised under section 62 of the 2005 Act. Under that authorisation Inspectors enforce 'relevant statutory provisions' i.e. provisions made under the 2005 Act and certain other existing enactments, one of which is the Dangerous Substances Act 1972.

Approval of Codes of Practice

Under section 60 of the 2005 Act the HSA '(*a*) may, and shall if so requested by the Minister, prepare and publish codes of practice, and (*b*) may approve of a code of practice or any part of a code of practice made or published by any other body.'

6.2 Retail and Private Petroleum Stores

6.2.1 Enforcement

Local authorities are responsible for licensing of retail and private petroleum stores throughout the State. In Phase 1 of the review, 26 No. local authorities were contacted in order to establish the number and location of retail petroleum stores in each county. Dublin City Council maintains an up-to-date record of licensed and unlicensed retail petroleum stores within their administrative area. Seven local authorities were able to provide an outdated list. Seventeen local authorities attempted to compile the information but suggested it would be outdated and would take a considerable amount of time to gather. One local authority suggested that there were no records at all. Nine of the 25 retail petroleum stores surveyed were in possession of a valid licence.

The low level of enforcement of the existing Regulations is seen in the failure of some local authorities to issue licences and the dearth of information on the locations of RPPSs in the local authority functional areas. Furthermore, non-compliance with certain aspects of the Regulations (refer to section 4.2) could reasonably be assumed to be a result of a lack of enforcement.

6.2.2 Retail Petroleum Stores

According to data provided by Catalist, the number of retail petroleum stores in Ireland is 2,033. The vast majority of these are on relatively large sites, with the fuel pumps located away from the roadway. Many of these stores are convenience stores also, and sell food, newspapers, magazines, other fuels, etc.

About 15% of the retail petroleum stores are kerbside stores.

6.2.3 Kerbside Retail Petroleum Stores

According to data provided by Catalist, of the 2,033 RPPSs in Ireland, 296 are kerbside sites. As stated in Section 2.2, the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979 have been amended five times to provide for retail petroleum stores constructed before the implementation of the 1979 Regulations. The petroleum retail outlet survey conducted in Phase 1 of the review has shown that none of the eight kerbside retail petroleum stores surveyed were in possession of a valid licence. Of the 28 parameters surveyed, the issues where compliance was less than 50% were:

- tanks were over 20 years old and not inspected regularly
- lack of safe parking for petroleum tanker deliveries
- lack of properly maintained surface areas
- not ATEX compliant
- lack of staff training
- proximity of boundary, source of ignition, public road to manhole i.e. <4.25m
- proximity of ventilating pipes to building obstructions
- crossing of pedestrian footways with dispensing pump
- lack of suitable fire extinguishers
- lack of emergency contact details; and
- lack of pump operation notices and no smoking signs

Kerbside facilities as a percentage of the RPPS market is higher in Ireland than in the other countries in the Arup survey (refer to Table 6). It is considered likely that kerbside retail petroleum stores contribute significantly to the social and economic fabric of the communities that they serve. Each set of amendment Regulations has provided a clause whereby these stores, constructed before the commencement of the 1979 Regulations, could continue to be operated despite lacking the appropriate safety arrangements provided for in the Regulations. The inherent dangers associated with kerbside retail petroleum stores include the proximity of dispensing pumps to public footways and roads and the necessity for petroleum deliveries to be conducted in close proximity to public footways and roads. Furthermore, the qualitative risk assessments have shown that a loss of containment from road tankers poses the highest risks at kerbside retail petroleum stores. These issues, coupled with a lack of ATEX compliant equipment and fire fighting equipment indicates that kerbside retail petroleum stores are particularly unsafe sites.

Table 6: Kerbside RPPSs as Percentage of Market

Country	No. of Kerbside RPPSs	Total No. RPPSs	% RPPS
ROI	296	2,033	14.56
UK	36	9,434	0.38
Germany	41	15,627	0.26
France	229	14,595	4.32*

* This data is provided by Catalist. Kerbside data is available for 5,300 retail petroleum outlets in France. Of these, approximately 4% are kerbside facilities.

6.2.4 Unattended Retail Petroleum Stores

Currently unsupervised dispensing of fuel is prohibited in Ireland under the Dangerous Substances (Retail and Private Petroleum Stores) Regulations. However, unattended retail petroleum stores are in operation in France, Germany and the UK. In the UK, dispensing of fuel at unattended retail petroleum stores by minors was previously controlled through the use of automatic payment methods whereby debit/credit cards only could be used. However, more recently, it has been observed that this control method no longer applies as debit and credit cards are freely available to minors[8]. There is currently, therefore, no control of persons dispensing fuel at these stores. The security measures for unattended retail petroleum stores in France comprise CCTV video surveillance and automatic shutdown devices.

Enforcement of the relevant Regulations as they apply to supervised retail petroleum stores is therefore the key issue with unattended retail petroleum stores. The following issues, taken from the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979 are particularly pertinent in the context of unattended retail petroleum stores:

- dispensing of petroleum in an unsafe manner, particularly:
  - into containers exceeding 25 litres
  - without turning off the vehicle engine
  - overstretching of dispensing hose
  - use of dispensing pumps by minors
  - use of dispensing pumps by unauthorised people
- smoking in the vicinity of dispensing pumps
- deactivation of dispensing pumps in the event of a spill

If unattended retail petroleum stores were permitted to operate in Ireland the legislation would have to be amended to reflect the above.

6.2.5 Biofuels

The emergence of biofuels in Ireland, in particular E85 (an alcohol-fuel mixture containing a mixture of ethanol at 85% and petroleum at 15% by volume), is of concern, owing to the incompatibility of high concentration ethanol-petroleum blends with some conventional materials used in fuel storage and dispensing equipment such as aluminium, zinc, brass, plastic and rubber. Where the equipment is not suitably rated for ethanol or ethanol-petroleum blend storage, there is risk of degradation of the tank, pumps, piping and dispensers. In addition, phase separation of ethanol-petroleum blends can occur, allowing petrol to by-pass a normal petroleum interceptor in the event of a spill. Furthermore, suitable alcohol resistant foam fire extinguishers are required where ethanol-petroleum blends are stored and dispensed.

In Ireland, Maxol Group is the only oil company dispensing E85 for use in motor vehicles. At present, E85 is available at 26 Maxol retail petroleum stores around the Country. Further locations are planned for 2008. There is currently no guidance or legislation regulating the storage and handling of biofuels, other than those containing petroleum, in Ireland. The HSA regards E85 as petroleum Class I owing to its petroleum content.

[8] Personal communication London Fire Brigade

In the UK, APEA/IP have recently published a biofuels guidance document "APEA/IP Guidance on Storage and Dispensing of High Blend Ethanol Fuels including E85 at Filling Stations" to advise the petroleum retail industry and the petroleum licensing authorities on the design details required for the storage and dispensing of high blend ethanol fuels. It is intended that this guidance will be incorporated into the APEA/IP publication "Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations" when it is republished. Currently, there is only one service station in the UK authorised to dispense an ethanol-petroleum blend.

6.2.6 Private Petroleum Stores

Private petroleum stores are also subject to the RPPS Regulations. These stores are located at a variety of facilities including the following:

- bus depots
- golf courses
- car hire companies
- car recycling facilities
- marinas
- postal depots
- construction sites

As with retail petroleum stores, the number and location of private petroleum stores around the country that are not licensed and are not subject to any enforcement is unknown.

6.3 Oil Jetties

Currently, the harbour authorities issue written consents authorising loading and unloading operations at jetties. Where a jetty is outside the functional area of a harbour authority, the HSA issues the consent.

Enforcement of the Regulations and communication with the relevant fire authorities by harbour authorities is lacking.[9] The licensing Regulations do not give any powers of enforcement to the licensing authority. Powers are given to the HSA and the fire authority by the following pieces of legislation:

- Dangerous Substances Act 1972
- Fire Services Act 1981
- Safety, Health and Welfare at Work Act, 2005
- European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 (S.I. No 74 of 2006).

6.4 Petroleum Bulk Stores

In Phase 1 of the review, the number of bulk petroleum stores and LPG depots was estimated from data provided by the HSA and by contacting the various oil companies. However, there are likely to be a number of smaller regional depots around the country which are not licensed by local authorities or regulated by the HSA. The number and location of these depots around the country is unknown.

[9] Personal communication with Chief Fire Officers Association DSA Review Sub-Committee

A number of diesel-only distribution stores are not regulated as they store less than the threshold volume stipulated in S.I. 313 of 1979 for bulk stores and do not require a licence under S.I. 311 of 1979 for retail and private petroleum stores because they do not store petrol.

Consultation with the Chief Fire Officers Association has also indicated that fire and emergency evacuation plans required under Regulation 77 of S.I. 313 of 1979 are not being submitted to fire authorities by licensed facilities[10].

6.5 Seveso Sites

Large petroleum bulk stores and LPG storage sites and many jetties handling ships unloading petroleum spirit and LPG are covered by the Control of Major Accident Hazards Directive Council Directive 96/82/EC of 9 December 1996[11] as amended by Directive 2003/105/EC of the European Parliament and of the Council, 16 December 2003[12]. This Directive is also known as the Seveso II[13] (Seveso 2) Directive or COMAH Directive and has as its objectives:

- the prevention of major accidents which involve dangerous substances, and
- the limitation of their consequences for man and the environment,

with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.

Insofar as it applies to the operators of affected facilities, the Directive was implemented in Ireland by the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. No. 74 of 2006), which are referred to as the "Seveso Regulations". The Seveso Regulations are enforced by the HSA.

Article 12 of the directive sets out land-use planning requirements for Member States.

These land-use planning requirements for Member States were implemented as follows:

- powers and duties of the Health and Safety Authority - by the Seveso Regulations;
- powers and duties of planning authorities including An Bord Pleanála - by the Planning and Development Regulations 2001 (S.I. No. 600 of 2001).

6.5.1 Buncefield

Around 6 am on Sunday 11 December 2005, a major fire and explosion took place at an oil storage depot in Buncefield, Hemel Hempstead, Hertfordshire, England. An Investigation Board was set up by the UK Government. A number of reports on the incident have been published, including:

- Recommendations on the emergency preparedness for, response to and recovery from incidents;
- Recommendations on the design and operation of fuel storage sites;
- Safety and environmental standards for fuel storage sites Buncefield Standards Task Group (BSTG) Final report.

[10] Personal communication with Chief Fire Officers Association DSA Review Sub-Committee.
[11] Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances, O.J. L 10, 14.1.1997, p. 13
[12] Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances, O.J. L 345, 31.12.2003, p. 97
[13] The first Seveso Directive was Directive 82/501/EEC. The Directive was amended by 87/216/EEC and by 88/610/EEC.

6.6 Other Relevant Legislation

Other pertinent licences and permits which are required for operators of facilities where dangerous goods are stored or handled are described below.

6.6.1 Local Government (Water Pollution) Act, 1977

A trade effluent licence is required to discharge any effluent, other than domestic effluent or stormwater, to a sewer. An application for a trade effluent licence must be made to the local authority under the Local Government (Water Pollution) Act, 1977

6.6.2 Volatile Organic Compounds

The Environmental Protection Agency Act, 1992 (Control of Volatile Organic Compound Emissions Resulting from Petrol Storage and Distribution) Regulations, 1997 (S.I. No. 374 of 1997) transpose elements of Directive 94/63/EC which place controls on volatile organic compound (VOC) emissions resulting from petrol storage and distribution. The Regulations provide for the operation of a system of permits by the EPA. According to the Regulations a permit is required for any operation where the loading/unloading of petrol from road tankers, rail tankers and/or vessels occurs. The information to be included in an application for a VOC permit is laid out in Schedule 1 of the Regulations and includes, *inter alia*:

- The throughput of the facility
- Proposed measurement and analysis methods
- Frequency of checks for leaks
- Shut-down procedures for loading operations
- A fee

The Air Pollution Act, 1987 (Petroleum Vapour Emissions) Regulations, 1997 (S.I. No. 375 of 1997) introduced controls on VOCs resulting from the storage and distribution of petrol which is intended for use as a fuel for motor vehicles. The Regulations provide for the monitoring of compliance of service station and mobile container operators by relevant local authorities. In a circular letter AQ6/97 of 30/9/1997, the Department of the Environment recommended that the licensing authorities issue VOC certificates in conjunction with their DSA licensing function.

6.6.3 Finance Act, 1999

This Act states that any person who produces, sells, delivers or deals in mineral oils must apply to the Revenue Commissioners for a Mineral Oil Trader's Licence. Each licence is required to be renewed annually. Each mineral oil licence application must be accompanied by a fee. The licence must be displayed on the premises to which it relates. The specified descriptions of mineral oils are given in Schedule 1 of the Mineral Oil Tax Regulations, 2001 (S.I. No. 442 of 2001).

6.7 Commission for Energy Regulation Licensing Model

The Commission for Energy Regulation (CER) is the regulator for the electricity and natural gas sectors in Ireland under the Electricity Regulation Act 1999. Any person or company who is planning to generate electricity or sell or supply electricity to final customers needs a licence from the CER.

The CER issues Supply and Generation licences. New entrants may apply for one or more of three 'generic' supply licences:

- 'Eligible Customer' Supply Licence – awarded to suppliers of electricity generated from any source including electricity from coal, gas and oil plant.

- 'Green' or 'Renewables' Supply Licence - awarded to suppliers of electricity that is generated from sources deemed 'green' as per the Electricity Regulation Act.
- CHP Supply Licence - awarded to suppliers of electricity generated from the Combined Heat and Power (CHP) generation process.

The CER may at any time revoke a Supply or Generation Licence for several reasons including:

- if the Licensee agrees with the Commission that the licence should be revoked
- non-payment of amounts due under a Levy Order
- failure to comply with any order made by the Minister under the Act
- if the Licensee is unable to pay its debts

The CER can consider a number of factors in evaluating a licence application. These may include, for example, the availability of sufficient appropriate financial, managerial or technical resources to ensure that the generator is able to comply with the terms and conditions that govern the electricity generation licence.

The CER issues various permissions that enable generators to build, connect to the electricity network and operate in the electricity market in Ireland.

Under the Electricity Regulation Act anyone wishing to construct a new generating station or reconstruct an existing generating station must obtain an authorisation from the CER prior to commencing work.

7. RECOMMENDATIONS – RETAIL AND PRIVATE PETROLEUM STORES

The existing Regulations applying to petroleum storage and handling facilities are highly prescriptive with regard to the requirement for the protection of persons and property. However, as can be seen from the results of the Arup survey (refer to Appendix 1), regulations do not of themselves ensure a high level of safety. It is considered that the existence or otherwise of a licence at the RPPSs surveyed by Arup had little impact on the protection of persons and property. It is our view that the level of protection of persons and property that can be achieved is primarily a function of the level of enforcement applied. Feedback from emergency services in the UK, USA and Australia corroborates this view. Given that the least compliant sites surveyed were dealer owned kerbside facilities, the level of protection of persons and property achieved could also be concluded to be a function of the type of ownership (i.e. dealer owned or oil company owned).

The purpose of S.I. No. 311 of 1979 is to prevent 'risk of injury to persons or property in the storage, conveying, loading, unloading and in dispensing operations carried on in connection with the stores'. In order to identify aspects of the current enforcement regime which could be improved upon to better achieve this aim and to make recommendations for improvement, the options for regulation of petroleum stores are considered here under a number of headings:

- Risk assessment of RPPSs
- Other safety issues at RPPSs
- Specification of technical requirements
- System for enforcement
- Competent authority and enforcement
- Powers of enforcing authorities
- Alternative fuels

7.1 Risk Assessment of Retail and Private Petroleum Stores

It is clear that some existing retail petroleum stores, in particular kerbside stores, may not be able to comply with some aspects of the current legislation. Many of these facilities were built before the Dangerous Substances Regulations of 1979 were published. As such, several RPPSs countrywide could be considered unsafe.

A requirement in regulations to carry out a risk assessment and improve safety standards on-site if shown by the assessment to be necessary, could lead to improved levels of safety at RPPSs.

A further benefit of introducing a risk assessment methodology under the Regulations would be that it would allow the competent authority to permit particular activities on-site for which regulations do not exist. For example, a risk assessment carried out by a competent person (refer to section 6.1.1) could be provided to the competent authority in support of the introduction of biofuel to the site, for which there is currently no regulation. This principle could apply to introduction of new technologies as well as new products.

(Recommendation 1) Legislation should contain an obligation to have an up to date risk assessment and to demonstrate to the competent authority that any measures required by the risk assessment have been taken.

Where a risk assessment has been prepared to meet the requirements of other legislation, this may be sufficient.

Within the risk assessment the following operations should be examined:

- Petrol delivery from the road tanker
- Petrol storage
- Petrol pipelines
- Petrol dispensing
- Petrol delivery to the customer's vehicle

A number of risk assessment formats have already been produced specially for retail stores. One worth noting is The London Fire Brigade's risk assessment methodology (refer to Appendix 3). This assessment operates the principle of assigning a risk rating based on a number of items. It requires, at minimum, an annual inspection. The assessment methodology considers previous convictions and records.

The results from a risk assessment would give operators a clear picture of the items which needed to be improved upon.

Space and financial limitations may mean that some stations and in particular kerbside retail petroleum stores may not be able to carry out significant changes to the site.

(Recommendation 2) It should be possible to retain the operation of kerbside stores within the risk assessment approach subject to a risk assessment demonstrating that the facility achieves acceptable levels of safety.

Risk limitation and mitigation at kerbside retail petroleum stores would rely mainly on the following measures:

- Site management
- Leak testing along with inventory control
- Mechanical protection against collision with dispensers
- Dispensing to be carried out under staff supervision only
- Restriction of parking in the areas surrounding the dispensing pumps

(Recommendation 3) It is recommended that the operation of an unattended self-service site should be preceded by a risk assessment of the site as discussed above. Operation of such stores should be possible subject to appropriate control measures being implemented and acceptable levels of safety achieved.

In addition the emergency equipment for unattended retail petroleum stores specified in the Blue Book should also be provided.

7.2 Other Safety Issues at RPPSs

The following safety issues were identified during the study and are considered separately in sections 7.2.1 to 7.2.4:

- Use of RPPSs by the public during road tanker deliveries
- Dispensing of fuel into portable containers by customers
- Provision of advertising screens and other material at dispensing pumps
- Reporting of unsafe conditions

7.2.1 Use of RPPSs by the public during road tanker deliveries

The qualitative risk assessments conducted have shown that the greatest risk at retail petroleum stores arises from loss of containment from a road tanker wagon. Current industry practice is that each RPPS is assessed with regard to forecourt size, age and condition prior to

deciding if the forecourt should be closed to the public during fuel delivery. As there is a large degree of variation in these parameters in forecourts, assessment on a site-by-site basis would appear to be the most equitable method of determining if a facility should require to be closed during fuel transfer.

(**Recommendation 4) A site risk assessment should be considered as a basis for deciding whether or not a site should be obliged to close to the public during fuel delivery (refer also to Section 7.1).**

7.2.2 Dispensing of fuel into portable containers by customers

The dispensing of petroleum by customers into inappropriate small containers is unsafe due to the higher risk of ignition of petroleum from static electricity, specifically from:

- Use of inappropriately rated containers;
- Lack of earthing of containers (pumping of petroleum generates static that can accumulate on isolated containers);
- Filling procedures.

(**Recommendation 5) A code of practice should be adopted for the safe filling of small containers with petrol at RPPSs.**

Items for consideration in this CoP should include but not necessarily be limited to:

- The container should be earthed before pumping starts (only unearthing once the container is closed);
- Use of suitable containers with closed fitting lids. A close fitting lid is necessary to prevent the egress of petroleum vapours;
- Filling of small containers at RPPSs by suitably trained staff or supervision of filling by suitably trained staff;
- Appropriate signage indicating the need to contact a staff member prior to filling containers.

7.2.3 Prohibition of advertising television screens and other material at the dispensing pump

Advertising in petroleum forecourts has become increasing popular in recent years. Placing adverts on the dispensing unit and the pumps handle ensures that the adverts are seen and read as the audience is captive. Automatic cut outs are provided on the pumps whereby once the tank is full dispensing ceases. This means that even if the driver is distracted during pumping the unit will cut out once the car tank is full.

Televisions playing advertisements are becoming increasing prevalent in retail forecourts. Moving pictures are particularly attention grabbing and distracting to humans.

The potential for the pump operator to remove the nozzle from the car's fuel tank without ceasing pumping exists. This would lead to the spillage of a highly flammable liquid.

A further issue with regard to television screens relates to locating them in potential explosive atmospheres. The television sets are a potential source of ignition unless they are specifically rated for the location in which they are to be situated.

It could be argued that the same reasons for banning the use of mobile phones apply to the use of televisions in the forecourt area. Both televisions and mobile phone are potentially distracting units and a potential source of ignition. Thus consideration should be given that advertising or signage, with the exception of pump operating instructions and warning and hazard signs should be prohibited from dispensing areas.

The petroleum retail outlet survey showed that the appropriate signage currently required under the legislation i.e. operating procedures and no smoking signs was lacking at the majority of sites. In addition, the "Blue Book"[14] states that the use of conspicuous and clear notices helps the safety of operations at filling stations by providing clear information, warnings and advice. The use of dispensing areas for advertising, other signage or televisions is likely to detract from these notices.

(**Recommendation 6) A prohibition on advertising around petrol pumps at RPPSs should be considered. While no linkage has been established in this review between accidents at RPPSs and advertising near the petrol pumps, it is considered that there may be grounds for a prohibition.**

7.2.4 Requirement to Report Unsafe Conditions

Data published by the Council of Canadian Fire Marshals and Fire Commissioners show only one fire at a 'petroleum products' facility in 2002.[15] In total, the Ontario Technical Standards & Safety Authority (TSSA) investigated 39 incidents at retail petroleum stores and private fuel outlets in 2006 (refer to Appendix 4). The TSSA's analysis identified human and equipment factors as key causes of these incidents. This is in contrast to the situation in Ireland, where an average of 62 fires per year was attended by fire brigades for the years 2000-2005 (refer to Appendix 4). However, the situation in Ireland compares favourably with that of the USA where during the five-year period of 1994-1998, an estimated 7,400 fires and explosions at public service stations were reported per year to U.S. municipal fire departments. On average, one of every 13 service stations suffered a fire.[16]

While the TSSA is unable to provide statistics, a portion of the 2,915 directives issued to bulk plants, retail gasoline stations, private fuel outlets, propane refill centres and construction sites engaged in petroleum handling in the Province of Ontario, Canada, came about as a direct result of notices received from suppliers to these facilities. Therefore, there would appear to be a safety benefit in the imposition of a mandatory requirement on fuel suppliers to report unsafe conditions to the competent authority.

While there currently exists in S.I. Nos. 311 and 313 an obligation to report unsafe conditions to an authorised person, an onus could be placed on suppliers and contractors for petroleum handling facilities to give written notice to the operator of the facility of unsafe conditions or practices observed. A copy of this notice could be sent to the competent authority.

It should be noted that all IPIA member companies currently have a system of internal reporting that drivers use to report any defect or problems encountered at an RPPS, bulk store or jetty back to the relevant oil company. The drivers are trained and under instruction not to proceed with the delivery if the conditions are unsafe and to return the product to base and report the issue without delay. The oil company then follows up on this situation with the relevant customer. In addition to internal industry reporting requirements, employees are obliged under Section 13 (1) of the Safety, Health and Welfare at Work Act 2005 to report to employers 'any defect in the place of work, the systems of work, any article or substance which might endanger the safety, health or welfare at work of the employee or that of any other person'. Employers are obliged under Section 8 of the Act to report accidents and dangerous occurrences, as may be prescribed, to the Authority'. Furthermore, the HSA requires RPPSs to maintain an incident log on-site.

With regard to spills and leaks of petroleum products on-site, there currently exists a requirement to report to the local authority. Under section 14 (1) of the Local Government (Water Pollution) Act, 1977 'As soon as practicable after the occurrence of an accidental discharge, spillage or deposit of any polluting matter which enters or is likely to enter any

[14] Ref: *Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations*. APEA/IP. 2005.
[15] Ref: 2006 TSSA Report
[16] Ref: Special Data Information Package Fires in or At Service Stations and Motor Vehicle Repair and Paint Shops NFPA One-Stop Data Shop Fire Analysis and Research Division April 2002

waters or a sewer, the person responsible shall notify the local authority in whose functional area the discharge, spillage or deposit occurs or, in the case of a sewer, the sanitary authority in which the sewer is vested or by which it is controlled'.

Mirroring the Canadian system of obliging fuel suppliers to inform the 'designated administrative authority' of unsafe conditions at petroleum product handling premises could give rise to industrial relations issues and practical difficulties in enforcing this obligation. Notwithstanding this and the fact that there is an industry internal reporting system in place there may be a safety and environmental protection benefit from implementing a similar requirement in Ireland as it might lead to hazards being highlighted to competent authority and fuel suppliers which otherwise might have escaped detection.

(Recommendation 7) Imposition of a requirement on fuel suppliers to report unsafe conditions to the competent authority could be considered in light of the safety measures currently employed by petroleum suppliers, the current legislation in this area and perceived difficulties with such a system.

7.3 Specification of Technical Requirements

7.3.1 Fixed in Legislation

Currently, the technical requirements as they apply to petroleum and LPG storage and handling are fixed in the legislation. As discussed in Section 6.1, this system provides no room for updating technical requirements in line with advances in technology and health and safety or for availing of alternative engineering solutions. The existing legislation can only be altered through amendment regulations which can take a considerable amount of time to produce and approve.

7.3.2 Standards and Codes of Practice

The use or reference to an approved standard or code of practice in legislation bypasses the requirement for a lengthy approval/amendment process. The US legislation adopts the relevant NFPA standards as the Massachusetts Fuel and Gas Code. NFPA develops, updates and publishes over 300 codes and standards to minimise the potential for fire and other risks. In Australia the use of recognised standards to achieve an acceptable level of risk is accounted for in legislation. Both these approaches ensure that the most up to date technology is being deferred to in the legislation.

Although the existing legislation prescribes a series of measures to be implemented it is clear from the site surveys conducted that there is a degree of uncertainty about how these can be implemented. An approved standard or code of practice would facilitate operators in applying best practice to their sites. However it is vital that any standard developed would not prohibit the advancement of technology within the industry.

7.3.3 Conclusion

Amendment of legislation takes longer than amendment of codes, and response to technical change is slower. Legislation is not suited to allowing alternative engineering solutions to location-specific problems.

(Recommendation 8) Most of the technical requirements for RPPSs should be removed from the Regulations and included in approved Codes of Practice.

The Code(s) of Practice should be compiled in consultation with the sectors it will directly impact and should include the chief fire officers, petroleum suppliers and equipment manufacturers. Reference could be made to, for example, "Design, Construction, Modification, Maintenance, and Decommissioning of Filling Stations" as published by the APEA and Energy Institute which details best design and practice for filling stations.

7.4 System of Enforcement

7.4.1 Licensing / Permitting

Licensing or permitting is the system in use at present. Each operator has to hold a licence from a competent authority (local authority or harbour authority), or from the Minister.

This system has been in operation for almost 30 years, since the Regulations were first introduced in Ireland. However, consultation with local authorities suggests that the system is not being fully implemented and in some cases it has not been implemented at all. This is evidenced by the fact that licences are not issued by some local authorities, information on the locations of RPPSs in the local authority functional areas is deficient in many cases and many sites surveyed did not comply with several aspects of the Regulations.

Licensing is the predominant system in other surveyed countries with the exception of France, which has a declaration system in place.

The lack of a licence does not relieve the operator of a petroleum storage facility of the obligations set out in the Regulations. The current legislation affords the competent authority an opportunity to impose additional safety requirements other than those set out in the Regulations.

7.4.2 Registration

Registration is simpler than licensing. The only requirement is that the operator registers with the competent authority. The only country surveyed that had a comparable system was France, which uses a system of declarations.

Registration rather than licensing would not reduce the obligation on operators of petroleum storage facilities to comply with the Regulations.

All facilities currently requiring a licence under the various Dangerous Substances Regulations could be required to register with the relevant body by a specified date.

Applications for registration would have to be accompanied by particular information on the facility regarding its design and operation which would be specified in the amended Regulations.

For new facilities, storage of petroleum products prior to registration would be an offence under the Regulations.

A registration fee would be payable annually, the amount of which would depend on the scale of the facility.

Failure to register would result in an instant penalty.

Failure to register following the serving of a notice by the registration body (specifying a date) would be a criminal offence. The directors and officers of the company owning and/or operating the facility (other than arms-length landlords) would be personally liable for criminal and civil sanctions.

The Register would be available for public inspection and on-line viewing. All notices issued would be viewable on-line.

7.4.3 No licensing/registration obligation

The alternative to licensing or registration is to have neither. However, the obligation to comply with any regulations would remain.

Given that levels of regulatory compliance at unlicensed company owned RPPSs were comparable to those at licensed sites, it could reasonably be expected that those sites achieving a high level of safety would continue to do so under without the requirement to be licensed or registered. This high level of safety could be achieved by a greater number of

RPPSs under a reformed regulatory system by imposing a risk assessment requirement on operators (refer to Section 7.1).

The two existing nationwide databases are:

- Revenue Commissioners data on holders of Mineral Oil Trader Licences.
- Catalist (commercial data base).

The latter comprises only retail stores.

Dublin Fire Brigade administers the Dangerous Substances Act 1972, within the Dublin City Council area and by agreement within the areas of, Dun Laoghaire Rathdown County Council, Fingal County Council and South Dublin County Council. It is responsible for enforcing the Act at approximately 11% of the RPPSs in the Country (222 sites from a total of 2,033 countrywide). The Fire Brigade currently maintains an up-to-date database which tracks the current licensing status of RPPSs within its functional area along with decommissioned sites and driver controlled delivery outlets. Dublin Fire Brigade also carries out the responsibilities of S.I. No. 375 Petroleum Vapour Emissions Regulations 1997 under the Air Pollution Act 1987, in conjunction with the licensing of petroleum stores, as suggested by the Department of Environment in its circular letter AQ6/97 of 30/9/1997. The above database also includes an up-to-date register in respect of S.I. No. 375.

7.4.4 Conclusion

(Recommendation 9) The requirement for operators of retail and private petroleum stores to hold a valid licence should be reconsidered.

(Recommendation 10) A national database of RPPSs should be maintained.

A national database could utilise the data currently maintained by the Revenue Commissioners (provided an appropriate mechanism were in place whereby this data could be shared) or the Catalist data.

7.5 Competent Authority and Enforcement

The current administrative structure with regard to petroleum storage and handling is described below. Alternatives to the current system are also outlined. Whatever system prevails, coordination of effort between bodies is important where more than one body has responsibility for different aspects of regulatory enforcement.

7.5.1 Local/Harbour Authorities

The current system is a distributed system. Each local authority or harbour authority is responsible for the licensing of petroleum storage facilities within its administrative area. The Regulations specify the form of application and licence, but the licence issuing body is responsible for deciding whether any additional conditions should be imposed.

Harbour authorities licence bulk stores, but do not currently licence any retail or private petroleum stores.

The survey of local authorities showed that the licensing system is not being effectively implemented in many cases.

In other countries surveyed, the most common authority for enforcement with respect to small installations is the local authority. In Australia and the UK enforcement of larger installations is the responsibility of a national competent authority.

7.5.2 Regional Authorities

To facilitate the consistent implementation of regulations a national support network could be put in place. This system has been extremely successful for the EPA's Office of Environmental Enforcement (OEE), in terms of supporting and furthering the work carried out

by Environmental Enforcement Officers in Ireland. A similar national support network for enforcement of petroleum regulations could be put in place. Where particular relevant expertise is identified within a local authority, this authority could assume a leading role in the network.

The priority of the Enforcement Network for petroleum products would be to ensure that a uniformly high level of safety and environmental protection is achieved at retail and private petroleum stores, bulk petroleum sores, oil jetties and LPG facilities throughout the country through:

- Consistent enforcement of regulations
- Sharing of knowledge and technical expertise between local authorities and other bodies
- Identification of training needs within local authorities
- Sharing of information between local authorities and other bodies regarding reports and findings of unsafe conditions and accidents and emergencies.

7.5.3 HSA

The role of the HSA is to ensure health and safety at work and high level control relating to chemicals. The HSA resources are allocated to these functions on the basis of priorities identified in annual work programmes.

7.5.4 Petroleum Regulatory Authority

An independent Petroleum Regulatory Authority (PRA) could be given responsibility for enforcement of the Regulations throughout the State. This approach would be comparable to that being taken towards electricity generation and supply, the regulation of which is controlled by the Commission for Energy Regulation (refer to section 6.7). This would ensure a consistent approach throughout the State. However, legislation would be required to establish a PRA; it would require separate funding.

7.5.5 Conclusion

The current administrative structure as it applies to petroleum storage and handling depends on a number of different organisations including the Department of Finance (for mineral oil trading licences), local authorities (for dangerous substances licences, trade effluent licences and VOC certificates) and the HSA (for ATEX and Seveso enforcement). The options for streamlining these enforcement systems should be considered. Taking account of the nature of the primary risks involved i.e. public safety and the environment response capabilities to incidents, competencies to set legal and other standards, the need to update the legislation to better reflect modern approaches and the desirability of avoiding the creation of new structures the optimal approach would be to leave the day to day enforcement with local authorities, overseen by a Central Competent Authority.

(Recommendation 11) A national support network should be put in place for local authorities and other bodies to help ensure consistent and high levels of enforcement of regulations with a suitable local authority or other network member assuming a lead role.

(Recommendation 12) Local authorities should be formally empowered and encouraged to pool their resources and coordinate enforcement activities.

(Recommendation 13) Consideration should be given to relieving harbour authorities of the authority to licence RPPSs as currently granted under No. 311 of 1979.

The ability to deliver protection of persons, property and the environment should the fundamental task of the network. Technical competence and the ability to make policy decisions and influence the day-to-day enforcement should be characteristics of the lead network member.

7.6 Powers of Enforcing Authorities

Powers in relation to safety and the environment have been given to competent authorities as follows:

- Dangerous Substances Act 1972 – the inspector has the power to issue a notice imposing prohibitions or restrictions or requirements "of whatsoever kind" as appear to the inspector necessary to safeguard persons or property;
- RPPS Regulations – no powers are given to any authority to enforce the provisions of a licence – the sole sanction appears to be the refusal of a licence or attachment of more onerous conditions on renewal (frequency up to 3 years);
- Fire Services Act 1981 (as amended) - provides a basis for the fire authority (local authority) to issue a fire safety notice which may prohibit use of the relevant "building" or a specified part thereof, for any purpose specified, and may impose specific requirements on the owner.

  Section 18 of the FSA was amended by section 29 of the Licensing of Indoor Events Act 2003 to remove the exclusion of "premises used as a store and subject to licensing under regulations made under the Dangerous Substances Act, 1972" from the list of premises to which the general obligations of fire safety apply.

  Section 20 of the FSA was amended by section 30 of the Licensing of Indoor Events Act 2003 so that a closure notice may be served on a building or premises "If an authorised person is of the opinion that a building poses or is likely to pose a serious and immediate risk, including a fire risk, to the safety of persons on or in such building or premises".
- Safety Health and Welfare at Work Act 2005 – HSA inspector may issue written directions including improvement plans and prohibition notices;
- European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. No. 74 of 2006) – HSA Inspector may serve notice with prohibitions, restrictions or requirements.

7.6.1 Power to Close Summarily

Under the Fire Services Act 1981 (FSA) a closure notice may be served where "a building or premises poses or is likely to pose a serious and immediate risk, including a risk of fire, to the safety of persons on or in such building". In Ireland, local authorities do not have the power under the RPPS Regulations to close down facilities with immediate effect in the case of non-compliance.

In Australia, Canada, Germany, UK and USA the enforcing authority may take immediate action to shut down a facility if they consider it poses an unacceptable risk or in the event of continued non-compliance with the relevant regulations. In France the courts may order that operations cease at a facility in the event of non-compliance with the regulations.

7.6.2 Power to Require Improvements in Facilities

The power to require improvements in facilities is currently achieved by attaching conditions to a licence. In other countries this is achieved by serving notices or directives. In most cases this entails the enforcing authority issuing a first notice which must be complied with by a specified time. More often, up to three notices are issued before the enforcing authority will order that a facility is shut down. Each notice gives the owner or operator a specified amount of time to remedy the relevant non-compliant issues.

The HSA has the power to issue Improvement Notices and Prohibition Notices as deemed appropriate where non-compliance with the Dangerous Substances Regulations is observed, and under other legislation – see above.

7.6.3 Power to Impose Fines

The Safety, Health and Welfare at Work Act 2005 provides for the specification in regulations of 'on-the-spot' fines 'If an inspector has reasonable grounds for believing that a person is committing or has committed a prescribed offence under the relevant statutory provisions'. The amount of the fine is specified in a notice and may not exceed €1,000. A prosecution will not be instituted in respect of the alleged offence if the fine is paid with 21 days of the date of the notice.

7.6.4 Conclusion

As there are different powers under the different Regulations it would make enforcement easier if the competent authorities and powers of competent authorities were clarified.

(Recommendation 14) Any new regulatory regime should be clear as to enforcement powers and enforcement structures.

Specification of all enforcement powers and enforcement structures under a single regulatory code would likely provide the greatest clarity in respect of this recommendation. However, this might not be possible to achieve. An alternative method of achieving the required clarity would be the publication of a Memorandum of Understanding describing the powers and interaction of the relevant authorities.

7.7 Alternative Fuels

As mentioned in Section 2.1, the definitions of the different classes of petroleum in the current Regulations are outdated.

(Recommendation 15) The definitions of the different classes of petroleum in the current Regulations should be replaced with the classification criteria for flammable substances in the Classification, Packaging and Labelling Regulations.

S.I. No. 311 does not contain provision for the dispensing of alternative fuels at RPPSs such as liquefied petroleum gasoline (LPG), biofuel, compressed natural gas (CNG) and hydrogen.

(Recommendation 16) Consideration should be given to incorporation of alternative fuels into the RPPS regulatory system. This could include allowing the competent authority to take cognisance of risk assessments carried out with respect to the introduction of alternative fuels to the site (refer to Section 7.1).

7.7.1 Liquefied Petroleum Gasoline (LPG)

For LPG, the following HSA approved Codes of Practice are currently available for the safe storage and handling of LPG:

- I.S. 3213: Code of Practice for the Storage of LPG Cylinders and Cartridges
- I.S. 3216 Part 1: Code of Practice for the Bulk Storage of Liquefied Petroleum Gas
- I.S. 3216 Part 2: Code of Practice for the Bulk Storage of Liquefied Petroleum Gas: Specific requirements for Liquefied Petroleum Gas refuelling facilities where a dispenser is used.

It is considered that compliance with these codes would adequately ensure the safety of the public.

7.7.2 Biofuel

(Recommendation 17) Given that dispensing of petrol/ethanol blends proceeds unregulated at RPPSs and petroleum bulk stores, it is recommended that the most expedient means to ensure unloading, storage and dispensing takes place in accordance with appropriate technical measure, is to adopt APEA/IP "*Guidance on Storage and Dispensing of High Blend Ethanol Fuels including E85 at Filling Stations*".

7.7.3 Compressed Natural Gas (CNG)

CNG has not yet been established as a vehicle fuel in Ireland. However, it is appropriate to provide for such a development. No European Standards for CNG have been identified.

(Recommendation 18) A Code of Practice (CoP) for CNG, approved by the Minister, should be implemented. This could be an existing CoP or a new document. A new document could adapt as appropriate elements of relevant international standards.

7.7.4 Hydrogen

Compressed hydrogen gas is becoming available in other countries as a fuel for vehicles.

(Recommendation 19) A CoP for hydrogen, approved by the Minister, should be implemented. This could be an existing CoP or a new document. A new document could adapt as appropriate elements of relevant international standards.

8. RECOMMENDATIONS – PETROLEUM BULK STORE

All employers are obliged under the Safety, Health and Welfare at Work Act 2005 to 'ensure, so far as reasonably practicable, the safety, health and welfare at work of his or her employees'. General duties of employers also include 'ensuring, so far as it is reasonably practicable, the safety and prevention of risk to health at work of his or her employees relating to the use of any article or substance'. Although the Act aims to protect employees at a place of work, it does not extend to protecting or assessing risks to persons or property outside the place of work or to the environment. The aim of S.I. No. 313 of 1979 'is to prevent risk of injury to person or property in the keeping, conveying, loading and unloading of petroleum at three categories of bulk stores namely, distribution stores, major distribution stores and private bulk stores', whereas the 2005 Act refers specifically refers solely to an employer's duties towards 'employees' and 'individuals at the place of work (not being his or her employees)'.

Petroleum bulk stores are required to be licensed by either the local authority or the harbour authority. As the greater degree of competence with regard to loading and unloading of ships lies with the harbour authorities, it is felt that they should continue in their role as the bodies responsible for issuing written consents for jetty operations (refer to Section 9). However, safety requirements with regard to storage of petroleum products could be considered to be outside the core competence of the harbour authorities. A greater degree of safety might therefore be afforded by relieving the harbour authorities of the duty of licensing of bulk stores; this duty could rest solely with local authorities and the HSA.

Where the quantities of petroleum products stored on-site at petroleum bulk stores are in excess of the threshold quantities specified in the Seveso Regulations, the facility is subject to these Regulations. Therefore, the enforcement of safety standards on-site is largely under the control of the HSA. While risks with regard to bulk tanks are regulated under Seveso and S.I. No. 313 of 1979, risks associated with fuel delivery from ships are not.

Upper tier Seveso sites are required to prepare a Safety Report which is assessed by the HSA. Similarly, lower tier bulk stores are required to prepare major accident hazard assessments and major accident prevention policies. Therefore, the degree to which 'injury to person or property' is prevented at these sites could be concluded to largely result from the obligations arising from their Seveso status. As such, it could be argued that these sites could be removed from the DSA enforcement system without any decrease in safety levels. Provisions made under the DSA following this review would not apply to Seveso bulk stores.

It should be noted that while fire safety standards are referenced in safety documentation prepared by/on behalf of bulk stores, these reference documents have no standing under the current DSA Regulations.

Introducing a risk assessment methodology under the Regulations would allow the competent authority to permit particular activities on-site for which regulations do not exist. For example, similarly to RPPSs, a risk assessment carried out by a competent person could be provided to the competent authority in support of the introduction of biofuel to the site, for which there is currently no regulation. This principle could apply to introduction of new technologies as well as new products.

Operators of bulk stores are currently liable for licensing fees under DSA Regulations and Central and Local Competent Authority fees in respect of duties carried out by these authorities under the Seveso Regulations.

(Recommendation 20) Consideration should be given to relieving harbour authorities of the authority to licence bulk stores as currently granted under No. 313 of 1979.

(Recommendation 21) Legislation should contain an obligation to have an up to date risk assessment and to demonstrate to the competent authority that any measures required by the risk assessment have been taken.

(Recommendation 22) Consideration should be given to removing Seveso bulk stores from the DSA licensing system.

(Recommendation 23) Consideration should be given to the implementation of an appropriate existing fire safety standard or CoP approved by the Minister or development of a new standard/CoP. A new document could adapt as appropriate elements of NFPA, Institute of Petroleum (IP) or BS documents.

(Recommendation 24) Development of any standard/CoP should be compiled in consultation with the sectors it will directly impact and should include the chief fire officers, petroleum suppliers and equipment manufacturers.

(Recommendation 25) The recommendations provided in the Buncefield Standards Task Group (BSTG)[17] Final Report could be taken into account (for application to upper tier Seveso sites) in any bulk stores standard/CoP (refer to Appendix 5).

[17] *Safety and Environmental Standards for Fuel Storage Sites*. Buncefield Standards Task Group (BSTG). 2007.

9. RECOMMENDATIONS – OIL JETTIES

Currently, the harbour authorities issue written consents for loading and unloading operations at jetties. Where a jetty is outside the functional area of a harbour authority, the HSA acts licensing body.

The duties of employer's under the Safety, Health and Welfare at Work Act 2005 described in Sections 6.1.1 and 8 also apply at oil jetties. It should be noted that the purpose of Dangerous Substances (Oil Jetties) Regulations, 1979 is to 'prevent risk of injury to persons or property' as opposed to solely to protection of the safety and health of an employer's employees, as stipulated in the 2005 Act.

S.I. No. 312 of 1979 applies to the loading and unloading of petroleum products. Other dangerous substances that are or may be transferred at jetties are not covered by the Regulations.

(Recommendation 26) Consideration should be given to extending the written consent procedure to other dangerous substances in addition to petroleum products.

(Recommendation 27) Consideration should be given to the development and implementation of an appropriate fire safety standard or CoP for jetties handling hazardous liquids that are approved by the Minister. This document could be based on appropriate elements of existing relevant standards.

(Recommendation 28) Each standard should be compiled in consultation with the sectors on which it will directly impact. Those consulted should include the Chief Fire Officers, Harbour Masters, petroleum product suppliers and equipment manufacturers.

Fire safety with regard to the refuelling of crafts at marinas is not regulated for.

(Recommendation 29) Consideration should be given to amending the existing Regulations to stipulate a competent authority for marina refuelling depots.

10. RECOMMENDATIONS – LPG STORAGE FACILITIES

S.I. No 201 of 1990 applies to any activity involving LPG where the quantity involved is greater than 70 kg or the total storage capacity is greater than 60 litres.

Similarly to the RPPS, Bulk Stores and Oil Jetties Regulations, the purpose of the Regulations is to prevent injury to 'persons or property' from the storage of LPG. The HSA enforces the LPG Regulations. In assessing the compliance of a site with the Regulations the HSA may have regard to any relevant code of practice. Employers at LPG facilities have the same duty towards their employees under the Safety, Health and Welfare at Work Act 2005 as are described above for all employers.

(Recommendation 30) Consideration should be given to removing LPG storage facilities that are subject to the Seveso Regulations from the DSA licensing system.

11. GLOSSARY

Atex
This is an acronym of the French term Atmosphères EXplosible meaning 'potentially explosive atmospheres'. The 'ATEX Directives' refers to Directive 99/92/EC (sometimes referred to as the 'Use Directive') stipulating mandatory health and safety requirements for workplaces where potentially explosive atmosphere arise and Directive 94/9/EC(referred to as the 'Product' Directive) which covers equipment and protective systems which may be used in potentially explosive atmospheres.

Biofuel
A fuel produced from organic matter or combustible oils produced by plants. Examples of biofuel include alcohol, black liquor from the paper-manufacturing process, wood, and soybean oil.
Source: IPCC Fourth Assessment Report: Climate Change 2007Appendix I: Glossary of Terms used in the IPCC Fourth Assessment Report

Boiling Liquid Expanding Vapour Explosion (BLEVE)

A BLEVE is the catastrophic failure of a pressure vessel occurring when the temperature of the liquid in the vessel is well above its normal boiling point temperature. The most likely cause is an external fire that heats the vessel. The vessel could be weakened by this and could fail catastrophically.

'Hazardous Area' is an area in which an explosive gas atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of apparatus.

Source: NSAI (2003) Electrical Apparatus for Explosive Gas Atmospheres Part 10: Classification of Hazardous Areas (IEC 60079-10:2002)

Bulk Store

For the purposes of this report, a 'bulk store' refers to a private bulk store, a distribution store or a major distribution store.

These are defined as follows:

"private bulk store" means a place or places used or intended to be used for keeping (other than for sale or resale in whole or in part)—

(a) under a licence petroleum Class I exceeding 13.638 litres (3 gallons) but excluding petroleum Class I kept in conformity with the Dangerous Substances Act (Retail and Private Petroleum Stores) Regulations, 1979 (S.I. No. 311 of 1979); or

(b) an aggregate quantity of petroleum Class II and petroleum Class III exceeding in liquid quantity 5 cubic metres but excluding a store used exclusively for the storage of petroleum Class III;

"distribution store", except where the context otherwise requires, means a place or premises used or intended to be used for the keeping for sale in whole or in part of—

(a) petroleum Class I not exceeding in storage capacity 5,000 cubic metres, or

(b) petroleum Class III and either petroleum Class I or petroleum Class II not exceeding in aggregate storage capacity 7,000 cubic metres;

"major distribution store", except where the context otherwise requires, means a refinery tank-farm or similar place or premises used or intended to be used for the keeping for sale in whole or in part or for trans-shipment of—

(a) petroleum Class I exceeding in quantity 5,000 cubic metres, or

(b) petroleum Class III and either petroleum Class I or petroleum Class II exceeding an aggregate storage capacity of 7,000 cubic metres of petroleum;

Source: S.I. No. 313/1979: Dangerous Substances (Petroleum Bulk Stores) Regulations, 1979.

Explosive Atmosphere

Means a mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture. For an explosion to occur a fuel source, oxygen and ignition source are necessary. Combustion of the fuel results in generation of intense heat and a corresponding pressure rise.

Source: Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

Flash point

This is the lowest temperature at which a liquid gives off enough vapour to form a flammable air-vapour mixture near its surface. Where liquids have flash points that would be exceeded at normal room temperatures, a spill of such a liquid could generate a flammable atmosphere, i.e. an atmosphere with a concentration in air that is between the lower and upper flammable limits.

Petrol Interceptor

In this report the term ‘petrol interceptor’ is taken to mean the same as ‘oil interceptor’. This is defined as ‘an oil interceptor, separator, chamber or other device approved by the proper authority and suitably designed, located, constructed, vented in a safe manner and maintained so as to retain for recovery and for safe disposal any petroleum conveyed to it by a drainage system’.

Source: S.I. No. 313/1979: Dangerous Substances (Petroleum Bulk Stores) Regulations, 1979.

Retail and Private Petroleum Stores (RPPS)

"private store" means a place or premises used or intended to be used for keeping (other than for resale in whole or in part) under a licence petroleum Class I for use in any engine or in connection with the propulsion of a vehicle, ship, vessel, boat or aircraft, of any kind;

"retail store" means a place or premises used or intended to be used for the keeping for sale to the public under a licence of petroleum Class I for use in the propulsion of a vehicle, ship, vessel, boat or aircraft or in the running of an engine of any kind.

Source: S.I. No. 311/1979: Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979.

Risk

The unwanted consequences of an activity connected with the probability of an occurrence. Often (including in this report) the probability of occurrence is replaced by the frequency of occurrence.

Source: Committee for Prevention of Disasters (1999) Guidelines for Quantitative Risk Assessment CPR 18E First Edition

Volatile Organic Compound

Any organic compound which evaporates readily to the atmosphere.

Arup Consulting Engineers

APPENDIX 1

Report on Survey of Petrol Retail Outlets, Bulk Stores, Jetties and LPG Installations

Arup Consulting Engineers

Department of Enterprise, Trade and Employment

Review of Dangerous Substances Acts 1972 and 1979 and Related Regulations

Report on Survey of Petrol Retail Outlets, Bulk Stores, Jetties and LPG Installations

REV A

Arup Consulting Engineers

Department of Enterprise, Trade and Employment

Review of Dangerous Substances Acts 1972 and 1979 and Related Regulations

Report on Survey of Petrol Retail Outlets, Bulk Stores, Jetties and LPG Installations

July 2008

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EXECUTIVE SUMMARY

Arup Consulting Engineers (Arup) was commissioned by the Department of Enterprise, Trade and Employment to carry out a review of the Dangerous Substances legislation as it applies to the regulation of the delivery, storage and dispensing of petroleum spirit and liquefied petroleum gas (LPG) at retail stations as well as the current controls on jetties, bulk petroleum stores and the storage of LPG.

This report has been prepared in accordance with agreed report phasing for the work and presents the findings of surveys and risk assessments carried out by Arup of petroleum retail outlets, oil jetties, bulk petroleum stores, and LPG installations.

25 petroleum retail outlets from 8 counties were surveyed in order to determine the broad level of compliance with respect to S.I. No. 311 of 1979. Company-owned and private dealer-owned sites were surveyed. 'Kerbside' operations were also surveyed. The outlets were assessed against those aspects of the Regulations that could be visually determined. Issues on which there was compliance at less than 50% of the petroleum retail sites were as follows:

- Provision of at least 4m distance between tank vehicle transfer area and the dispensing pumps;
- Requirement to display emergency contact details;
- Dispensing pump operating instructions

Lists were also collated on a nation-wide basis of:

- Petroleum retail outlets;
- Petroleum bulk stores;
- Oil jetties;
- LPG retail outlets.

The location of 2,033 petroleum retail outlets is provided in this report (refer to Appendix B). This data has been purchased from Experian Catalist, a company providing information relating to the retail petroleum industry. Information from Local Authorities was generally not forthcoming. We have not been able to establish that information from these sources is up-to-date.

A list of petroleum bulk stores was obtained from the Health and Safety Authority. It has not been possible to determine if all of these are currently operational.

The LPG Regulations (S.I. No 271 of 1990) apply to all facilities storing in excess of 160 L of LPG for use in the course of business. A list of facilities to which the Regulations apply is therefore effectively a customer list for Flogas and Calor Gas. It has not been possible to obtain this information, as it is confidential commercial information. In any case, it considered of questionable value in the context of the report. A list of LPG retail outlets provided by the Irish LPG Association (ILPGA) is included in this report.

Those facilities to which both the Dangerous Substances Acts and the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations (Seveso II) apply are also listed.

Detailed risk assessments were carried out of sample petroleum retail outlets, oil storage facilities and LPG storage facilities visited during the above surveys. The likelihood of loss of containment of petroleum product at each of the facilities was determined from published data. This information was used to assign a frequency factor to the event. A qualitative assessment of the severity of the consequences was made. The risk of the different incidents

was determined i.e. the product of the frequency of a given event and the potential severity of its consequences. The accident events were then ranked in descending order of risk.

Higher risk scenarios were identified at the petroleum bulk stores than at retail outlets or at LPG facilities. Bulk stores are generally considered to present a greater risk than retail outlets because of the larger quantities of dangerous substances stored. While the potential consequences associated with ignition of LPG are extremely severe with respect to the potential for harm to human beings, the low likelihood of occurrence reduces the risk.

1. INTRODUCTION

Arup Consulting Engineers (Arup) was commissioned by the Department of Enterprise, Trade and Employment to carry out a review of the Dangerous Substances legislation as it applies to the regulation of the delivery, storage and dispensing of petroleum spirit and liquefied petroleum gas (LPG) at retail stations as well as the current controls on jetties, bulk petroleum stores and the storage of LPG.

This report has been prepared in accordance with agreed report phasing for the work and presents the findings of surveys carried out by Arup of petroleum retail outlets, oil jetties, bulk petroleum stores, and LPG installations.

2. SCOPE

The scope of this report is as follows:

- Petroleum retail outlet survey
- Oil jetty survey
- Bulk petroleum store survey
- LPG installation survey
- Survey of facilities to which the European Communities (Control of Major Accidents Involving Dangerous Substances) Regulations S.I. No. 74 of 2006 apply.

3. PETROLEUM RETAIL OUTLET SURVEY

The purpose of the petroleum retail outlet survey was to determine the number and geographic location of all petroleum retail outlets currently in operation in Ireland whether operated by oil companies, commercial operators or independent retailers.

The number and location of the petroleum retail outlets was initially obtained from communications with the following:

- Chief Fire Officers
- 26 No. Local Authorities
- Irish Petroleum Retail Association
- Irish Petroleum Industry Association
- Topaz Energy Limited
- Esso Ireland Limited
- Maxol Group
- Texaco (Ireland) Limited
- Emo Oil Limited
- Campus Oil Limited

The location of 943 retail petroleum outlets was determined in this way. The location by county of all 2,033 petroleum retail outlets in Ireland was purchased from Experian Catalist, a UK based company specialising in the provision of information relating to the petroleum retail industry (refer to Appendix B). A site survey of 25 outlets (8 No. kerbside stations and 17 No. forecourt stations) was undertaken in order to review the status of typical petroleum retail outlets across the country. The survey was designed to determine compliance with the requirements set out under the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979 S.I. No. 311 of 1979. The survey form is shown in Appendix B).

With the exception of Dublin City Council, none of the local authorities maintains an up-to-date record of licensed and unlicensed petroleum retail outlets within their administrative area. Seven local authorities were able to provide an outdated list. 17 local authorities attempted to compile the information but suggested it would be outdated and would take a considerable amount of time to gather. One local authority suggested that there were no records at all. The primary reason given for the lack of enforcement of the licensing system from all authorities was inadequate resources.

Of the 25 petroleum retail outlets surveyed, 9 held a valid license issued under the 1979 Regulations, 15 did not hold a valid licence and 1 was not determined. Of the licensed facilities all were forecourts and none were kerbside. The key findings from each of the sites s surveyed are presented in Table 1.

Table 1 Forecourt Survey Results (25 sites)

Relevant Section in S.I. No. 311 of 1979	Item	No. of Compliant Sites	No. of Non-Compliant Sites
II (13)	Petroleum leakages[1]	25	0
II (15)	Petroleum transfer >4m distance to dispensing pumps	12	13
II (15)	Petroleum transfer – maintenance of surface area including petrol interceptors	18	7
II (15)	Petroleum delivery - safe parking for trucks	16	9
II (24)	Electrical Apparatus	15	10
II (25)	"No Smoking" signs	19	6
II (28)	Underground tanks – weekly inspections of tanks >20 years old	15	10
II (30)	Staff training	16	9
II (31)	Underground tanks – suitable design and pressure testing[2]	17	1
II (31)	Underground tanks – appropriate measuring devices	25	0
II (31)	Manholes - nameplate details	22	3
II (32)	Underground tanks – capacity >40,000L	25	0
II (32)	Manholes - locations	15	10
II(35)	Colour coded and locked filling/dipping lines [3]	15	3
II (36)	Ventilating pipes - location	20	5
II (36)	Ventilating pipes – rainwater prevention	23	2
II (36)	Ventilating pipes - 4m height	20	5
II (36)	Ventilating pipes – 6m to dispensing pumps	21	4
II (36)	Ventilating pipes – building obstruction	22	3
II (36)	Ventilating pipes – flame arresting device[4]	19	2
II (41)	Underground tanks - 250mm concrete layer [5]	5	0
II (42)	Pedestrian footways	19	6
II (46)	Fire extinguishers	16	9
II (46)	Emergency contact details	5	20
II (46)	Emergency exits	20	5
II (53)	Empty containers	23	2
II(56)	Dispensing pumps - operation instructions	8	17
II(56)	Dispensing pumps – no smoking signs	16	9

[1] Minor spillages of diesel oil were evident at all sites
[2] Inspection of underground tank layout could not be conducted at 7 sites
[3] Inspection of filling and dipping lines could not be conducted at 7 sites
[4] The presence of flame arresting devices was not known at 4 sites
[5] Inspection of concrete layers could not be conducted at 20 sites

Of all the sites surveyed, 20 showed evidence of diesel spillages, particularly around the dispensing pump area. It could not be determined whether the spillages occurred as a result of dispensing activities or equipment malfunction. Petroleum spillages could not be determined due to the volatility of the substance.

Petroleum delivery and safe parking requirements specified in Regulation 15 of S.I. No. 311 of 1979 were complied with at 14 forecourts, and 2 kerbside stations. At the six remaining kerbside stations, non-compliances were largely due to space restrictions and the proximity of the manholes to pedestrian footpaths and public roads.

The presence of petrol/oil interceptors was determined from communications with site personnel. Petrol/oil interceptors were not examined at any sites. The survey identified 16 forecourts and 2 kerbsides which had petrol/oil interceptors in place.

Regulation 24 of S.I. No. 311 of 1979 requires *inter alia* that electrical apparatus likely to ignite flammable Class I vapours not be installed in such areas. While a formal designation of potentially explosive atmospheres was outside the scope of the surveys, 10 of the sites were found to have inappropriately rated electrical equipment within potentially explosive atmospheres.

Empty tanks were present on 2 of the surveyed sites. Both tanks had previously held diesel. On one of these sites the presence of the diesel empty tank was due to the introduction of E85 (bioethanol) on-site. As each pair of tanks were connected and filled via overflow, one tank had to remain empty as demand for E85 did not warrant filling two tanks. All underground tanks did possess a suitable measuring device and none exceeded the 40,000L limit specified in the Regulations.

The requirements specified in the Regulations for vent pipes were complied with at the majority of sites. The greatest number of non-compliances regarding vent pipes concerned the location of the pipes relative to the site boundary and to dispensing pumps.

Appropriate fire fighting equipment was present at 16 of the 25 sites surveyed. Only 5 sites had details of emergency contacts in a prominent place and 20 sites had adequate means of escape from the store in the event of a fire.

It was also noted that there was no collision protection at any of the kerbside sites.

4. OIL JETTY SURVEY

The purpose of the oil jetty survey was to establish the number of oil jetties to which the Dangerous Substances Act 1972 (Oil Jetties) Regulations, 1979 (S.I. No. 312 of 1979) apply. The location of all operational oil jetties was obtained from the Health and Safety Authority (HSA, refer to Table 2). All of these facilities are licensed under S.I. No. 312 of 1979.

Table 2 Licensed Oil Jetties

No.	Company Name	Address
1	Shannon Foynes Port Company	Dernish Island, Shannon Airport, Co. Clare
2	Bantry Bay Terminals Ltd.	Bantry, Co.Cork
3	Cork H.C. Oil Jetty (Cattle Berth)	Tivoli Docks, Co. Cork (Texaco/Esso Joint)
4	Marino Point Jetty	Marino Point, Cobh. Co. Cork
5	ConocoPhillips Whitegate Refinery Ltd.	Whitegate. Co.Cork.
6	Shannon Foynes Port Company	Foynes, Co. Limerick
7	Galway Harbour Commissioners	Galway Port, Co. Galway
8	Deancrest Ltd	Quay Street, Dundalk, Co. Louth
9	Dublin Port & Docks Board	Dublin Port, Dublin 1
10	New Ross Port Company	New Ross, Co. Wexford
11	Morris Oil Ltd.	Fiddown, Co. Kilkenny
12	Drogheda H.C.	Drogheda Port, Co. Louth

5. BULK PETROLEUM SURVEY

The purpose of the bulk petroleum stores survey was to establish the number of bulk stores which are licensed or should be licensed under the Dangerous Substances Act 1972 (Petroleum Bulk Stores) Regulations 1979 (S.I. No. 313 of 1979).

Information on bulk petroleum stores was obtained from the following sources:

- Health and Safety Authority
- Topaz Energy Limited
- Esso Ireland Limited
- Maxol Group
- Texaco (Ireland) Limited
- Emo Oil Limited
- Campus Oil Limited

A list of bulk petroleum stores is provided in Appendix C.

6. LPG INSTALLATIONS SURVEY

The purpose of the LPG survey was to establish the number of petroleum stores at which LPG is stored and dispensed and other locations at which LPG is stored and made available to which the Dangerous Substances (Storage of Liquefied Petroleum Gas) Regulations 1990 (S.I. No. 201 of 1990) would apply. The LPG survey applied to facilities storing LPG gas in quantities greater than 70 kg or 160 L for dispensing purposes, with the exception of LPG gas in the fuel tanks of vehicles or engines. Details of LPG storage facilities were obtained from the Irish LPG Association (refer to Appendix D).

7. FACILITIES SUBJECT TO S.I. NO. 74 OF 2006 (THE SEVESO II REGULATIONS)

A list of all establishments identified in Section 3 to Section 6 above which are believed to fall within the thresholds set out in the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 (S.I. No. 74 of 2006) was obtained from the HSA (refer to Table 3 and Table 4).

Table 3 Upper Tier Seveso Establishments

No.	Operator	Location
1	ConocoPhillips Bantry Terminals Ltd.	Reenrour, Bantry, Co. Cork
2	Calor Gas Teo	Tolka Quay, Alexander Rd. Dublin 1
3	Calor Gas Teo	Whitegate, Co. Cork
4	Calor Gas Teo	Tivoli, Co. Cork
5	Esso Ireland Ltd.	Dublin Joint Fuels Terminal, Alexandra Rd. Dublin 1
6	Flogas Irl. Ltd	Marsh Rd. Drogheda, Co. Louth
7	Flogas Irl. Ltd	Tivoli Ind. Est, Co. Cork
8	Conoco Phillips Whitegate Refinery Ltd.	Whitegate, Co.Cork
9	National Oil Reserves Agency	ESB Marina Tank Farm, Centre Park Road, Co. Cork.
10	Shannon Aviation Fuels	Aer Rianta Fuel Farm Road, Shannon Airport, Shannon, Co Clare.
11	Tedcastles Oil Products (Yard 2)	Promenade Rd, Dublin 3
12	ENWest Limited Galway Harbour	Enterprise Park, New Docks, Co. Galway

Table 4 Lower Tier Seveso Establishments

No.	Operator	Location
1	Barrow Storage Co. Ltd. T/A Campus Oil	Marshmeadows, New Ross, Co. Wexford
2	Braun Ireland Ltd.	Dublin Road, Co. Carlow
3	Brooklands Gas Co. Ltd.	Church Rd. Ballina, Co. Mayo
4	Calor Teo	Claremorris, Co. Mayo
5	Derrymore Agencies Ltd.	Quaterstown, Mallow, Co. Cork
6	Dublin Bay Power	Pigeon House Road, Dublin 4
7	ESB Aghada Power Station	Whitegate, Co. Cork
8	ESB Poolbeg Power Station	Pigeon House Road, Dublin 4
9	ESB North Wall Generating Station	Alexander Rd, Dublin 1
10	ESB - Rhode Generating Station	Rhode, Co. Offaly
11	ESB - Tawnaghmore Generating Station	Tawnaghmore, Ballina, Co. Mayo
12	Esso Ireland Ltd. Dublin Airport Joint Storage Facility	Corballis Park, Dublin Airport.
13	Esso Ireland Ltd. Joint Fuels Terminal	Marshmeadows, New Ross, Co. Wexford
14	Flogas Irl. Ltd	Hazelhill, Ballyhaunis, Co. Mayo
15	Iarnrod Eireann	Inchicore, Dublin 8
16	Iarnrod Eireann	Alexander Rd, Dublin Port. Dublin 1
17	Topaz Energy Ltd. (Irish Shell)	Centre park road, Co. Cork
18	Topaz Energy Ltd. (Irish Shell	Site 1, Alexandra Road, Dublin 1
19	Topaz Energy Ltd. (Irish Shell)	Courtbrack Road, Co. Limerick
20	Topaz Energy Ltd. (Irish Shell)	Site 2, Alexandra Road, Dublin 1
21	Topaz Energy Ltd. (Irish Shell)	Site 3, Alexandra Road, Dublin 1
22	Topaz Energy Ltd. (Irish Shell)	New Docks, Co. Galway
23	Leeside Oil Terminal Company Ltd	Lough Atalia Road, Co. Galway
24	Marsh Oil Products Ltd.	Marsh Road, Drogheda, Co. Louth
25	Statoil Ireland Ltd Yard 1	Leeside Oil Terminal, Promenade Road, Dublin Port, Dublin 3
26	Statoil Ireland Ltd Yard 2	Leeside Oil Terminal, Promenade Road, Dublin Port, Dublin 3
27	Tedcastles Oil Products (Yard 1)	Promenade Rd. Dublin 3.
28	Barrow Storage Co. Ltd. T/A Campus Oil Marsh Meadows	Drogheda, Co. Louth
29	Gensys Power Ltd. T/A Huntstown Power Station	Huntstown Quarry. Dublin 11

8. HAZARDOUS PROPERTIES OF PETROLEUM PRODUCTS

The hazards associated with the storage and handling of petroleum products relates to (a) the risk of fire and/or explosion and (b) the risks posed to human health and (c) the risks posed to the environment. CONCAWE (European Oil Company Organisation for Environment, Health and Safety) publishes product dossiers summarising the physical and chemical properties of and toxicological, health, safety and environmental information available on oil products. The human health and ecotoxicological information below is extracted from the following CONCAWE product dossiers:

- Product Dossier No. 92/103: Gasolines
- Product Dossier No. 94/106: Kerosenes/Jet Fuels
- Product Dossier No. 95/107: Gas Oils (Diesel Fuels/Heating Oils)

8.1 Fire and Explosion Hazards

All petroleum products are combustible, however, only some are classified as flammable i.e. the flash point (refer to Appendix A.2 for definitions) is less than 21ºC. Gasoline and LPG are classified as flammable, and present a significant explosion hazard. Leaks of LPG and of gasoline can lead to a vapour cloud whose composition is within the lower and upper flammable or explosive limits. Such clouds can explode if an energetic source of ignition is present. A source of ignition with quite low energy is sufficient to ignite such a cloud.

Other petroleum products such as kerosene and diesel oil are combustible, but require a source of heat to generate a flammable vapour, or mechanical means to create an aerosol.

Heavier oils are even more difficult to ignite, and may present only an environmental hazard, unless the conditions are exceptional.

8.2 Health Hazards

Petroleum products may also pose a threat to human health if inhaled, ingested or if they come into contact with the skin or eyes.

8.2.1 Gasoline [1]

8.2.1.1 Inhalation

Gasoline is a highly volatile substance and can produce significant vapour quantities even at ambient temperatures. Exposure to low vapour concentrations are unlikely to give rise to significant health effects, however prolonged exposure can cause irritation of the upper respiratory tract, headache, dizziness, nausea and loss of consciousness.

8.2.1.2 Ingestion

Ingestion is an unlikely event but can result in irritation of the digestive tract, diarrhoea, vomiting and aspiration into the lungs.

8.2.1.3 Skin Contact

Repeated or prolonged exposure to skin from gasoline can result in drying or cracking of the skin, irritation and in some cases, chemical burns.

8.2.1.4 Eye Contact

Contact of liquid or vapour gasoline with the eye can result in moderate to severe irritation and conjunctivitis.

8.2.2 Kerosine [2]

8.2.2.1 Inhalation

Under normal storage conditions the vapour pressure of kerosine is too low to pose any health risk. However, inhalation of vapours can occur given high temperatures and poor ventilation and can result in narcotic effects, loss of consciousness and irritation of the upper respiratory tract.

8.2.2.2 Ingestion

The taste and smell of kerosine would normally limit ingestion, however if kerosine is ingested vomiting can occur, with the associated risk of aspiration of gas oil into the lungs. Ingestion can also give rise to irritation of the mouth, throat and gastrointestinal tract.

8.2.2.3 Skin Contact

Skin contact can result in the removal of natural fat from the skin. Repeated or prolonged exposure can result in drying or cracking of the skin. Excessive exposure under conditions of poor personal hygiene can result in acne, folliculitis or the development of warty growths.

8.2.2.4 Eye Contact

Eye contact can cause transient irritation or in the case of prolonged exposure, conjunctivitis.

8.2.3 Gas Oils (Disel Fuels/Heating Oils) [3]

8.2.3.1 Inhalation

Under normal storage conditions the vapour pressure of gas oils is too low to pose any health risk. However, inhalation of vapours can occur given high temperatures and poor ventilation and can result in central nervous and respiratory system depression.

8.2.3.2 Ingestion

The taste and smell of gas oil would normally limit ingestion, however if gas oil is ingested vomiting can occur, with the associated risk of aspiration of gas oil into the lungs. Ingestion can also give rise to irritation of the mouth, throat and gastrointestinal tract.

8.2.3.3 Skin Contact

Skin contact can result in the removal of natural fat from the skin. Repeated or prolonged exposure can result in drying or cracking of the skin. Excessive exposure under conditions of poor personal hygiene can result in acne, folliculitis or the development of warty growths.

8.2.3.4 Eye Contact

Eye contact can cause mild stinging and/or redness. Exposure to particularly high concentrations can also cause eye irritation.

8.3 Ecotoxicological Hazards

8.3.1 Gasoline [1]

Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc.), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

In general, gasoline exhibits some short-term toxicity to freshwater and marine organisms. However, based on the volatility, biodegradability and non-bioaccumulative nature, spilt gasoline is unlikely to remain in the water column in sufficient quantities to cause aquatic effects and as a result presents a minimal overall risk to the environment.

8.3.2 Kerosine [2]

When kerosines escape into the environment due to leakages or spillage, most of the constituent hydrocarbons will evaporate and will be photodegraded by reaction with hydroxyl radicals in the atmosphere. Atkinson has calculated the half-lives in air for many of the individual hydrocarbons found in kerosines under these conditions and all are less than one day. The less volatile hydrocarbons remain floating on the surface of the water.

Bioaccumulation of hydrocarbons in fish has also been reported as a kerosine-like taint in sea mullet.

8.3.3 Gas Oils (Diesel Fuels/Heating Oils) [3]

On release to the environment the lighter components of gas oil will generally evaporate and be photooxidised. Depending on the circumstances, the remainder may become dispersed in the water column or adsorbed to soil or sediment. On release into water, gas oils will tend to float on the surface and spread out. Approximately 40% biodegradation has been recorded over 28 days.

8.4 Qualitative Risk Assessment Methodology

A qualitative risk assessment of 10 facilities identified from Section 2 to Section 7 was undertaken. The risk assessment was designed to identify all serious accident hazards, taking into account the provisions of the Dangerous Substances Act and related Regulations. The accidents assessed were based on published scenarios [4].The following facilities were assessed:

- 2 No. forecourt petroleum retail outlets
- 2 No. kerbside petroleum retail outlets
- 3 No. petroleum products bulk stores
- 1 No. oil jetty
- 1 No. LPG jetty
- 1 No. LPG bulk store

8.4.1 Likelihood (Frequency) of Hazardous Events

The likelihood of each potential incident was assessed qualitatively by taking into account the precautions actually in place to prevent, detect, suppress or mitigate the event. A frequency factor was applied to each identified incident (refer to Table 5). Where a published value for incident likelihood was available, this was used to assign a frequency factor to the event.

Table 5 Frequency Factors

Factor	Likelihood		
	Frequency	Description	
0	0	Impossible	Absolutely impossible, or theoretically possible, but incredible
1	$<10^{-6}$ per year	Very low	Extremely Unlikely
2	10^{-6} to 10^{-4} per year	Low	Very Unlikely
3	10^{-4} to 10^{-2} per year	Medium	Unlikely
4	10^{-2} to 1 per year	High	Improbable
5	> 1 per year	Very high	Probable

8.4.2 Consequences of Hazard Events

Consequences were assessed qualitatively with reference to credible hazardous events (refer to Table 6).

Table 6 Potential Hazardous Events and Consequences

Hazardous Event	Consequences
Pool fire	Thermal effects Overpressurisation and rupture of storage tank
Jet fire	Thermal effects
Flash fire	Thermal effects
Vapour cloud explosion	Overpressure
Tank leak/rupture	Soil/groundwater/surface water contamination
Pipe leak/rupture	Soil/groundwater/surface water contamination
Pump leak/rupture	Risk of escalation of the event (on-site) and/or domino effects (off-site)
Loss of containment from road tanker wagon	Soil/groundwater/surface water contamination
Loss of containment from ship	Surface water contamination

The magnitude of each consequence was determined by taking into account the following key features:

- The spatial scale of the consequences: the geographical scale of harm resulting from an environmental impact may often extend considerably beyond the boundaries of the source of the hazard. The consideration of this feature shall prevent the scope of the risk assessment from being too limited
- The temporal scale of the consequences: the duration of the harm may be so prolonged that the damage can be assumed to be permanent and the environment beyond recovery
- The environmental sensitivity of the affected area.

A consequence factor was applied to each incident (refer to Table 7). Accident scenarios were ranked in order of decreasing overall risk factor. Where the overall risk factor was the same for different accident scenarios, they were ranked in order of decreasing frequency factor

Table 7 Consequence Factors

	Definitions											
		On-site				Off-site				Environment		
Factor	**Description**	**Injury On-site**	**Airborne On-site**	**Damage to Property**	**On-site Escalation Potential**	**Injury Off-site**	**Airborne Off-site**	**Damage to Property**	**Other Off-site**	**Terrestrial**	**Freshwater/ Marine**	**Aquifer/ Ground-water**
5	Catastrophic	Many (≥10) fatalities. ≥50 serious injuries.	Major airborne release resulting in the site being shutdown.	Damage costing ≥ €25million.	Fire close to flammable material storage area. Risk of rapid spread to sensitive buildings.	One or more fatalities. Several injuries. >100 in hospital.	Release of large quantities of toxic materials, serious off-site effects.	Damage costing ≥ €10million.	Dwelling(s) indefinitely unusable as result of an accident. (Persons x evacuation time (hours)) value ≥2500. (Persons x interruption time drinking water, electricity, gas or telephone service (hours)) value ≥5000.	Destruction of protected species and/or habitat. ≥20ha widespread habitat incl. agricultural land indefinitely contaminated.	Significant or long-term damage to: ≥100km river/canal ≥10ha lake/pond ≥20ha delta ≥20ha coastline /open sea	Significant damage to ≥100ha.
4	Major	Single or few fatalities. 6+ serious injuries.	Major on-site concern. Fires, explosions, evacuation.	Damage costing ≥ €2.5million.	Fire close to flammable material storage area. Risk of rapid spread to sensitive buildings.	Serious injuries. Tens in hospital.	Serious toxic emission resulting in evacuation, hospitalisation, etc.	Damage costing ≥ €1million.	Dwelling(s) unusable as a result of the accident. (Persons x evacuation time (hours)) value ≥500. (Persons x interruption time drinking water, electricity, gas or telephone service (hours)) value ≥1000.	Permanent or long-term damage to: ≥0.5ha habitat protected by legislation and/or ≥10ha widespread habitat incl. agricultural land.	Significant or long-term damage to: ≥10km river/canal ≥1ha lake/pond ≥2ha delta ≥2ha coastline/open sea.	Significant damage to ≥10ha.
3	Severe	Single or few serious injuries.	Serious on-site concern.	Damage costing ≥ €0.25million.	Fire in or near sensitive building.	Few people require hospital treatment. Emergency plan in operation.	Fire or smoke effecting off-site area. Radio warning to the public. Off-site emergency plan in operation.	Damage costing ≥ €100,000	Dwelling(s) unusable as a result of the accident (Persons x evacuation time (hours)) value ≥100. (Persons x interruption time drinking water, electricity, gas or telephone service (hours)) value ≥200.	Long-term damage to: ≥ 0.25ha habitat protected by legislation and/or ≥ 5 ha widespread habitat incl. agricultural land.	Significant or long-term damage to: ≥5km river/canal ≥0.25ha lake/pond ≥0.5ha delta ≥0.5ha coastline/open sea.	Significant damage to ≥5ha.
2	Significant	Lost time accident.	Severe nuisance. Noise, smell, dust, etc.	Damage costing ≥ €25,000.	Fire in or near sensitive building.	Short term, minor effects.	Sustained nuisance levels of atmospheric pollution. One off unusual problems causing complaints.	Damage costing ≥ €10,000.	Short-term evacuation of dwellings.	Short-term damage to: habitat protected by legislation and/or ≥5 ha widespread habitat incl. agricultural land.	Short-term damage to: ≥5km river/canal ≥0.25ha lake/pond ≥0.5ha delta ≥0.5ha coastline/open sea.	Short-term damage to ≥5ha.
1	Minor	Minor injury.	Nuisance only.	Damage costing €1000's.	Incident occurs in isolated area on-site.	Nuisance Off-site.	Short duration minor problems.	Damage costing €100's.	Dwellings useable but short-term interruption of utilities.	Short-term damage to <5ha widespread land incl. agricultural land.	Short-term, noticeable damage to river/canal, lake/pond, delta, coastline/open sea.	Short-term damage to <1ha.

8.4.3 Catastrophic Rupture of Bulk Tanks

Catastrophic rupture (instantaneous release of the complete inventory) of bulk tanks, while unlikely, is a credible scenario. The Environmental Protection Agency's (EPA) guidelines [5], state that where retention of liquid is required, following capacity is to be provided:

- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the volume of the substance which could be stored within the bunded area, whichever is the greater.

Bunds are intended to contain a leakage of hazardous material from the primary containment unit. However, most bunds will not contain the entire tank inventory for a catastrophic loss of containment event. A number of correlations have been developed for the potential overtopping of the bund wall following the catastrophic rupture of a storage tank. In all cases, some overtopping of the bund wall is predicted by the correlation. For a given bund/tank arrangement, the average percentage overtopping predicted is approximately 70%.

HSE CRR 324/2001 [6], prepared by WS Atkins gives correlations for calculating bund overtopping. The correlations imply overtopping in all cases where the height of the bund wall is less than the height of the tank, e.g.:

$$Q = e^{-3.8898(h/H)}$$

where:

Q = fraction of the tank contents that will overtop a vertical bund wall

h = bund wall height

H = height of liquid in the tank.

9. QUALITATIVE RISK ASSESSMENT FOR FORECOURT NO. 1

9.1 Description of Facility

The site is a large suburban forecourt located approximately 5 km from Dublin City centre. It comprises 4 pumps, 3 underground tanks containing petroleum spirit (3 x 20,500 L), one underground tank containing diesel (22,000 L) and one underground tank containing bioethanol (3,800 L). LPG cylinders are also stored on-site. Although compliance with the Regulations was generally observed to be good, the proprietor did not possess a valid license. The quantities of the various products stored on-site are presented in Table 8.

Table 8 Quantities of Flammable Materials Stored On-site

Petroleum Product	Volume (L)	Relative Density	Quantity (tonnes)
Petroleum Spirit (Class 1 hydrocarbon)	53,000	0.72 – 0.78 @ 15ºC	39.8
Diesel (Class 3 hydrocarbon)	19,200	0.82 – 0.86 @ 15ºC	16.1
LPG	-	0.5 – 0.6 @ 15 ºC	0.13
Bioethanol (E85)	2,750	0.72 – 0.78 @ 15ºC	2.1
TOTAL			58.1

Road tankers from an authorised distributor supply petroleum products to the station. Road tankers fill the underground tanks from colour-coded filling lines located within the forecourt area. All ventilating pipes, delivery requirements and signage meet the minimum requirements set out in the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979. There is one empty underground tank at the site which is filled via overflow from the E85 tank. However, as there is currently not sufficient demand to warrant filling two tanks with E85, this tank has remained empty. Site plans indicate that all underground tanks are appropriately spaced and designed in accordance with the Regulations.

9.2 Fire Prevention/Mitigation On-site

There are adequate means of extinguishing and fighting fire on the premises i.e. 2 extinguishers of 9 L (foam).

9.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. The potential loss of containment scenarios are identified and ranked in Table 9. Frequency and consequence factors have been assigned in order to calculate the risk associated with a given event. A detailed description of the means of loss of containment prevention, detection, isolation and suppression is given in Appendix E.

9.4 Assessment of Risk

The risk assessment for each of the identified hazards (1-14) is presented Table 9 (the individual risk assessments are presented in Appendix E).

Table 9 Record of the Identification and Ranking of Major Accident Hazards for Forecourt No. 1

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
14	Loss of containment from road tanker wagon – fire under vehicle	3	4	12
3	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm	3	3	9
1	Loss of containment from underground tank - instantaneous release of the complete inventory	3	3	9
2	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release	3	3	9
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	3	3	9
4	Loss of containment underground tank - tank overfill	3	2	6
7	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline	3	2	6
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
5	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	2	2	4
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3
6	Loss of containment from a pipe – leak	2	1	2
13	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

10. QUALITATIVE RISK ASSESSMENT FOR FORECOURT NO. 2

10.1 Description of Facility

The site is a large urban service station located approximately 2 km from Dublin City Centre comprising 4 pumps, 2 underground tanks containing petroleum spirit (2 x 35,150 L) and one underground tank containing diesel (1 x 35,150 L). LPG cylinders are also stored on-site. The proprietor possesses a valid licence. The quantities of petroleum and diesel stored on-site are presented in Table 10.

Table 10 Quantities of Flammable Materials Stored On-site

Petroleum Product	Volume (L)	Relative Density	Quantity (tonnes)
Petroleum Spirit (Class 1 hydrocarbon)	70,300	0.72 – 0.78 @ 15ºC	52.7
Diesel (Class 3 hydrocarbon)	35,150	0.82 – 0.86 @ 15ºC	29.5
LPG	-	0.5 – 0.6 @ 15 ºC	0.06
TOTAL			82.3

Road tankers from an authorised distributor distribute petroleum products to the station. Road tankers fill the underground tanks from colour-coded and locked filling lines located in the forecourt area. All ventilating pipes, delivery requirements and signage meet the minimum requirements set out in the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979. There are no empty containers stored on-site. Site plans also indicated that all underground tanks are suitably spaced and designed.

10.2 Fire Prevention/Mitigation On-site

There are adequate means of extinguishing and fighting fire on the premises i.e. 2 extinguishers of 9 L (foam).

10.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. The potential loss of containment scenarios are identified and ranked in Table 11. Frequency and consequence factors have been assigned in order to calculate the risk associated with a given event. A detailed description of the means of loss of containment prevention, detection, isolation and suppression is given in Appendix E.

10.4 Assessment of Risk

The risk assessment for each of the identified hazards (1-14) is presented in Table 11. Individual risk assessments are presented in Appendix E.

Table 11 Record of the Identification and Ranking of Major Accident Hazards for Forecourt No. 2

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
14	Loss of containment from road tanker wagon – fire under vehicle	3	4	12
3	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm	3	3	9
1	Loss of containment from underground tank - instantaneous release of the complete inventory	3	3	9
2	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release	3	3	9
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	3	3	9
4	Loss of containment underground tank - tank overfill	3	2	6
7	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline	3	2	6
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
5	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	2	2	4
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3
6	Loss of containment from a pipe – leak	2	1	2
13	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

11. QUALITATIVE RISK ASSESSMENT FOR KERBSIDE NO. 1

11.1 Description of Facility

The site is located in a small rural village and comprises 2 tanks (petrol and diesel) and 1 pump. Dispensing of petroleum products takes place approximately 2 m from the roadside. There is no pedestrian footway although pedestrians are likely to use the roadside. There is no crash barrier between the pumps and the roadside. The quantities of petroleum, diesel and LPG stored on-site are presented in Table 12.

Table 12 Quantity of Flammable Materials Stored On-site

Petroleum Product	Volume (L)	Relative Density	Quantity (tonnes)
Petroleum Spirit (Class 1 hydrocarbon)	5,000	0.72 – 0.78 @ 15ºC	3.75
Diesel (Class 3 hydrocarbon)	2,000	0.82 – 0.86 @ 15ºC	1.68
LPG	-	0.5 – 0.6 @ 15 ºC	0.06
TOTAL			5.5

Road tankers from an authorised distributor distribute petroleum products to the station. Petroleum transfer takes place at a manhole located less than 4 m from the dispensing pump. There is no safe parking or adequate lighting for the delivery tanker. Ventilating pipes do not meet all of the minimum requirements set out in the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979. There is no appropriate signage on or around the pumps. Both tanks are over 20 years old. There are no empty containers stored on-site.

11.2 Fire Prevention/Mitigation On-site

There is no means of extinguishing or fighting fire on the premises.

11.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. The potential loss of containment scenarios are identified and ranked in Table 13. Frequency and consequence factors have been assigned in order to calculate the risk associated with a given event. A detailed description of the means of prevention, detection, isolation and suppression is given in Appendix E.

There are a number of incidents or items listed below, particularly relevant to kerbside sites, which can cause or exacerbate a fire hazard [7]:

- People smoking within the hazardous area
- Filling inappropriate containers with petrol
- Parked vehicles obstructing escape routes
- Cutting grass with an electric or petrol motor within the hazardous area
- Overstretching of dispenser hoses

- Incorrect stowage of dispenser nozzle
- Leaving engine running while filling
- Using a mobile phone or electrical equipment within the hazardous area
- Leaving rubbish on-site
- Children playing in and around site
- Contractors working adjacent to the site without due care of hazardous area
- Inadequate maintenance of site and electrical equipment
- Under age people dispensing petrol.

Kerbsides are generally more exposed to fire hazards as a result of the proximity of pedestrian footways and public roads. In addition, it was observed that many of the kerbsides surveyed had inadequate space for the delivery of petroleum products, no staff training and signage was lacking.

11.4 Assessment of Risk

The risk assessment for each of the identified hazards (1-14) is presented in Table 13. The individual risk assessments are presented in Appendix E.

Table 13 Record of the Identification and Ranking of Major Accident Hazards for Kerbside No. 1

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
14	Loss of containment from road tanker wagon – fire under vehicle	3	4	12
3	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10mm	3	3	9
1	Loss of containment from underground tank - instantaneous release of the complete inventory	3	3	9
2	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release	3	3	9
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	3	3	9
4	Loss of containment underground tank - tank overfill	3	2	6
7	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline	3	2	6
13	Loss of containment from road tanker wagon – external impact	2	3	6
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
5	Loss of containment from a pump - full bore rupture of the largest connecting	2	2	4

	pipeline			
6	Loss of containment from a pipe – leak	3	1	3
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3

12. QUALITATIVE RISK ASSESSMENT FOR KERBSIDE NO. 2

12.1 Description of Facility

The site is a semi-rural kerbside station comprising 2 pumps, two underground tanks containing petroleum and one aboveground bunded tank containing diesel. The pumps are located approximately 1.5m from the roadside. There is no pedestrian footway although pedestrians are likely to use the roadside. There is no crash barrier between the pumps and the roadside. The quantities of petroleum and diesel stored on-site are presented in Table 14.

Table 14 Quantities of Flammable Materials Stored On-site

Petroleum Product	Volume (L)	Relative Density	Quantity (tonnes)
Petroleum Spirit (Class 1 hydrocarbon)	6,840	0.72 – 0.78 @ 15ºC	5.1
Diesel (Class 3 hydrocarbon)	2,740	0.82 – 0.86 @ 15ºC	2.3
LPG	-	0.5 – 0.6 @ 15 ºC	0.06
TOTAL			7.5

Road tankers from an authorised distributor distribute petroleum products to the station. Two underground unleaded petroleum tanks are located at the front of the shop and one aboveground bunded diesel tank is located at the rear of the shop. Road tankers fill the underground tanks from a manhole located approximately 4 m from the dispensing pumps at the front of the shop. The ventilating pipes do not meet all the requirements set out under the Dangerous Substances (Retail and Private Petroleum Stores) Regulations, 1979.

12.2 Fire Prevention/Mitigation On-site

There is one foam fire extinguisher on-site.

12.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. The potential loss of containment scenarios are identified and ranked in Table 15. Frequency and consequence factors have been assigned in order to calculate the risk associated with a given event. A detailed description of the means of prevention, detection, isolation and suppression is given in Appendix E.

12.4 Assessment of Risk

The risk assessment for each of the identified hazards (1-18) is presented in Table 15. The individual risk assessments are presented in Appendix E.

Table 15 Record of the Identification and Ranking of Major Accident Hazards for Kerbside No. 2

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
15	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
18	Loss of containment from road tanker wagon – fire under vehicle	3	4	12
3	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm	3	3	9
7	Loss of containment from aboveground tank - continuous release from a hole with an effective diameter of 10 mm	3	3	9
1	Loss of containment from underground tank - instantaneous release of the complete inventory	3	3	9
2	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release	3	3	9
6	Loss of containment from aboveground tank - continuous release of the complete inventory in 10 min at a constant rate of release	3	3	9
13	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	3	3	9
17	Loss of containment from road tanker wagon – external impact	3	3	9
4	Loss of containment underground tank - tank overfill	3	2	6
8	Loss of containment from aboveground tank - tank overfill	3	2	6
11	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline	3	2	6
5	Loss of containment from aboveground tank - instantaneous release of the complete inventory	2	3	6
16	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
9	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	2	2	4
10	Loss of containment from a pipe – leak	3	1	3
12	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
14	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3

13. QUALITATIVE RISK ASSESSMENT FOR BULK STORE NO. 1 AND OIL JETTY

13.1 Description of Facility

The bulk quantities of petroleum products stored at the facility are presented in Table 16.

Table 16 Quantity of Flammable Material Stored On-site

Petroleum Product	Volume (L)	Relative Density	Quantity (tonnes)
Motor Spirit (Petrol) (Class 1 hydrocarbon)	2,120,000	0.72 – 0.78 @ 15ºC	1,590
Kerosene (Class 2 hydrocarbon)	2,120,000	0.775 – 0.84 @ 15ºC	1,712
DERV (Class 3 hydrocarbon)	4,240,000	0.82 – 0.86 @ 15ºC	3,562
Marked Gas Oil (Class 3 hydrocarbon)	2,120,000	0.82 – 0.86 @ 15ºC	1,781
TOTAL			8,650

In addition, smaller volumes of bioethanol are stored on-site for blending of petrol and bioethanol.

The company is engaged in the importation, storage and handling of bulk petroleum products at the terminal. The quantities of flammable materials stored on-site are such as bring the facility under the requirements of the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2000 (S.I. No 74 of 2006).

The bulk store is located beside a river which acts as the fire fighting and tank cooling water supply. It occupies a rectangular shaped site of some 1.4 hectares. It has a road frontage of approximately 75m. It is flanked on one side by an LPG storage and importation facility with which it shares jetty facilities. On the other side is a vacant undeveloped site.

Facilities on-site are:

- Jetty at river to facilitate importation of bulk hydrocarbon oil products by ocean tanker
- Main bulk storage tank area for oil products
- Area of smaller service tanks for oil products
- Product pump area
- Road tanker loading gantry for bulk loading of oil products
- Electrical controls switch room and ESB sub station located on western side of site
- Road tanker parking area
- Office administration buildings to front of the site

- Fire pump house located adjacent to the river
- Entrance to the site, controlled by permanently on duty security.

13.2 Fire Prevention/Mitigation On-site

Fire prevention/mitigation measures in place on-site are described below. Water is supplied from town water and from river water.

13.2.1 Town Water

The town mains water supply is fed to the site via an underground pipeline to 4 No. aboveground fire hydrants equipped with quick couplings to facilitate a standard 65mm diameter fire hose.

In the event of a fire, additional town mains supplies can be made available via the fire hydrant system that exists at the neighbouring LPG facility.

13.2.2 River Water

In addition to the town mains water supply, the facility has the capacity to use river water for fire fighting and tank cooling. Separate pumps are used for the tank sprinkler and hydrant systems.

An underground piped hydrant system supplies 6 No. aboveground fire hydrants equipped with quick couplings to facilitate a standard 65 mm diameter fire hose.

A cooling water pipe work system is directed to the roofs of the 5 No. main storage tanks. This pipe work system consists of a single pipe which feeds a 5-way manifold situated aboveground at the rear of the tank farm, close to the bund wall. This 5-way manifold feeds five individual 150 mm diameter steel pipes that are connected to the top of each respective main storage tank, thereby enabling the tanks to be deluged with cooling water in the event of a fire. Splash plates are fitted to the eaves of each tank to direct the deluge of water onto the tank sides for tank cooling purposes. The 5-way manifold is controlled by 5 air valves fitted with air actuators, and operated by compressed air. The panel for controlling the open/close action of each of these valves is located on the eastern wall of the Electrical Switchroom. This enables remote operation to direct water onto the main tanks selected for cooling in the event of a fire.

Within the outlet pipework network coupled to the fire pumps, a cross-over branch exists enabling pumping of cooling water from the tank sprinkler pump to the fire hydrant network and from the fire hydrant pump to the tank sprinkler network so that both pipework networks are enabled for supply in the unlikely event of one of the fire pumps failing.

In addition, 2 No. specially designed “Hydrant to Hydrant” fire hoses are provided. These hoses are fitted with male couplings at both ends, and thus can be used to feed mains water into a “dry” hydrant pump hydrant system, in an emergency.

13.2.3 Foam

Fire fighting foam concentrate and foam making equipment are available on-site. Usage is by way of induction into foam - making equipment, combined with water and directing the resultant foam mix onto the fire. Sufficient stocks of ethanol resistant foam are also kept on-site to fight a bioethanol bund fire.

The terminal foam making equipment consists of:

- 1 No. Angus FC 2700 mobile foam/water cannon trailer. This trailer, equipped with standard tow-bar for mobility, holds a foam cannon mounted on top of a trailer tank with storage for 900 L of foam concentrate.

- 2 No. Angus AF 120 mobile foam units, each with storage capacity for 120 L of foam concentrate. Each consists of a small mobile-wheeled unit, complete with foam making branch pipe and fire hose, and which can be manually moved.

The foam stock on-site is held primarily in 25 L plastic drums, to facilitate manual handling, ease of manual movement and for easy manual decanting to a pool. Foam testing is carried out in accordance with manufacturer's recommendations, and replaced, as and when required.

13.2.4 Organisational Measures

The following procedures are in place under the terminal Safety Management System to prevent and fight fires:

- Hot Work
- Identification and Ranking of Major Accident Hazards
- Staff Training
- Pre-arrival Vessel Duties
- Berthing of a Vessel and Discharge of Cargo
- Vessel Pumping
- Vehicle Loading and Discharge
- Depot Daily Inspection
- Security and Control of Access
- Smoking
- Housekeeping
- Spillages and Contamination
- Emergency Response Plan
- Emergency Response Training
- Servicing of Fire Extinguishers
- Testing of Firewater Systems.

13.2.5 Containment of Spills

The main bund wall is a 1 m high 100 mm thick reinforced concrete wall, complete with sealed joints. The bund floor is made up of a 100 mm deep reinforced concrete slab, complete with sealed joints.

The main bund is divided into a number of intermediate bunds. The intermediate bund walls are 500 mm high reinforced concrete. Their purpose is to confine any initial tank spillage to an area around the tank, which would prevent it spreading throughout the entire bund, until such time as the height of the intermediate bund wall is breached.

Drainage gulleys are situated within the bunded area and feed through a network of drainage pipes to two control valves that are connected to the main surface water drainage system. The valves control the emission of any liquid contained within the bund to the main drainage system that leads to the oil interceptor.

The two control valves controlling the flow of liquid from the tank farm bund areas are underground gate valves that are opened using a stand pipe lever. These valves are normally kept in the closed position, and are only opened under controlled conditions.

In the event of a spillage occurring within the bunded tank farm area, it will remain on the surface of the concrete, until either recovered or drained to the oil interceptor by opening the control valves.

13.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. Potential loss of containment (LOC) scenarios have been identified for the facility (refer to Appendix F).

13.4 Assessment of Risk

The risk assessment for each of the identified hazards (1 – 18) is presented in Table 17. The individual risk assessments are presented in Appendix F.

Table 17 Record of Identification and Ranking of Major Accident Hazards at Bulk Store No. 1/Jetty

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
3	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm	3	3	9
1	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund	2	4	8
14	Loss of containment from road tanker wagon – fire under vehicle	2	4	8
4	Loss of containment from bulk storage tank - tank overfill	3	2	6
7	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	3	2	6
15	Loss of containment from ship - full bore rupture of the loading/unloading flexible hose	3	2	6
16	Loss of containment from ship - leak of the loading/unloading arm	3	2	6
2	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release into the bund	2	3	6
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	2	3	6
17	Loss of containment from ship - external impact, large spill	1	5	5
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
5	Loss of containment from a pipe – full bore rupture 75mm ≤nominal diameter≥ 150mm	2	2	4
18	Loss of containment from ship - external impact, small spill	1	4	4
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3

6	Loss of containment from a pipe – leak 75mm ≤nominal diameter≥ 150mm	2	1	2
13	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

14. QUALITATIVE RISK ASSESSMENT FOR BULK STORE NO. 2

14.1 Description of Facility

The quantities of flammable materials stored on-site are presented in Table 18.

Table 18 Quantity of Flammable Material Stored On-site

Petroleum Product	Volume (L)	Relative Density	Mass (tonnes)
Petroleum Spirit (Class 1 hydrocarbon)	55,000	0.72 – 0.78 @ 15ºC	41,250
Kerosene (Class 2 hydrocarbon)	55,000	0.775 – 0.84 @ 15ºC	44,413
DERV (Class 3 hydrocarbon)	55,000	0.82 – 0.86 @ 15ºC	46,200
Gas Oil (Class 3 hydrocarbon)	55,000	0.82 – 0.86 @ 15ºC	46,200
TOTAL			178,063

Road tankers wagons from an authorised distributor distribute petroleum products to retail outlet, domestic and commercial users. The bulk store is located at the rear of a petrol retail outlet. Road tanker access to the bulk store is through the retail outlet forecourt.

The threshold quantities for sites subject to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. No. 74 of 2006) (the Seveso II Regulations) for petroleum products are 2,500 tonnes (lower tier sites) and 25,000 (upper tier sites). The bulk store in question is therefore not subject to the requirements of the Seveso II Regulations.

14.2 Fire Prevention/Mitigation On-site

The primary means of fire prevention on-site is through the prevention of the initiating event i.e. loss of containment of fuel. This is ensured through the use of appropriately rated and maintained fuel storage and transfer equipment by adequately trained personnel.

In the event of a large fire on-site, the facility would rely on the local fire brigade to fight the fire. Dry powder fire extinguishers are provided on-site in the vicinity of the road tanker loading gantry and bund. Fire extinguishers are also provided on all road tanker wagons. The fire fighting measures provided have been agreed with the local fire officer.

14.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. Potential loss of containment (LOC) scenarios have been identified for the site (refer to Appendix F)

14.4 Assessment of Risk

The risk assessment for each of the identified hazards (1 – 14) is presented in Table 19. The individual risk assessments are presented in Appendix F.

Table 19 Record of the Identification and Ranking of Major Accident Hazards at Bulk Store 2

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
3	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm into the bund	3	3	9
1	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund	2	4	8
14	Loss of containment from road tanker wagon – fire under vehicle	2	4	8
4	Loss of containment from bulk storage tank - tank overfill	3	2	6
7	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	3	2	6
2	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund	2	3	6
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	2	3	6
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	4	1	4
5	Loss of containment from a pipe – full bore rupture 75mm ≤nominal diameter≥ 150mm	2	2	4
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3
6	Loss of containment from a pipe – leak 75mm ≤nominal diameter≥ 150mm	2	1	2
13	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

15. QUALITATIVE RISK ASSESSMENT FOR BULK STORE NO. 3

15.1 Description of Facility

The site is a major petroleum bulk store located in a port. In addition kerosene (for jet aircrafts) and diesel are stored at the facility. Minor blending takes place on-site with the addition of additives to improve fuel to power conversion factors.

The company is engaged in the importation, storage and handling of bulk petroleum products at the terminal. The quantities of flammable materials stored on-site are such as to bring the facility under the requirements of the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2000 (S.I. No 74 of 2006).

The bulk store is located adjacent to the jetty. It is split on two sides of a road to the port. The bulk storage tanks are located on the northern side. On the southern side all other operations take place including the loading of road tankers.

Facilities on-site are:

- Jetty at river to facilitate importation of bulk hydrocarbon oil products by ocean tanker
- Main bulk storage tank area for oil products
- Product pump area
- Road tanker loading gantry for bulk loading of oil products
- Road tanker parking area
- Office administration buildings to front of site
- Entrance to site, controlled by permanently on duty security.

15.2 Fire Prevention/Mitigation

Located in the north yard there are two 1,300,000 L water tanks fed from 150 mm town main. This is used for fire fighting on both the north and south yard. In the event of a fire there are water drenchers on the fuel tanks; these are fed from seawater main. This will cool the contents of the tank in the event of a fire on-site to prevent a domino effect of a fire in one area leading to a fire in another area or tank. Hydrants and hand-held fire extinguishers are located along perimeter of the site. Emergency stop buttons are located in the yard and there are break-glass units around site. On the north side of the site product pumps are fitted with heat and hydrocarbon detectors.

The site is serviced by the "Graving system". This system pumps water from the river around the port. It also services many of the sites in the area. Several hydrants are also supplied from the "Graving System".

15.2.1 Organisational Measures

- As an 'upper tier' Seveso site, a Safety Report has been prepared for the facility in accordance with the requirements of S.I. No. 74 of 2006. A safety management system and major accident prevention policy are in place.

15.2.2 Containment of Spills

The bunds are designed in accordance with the EPA criteria and are well maintained. The bunds are tested on a regular basis. The valves control the emission of any liquid contained within the bund to the main drainage system that leads to the oil interceptor.

During the transfer from the jetty to the bulk storage tank, an operator has to open the manual valve at the bulk storage tank. This acts as a further safety check to ensure that the correct tank has been selected and that the tank is ready for the transfer. The transfer from the bulk storage tank to the road tanker loading point is carried out automatically.

In the event of a spillage occurring within the bunded tank farm area, it will remain on the surface of the concrete, until either recovered or drained to the oil interceptor by opening the control valves.

15.3 Potential Hazards

Hazards to human safety and the environment could arise through the loss of containment of petroleum products on-site. Potential loss of containment (LOC) scenarios have been identified, assessed and ranked for the facility (refer to Appendix F).

15.4 Assessment of Risk

The risk assessment for each of the identified hazards (1 – 14) is presented in Table 20. The individual risk assessments are presented in Appendix F.

Table 20 Identification and Ranking of Potential Major Accident Hazards at Bulk Store No. 3

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
11	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose	4	3	12
3	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm into the bund	3	3	9
1	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund	2	4	8
14	Loss of containment from road tanker wagon – fire under vehicle	2	4	8
7	Loss of containment from a pump - full bore rupture of the largest connecting pipeline	3	2	6
4	Loss of containment from bulk storage tank - tank overfill	3	2	6
2	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund	2	3	6
9	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment	2	3	6
5	Loss of containment from a pipe – full bore rupture	2	2	4
8	Loss of containment from a pump – leak from a connecting pipeline	3	1	3

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
10	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	3	3
6	Loss of containment from a pipe – leak	2	1	2
12	Loss of containment from road tanker wagon - leak of the loading/unloading hose	2	1	2
13	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

16. QUALITATIVE RISK ASSESSMENT OF LPG JETTY

16.1 Description of Facility

The LPG jetty is located in a major port. The port is used to import and export a wide range of products. Businesses in the area include bulk oil storage, tar and bitumen storage, chemical storage warehouse, general transport storage, container depot and a car ferry terminal.

LPG is a liquefied petroleum gas consisting mainly of the carbon chains propane and/or butane. Propane, butane and isobutane are liquid at atmospheric temperature if compressed and revert to a gaseous state when the pressure is reduced. This property allows them to be easily transported and stored. At normal temperatures and pressures, LPG will evaporate. To prevent this occurring LPG is pressurised to liquefy it.

At the jetty both liquefied propane and butane are unloaded. As propane tends to be used in greater quantities due to its higher calorific value and thus is brought into the port in greater quantities.

The ratio between the volumes of the vaporised gas and the liquefied gas varies depending on composition, pressure and temperature, but is typically around 250:1. LPG is heavier than air, and thus has the capability of flowing along surfaces and migrating to sources of spark.

After the ship has berthed and has been secured at its berth, its discharge pumps are connected to pipelines at the jetty by a rotary unloading arm. Liquid and vapour pipelines on the jetty are connected to their counterparts on the ship. The vessels to be filled are identified from stock check lists and valves on the liquid inlet and vapour outlet are opened. The ship's pumps are started and LPG is pumped to the storage vessel until it is filled to 90% of nominal capacity, when the LPG is directed to another tank. When all vessels are full, or when the cargo has been completely discharged, pumping is stopped. Storage vessels are isolated except when they are being filled.

The maximum size cargo that can be berthed at the port is 12,000 tonnes, but the normal size is 2,000 tonnes. There are about 30 cargoes per annum.

When all the cargo has been discharged, the lines are cleared of liquid LPG, and all isolation valves are shut. The unloading arm is disconnected, and the tanker can undock.

The oil pipeline is a shared line used to transfer a range of petroleum products from the jetty to facilities around the port. A sub line of this is used to transfer LPG from the jetty to the LPG facility located in the port. The properties of LPG and the high pressures involved make LPG potentially most “dangerous” product on the line.

16.2 Fire Prevention/Mitigation

The unloading of an LPG ship falls under the control of the port fire officer. It is a manned operation with two operators walking the line looking for leaks at the flanges during the transfer.

The fire suppression system for the jetty is primarily intended to assist the tankers’ onboard systems to fight a fire. There are nine monitors along the jetty. A mixture of foam and water is available to fight the fire. The escape routes are cooled using a sprinkler system. As a back up to the jetty’s own system it can be manually connected to the “Graving system”. This system pumps water from the river around the port servicing many of the sites in the area. Several hydrants are also supplied from the “Graving System”.

The manual fire alarm system is linked to the Port and Docks alarm system which automatically sounds an alarm all over the Port area and alerts the fire brigade. A short wave radio system also operates and in the event of the alarm sounding, designated emergency staff uses this to maintain contact with the Port and Docks central station. A manual/automatic fire alarm system serves the administration and services buildings.

The LPG facility has a strong relationship with the fire brigade. The fire brigade will fight the fire and any necessary technical assistance will be provided by site personnel. Key staff from the LPG site have an access card which permits a Garda escort from anywhere in the state and access to the port in the event of an incident either on the site or at adjacent facilities.

16.3 Potential Hazards

Hazards mainly to human safety could arise through the loss of containment of LPG on-site. Potential loss of containment (LOC) scenarios have been identified for the facility (refer to Appendix G)

16.4 Assessment of Risk

The risk assessment for each of the identified hazards (1 – 6) is presented in Table 21. The individual risk assessments are presented in Appendix G.

Table 21 Identification and Ranking of Major Accident Scenarios for LPG Jetty

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
1	Loss of containment from ship - full bore rupture of the loading /unloading arm	2	5	10
2	Loss of containment from ship - leak of the loading/unloading arm - the outflow is from a hole with an effective diameter of 10% of the nominal diameter, with a maximum of 50 mm	2	5	10
3	External impact, large spill	2	5	10
4	Loss of containment from ship - external impact, small spill	1	5	5
5	Loss of containment from a pipe – full bore rupture	1	5	5
6	Loss of containment from a pipe – leak	1	5	5

17. QUALITATIVE RISK ASSESSMENT OF LPG INSTALLATION

17.1 Description of Facility

The LPG facility is located in a port. Other businesses in the area include bulk oil storage, tar and bitumen storage, chemical storage warehouse, general transport storage, a container depot, a car ferry terminal. LPG is transferred from the jetty to the site using a gas sub line on the main pipeline. It is temporarily stored on-site before it is either bottled into gas cylinders or sent off site using specially adapted road tankers.

Different mixes of LPG are sold depending on the use for which it is intended. Varieties of LPG bought and sold include mixes that are primarily propane, mixes that are primarily butane, and the more common, mixes including both propane (60%) and butane (40%), as propane has a higher calorific value. Propylene and butylenes are usually also present in small concentration. A powerful odorant, mercaptan is added so that leaks can be detected easily.

Storage on-site is in specially designed tanks. The tanks are designed to withstand the high storage pressures and are clad in material capable of withstanding a flame from a blow torch for 3 hours.

In order to allow for thermal expansion of the contained liquid, neither the bottles nor the road tanker are filled completely; typically, they are filled to between 80% and 90% of their capacity. The ratio between the volumes of the vaporised gas and the liquefied gas varies depending on composition, pressure and temperature, but is typically around 250:1. LPG is heavier than air, and thus has the capability of flowing along surfaces and migrating to sources of ignition.

17.1.1 Cylinder Filling Installation

Cylinders can be filled using the two automatic carousels; larger cylinders are filled semi-automatically or manually on platform scales. Cylinders are checked before filling and any necessary repairs are made.

17.1.2 Facilities

Facilities on-site are:

- Main bulk storage tank area for LPG
- Road tanker loading point for bulk loading
- Road tanker parking area
- Office administration buildings to front of site
- Entrance to site, controlled by 24hr permanently on duty security
- Bottling facility

All vessels store LPG at atmospheric temperatures. Storage pressures are approximately 7-9 bar and 1.7-3.1 bar for propane and butane respectively at 15ºC.

Two of the vessels were designed for a maximum working pressure of 7 bar and are therefore suitable only for storing butane. The remainder were designed for a maximum working pressure of 14.5 bar and are therefore suitable for storing propane or butane.

17.2 Fire Prevention/Mitigation

The over-ground storage vessels are provided with water drenching against overheating which in the event of fire will maintain the temperature at a safe level for up to three hours. There are two firewater storage tanks each with a capacity of 150,000 gallons.

The drenching system is divided into seven zones all of which are operated in the event of an emergency stop button being depressed. The stop valve on the fire pump is held closed by compressed air. In the event of a failure in electricity supply the valves opens. A separate air compressor comes into service if there is a failure in electricity supply, and can be used to isolate the drenching system in zones where it is not required.

Four of the tanks are buried in a mound so that 89% of the vessel surface area is covered with sand and top soil. The remainder of the vessel protrudes through a reinforced concrete wall to allow access to fill and discharge pipes and instrumentation. The exposed ends are protected by water drenching systems.

In addition to ring mains for drenching systems, Dublin Port and Docks Board water hydrants are installed outside the periphery of the site to allow the fire brigade fight any large scale fires that cannot be dealt with by portable appliances.

As LPG is stored as a liquid under pressure one risk in particular is of concern – a Boiling Liquid Expanding Vapour Explosion (BLEVE). A BLEVE is the catastrophic failure of a pressure vessel occurring when the temperature of the liquid in the vessel is well above its normal boiling point temperature. The most likely cause is an external fire that heats the vessel. The vessel could be weakened by this and could fail catastrophically. The LPG remaining in the vessel could then form a fireball. The tank drenching and fire resistant cladding on the tanks offer a high degree of protection against a BLEVE.

The manual fire alarm system is linked to the Dublin Port and Docks alarm system which automatically sounds an alarm all over the Port area and alerts the fire brigade. A short wave radio system also operates and in the event of the alarm sounding, designated emergency staff uses this to maintain contact with the Dublin Port and Docks central station. A manual/automatic fire alarm system serves the administration and services buildings.

The facility has a strong relationship with the fire brigade. The fire brigade will fight the fire and any necessary technical assistance will be provided by site personnel. Key staffs from the site have an access card which ensures that they will get a Garda escort from any where in the State and access to the port in the event of an incident either on the site or adjacent facilities.

17.2.1 Organisational Measures

The following procedures are in place under the terminal Safety Management System to prevent and fight fires:

- Hot Work
- Identification and Ranking of Major Accident Hazards
- Staff Training
- Vessel Pumping
- Vehicle Loading and Discharge
- Depot Daily Inspection
- Security and Control of Access
- Smoking
- Housekeeping

- Spillages and Contamination
- Emergency Response Plan
- Emergency Response Training
- Servicing of Fire Extinguishers
- Testing of Firewater Systems.

17.3 Potential Hazards

Hazards mainly to human safety could arise through the loss of containment of LPG on-site. Potential loss of containment (LOC) scenarios have been identified for the facility (refer to Appendix H).

17.4 Assessment of Risk

The risk assessment for each of the identified hazards (1 – 14) is presented in Table 22. The individual risk assessments are presented in Appendix H.

Table 22 Identification and Ranking of Major Accident Scenarios at LPG Installation

Ref.	Description	Frequency Factor	Consequence Factor	Risk Factor
7	Loss of containment from a pump – leak from a connecting pipeline or pump seal	3	5	15
3	Continuous release from a hole with an effective diameter of 10 mm	2	5	10
5	Loss of containment from a pipe – leak	2	5	10
6	Loss of containment from compressing pump - full bore rupture of the largest connecting pipeline	2	5	10
8	Loss of containment from road tanker wagon - instantaneous release of complete inventory	2	4	8
10	Loss of containment from road tanker wagon - full bore rupture of the loading hose	2	4	8
11	Loss of containment from road tanker wagon - leak of the loading hose	2	4	8
13	Loss of containment from road tanker wagon – fire under vehicle	2	4	8
1	Instantaneous release of the complete inventory of a bulk storage tank	1	5	5
2	Continuous release of the complete inventory in 10 min at a constant rate of release	1	5	5
4	External fire leading to BLEVE	1	5	5
9	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection	1	4	4
12	Loss of containment from road tanker wagon – external impact*	-	-	-

*In general does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]

18. REFERENCES

1. CONCAWE (1992) *Gasolines* product dossier no. 92/103
2. CONCAWE (1995) *Kerosines/jet fuels* product dossier no. 94/106
3. CONCAWE (1996) *Gas oils (diesel fuels/heating oils)* product dossier no. 95/107
4. Committee for Prevention of Disasters (1999) *Guidelines for Quantitative Risk Assessment CPR 18E First Edition*
5. Environmental Protection Agency (2004) 'Storage and Transfer of Materials for Scheduled Activities'
6. Health and Safety Executive (2001) Effects of secondary containment on source term modelling Contract Research Report 324/2001
7. Health and Safety Executive (2002) Dispensing Petrol - Assessing and controlling the risk of fire and explosion at sites where petrol is stored and dispensed as a fuel
8. Competition Authority Decision of 17 June 1998, relating to a proceeding under Section 4 of the Competition Act, 1991. Notification Nos. CA/14/96 and CA/15/96. Decision No. 507
9. Central Statistics Office (2006) Statistics of Port Traffic

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APPENDIX A

Physical Characteristics of Petroleum Products

A1. PHYSICAL PROPERTIES OF PETROLEUM PRODUCTS

The physical characteristics of the flammable/combustible materials stored and handled at the various facilities are as presented in Table A.1.

Table A.1 Physical Characteristics of Flammable/Combustible Materials

Property	Liquid			
	Motor Spirit (Petrol)	**Gas Oil**	**Derv**	**Kerosene**
Melting point (°C)	*	*	*	*
Boiling point (°C)	25-220	170-400	170-400	150-270
Relative vapour density (air = 1)	3-4	*	*	4.7
Flash Point (°C)	-40 (closed cup)	>60	>60	46 (closed cup)
Classification	Extremely flammable	Combustible	Combustible	Flammable
Flammable limits:				
Lower [LFL] (% v/v)	1.4	0.6	0.6	1.7
Upper [UFL] (% v/v)	7.6	7.5	7.5	6
Autoignition temperature [AIT](°C)	370	336	336	190
Minimum ignition current [MIC] (mA)	*	*	*	*
Conductivity (pS/m)	*	*	*	*
Minimum ignition energy [MIE] (mJ)	*	*	*	*
T class of suitable apparatus	T2	T2	T2	T3

*information not obtained

A2. DEFINITIONS

Flammable/highly flammable/extremely flammable liquids and gases are defined in S.I. No. 74 of 2006 as follows:

- Flammable liquids: Substances and preparations having a flash point equal to or greater than 21°C and less than or equal to 55°C (risk phrase R 10), supporting combustion
- Highly flammable liquids: Substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any input of energy (risk phrase R 17), and
- Substances and preparations which have a flash point lower than 55°C and which remain liquid under pressure, where particular processing conditions, such as high pressure or high temperature, may create major-accident hazards
- Substances and preparation having a flash point lower than 21ºC and which are not extremely flammable (risk phrase R 11)
- Extremely flammable gases and liquids: Liquid substances and preparations which have a flash point lower than 0°C and the boiling point (or, in the case of a boiling range, the initial boiling point) of which at normal pressure is less than or equal to 35 °C (risk phrase R 12, first indent), and
- Gases which are flammable in contact with air at ambient temperature and pressure (risk phrase R 12, second indent), which are in a gaseous or supercritical state, and

Flammable and highly flammable liquid substances and preparations maintained at a temperature above their boiling point.

- Autoignition temperature is the temperature at which the liquid will spontaneously ignite
- Electrical apparatus are assigned a T class, T1-T6. The higher the temperature class, the lower the maximum surface temperature of the particular piece of apparatus. Using this information, appropriate electrical equipment for use in flammable vapour atmospheres can be selected based on the AIT of the vapour.
- 'Flash point' is the lowest temperature at which a liquid gives off enough vapour to form a flammable air-vapour mixture near its surface. Where liquids have flash points that would be exceeded at normal room temperatures, a spill of such a liquid could generate a flammable atmosphere, i.e. an atmosphere with a concentration in air that is between the lower and upper flammable limits.
- Flammable limits: the upper and lower flammability limits (UFL and LFL) of a material are the lowest and highest concentrations in air, at normal temperature and pressure, at which a flame will propagate through the mixture. Above the UFL the vapour/air mixture is said to be vapour rich. Below the LFL the vapour/air mixture is said to be vapour lean. The 'flammable envelope' describes the range of concentration from the lower to the upper flammable limits over which the material will burn in air if ignited.
- Minimum Ignition Energy (MIE) test will determine the smallest amount of electrostatic spark energy that is required to initiate a vapour cloud explosion.

A3. ECOTOXICOLOGICAL HAZARD OF PETROLEUM PRODUCTS

CONCAWE (European Oil Company Organisation for Environment, Health and Safety (Belgium)) publishes product dossiers summarising the physical and chemical properties of and toxicological, health, safety and environmental information available on oil products. The information below is extracted from CONCAWE product dossiers.

Gasolines (product dossier no. 92/103) [1]

Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc.), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

The bulk of the available literature on gasoline relates to the environmental impact of monoaromatic (BTEX) and diaromatic (naphthalene, methylnaphthalenes) constituents. In general, gasoline exhibits some short-term toxicity to freshwater and marine organisms, especially under closed vessel or flow-through exposure conditions in the laboratory. The components which are the most prominent in the water soluble fraction and cause aquatic toxicity, are also highly volatile and can be readily biodegraded by microorganisms. The potential for bioaccumulation and/or long-term persistence of these materials in the environment is, therefore, low to non-existent. Based on the volatility, biodegradability and nonbioaccumulative nature, spilt gasoline is unlikely to remain in the water column in sufficient quantities to cause aquatic effects and as a result presents a minimal overall risk to the environment.

Persistence and Biodegradation

The primary factors contributing to gasoline component movement are water solubility, soil sorption and biodegradability. Microorganisms present in sediments and in the water are capable of degrading gasoline constituents. Some gasoline constituents are broken down more readily than others, based on the complexity of the molecule. The aromatic fraction is of greatest concern due to its relatively high water solubility and aquatic toxicity.

Biodegradation of gasoline has also been observed following accidental spillage. In 1976, a pipeline break in Alaska caused 200 000 litres of leaded gasoline to leak into a nearby freshwater lake. Following the spill, shifts in the microbial population of the water and sediment showed enrichment of leaded gasoline-tolerant microorganisms and increased oxygen consumption rates in the highly contaminated areas. Microbial counts increased from 106 cfu/ml to 108 cfu/ml in the sediments and from 103 cfu/ml to 107 cfu/ml in the water. After half of the spilt gasoline was recovered by damming and wells, natural abiotic and biodegradative processes in the sediment resulted in an 85% loss of gasoline after 3 weeks and an additional 5% loss after 2 more weeks. Nutrient addition and inoculation with bacterial isolates further enhanced the biodegradative losses, removing up to 97% of the gasoline.

Movement of Gasolines in Groundwater

The movement of gasoline in groundwater is influenced by many factors, including water solubility, soil sorption, biodegradation rate, rainfall, ambient temperature, pH, soil type, depth to water table, quantity and duration of gasoline release. The components dissolved in groundwater are affected primarily by dilution and dispersion since organic matter, microbes and oxygen typically limit biodegradation in saturated soil pore spaces. The gasoline components in groundwater do not occur in the same proportions as in the parent gasoline, due to the differing solubilities and related partition coefficients of individual gasoline constituents.

Additionally, the concentrations of gasoline components dissolved in the groundwater are much lower than the solubility of the individual, pure components. Adaptation of bacteria in

gasoline-contaminated groundwater to soluble constituents has been reported. Removal of gasoline from contaminated groundwater, following a pipeline leak, was achieved by both physical pumping and biodegradation (by the native microbial population); however nitrogen, phosphate and oxygen were considered rate limiting.

Kerosines/Jet Fuels (product dossier no. 94/106) [2]

Persistence and Biodegradation

When kerosines and jet fuels escape into the environment due to leakages or spillage, most of the constituent hydrocarbons will evaporate and will be photodegraded by reaction with hydroxyl radicals in the atmosphere. Atkinson has calculated the half-lives in air for many of the individual hydrocarbons found in kerosines under these conditions and all are less than one day. The less volatile hydrocarbons in kerosines and jet fuels will persist in the aqueous environment for longer periods. They remain floating on the surface of the water; those that reach soil or sediment biodegrade relatively slowly.

Very few biodegradation studies of kerosines or jet fuels in water have been published and none are known that have used the 28 day method described in OECD guidelines. The BOD values of kerosine in fresh and sea water were 41% and 36% of the theoretical oxygen demand, respectively after 5 days in the presence of nutrient salts; however, without nutrient salts in sea water, the BOD was only 2% after 5 days and had not changed after 10 days.

The most useful data for evaluating the persistence of kerosines has been from studies of soil contaminated with jet fuel. Biodegradation of Jet Fuel JP-4 has been reported in soils from four different climatic areas with removal rates varying from 2 to 20 mg/kg soil/day, soil venting being a particularly good remediation technique. The half-life of jet fuel at 27°C was reported as greater than 12 weeks in sand and loam soils, but 3.5 weeks in a clay loam soil; bioremediation with nitrogen and phosphorous fertilizers significantly reduced the persistence of jet fuels in clay loam soil.

Bioaccumulation of hydrocarbons in fish has also been reported as a kerosine - like taint in sea mullet (*Chelon labrosus).* Preferential metabolism and degradation of n-alkanes is reported to occur leaving iso-alkanes and other hydrocarbons in sea mullet tissue.

Gas Oils (Diesel Fuels/Heating Oils) (product dossier no. 95/107) [3]

Persistence and Biodegradation

On release to the environment the lighter components of gas oil will generally evaporate and be photooxidised by reaction with OH radicals. Depending on the circumstances, the remainder may become dispersed in the water column or adsorbed to soil or sediment. Higher molecular weight components may also be subject to photooxidation. On release into water, gas oils will tend to float on the surface and spread out; the components are generally poorly soluble in water, but the most soluble will dissolve and be dispersed.

No data are available on the behaviour of gas oils in standard tests for biodegradability. Although a gas oil would not be expected to be "readily biodegradable" as defined by OECD guideline tests, most of the hydrocarbon species present are known to be degraded by micro-organisms; in a modified Sturm test (OECD method 301B) approximately 40% biodegradation was recorded over 28 days.

The aquatic toxicity data on gas oils indicates that acute $LL_{50}/EL_{50}/IL_{50}$ values for aquatic organisms are in the range 1 to 100 mg/l. However there is little available data generated using accepted protocols for oil products and the current database should be interpreted with caution.

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APPENDIX B

Petroleum Retail Outlet Survey

B1. SURVEY FORM

Appendix 1 Forecourt Survey

Date	
Proprietor	
Address	
Telephone No.	
Supplier	
Assessed by	

Section	Item	Response
N/A	No. of pumps	
N/A	Does the proprietor possess a valid license?	
N/A	Licensee	
N/A	License issue date	
I (2)	Licensing authority	
N/A	Total quantity authorised	
II (2)	Is the licence valid i.e. is it less than 3 years old and issued under the 1979 Regs?	
II(13)	Is there evidence of petrol leakages?	
II(14)	Are other flammables stored?	
II (15)	Does petroleum transfer take place in an area not less than 4 m from dispensing pumps?	
II (15)	Is the surface area where transfer of petroleum takes place properly maintained and in good condition i.e. impervious and non-absorbent, provided with suitable drainage including an interceptor?	
II(15)	Is there safe parking for the delivery truck with suitable lighting?	
II (22)	Is there a combustible gas indicator instrument on the premises?	
II (24)	Is the forecourt ATEX compliant?	
II(25)	Are “No Smoking” signs displayed	
II(28)	Is the storage tank over 20 years old? If yes, is it inspected on a weekly basis?	
II(30)	Are the staff trained?	
II (31)	Are all underground tanks and pipelines suitably designed (horizontally cylindrical), maintained and pressure tested?	
II (31)	Is there suitable means for measuring tank contents e.g. dipstick?	
II (31)	Does the manhole contain a nameplate detailing manufacturing specification/standard, test pressure, capacity, manufacturer’s name and reference number?	
II (32)	Are all underground tanks located outside the bund area of any above-ground tanks and spaced at least 150 mm from other underground tanks?	
II (32)	Does any underground tank exceed 40,000 L capacity?	

Section	Item	Response
II (32)	Is the manhole located less than 4.25 m from the boundary building, source of ignition or public road?	
II(35)	Are filling/dipping lines suitably colour coded, closed or/and locked when not in use?	
II (36)	Is the ventilating pipe located less than 1.5 m from the boundary?	
II (36)	Does the ventilation pipe prevent the collection of rainwater?	
II (36)	Is the ventilating pipe located less than 4 m above ground level?	
II (36)	Is the ventilating pipe located less than 6 m from a dispensing pump?	
II (36)	Is the ventilation pipe located in an area where the vapour cannot be trapped or obstructed by buildings?	
II (36)	Does ventilating pipe possess a flame arresting device with weather-proof hood?	
II (41)	Is the shell of any underground tanks greater than 0.6 m below ground level?	
II (41)	Is there a layer of reinforced concrete not less than 250 mm above every tank likely to be subjected to vehicular traffic?	
II (42)	Does any dispensing pump cross a pedestrian footway?	
II (46)	Is there adequate means of extinguishing and fighting fire on the premises i.e. 2 extinguishers of 9 litres (foam) or 9 kgs (dry powder) easily accessible and in date?	
II (46)	Are details of the emergency contacts displayed in a prominent location?	
II (46)	Is there adequate and unobstructed means of escape from fire from all parts of the retail store?	
II (52)	Are all containers containing petroleum appropriately labelled i.e. danger symbols, capacity, storage and handling requirements etc?	
II (53)	Are there any empty containers kept on-site?	
II(56)	Is a suitable notice displayed with instructions on how to operate the pump at the pumps or pumping island?	
II(56)	Is there a notice on each pump saying “No smoking switch off engine before refuelling” in red writing on a white background?	

B2. RETAIL PETROLEUM STORES

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1	CARLOW	21273	KERBSIDE	YES	YES	NO	DEALER	RURAL
2	CARLOW	21274	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
3	CARLOW	22010	KERBSIDE	YES	NO	NO	DEALER	RESIDENTIAL
4	CARLOW	22005	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
5	CARLOW	21243	KERBSIDE	YES	YES	NO	DEALER	RURAL
6	CARLOW	21242	KERBSIDE	YES	YES	NO	DEALER	RURAL
7	CARLOW	21244	KERBSIDE	YES	YES	NO	DEALER	RURAL
8	CARLOW	21246	KERBSIDE	YES	YES	NO	DEALER	RURAL
9	CARLOW	21247	KERBSIDE	YES	YES	NO	DEALER	RURAL
10	CARLOW	21245	KERBSIDE	YES	YES	NO	DEALER	RURAL
11	CARLOW	19689	PETROL STATION	YES	YES	NO	DEALER	RURAL
12	CARLOW	19925	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
13	CARLOW	22046	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
14	CARLOW	21272	PETROL STATION	YES	YES	NO	DEALER	RURAL
15	CARLOW	21227	PETROL STATION	YES	YES	NO	DEALER	RURAL
16	CARLOW	22006	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
17	CARLOW	21230	PETROL STATION	YES	YES	NO	DEALER	RURAL
18	CARLOW	19681	PETROL STATION	YES	YES	NO	DEALER	RURAL
19	CARLOW	19092	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
20	CARLOW	19027	PETROL STATION	YES	YES	NO	DEALER	RURAL
21	CARLOW	19863	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
22	CARLOW	19091	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
23	CARLOW	21883	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
24	CARLOW	21881	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
25	CARLOW	19093	PETROL STATION	YES	YES	YES	DEALER	RURAL
26	CARLOW	19096	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
27	CARLOW	18862	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
28	CARLOW	21982	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
29	CARLOW	22057	PETROL STATION	YES	YES	NO	DEALER	RURAL
30	CARLOW	19095	PETROL STATION	YES	YES	NO	DEALER	RURAL
31	CARLOW	21236	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
32	CARLOW	21257	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
33	CARLOW	18942	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
34	CARLOW	19569	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
35	CARLOW	21241	PETROL STATION	YES	YES	NO	DEALER	RURAL
36	CARLOW	19573	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
37	CAVAN	20740	KERBSIDE	YES	YES	NO	DEALER	RURAL
38	CAVAN	20497	KERBSIDE	YES	YES	NO	DEALER	RURAL
39	CAVAN	20738	KERBSIDE	YES	YES	NO	DEALER	RURAL
40	CAVAN	20736	KERBSIDE	YES	YES	NO	DEALER	RURAL
41	CAVAN	20732	KERBSIDE	YES	YES	NO	DEALER	RURAL
42	CAVAN	18979	KERBSIDE	YES	YES	NO	DEALER	RURAL
43	CAVAN	19102	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
44	CAVAN	20731	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
45	CAVAN	19716	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
46	CAVAN	20722	KERBSIDE	NO	YES	NO	DEALER	RURAL
47	CAVAN	20720	KERBSIDE	YES	YES	NO	DEALER	RURAL
48	CAVAN	20697	KERBSIDE	YES	YES	NO	DEALER	RURAL
49	CAVAN	20717	KERBSIDE	NO	YES	NO	DEALER	RESIDENTIAL
50	CAVAN	19605	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
51	CAVAN	20490	PETROL STATION	YES	YES	NO	DEALER	RURAL
52	CAVAN	19388	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
53	CAVAN	19103	PETROL STATION	YES	YES	NO	DEALER	RURAL
54	CAVAN	19062	PETROL STATION	YES	YES	NO	DEALER	RURAL
55	CAVAN	20734	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
56	CAVAN	18900	PETROL STATION	YES	YES	NO	DEALER	RURAL
57	CAVAN	19098	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
58	CAVAN	19099	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
59	CAVAN	19100	PETROL STATION	YES	YES	NO	DEALER	RURAL
60	CAVAN	21342	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
61	CAVAN	21937	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
62	CAVAN	19101	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
63	CAVAN	19708	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
64	CAVAN	19619	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
65	CAVAN	21936	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
66	CAVAN	19627	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
67	CAVAN	19019	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
68	CAVAN	19738	PETROL STATION	YES	YES	NO	DEALER	RURAL
69	CAVAN	20710	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
70	CAVAN	20709	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
71	CAVAN	20707	PETROL STATION	YES	YES	NO	DEALER	RURAL
72	CAVAN	20719	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
73	CAVAN	20706	PETROL STATION	YES	YES	NO	DEALER	RURAL
74	CAVAN	20705	PETROL STATION	YES	YES	NO	DEALER	RURAL
75	CAVAN	20704	PETROL STATION	YES	YES	NO	DEALER	RURAL
76	CAVAN	20703	PETROL STATION	YES	YES	NO	DEALER	RURAL
77	CAVAN	20718	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
78	CAVAN	20713	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
79	CAVAN	20739	PETROL STATION	YES	YES	NO	DEALER	RURAL
80	CAVAN	20729	PETROL STATION	YES	YES	NO	DEALER	RURAL
81	CAVAN	20702	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
82	CAVAN	20721	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
83	CAVAN	21047	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
84	CAVAN	22049	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
85	CAVAN	20698	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
86	CAVAN	20723	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
87	CAVAN	20724	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
88	CAVAN	20726	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
89	CAVAN	20716	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
90	CAVAN	20695	PETROL STATION	YES	YES	NO	DEALER	RURAL
91	CAVAN	20727	PETROL STATION	YES	YES	NO	DEALER	RURAL
92	CAVAN	20728	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
93	CLARE	20168	KERBSIDE	YES	YES	NO	DEALER	RURAL
94	CLARE	19791	KERBSIDE	YES	YES	NO	DEALER	RURAL
95	CLARE	20144	KERBSIDE	YES	YES	NO	DEALER	RURAL
96	CLARE	20145	KERBSIDE	YES	YES	NO	DEALER	RURAL
97	CLARE	20148	KERBSIDE	YES	YES	NO	DEALER	RURAL
98	CLARE	19812	KERBSIDE	YES	YES	YES	DEALER	RURAL
99	CLARE	19115	KERBSIDE	YES	YES	NO	DEALER	RURAL
100	CLARE	18986	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
101	CLARE	20136	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
102	CLARE	21899	KERBSIDE	YES	YES	NO	DEALER	RURAL
103	CLARE	20142	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
104	CLARE	20284	KERBSIDE	YES	YES	YES	DEALER	RURAL
105	CLARE	20282	KERBSIDE	YES	YES	NO	DEALER	RURAL
106	CLARE	18933	KERBSIDE	YES	YES	NO	DEALER	RURAL
107	CLARE	18854	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
108	CLARE	18870	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
109	CLARE	18839	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
110	CLARE	20138	PETROL STATION	YES	YES	NO	DEALER	RURAL
111	CLARE	20167	PETROL STATION	YES	YES	NO	DEALER	RURAL
112	CLARE	19117	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
113	CLARE	19114	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
114	CLARE	19111	PETROL STATION	YES	YES	NO	DEALER	RURAL
115	CLARE	18801	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
116	CLARE	20147	PETROL STATION	YES	YES	NO	DEALER	RURAL
117	CLARE	19109	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
118	CLARE	19108	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
119	CLARE	20155	PETROL STATION	YES	YES	NO	DEALER	RURAL
120	CLARE	19116	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
121	CLARE	19104	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
122	CLARE	19107	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
123	CLARE	20149	PETROL STATION	YES	YES	NO	DEALER	RURAL
124	CLARE	20151	PETROL STATION	YES	YES	NO	DEALER	RURAL
125	CLARE	20154	PETROL STATION	YES	YES	NO	DEALER	RURAL
126	CLARE	19118	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
127	CLARE	19106	PETROL STATION	YES	YES	NO	DEALER	RURAL
128	CLARE	20159	PETROL STATION	YES	YES	YES	DEALER	RURAL
129	CLARE	19105	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
130	CLARE	21972	PETROL STATION	YES	YES	NO	DEALER	RURAL
131	CLARE	20114	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
132	CLARE	20115	PETROL STATION	YES	YES	NO	COMPANY	RURAL
133	CLARE	20116	PETROL STATION	YES	YES	NO	DEALER	RURAL
134	CLARE	19726	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
135	CLARE	20119	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
136	CLARE	19629	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
137	CLARE	19011	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
138	CLARE	20123	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
139	CLARE	19496	PETROL STATION	YES	YES	NO	DEALER	RURAL
140	CLARE	20125	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
141	CLARE	20126	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
142	CLARE	18996	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
143	CLARE	18970	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
144	CLARE	21971	PETROL STATION	YES	YES	NO	DEALER	RURAL
145	CLARE	20122	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
146	CLARE	21976	PETROL STATION	YES	YES	NO	DEALER	RURAL
147	CLARE	21980	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
148	CLARE	20128	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
149	CLARE	20132	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
150	CLARE	20134	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
151	CLARE	20135	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
152	CLARE	18957	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
153	CLARE	22019	PETROL STATION	YES	YES	NO	DEALER	RURAL
154	CLARE	22021	PETROL STATION	YES	YES	NO	DEALER	RURAL
155	CLARE	18939	PETROL STATION	YES	YES	NO	DEALER	RURAL
156	CLARE	20127	PETROL STATION	YES	YES	YES	DEALER	RURAL
157	CLARE	20141	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
158	CLARE	19631	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
159	CLARE	19028	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
160	CLARE	18913	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
161	CLARE	19064	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
162	CLARE	20106	PETROL STATION	YES	YES	NO	DEALER	RURAL
163	CLARE	19495	PETROL STATION	YES	YES	NO	DEALER	RURAL
164	CLARE	20107	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
165	CLARE	19060	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
166	CLARE	21330	PETROL STATION	YES	YES	NO	DEALER	RURAL
167	CLARE	20283	PETROL STATION	YES	YES	NO	DEALER	RURAL
168	CLARE	18927	PETROL STATION	YES	YES	NO	DEALER	RURAL
169	CLARE	20139	PETROL STATION	YES	YES	NO	DEALER	RURAL
170	CLARE	20140	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
171	CORK	21553	KERBSIDE	YES	YES	NO	DEALER	RURAL
172	CORK	20293	KERBSIDE	YES	YES	NO	DEALER	RURAL
173	CORK	20292	KERBSIDE	YES	YES	NO	DEALER	RURAL
174	CORK	19727	KERBSIDE	YES	NO	NO	DEALER	RESIDENTIAL
175	CORK	19692	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
176	CORK	18969	KERBSIDE	YES	YES	NO	DEALER	RURAL
177	CORK	19130	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
178	CORK	21832	KERBSIDE	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
179	CORK	21842	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
180	CORK	20442	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
181	CORK	21852	KERBSIDE	YES	NO	NO	DEALER	RURAL
182	CORK	21843	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
183	CORK	20406	KERBSIDE	YES	YES	NO	DEALER	RURAL
184	CORK	20412	KERBSIDE	YES	YES	NO	DEALER	RURAL
185	CORK	20413	KERBSIDE	YES	YES	NO	DEALER	RURAL
186	CORK	20414	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
187	CORK	20419	KERBSIDE	YES	YES	NO	DEALER	RURAL
188	CORK	20428	KERBSIDE	YES	YES	NO	DEALER	RURAL
189	CORK	20436	KERBSIDE	YES	YES	NO	DEALER	RURAL
190	CORK	21872	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
191	CORK	21870	KERBSIDE	YES	YES	NO	DEALER	RURAL
192	CORK	20366	KERBSIDE	YES	YES	NO	DEALER	RURAL
193	CORK	19810	KERBSIDE	YES	NO	NO	DEALER	RESIDENTIAL
194	CORK	19776	KERBSIDE	YES	YES	NO	DEALER	RURAL
195	CORK	20375	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
196	CORK	20333	KERBSIDE	YES	YES	NO	DEALER	RURAL
197	CORK	20350	KERBSIDE	YES	YES	NO	DEALER	RURAL
198	CORK	20399	KERBSIDE	YES	YES	NO	DEALER	RURAL
199	CORK	20400	KERBSIDE	YES	YES	NO	DEALER	RURAL
200	CORK	20401	KERBSIDE	YES	YES	NO	DEALER	RURAL
201	CORK	21746	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
202	CORK	20383	KERBSIDE	YES	YES	NO	DEALER	RURAL
203	CORK	20385	KERBSIDE	YES	YES	NO	DEALER	RURAL
204	CORK	19757	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
205	CORK	21556	KERBSIDE OFFROAD	YES	YES	NO	DEALER	RURAL
206	CORK	20314	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
207	CORK	19153	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
208	CORK	19150	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
209	CORK	19147	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
210	CORK	20315	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
211	CORK	19146	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
212	CORK	19142	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
213	CORK	19143	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
214	CORK	21554	PETROL STATION	YES	YES	YES	DEALER	RURAL
215	CORK	20291	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
216	CORK	21557	PETROL STATION	YES	YES	NO	DEALER	RURAL
217	CORK	19141	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
218	CORK	19140	PETROL STATION	YES	YES	NO	DEALER	RURAL
219	CORK	19145	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
220	CORK	20296	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
221	CORK	20301	PETROL STATION	YES	YES	NO	DEALER	RURAL
222	CORK	20302	PETROL STATION	YES	YES	YES	DEALER	RURAL
223	CORK	20300	PETROL STATION	YES	YES	NO	DEALER	RURAL
224	CORK	20318	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
225	CORK	20979	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
226	CORK	20299	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
227	CORK	20307	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
228	CORK	20298	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
229	CORK	20313	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
230	CORK	20306	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
231	CORK	20311	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
232	CORK	20294	PETROL STATION	YES	YES	NO	DEALER	RURAL
233	CORK	21552	PETROL STATION	YES	YES	NO	DEALER	RURAL
234	CORK	19625	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
235	CORK	18976	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
236	CORK	20289	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
237	CORK	20287	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
238	CORK	18894	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
239	CORK	20285	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
240	CORK	18896	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
241	CORK	19068	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
242	CORK	18972	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
243	CORK	19063	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
244	CORK	19061	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
245	CORK	19053	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
246	CORK	19052	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
247	CORK	18861	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
248	CORK	19025	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
249	CORK	18868	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
250	CORK	19021	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
251	CORK	19701	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
252	CORK	19699	PETROL STATION	YES	YES	NO	DEALER	RURAL
253	CORK	19685	PETROL STATION	YES	YES	NO	DEALER	RURAL
254	CORK	19647	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
255	CORK	18988	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
256	CORK	18964	PETROL STATION	YES	YES	YES	DEALER	RURAL
257	CORK	18958	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
258	CORK	18943	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
259	CORK	19032	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
260	CORK	19126	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
261	CORK	21546	PETROL STATION	YES	YES	NO	DEALER	RURAL
262	CORK	21544	PETROL STATION	YES	YES	NO	DEALER	RURAL
263	CORK	21542	PETROL STATION	YES	YES	NO	DEALER	RURAL
264	CORK	21540	PETROL STATION	YES	YES	NO	DEALER	RURAL
265	CORK	21539	PETROL STATION	YES	YES	NO	DEALER	RURAL
266	CORK	21538	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
267	CORK	21537	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
268	CORK	19139	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
269	CORK	19137	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
270	CORK	19135	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
271	CORK	19133	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
272	CORK	19132	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
273	CORK	18980	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
274	CORK	19129	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
275	CORK	20346	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
276	CORK	19125	PETROL STATION	YES	YES	NO	COMPANY	RURAL
277	CORK	19124	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
278	CORK	19121	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
279	CORK	19119	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
280	CORK	18792	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
281	CORK	18793	PETROL STATION	YES	YES	NO	DEALER	RURAL
282	CORK	18816	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
283	CORK	18823	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
284	CORK	18840	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
285	CORK	18841	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
286	CORK	18857	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
287	CORK	18866	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
288	CORK	21548	PETROL STATION	YES	YES	NO	DEALER	RURAL
289	CORK	21851	PETROL STATION	YES	YES	NO	DEALER	RURAL
290	CORK	21782	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
291	CORK	21838	PETROL STATION	YES	YES	NO	DEALER	RURAL
292	CORK	21841	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
293	CORK	19608	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
294	CORK	21847	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
295	CORK	21853	PETROL STATION	YES	YES	NO	DEALER	RURAL
296	CORK	20319	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
297	CORK	19937	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
298	CORK	20336	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
299	CORK	21859	PETROL STATION	YES	YES	NO	DEALER	RURAL
300	CORK	20424	PETROL STATION	YES	YES	NO	DEALER	RURAL
301	CORK	20405	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
302	CORK	21831	PETROL STATION	YES	YES	NO	DEALER	RURAL
303	CORK	21863	PETROL STATION	YES	YES	NO	DEALER	RURAL
304	CORK	19527	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
305	CORK	20438	PETROL STATION	YES	YES	NO	DEALER	RURAL
306	CORK	20440	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
307	CORK	20441	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
308	CORK	20415	PETROL STATION	YES	YES	NO	DEALER	RURAL
309	CORK	21950	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
310	CORK	21993	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
311	CORK	19557	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
312	CORK	19555	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
313	CORK	19548	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
314	CORK	19543	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
315	CORK	21860	PETROL STATION	YES	YES	NO	DEALER	RURAL
316	CORK	21955	PETROL STATION	YES	YES	NO	DEALER	RURAL
317	CORK	19898	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
318	CORK	19538	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
319	CORK	19522	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
320	CORK	19523	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
321	CORK	19529	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
322	CORK	19525	PETROL STATION	YES	YES	NO	DEALER	RURAL
323	CORK	19526	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
324	CORK	19540	PETROL STATION	YES	YES	NO	DEALER	RURAL
325	CORK	19581	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
326	CORK	20423	PETROL STATION	YES	YES	NO	DEALER	RURAL
327	CORK	21864	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
328	CORK	21865	PETROL STATION	YES	YES	NO	DEALER	RURAL
329	CORK	21866	PETROL STATION	YES	YES	NO	DEALER	RURAL
330	CORK	21867	PETROL STATION	YES	YES	NO	DEALER	RURAL
331	CORK	21869	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
332	CORK	21901	PETROL STATION	YES	YES	NO	DEALER	RURAL
333	CORK	21996	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
334	CORK	19568	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
335	CORK	19564	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
336	CORK	19907	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
337	CORK	22015	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
338	CORK	19901	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
339	CORK	21862	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
340	CORK	20331	PETROL STATION	YES	YES	NO	DEALER	RURAL
341	CORK	20372	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
342	CORK	20371	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
343	CORK	20370	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
344	CORK	19591	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
345	CORK	19592	PETROL STATION	YES	YES	YES	DEALER	RURAL
346	CORK	19762	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
347	CORK	20327	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
348	CORK	20329	PETROL STATION	YES	YES	NO	DEALER	RURAL
349	CORK	20426	PETROL STATION	YES	YES	NO	DEALER	RURAL
350	CORK	19774	PETROL STATION	YES	YES	NO	DEALER	RURAL
351	CORK	20376	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
352	CORK	20365	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
353	CORK	20364	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
354	CORK	20363	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
355	CORK	20359	PETROL STATION	YES	YES	NO	DEALER	RURAL
356	CORK	20354	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
357	CORK	20353	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
358	CORK	20348	PETROL STATION	YES	YES	NO	COMPANY	RURAL
359	CORK	20347	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
360	CORK	20335	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
361	CORK	20341	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
362	CORK	22104	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	COMPANY	UNSURVEYED
363	CORK	20392	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
364	CORK	21753	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
365	CORK	21754	PETROL STATION	YES	YES	NO	DEALER	RURAL
366	CORK	21755	PETROL STATION	YES	YES	NO	DEALER	RURAL
367	CORK	21757	PETROL STATION	YES	YES	NO	DEALER	RURAL
368	CORK	21758	PETROL STATION	YES	YES	NO	DEALER	RURAL
369	CORK	20378	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
370	CORK	20321	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
371	CORK	21751	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
372	CORK	20394	PETROL STATION	YES	YES	NO	DEALER	RURAL
373	CORK	20395	PETROL STATION	YES	YES	NO	DEALER	RURAL
374	CORK	20398	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
375	CORK	21759	PETROL STATION	YES	YES	NO	DEALER	RURAL
376	CORK	20380	PETROL STATION	YES	YES	NO	DEALER	RURAL
377	CORK	20381	PETROL STATION	YES	YES	NO	DEALER	RURAL
378	CORK	20386	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
379	CORK	21745	PETROL STATION	YES	YES	NO	DEALER	RURAL
380	CORK	21750	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
381	CORK	20325	PETROL STATION	YES	YES	YES	DEALER	RURAL
382	CORK	20324	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
383	CORK	21749	PETROL STATION	YES	YES	YES	DEALER	RURAL
384	CORK	20389	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
385	CORK	20310	SERVICE AREA	YES	YES	NO	COMPANY	RURAL
386	DONEGAL	20563	KERBSIDE	YES	YES	NO	DEALER	RURAL
387	DONEGAL	20509	KERBSIDE	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
388	DONEGAL	20510	KERBSIDE	YES	YES	NO	DEALER	RURAL
389	DONEGAL	20043	KERBSIDE	YES	YES	NO	DEALER	RURAL
390	DONEGAL	20044	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
391	DONEGAL	19721	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
392	DONEGAL	20061	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
393	DONEGAL	20550	PETROL STATION	YES	YES	NO	DEALER	RURAL
394	DONEGAL	20551	PETROL STATION	YES	YES	YES	DEALER	RURAL
395	DONEGAL	20554	PETROL STATION	YES	YES	NO	DEALER	RURAL
396	DONEGAL	20557	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
397	DONEGAL	20548	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
398	DONEGAL	20549	PETROL STATION	YES	YES	NO	DEALER	RURAL
399	DONEGAL	20568	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
400	DONEGAL	20506	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
401	DONEGAL	20565	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
402	DONEGAL	19588	PETROL STATION	YES	YES	NO	DEALER	RURAL
403	DONEGAL	19587	PETROL STATION	YES	YES	NO	DEALER	RURAL
404	DONEGAL	20573	PETROL STATION	YES	YES	NO	DEALER	RURAL
405	DONEGAL	20572	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
406	DONEGAL	20570	PETROL STATION	YES	YES	YES	DEALER	RURAL
407	DONEGAL	20569	PETROL STATION	YES	YES	NO	DEALER	RURAL
408	DONEGAL	19632	PETROL STATION	YES	YES	NO	DEALER	RURAL
409	DONEGAL	20567	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
410	DONEGAL	20562	PETROL STATION	YES	YES	NO	DEALER	RURAL
411	DONEGAL	20561	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
412	DONEGAL	19566	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
413	DONEGAL	20560	PETROL STATION	YES	YES	NO	DEALER	RURAL
414	DONEGAL	19638	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
415	DONEGAL	20559	PETROL STATION	YES	YES	NO	DEALER	RURAL
416	DONEGAL	20571	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
417	DONEGAL	19598	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
418	DONEGAL	20519	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
419	DONEGAL	20518	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
420	DONEGAL	20517	PETROL STATION	YES	YES	NO	DEALER	RURAL
421	DONEGAL	20513	PETROL STATION	YES	YES	NO	DEALER	RURAL
422	DONEGAL	20511	PETROL STATION	YES	YES	NO	DEALER	RURAL
423	DONEGAL	20507	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
424	DONEGAL	20504	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
425	DONEGAL	20521	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
426	DONEGAL	20501	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
427	DONEGAL	20522	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
428	DONEGAL	19154	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
429	DONEGAL	19155	PETROL STATION	YES	YES	NO	DEALER	RURAL
430	DONEGAL	19156	PETROL STATION	YES	YES	NO	DEALER	RURAL
431	DONEGAL	19157	PETROL STATION	YES	YES	NO	DEALER	RURAL
432	DONEGAL	19158	PETROL STATION	YES	YES	NO	DEALER	RURAL
433	DONEGAL	19160	PETROL STATION	YES	YES	NO	DEALER	RURAL
434	DONEGAL	19161	PETROL STATION	YES	YES	NO	DEALER	RURAL
435	DONEGAL	19162	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
436	DONEGAL	19164	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
437	DONEGAL	19165	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
438	DONEGAL	20502	PETROL STATION	YES	YES	YES	DEALER	RURAL
439	DONEGAL	20533	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
440	DONEGAL	19524	PETROL STATION	YES	YES	NO	DEALER	RURAL
441	DONEGAL	19624	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
442	DONEGAL	19623	PETROL STATION	YES	YES	NO	DEALER	RURAL
443	DONEGAL	19519	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
444	DONEGAL	20546	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
445	DONEGAL	20544	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
446	DONEGAL	20541	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
447	DONEGAL	20539	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
448	DONEGAL	20537	PETROL STATION	YES	YES	NO	DEALER	RURAL
449	DONEGAL	20520	PETROL STATION	YES	YES	NO	DEALER	RURAL
450	DONEGAL	20534	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
451	DONEGAL	20547	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
452	DONEGAL	20532	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
453	DONEGAL	20531	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
454	DONEGAL	20530	PETROL STATION	YES	YES	NO	DEALER	RURAL
455	DONEGAL	20529	PETROL STATION	YES	YES	NO	DEALER	RURAL
456	DONEGAL	20527	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
457	DONEGAL	20526	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
458	DONEGAL	20524	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
459	DONEGAL	20523	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
460	DONEGAL	19072	PETROL STATION	YES	YES	NO	DEALER	RURAL
461	DONEGAL	19073	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
462	DONEGAL	20536	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
463	DONEGAL	20064	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
464	DONEGAL	20051	PETROL STATION	YES	YES	NO	DEALER	RURAL
465	DONEGAL	20054	PETROL STATION	YES	YES	NO	DEALER	RURAL
466	DONEGAL	20055	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
467	DONEGAL	20056	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
468	DONEGAL	20057	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
469	DONEGAL	20058	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
470	DONEGAL	18877	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
471	DONEGAL	20062	PETROL STATION	YES	YES	NO	DEALER	RURAL
472	DONEGAL	20047	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
473	DONEGAL	21787	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
474	DONEGAL	21786	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
475	DONEGAL	19822	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
476	DONEGAL	19769	PETROL STATION	YES	YES	NO	DEALER	RURAL
477	DONEGAL	18807	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
478	DONEGAL	18817	PETROL STATION	YES	YES	NO	DEALER	RURAL
479	DONEGAL	18849	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
480	DONEGAL	20060	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
481	DONEGAL	21933	PETROL STATION	YES	YES	NO	DEALER	RURAL
482	DONEGAL	21988	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
483	DONEGAL	21986	PETROL STATION	YES	YES	NO	DEALER	RURAL
484	DONEGAL	21983	PETROL STATION	YES	YES	NO	DEALER	RURAL
485	DONEGAL	21966	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
486	DONEGAL	21965	PETROL STATION	YES	YES	NO	DEALER	RURAL
487	DONEGAL	21964	PETROL STATION	YES	YES	NO	DEALER	RURAL
488	DONEGAL	21945	PETROL STATION	YES	YES	NO	DEALER	RURAL
489	DONEGAL	20050	PETROL STATION	YES	NO	NO	DEALER	RURAL
490	DONEGAL	21935	PETROL STATION	YES	YES	NO	DEALER	RURAL
491	DONEGAL	20048	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
492	DONEGAL	21902	PETROL STATION	YES	YES	NO	DEALER	RURAL
493	DONEGAL	21877	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
494	DONEGAL	21875	PETROL STATION	YES	YES	NO	DEALER	RURAL
495	DONEGAL	20041	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
496	DONEGAL	20063	PETROL STATION	YES	YES	NO	DEALER	RURAL
497	DONEGAL	21944	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
498	DONEGAL	19660	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
499	DONEGAL	19712	PETROL STATION	YES	YES	NO	DEALER	RURAL
500	DONEGAL	20566	PETROL STATION	YES	YES	YES	DEALER	RURAL
501	DONEGAL	21350	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RESIDENTIAL
502	DONEGAL	22106	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	UNSURVEYED
503	DONEGAL	19663	PETROL STATION	YES	YES	YES	DEALER	RURAL
504	DONEGAL	19657	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
505	DONEGAL	21344	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
506	DONEGAL	21346	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
507	DONEGAL	21347	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
508	DONEGAL	21349	PETROL STATION	YES	YES	NO	DEALER	RURAL
509	DUBLIN	21855	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
510	DUBLIN	22050	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
511	DUBLIN	22056	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
512	DUBLIN	18561	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
513	DUBLIN	19466	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
514	DUBLIN	22098	PETROL STATION	NO	YES	NO	COMPANY	INDUSTRY/OFFICE
515	DUBLIN	18571	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
516	DUBLIN	18569	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
517	DUBLIN	18568	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
518	DUBLIN	18454	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
519	DUBLIN	18567	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
520	DUBLIN	18565	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
521	DUBLIN	18564	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
522	DUBLIN	18525	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
523	DUBLIN	18562	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
524	DUBLIN	19463	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
525	DUBLIN	18551	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
526	DUBLIN	18460	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
527	DUBLIN	19880	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
528	DUBLIN	18550	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
529	DUBLIN	18548	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
530	DUBLIN	18547	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
531	DUBLIN	18543	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
532	DUBLIN	18542	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
533	DUBLIN	19891	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
534	DUBLIN	18538	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
535	DUBLIN	18537	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
536	DUBLIN	18563	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
537	DUBLIN	18592	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
538	DUBLIN	21729	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
539	DUBLIN	18613	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
540	DUBLIN	18612	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
541	DUBLIN	18610	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
542	DUBLIN	18609	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
543	DUBLIN	18608	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
544	DUBLIN	18606	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
545	DUBLIN	18600	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
546	DUBLIN	18599	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
547	DUBLIN	18598	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
548	DUBLIN	18597	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
549	DUBLIN	18459	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
550	DUBLIN	18593	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
551	DUBLIN	18456	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
552	DUBLIN	18591	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
553	DUBLIN	18587	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
554	DUBLIN	18586	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
555	DUBLIN	21339	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
556	DUBLIN	18579	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
557	DUBLIN	18574	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
558	DUBLIN	18573	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
559	DUBLIN	22105	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	COMPANY	UNSURVEYED
560	DUBLIN	18455	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
561	DUBLIN	19462	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
562	DUBLIN	18533	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
563	DUBLIN	18594	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
564	DUBLIN	18463	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
565	DUBLIN	18536	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
566	DUBLIN	18496	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
567	DUBLIN	18494	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
568	DUBLIN	18492	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
569	DUBLIN	18490	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
570	DUBLIN	18489	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
571	DUBLIN	18488	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
572	DUBLIN	22032	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
573	DUBLIN	18487	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
574	DUBLIN	18484	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
575	DUBLIN	18482	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
576	DUBLIN	18499	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
577	DUBLIN	18479	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
578	DUBLIN	18501	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
579	DUBLIN	19962	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
580	DUBLIN	18477	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
581	DUBLIN	18465	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
582	DUBLIN	18475	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
583	DUBLIN	18473	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
584	DUBLIN	19961	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
585	DUBLIN	18472	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
586	DUBLIN	18470	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
587	DUBLIN	19575	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
588	DUBLIN	18480	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
589	DUBLIN	18516	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
590	DUBLIN	18467	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
591	DUBLIN	18530	PETROL STATION	YES	YES	YES	DEALER	RURAL
592	DUBLIN	18527	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
593	DUBLIN	18526	PETROL STATION	YES	UNSURVEYED	UNSURVEYED	DEALER	RURAL
594	DUBLIN	18614	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
595	DUBLIN	18461	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
596	DUBLIN	19465	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
597	DUBLIN	18524	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
598	DUBLIN	18522	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
599	DUBLIN	18521	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
600	DUBLIN	18519	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
601	DUBLIN	18498	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
602	DUBLIN	18517	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
603	DUBLIN	18534	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
604	DUBLIN	19963	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
605	DUBLIN	21967	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
606	DUBLIN	18515	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
607	DUBLIN	18513	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
608	DUBLIN	20017	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
609	DUBLIN	18512	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
610	DUBLIN	18511	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
611	DUBLIN	18508	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
612	DUBLIN	18507	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
613	DUBLIN	18506	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
614	DUBLIN	18504	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
615	DUBLIN	18518	PETROL STATION	YES	YES	NO	DEALER	RURAL
616	DUBLIN	18676	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
617	DUBLIN	18663	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
618	DUBLIN	18707	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
619	DUBLIN	18703	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
620	DUBLIN	18702	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
621	DUBLIN	18701	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
622	DUBLIN	18699	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
623	DUBLIN	18698	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
624	DUBLIN	18696	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
625	DUBLIN	18695	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
626	DUBLIN	18686	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
627	DUBLIN	18709	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
628	DUBLIN	18682	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
629	DUBLIN	18710	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
630	DUBLIN	18675	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
631	DUBLIN	18673	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
632	DUBLIN	19964	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
633	DUBLIN	18671	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
634	DUBLIN	18670	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
635	DUBLIN	18669	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
636	DUBLIN	18668	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
637	DUBLIN	18666	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
638	DUBLIN	18665	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
639	DUBLIN	18664	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
640	DUBLIN	18685	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
641	DUBLIN	18729	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
642	DUBLIN	21351	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
643	DUBLIN	18858	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
644	DUBLIN	18773	PETROL STATION	YES	YES	NO	DEALER	RURAL
645	DUBLIN	18769	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
646	DUBLIN	18768	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
647	DUBLIN	18766	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
648	DUBLIN	18764	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
649	DUBLIN	18755	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
650	DUBLIN	18743	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
651	DUBLIN	18738	PETROL STATION	YES	YES	NO	COMPANY	RURAL
652	DUBLIN	18708	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
653	DUBLIN	18732	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
654	DUBLIN	18717	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
655	DUBLIN	18725	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
656	DUBLIN	18724	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
657	DUBLIN	18723	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
658	DUBLIN	18722	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
659	DUBLIN	18721	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
660	DUBLIN	18720	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
661	DUBLIN	18718	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
662	DUBLIN	18617	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
663	DUBLIN	18716	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
664	DUBLIN	18714	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
665	DUBLIN	18735	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
666	DUBLIN	18632	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
667	DUBLIN	18620	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
668	DUBLIN	18622	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
669	DUBLIN	18624	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
670	DUBLIN	18628	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
671	DUBLIN	18648	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
672	DUBLIN	18662	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
673	DUBLIN	18631	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
674	DUBLIN	18629	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
675	DUBLIN	18638	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
676	DUBLIN	18649	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
677	DUBLIN	18639	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
678	DUBLIN	18641	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
679	DUBLIN	18643	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
680	DUBLIN	18619	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
681	DUBLIN	18630	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
682	DUBLIN	18618	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
683	DUBLIN	18657	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
684	DUBLIN	18656	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
685	DUBLIN	18654	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
686	DUBLIN	18653	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
687	DUBLIN	18652	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
688	DUBLIN	18719	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
689	GALWAY	20643	KERBSIDE	YES	YES	NO	DEALER	RURAL
690	GALWAY	20175	KERBSIDE	YES	YES	NO	DEALER	RURAL
691	GALWAY	20648	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
692	GALWAY	20657	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
693	GALWAY	20668	KERBSIDE	YES	YES	NO	DEALER	RURAL
694	GALWAY	21422	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
695	GALWAY	21419	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
696	GALWAY	21424	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
697	GALWAY	20579	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
698	GALWAY	21415	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
699	GALWAY	21412	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
700	GALWAY	19071	KERBSIDE	YES	YES	YES	DEALER	RURAL
701	GALWAY	20177	KERBSIDE	YES	YES	NO	DEALER	RURAL
702	GALWAY	20580	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
703	GALWAY	20622	KERBSIDE	YES	YES	NO	DEALER	RURAL
704	GALWAY	20629	KERBSIDE	YES	YES	NO	DEALER	RURAL
705	GALWAY	20628	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
706	GALWAY	20619	KERBSIDE	YES	YES	NO	DEALER	RURAL
707	GALWAY	20183	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
708	GALWAY	19839	KERBSIDE	YES	YES	NO	DEALER	RURAL
709	GALWAY	19711	KERBSIDE	YES	YES	NO	COMPANY	RESIDENTIAL
710	GALWAY	22043	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
711	GALWAY	19760	KERBSIDE	YES	YES	NO	DEALER	RURAL
712	GALWAY	21800	KERBSIDE	YES	NO	NO	DEALER	RURAL
713	GALWAY	20671	PETROL STATION	YES	YES	NO	DEALER	RURAL
714	GALWAY	20645	PETROL STATION	YES	YES	NO	DEALER	RURAL
715	GALWAY	20646	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
716	GALWAY	20647	PETROL STATION	YES	YES	NO	DEALER	RURAL
717	GALWAY	20650	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
718	GALWAY	20664	PETROL STATION	YES	YES	NO	DEALER	RURAL
719	GALWAY	20667	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
720	GALWAY	20672	PETROL STATION	YES	YES	NO	DEALER	RURAL
721	GALWAY	20670	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
722	GALWAY	20174	PETROL STATION	YES	YES	NO	DEALER	RURAL
723	GALWAY	19582	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
724	GALWAY	20673	PETROL STATION	YES	YES	NO	DEALER	RURAL
725	GALWAY	20170	PETROL STATION	YES	YES	NO	DEALER	RURAL
726	GALWAY	18883	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
727	GALWAY	19934	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
728	GALWAY	20640	PETROL STATION	YES	YES	NO	DEALER	RURAL
729	GALWAY	22064	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
730	GALWAY	20172	PETROL STATION	YES	YES	NO	DEALER	RURAL
731	GALWAY	19083	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
732	GALWAY	20669	PETROL STATION	YES	YES	NO	DEALER	RURAL
733	GALWAY	20577	PETROL STATION	YES	YES	NO	DEALER	RURAL
734	GALWAY	20633	PETROL STATION	YES	YES	NO	DEALER	RURAL
735	GALWAY	20592	PETROL STATION	YES	YES	NO	DEALER	RURAL
736	GALWAY	20591	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
737	GALWAY	20589	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
738	GALWAY	20586	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
739	GALWAY	20584	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
740	GALWAY	20583	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
741	GALWAY	20581	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
742	GALWAY	20594	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
743	GALWAY	20601	PETROL STATION	YES	YES	NO	DEALER	RURAL
744	GALWAY	20576	PETROL STATION	YES	YES	NO	DEALER	RURAL
745	GALWAY	20575	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
746	GALWAY	20574	PETROL STATION	YES	YES	NO	DEALER	RURAL
747	GALWAY	21418	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
748	GALWAY	21411	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
749	GALWAY	20636	PETROL STATION	YES	YES	NO	DEALER	RURAL
750	GALWAY	20634	PETROL STATION	YES	YES	NO	DEALER	RURAL
751	GALWAY	20631	PETROL STATION	YES	YES	NO	DEALER	RURAL
752	GALWAY	19918	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
753	GALWAY	20630	PETROL STATION	YES	YES	NO	DEALER	RURAL
754	GALWAY	20627	PETROL STATION	YES	YES	NO	DEALER	RURAL
755	GALWAY	20593	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
756	GALWAY	20624	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
757	GALWAY	20638	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
758	GALWAY	20621	PETROL STATION	YES	YES	NO	DEALER	RURAL
759	GALWAY	20616	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
760	GALWAY	20615	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
761	GALWAY	20613	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
762	GALWAY	20612	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
763	GALWAY	20609	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
764	GALWAY	20606	PETROL STATION	YES	YES	NO	DEALER	RURAL
765	GALWAY	20604	PETROL STATION	YES	YES	NO	DEALER	RURAL
766	GALWAY	20625	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
767	GALWAY	20184	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
768	GALWAY	21331	PETROL STATION	YES	YES	YES	DEALER	RURAL
769	GALWAY	19176	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
770	GALWAY	19169	PETROL STATION	YES	YES	NO	DEALER	RURAL
771	GALWAY	19168	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
772	GALWAY	19637	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
773	GALWAY	20186	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
774	GALWAY	19178	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
775	GALWAY	20185	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
776	GALWAY	19179	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
777	GALWAY	20181	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
778	GALWAY	20180	PETROL STATION	YES	YES	NO	DEALER	RURAL
779	GALWAY	18791	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
780	GALWAY	19533	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
781	GALWAY	20164	PETROL STATION	YES	YES	NO	DEALER	RURAL
782	GALWAY	19893	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
783	GALWAY	19856	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
784	GALWAY	19827	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
785	GALWAY	19012	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
786	GALWAY	19602	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
787	GALWAY	19192	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
788	GALWAY	19189	PETROL STATION	YES	YES	NO	DEALER	RURAL
789	GALWAY	19177	PETROL STATION	YES	YES	YES	DEALER	RURAL
790	GALWAY	21903	PETROL STATION	YES	YES	NO	DEALER	RURAL
791	GALWAY	19186	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
792	GALWAY	19184	PETROL STATION	YES	YES	NO	COMPANY	RURAL
793	GALWAY	19183	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
794	GALWAY	19182	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
795	GALWAY	19181	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
796	GALWAY	19180	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
797	GALWAY	19188	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
798	GALWAY	19650	PETROL STATION	YES	YES	NO	DEALER	RURAL
799	GALWAY	19792	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
800	GALWAY	21948	PETROL STATION	YES	NO	NO	DEALER	RESIDENTIAL
801	GALWAY	18919	PETROL STATION	YES	YES	NO	DEALER	RURAL
802	GALWAY	22029	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
803	GALWAY	22038	PETROL STATION	YES	YES	NO	DEALER	RURAL
804	GALWAY	19656	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
805	GALWAY	18806	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
806	GALWAY	18835	PETROL STATION	YES	YES	NO	DEALER	RURAL
807	GALWAY	20160	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
808	GALWAY	22053	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
809	GALWAY	22054	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
810	GALWAY	20163	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
811	GALWAY	22030	PETROL STATION	YES	YES	NO	DEALER	RURAL
812	GALWAY	19549	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
813	GALWAY	19010	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
814	GALWAY	20178	PETROL STATION	YES	YES	NO	DEALER	RURAL
815	GALWAY	19734	PETROL STATION	YES	YES	NO	DEALER	RURAL
816	GALWAY	19545	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
817	GALWAY	18928	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
818	GALWAY	18944	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
819	GALWAY	19546	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
820	GALWAY	19643	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
821	GALWAY	18929	PETROL STATION	YES	YES	NO	DEALER	RURAL
822	KERRY	22031	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
823	KERRY	19693	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
824	KERRY	19731	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
825	KERRY	19777	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
826	KERRY	21650	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
827	KERRY	21643	KERBSIDE	YES	YES	NO	DEALER	RURAL
828	KERRY	18782	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
829	KERRY	21824	KERBSIDE	YES	YES	NO	DEALER	RURAL
830	KERRY	21820	KERBSIDE	YES	YES	NO	DEALER	RURAL
831	KERRY	21823	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
832	KERRY	21827	KERBSIDE	YES	YES	NO	DEALER	RURAL
833	KERRY	21822	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
834	KERRY	21694	KERBSIDE	YES	YES	NO	DEALER	RURAL
835	KERRY	21683	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
836	KERRY	21775	KERBSIDE	YES	YES	NO	DEALER	RURAL
837	KERRY	19193	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
838	KERRY	19595	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
839	KERRY	19718	PETROL STATION	YES	YES	NO	DEALER	RURAL
840	KERRY	19768	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
841	KERRY	19665	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
842	KERRY	19790	PETROL STATION	YES	YES	NO	DEALER	RURAL
843	KERRY	19750	PETROL STATION	YES	YES	NO	DEALER	RURAL
844	KERRY	19645	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
845	KERRY	19658	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
846	KERRY	21658	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
847	KERRY	21644	PETROL STATION	YES	YES	NO	DEALER	RURAL
848	KERRY	21647	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
849	KERRY	21649	PETROL STATION	YES	YES	NO	DEALER	RURAL
850	KERRY	21651	PETROL STATION	YES	YES	NO	DEALER	RURAL
851	KERRY	21652	PETROL STATION	YES	YES	NO	DEALER	RURAL
852	KERRY	20974	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
853	KERRY	21656	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
854	KERRY	21638	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
855	KERRY	21661	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
856	KERRY	21662	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
857	KERRY	21663	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
858	KERRY	21668	PETROL STATION	YES	YES	NO	DEALER	RURAL
859	KERRY	21669	PETROL STATION	YES	YES	NO	COMPANY	RURAL
860	KERRY	21675	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
861	KERRY	21653	PETROL STATION	YES	YES	YES	DEALER	RURAL
862	KERRY	19195	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
863	KERRY	20975	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
864	KERRY	20977	PETROL STATION	YES	YES	NO	DEALER	RURAL
865	KERRY	19205	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
866	KERRY	19204	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
867	KERRY	19202	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
868	KERRY	19201	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
869	KERRY	19197	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
870	KERRY	21640	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
871	KERRY	19069	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
872	KERRY	18995	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
873	KERRY	19196	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
874	KERRY	18890	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
875	KERRY	18888	PETROL STATION	YES	YES	NO	DEALER	RURAL
876	KERRY	21679	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
877	KERRY	19199	PETROL STATION	YES	YES	NO	DEALER	RURAL
878	KERRY	21676	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
879	KERRY	21814	PETROL STATION	YES	YES	NO	DEALER	RURAL
880	KERRY	21816	PETROL STATION	YES	YES	NO	DEALER	RURAL
881	KERRY	21819	PETROL STATION	YES	YES	NO	DEALER	RURAL
882	KERRY	21821	PETROL STATION	YES	YES	NO	DEALER	RURAL
883	KERRY	21811	PETROL STATION	YES	YES	NO	DEALER	RURAL
884	KERRY	21809	PETROL STATION	YES	YES	NO	DEALER	RURAL
885	KERRY	21825	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
886	KERRY	21826	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
887	KERRY	21828	PETROL STATION	YES	YES	NO	DEALER	RURAL
888	KERRY	22036	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
889	KERRY	22073	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	URBAN TRANSIENT
890	KERRY	19008	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
891	KERRY	21680	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
892	KERRY	21684	PETROL STATION	YES	YES	NO	DEALER	RURAL
893	KERRY	21686	PETROL STATION	YES	YES	NO	DEALER	RURAL
894	KERRY	21687	PETROL STATION	YES	YES	NO	DEALER	RURAL
895	KERRY	21812	PETROL STATION	YES	YES	NO	DEALER	RURAL
896	KERRY	21693	PETROL STATION	YES	YES	NO	DEALER	RURAL
897	KERRY	21677	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
898	KERRY	21696	PETROL STATION	YES	YES	NO	DEALER	RURAL
899	KERRY	21702	PETROL STATION	YES	YES	NO	DEALER	RURAL
900	KERRY	21705	PETROL STATION	YES	YES	NO	DEALER	RURAL
901	KERRY	21772	PETROL STATION	YES	YES	NO	DEALER	RURAL
902	KERRY	21793	PETROL STATION	YES	YES	NO	DEALER	RURAL
903	KERRY	21805	PETROL STATION	YES	YES	NO	DEALER	RURAL
904	KERRY	21688	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
905	KERRY	19572	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
906	KERRY	19571	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
907	KERRY	19528	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
908	KERRY	19531	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
909	KERRY	19539	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
910	KERRY	19556	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
911	KILDARE	22065	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
912	KILDARE	19758	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
913	KILDARE	20945	KERBSIDE	YES	YES	NO	DEALER	RURAL
914	KILDARE	20948	PETROL STATION	YES	YES	NO	DEALER	RURAL
915	KILDARE	20967	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
916	KILDARE	20966	PETROL STATION	YES	YES	NO	DEALER	RURAL
917	KILDARE	18604	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
918	KILDARE	20954	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
919	KILDARE	20953	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
920	KILDARE	20937	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
921	KILDARE	20949	PETROL STATION	YES	YES	NO	DEALER	RURAL
922	KILDARE	19212	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
923	KILDARE	20943	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
924	KILDARE	20938	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
925	KILDARE	20950	PETROL STATION	YES	YES	NO	DEALER	RURAL
926	KILDARE	18815	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
927	KILDARE	19615	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
928	KILDARE	18910	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
929	KILDARE	18887	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
930	KILDARE	18882	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
931	KILDARE	18833	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
932	KILDARE	18831	PETROL STATION	YES	YES	YES	DEALER	RURAL
933	KILDARE	20968	PETROL STATION	YES	YES	NO	DEALER	RURAL
934	KILDARE	19604	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
935	KILDARE	20969	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
936	KILDARE	18805	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
937	KILDARE	20449	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
938	KILDARE	20448	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
939	KILDARE	20447	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
940	KILDARE	19207	PETROL STATION	YES	YES	NO	COMPANY	RURAL
941	KILDARE	19210	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
942	KILDARE	20944	PETROL STATION	YES	YES	NO	DEALER	RURAL
943	KILDARE	18827	PETROL STATION	YES	YES	NO	DEALER	RURAL
944	KILDARE	19215	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
945	KILDARE	21977	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
946	KILDARE	19861	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
947	KILDARE	21906	PETROL STATION	YES	YES	NO	DEALER	RURAL
948	KILDARE	18596	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
949	KILDARE	20947	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
950	KILDARE	19213	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
951	KILDARE	21905	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
952	KILDARE	19214	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
953	KILDARE	19851	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
954	KILDARE	19216	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
955	KILDARE	19217	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
956	KILDARE	19219	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
957	KILDARE	19867	PETROL STATION	YES	YES	NO	COMPANY	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
958	KILDARE	19890	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
959	KILDARE	18540	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
960	KILDARE	20900	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
961	KILDARE	19558	PETROL STATION	YES	YES	YES	DEALER	RURAL
962	KILDARE	21780	PETROL STATION	YES	YES	NO	DEALER	RURAL
963	KILDARE	21781	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
964	KILDARE	21783	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
965	KILDARE	19541	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
966	KILDARE	19547	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
967	KILDARE	19857	PETROL STATION	YES	YES	NO	COMPANY	RURAL
968	KILDARE	19553	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
969	KILDARE	19845	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
970	KILDARE	22008	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
971	KILDARE	22068	SERVICE AREA	YES	YES	NO	COMPANY	URBAN TRANSIENT
972	KILKENNY	21289	KERBSIDE	YES	YES	NO	DEALER	RURAL
973	KILKENNY	21297	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
974	KILKENNY	21302	KERBSIDE	YES	NO	NO	DEALER	RURAL
975	KILKENNY	21288	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
976	KILKENNY	21287	KERBSIDE	YES	YES	NO	DEALER	RURAL
977	KILKENNY	21286	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
978	KILKENNY	21285	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
979	KILKENNY	21313	KERBSIDE	YES	YES	NO	DEALER	RURAL
980	KILKENNY	21316	KERBSIDE	YES	YES	NO	DEALER	RURAL
981	KILKENNY	21323	KERBSIDE	YES	YES	NO	DEALER	RURAL
982	KILKENNY	21319	KERBSIDE	YES	YES	NO	DEALER	RURAL
983	KILKENNY	20849	KERBSIDE	YES	YES	NO	DEALER	RURAL
984	KILKENNY	21304	KERBSIDE	YES	YES	NO	DEALER	RURAL
985	KILKENNY	18966	KERBSIDE	YES	YES	NO	DEALER	RURAL
986	KILKENNY	21271	KERBSIDE	YES	YES	NO	DEALER	RURAL
987	KILKENNY	21298	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
988	KILKENNY	19674	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
989	KILKENNY	21306	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
990	KILKENNY	21300	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
991	KILKENNY	21295	PETROL STATION	YES	YES	NO	DEALER	RURAL
992	KILKENNY	21290	PETROL STATION	YES	YES	NO	DEALER	RURAL
993	KILKENNY	19688	PETROL STATION	YES	YES	YES	DEALER	RURAL
994	KILKENNY	21284	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
995	KILKENNY	20800	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
996	KILKENNY	21291	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
997	KILKENNY	20857	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
998	KILKENNY	22011	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
999	KILKENNY	21858	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1000	KILKENNY	19565	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1001	KILKENNY	21301	PETROL STATION	YES	YES	NO	DEALER	RURAL
1002	KILKENNY	20801	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1003	KILKENNY	21282	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1004	KILKENNY	20803	PETROL STATION	YES	YES	NO	DEALER	RURAL
1005	KILKENNY	20850	PETROL STATION	YES	YES	NO	DEALER	RURAL
1006	KILKENNY	18798	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1007	KILKENNY	19729	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1008	KILKENNY	18845	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1009	KILKENNY	21321	PETROL STATION	YES	YES	NO	DEALER	RURAL
1010	KILKENNY	21318	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1011	KILKENNY	19222	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1012	KILKENNY	19226	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1013	KILKENNY	19079	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1014	KILKENNY	18994	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1015	KILKENNY	18985	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1016	KILKENNY	19229	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1017	KILKENNY	19022	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1018	KILKENNY	19227	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1019	KILKENNY	19221	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1020	KILKENNY	19655	PETROL STATION	YES	YES	NO	DEALER	RURAL
1021	KILKENNY	19223	PETROL STATION	YES	YES	NO	DEALER	RURAL
1022	KILKENNY	21275	PETROL STATION	YES	YES	NO	DEALER	RURAL
1023	KILKENNY	19225	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1024	KILKENNY	21277	PETROL STATION	YES	YES	NO	DEALER	RURAL
1025	KILKENNY	19224	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1026	KILKENNY	21279	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1027	KILKENNY	19589	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1028	LAOIS	20961	KERBSIDE	YES	YES	NO	DEALER	RURAL
1029	LAOIS	20960	KERBSIDE	YES	YES	NO	DEALER	RURAL
1030	LAOIS	20962	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1031	LAOIS	20906	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1032	LAOIS	21896	KERBSIDE	YES	YES	NO	DEALER	RURAL
1033	LAOIS	20934	KERBSIDE	YES	YES	NO	DEALER	RURAL
1034	LAOIS	19761	PETROL STATION	YES	YES	NO	DEALER	RURAL
1035	LAOIS	20915	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1036	LAOIS	20917	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1037	LAOIS	20918	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1038	LAOIS	19239	PETROL STATION	YES	YES	NO	DEALER	RURAL
1039	LAOIS	20963	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1040	LAOIS	20914	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1041	LAOIS	20912	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1042	LAOIS	20911	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1043	LAOIS	19741	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1044	LAOIS	19237	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1045	LAOIS	19236	PETROL STATION	YES	YES	NO	DEALER	RURAL
1046	LAOIS	20965	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1047	LAOIS	20903	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1048	LAOIS	20904	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1049	LAOIS	20905	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1050	LAOIS	20907	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1051	LAOIS	19024	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1052	LAOIS	22088	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
1053	LAOIS	19667	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1054	LAOIS	20924	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1055	LAOIS	19586	PETROL STATION	YES	YES	NO	DEALER	RURAL
1056	LAOIS	19233	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1057	LAOIS	19955	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1058	LAOIS	20922	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1059	LAOIS	21232	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1060	LAOIS	22066	PETROL STATION	YES	YES	NO	DEALER	RURAL
1061	LAOIS	20928	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1062	LAOIS	19235	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1063	LAOIS	19903	PETROL STATION	YES	YES	NO	DEALER	RURAL
1064	LAOIS	19017	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1065	LAOIS	19045	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1066	LAOIS	20959	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1067	LAOIS	20935	PETROL STATION	YES	YES	NO	DEALER	RURAL
1068	LAOIS	19846	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1069	LAOIS	19050	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1070	LAOIS	19238	PETROL STATION	YES	YES	NO	DEALER	RURAL
1071	LAOIS	20920	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1072	LAOIS	19231	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1073	LAOIS	20921	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1074	LAOIS	20919	PETROL STATION	YES	YES	NO	DEALER	RURAL
1075	LAOIS	20933	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1076	LAOIS	22047	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1077	LAOIS	19039	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1078	LEITRIM	19766	KERBSIDE	YES	YES	NO	DEALER	RURAL
1079	LEITRIM	20069	KERBSIDE	YES	YES	NO	DEALER	RURAL
1080	LEITRIM	20474	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1081	LEITRIM	20499	KERBSIDE	NO	YES	NO	DEALER	RESIDENTIAL
1082	LEITRIM	20483	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1083	LEITRIM	20491	KERBSIDE	YES	YES	NO	DEALER	RURAL
1084	LEITRIM	20487	KERBSIDE	YES	NO	NO	DEALER	RURAL
1085	LEITRIM	20482	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1086	LEITRIM	20067	PETROL STATION	YES	YES	NO	DEALER	RURAL
1087	LEITRIM	21941	PETROL STATION	NO	YES	NO	DEALER	RURAL
1088	LEITRIM	19675	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1089	LEITRIM	19695	PETROL STATION	YES	YES	NO	DEALER	RURAL
1090	LEITRIM	19243	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1091	LEITRIM	19610	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1092	LEITRIM	18932	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1093	LEITRIM	20475	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1094	LEITRIM	20476	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1095	LEITRIM	18855	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1096	LEITRIM	20479	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1097	LEITRIM	19242	PETROL STATION	YES	YES	NO	DEALER	RURAL
1098	LEITRIM	20495	PETROL STATION	YES	YES	NO	DEALER	RURAL
1099	LEITRIM	19244	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1100	LEITRIM	19241	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1101	LEITRIM	20480	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1102	LEITRIM	20478	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1103	LEITRIM	21907	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1104	LEITRIM	20488	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1105	LIMERICK	20233	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1106	LIMERICK	20257	KERBSIDE	YES	YES	NO	DEALER	RURAL
1107	LIMERICK	20258	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1108	LIMERICK	21777	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1109	LIMERICK	20211	KERBSIDE	YES	YES	NO	DEALER	RURAL
1110	LIMERICK	21561	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1111	LIMERICK	20236	KERBSIDE	YES	YES	NO	DEALER	RURAL
1112	LIMERICK	19516	PETROL STATION	YES	YES	NO	DEALER	RURAL
1113	LIMERICK	19895	PETROL STATION	YES	NO	NO	COMPANY	INDUSTRY/OFFICE
1114	LIMERICK	19479	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1115	LIMERICK	19939	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1116	LIMERICK	19518	PETROL STATION	YES	YES	NO	DEALER	RURAL
1117	LIMERICK	19517	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1118	LIMERICK	19043	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1119	LIMERICK	19485	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1120	LIMERICK	20219	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1121	LIMERICK	19082	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1122	LIMERICK	18843	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
1123	LIMERICK	18844	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1124	LIMERICK	18852	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1125	LIMERICK	18869	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1126	LIMERICK	18871	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1127	LIMERICK	19472	PETROL STATION	YES	YES	YES	DEALER	RURAL
1128	LIMERICK	18920	PETROL STATION	YES	YES	YES	COMPANY	INDUSTRY/OFFICE
1129	LIMERICK	19473	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1130	LIMERICK	19041	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1131	LIMERICK	19636	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1132	LIMERICK	18981	PETROL STATION	YES	YES	NO	DEALER	RURAL
1133	LIMERICK	18962	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1134	LIMERICK	19651	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1135	LIMERICK	18959	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1136	LIMERICK	19676	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1137	LIMERICK	19666	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1138	LIMERICK	19054	PETROL STATION	YES	YES	NO	DEALER	RURAL
1139	LIMERICK	19491	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1140	LIMERICK	19512	PETROL STATION	YES	YES	NO	DEALER	RURAL
1141	LIMERICK	19511	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1142	LIMERICK	19507	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1143	LIMERICK	19506	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1144	LIMERICK	19502	PETROL STATION	YES	NO	NO	COMPANY	INDUSTRY/OFFICE
1145	LIMERICK	19499	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1146	LIMERICK	19497	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1147	LIMERICK	19494	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1148	LIMERICK	19607	PETROL STATION	YES	YES	NO	DEALER	RURAL
1149	LIMERICK	19492	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1150	LIMERICK	19515	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1151	LIMERICK	19490	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1152	LIMERICK	19488	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1153	LIMERICK	19486	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1154	LIMERICK	19484	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1155	LIMERICK	19478	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
1156	LIMERICK	19477	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1157	LIMERICK	19476	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1158	LIMERICK	19474	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1159	LIMERICK	19773	PETROL STATION	YES	YES	NO	DEALER	RURAL
1160	LIMERICK	20237	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1161	LIMERICK	21991	PETROL STATION	YES	YES	NO	DEALER	RURAL
1162	LIMERICK	21994	PETROL STATION	YES	YES	NO	DEALER	RURAL
1163	LIMERICK	20234	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1164	LIMERICK	21764	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1165	LIMERICK	21995	PETROL STATION	YES	YES	NO	DEALER	RURAL
1166	LIMERICK	21997	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1167	LIMERICK	22016	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1168	LIMERICK	22022	PETROL STATION	YES	YES	NO	DEALER	RURAL
1169	LIMERICK	20260	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1170	LIMERICK	20197	PETROL STATION	YES	YES	NO	DEALER	RURAL
1171	LIMERICK	20229	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1172	LIMERICK	20240	PETROL STATION	YES	YES	NO	DEALER	RURAL
1173	LIMERICK	20242	PETROL STATION	YES	YES	NO	DEALER	RURAL
1174	LIMERICK	20246	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1175	LIMERICK	20251	PETROL STATION	YES	YES	NO	DEALER	RURAL
1176	LIMERICK	20252	PETROL STATION	YES	YES	NO	DEALER	RURAL
1177	LIMERICK	20253	PETROL STATION	YES	YES	NO	DEALER	RURAL
1178	LIMERICK	20254	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1179	LIMERICK	22033	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1180	LIMERICK	20209	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1181	LIMERICK	20199	PETROL STATION	YES	YES	NO	DEALER	RURAL
1182	LIMERICK	20202	PETROL STATION	YES	YES	NO	DEALER	RURAL
1183	LIMERICK	20203	PETROL STATION	YES	YES	NO	DEALER	RURAL
1184	LIMERICK	20205	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1185	LIMERICK	20206	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1186	LIMERICK	21911	PETROL STATION	YES	YES	NO	DEALER	RURAL
1187	LIMERICK	21779	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1188	LIMERICK	20207	PETROL STATION	YES	YES	NO	DEALER	RURAL
1189	LIMERICK	20208	PETROL STATION	YES	YES	NO	DEALER	RURAL
1190	LIMERICK	21765	PETROL STATION	YES	YES	NO	DEALER	RURAL
1191	LIMERICK	20230	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1192	LIMERICK	20109	PETROL STATION	YES	YES	NO	DEALER	RURAL
1193	LIMERICK	20210	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1194	LIMERICK	20212	PETROL STATION	YES	YES	YES	DEALER	RURAL
1195	LIMERICK	20218	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1196	LIMERICK	20220	PETROL STATION	YES	YES	NO	DEALER	RURAL
1197	LIMERICK	20221	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1198	LIMERICK	21766	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1199	LIMERICK	20222	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1200	LIMERICK	20238	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1201	LIMERICK	21778	PETROL STATION	YES	YES	NO	DEALER	RURAL
1202	LIMERICK	21327	PETROL STATION	YES	YES	NO	DEALER	RURAL
1203	LIMERICK	21567	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1204	LIMERICK	21565	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1205	LIMERICK	21564	PETROL STATION	YES	YES	NO	DEALER	RURAL
1206	LIMERICK	21571	PETROL STATION	YES	YES	NO	DEALER	RURAL
1207	LIMERICK	21332	PETROL STATION	YES	YES	NO	DEALER	RURAL
1208	LIMERICK	20261	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1209	LIMERICK	20214	PETROL STATION	YES	YES	NO	DEALER	RURAL
1210	LIMERICK	22072	SERVICE AREA	YES	YES	NO	COMPANY	RURAL
1211	LONGFORD	20085	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1212	LONGFORD	20098	KERBSIDE	YES	YES	NO	DEALER	RURAL
1213	LONGFORD	20099	KERBSIDE	YES	YES	NO	DEALER	RURAL
1214	LONGFORD	20101	KERBSIDE	YES	YES	NO	DEALER	RURAL
1215	LONGFORD	20071	KERBSIDE	YES	YES	NO	DEALER	RURAL
1216	LONGFORD	20074	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1217	LONGFORD	20078	KERBSIDE	YES	YES	NO	DEALER	RURAL
1218	LONGFORD	20094	PETROL STATION	YES	YES	NO	DEALER	RURAL
1219	LONGFORD	20090	PETROL STATION	YES	YES	NO	DEALER	RURAL
1220	LONGFORD	19246	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1221	LONGFORD	20082	PETROL STATION	YES	YES	NO	DEALER	RURAL
1222	LONGFORD	20091	PETROL STATION	YES	YES	NO	DEALER	RURAL
1223	LONGFORD	20088	PETROL STATION	YES	YES	NO	DEALER	RURAL
1224	LONGFORD	20081	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1225	LONGFORD	19770	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1226	LONGFORD	21979	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1227	LONGFORD	20096	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1228	LONGFORD	18842	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1229	LONGFORD	18955	PETROL STATION	YES	YES	NO	DEALER	RURAL
1230	LONGFORD	21916	PETROL STATION	YES	YES	NO	DEALER	RURAL
1231	LONGFORD	21915	PETROL STATION	YES	YES	NO	DEALER	RURAL
1232	LONGFORD	19732	PETROL STATION	YES	YES	NO	DEALER	RURAL
1233	LONGFORD	18991	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1234	LONGFORD	19245	PETROL STATION	YES	YES	YES	DEALER	RURAL
1235	LONGFORD	21513	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1236	LONGFORD	20079	PETROL STATION	YES	YES	NO	DEALER	RURAL
1237	LONGFORD	19249	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1238	LONGFORD	19248	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
1239	LONGFORD	19841	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1240	LONGFORD	21741	PETROL STATION	YES	YES	NO	DEALER	RURAL
1241	LONGFORD	18781	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1242	LONGFORD	19247	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1243	LONGFORD	19897	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1244	LOUTH	18982	KERBSIDE	YES	YES	NO	DEALER	RURAL
1245	LOUTH	21726	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1246	LOUTH	21727	KERBSIDE	YES	YES	NO	DEALER	RURAL
1247	LOUTH	21728	KERBSIDE	YES	YES	NO	DEALER	RURAL
1248	LOUTH	20011	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
1249	LOUTH	19614	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1250	LOUTH	19255	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1251	LOUTH	18977	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1252	LOUTH	19704	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1253	LOUTH	19649	PETROL STATION	YES	YES	YES	DEALER	RURAL
1254	LOUTH	21724	PETROL STATION	YES	YES	NO	DEALER	RURAL
1255	LOUTH	19254	PETROL STATION	YES	YES	NO	DEALER	RURAL
1256	LOUTH	19036	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1257	LOUTH	20749	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1258	LOUTH	19074	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1259	LOUTH	18997	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1260	LOUTH	19521	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1261	LOUTH	19536	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1262	LOUTH	18847	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1263	LOUTH	19253	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1264	LOUTH	20745	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1265	LOUTH	20750	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1266	LOUTH	20748	PETROL STATION	YES	YES	NO	DEALER	RURAL
1267	LOUTH	20747	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1268	LOUTH	19252	PETROL STATION	YES	YES	NO	DEALER	RURAL
1269	LOUTH	19251	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1270	LOUTH	19250	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1271	LOUTH	20746	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1272	LOUTH	18813	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1273	LOUTH	20751	PETROL STATION	YES	YES	NO	DEALER	RURAL
1274	LOUTH	20013	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1275	LOUTH	19969	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1276	LOUTH	19968	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1277	LOUTH	19965	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1278	LOUTH	19960	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1279	LOUTH	20005	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1280	LOUTH	20007	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1281	LOUTH	20008	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1282	LOUTH	20009	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1283	LOUTH	20012	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1284	LOUTH	20014	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1285	LOUTH	20015	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1286	LOUTH	19859	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1287	LOUTH	19789	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1288	LOUTH	22074	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
1289	LOUTH	21918	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1290	LOUTH	21919	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1291	MAYO	21095	KERBSIDE	YES	YES	NO	DEALER	RURAL
1292	MAYO	21403	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1293	MAYO	21140	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1294	MAYO	21150	KERBSIDE	NO	YES	NO	DEALER	RURAL
1295	MAYO	21103	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1296	MAYO	21113	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1297	MAYO	21109	KERBSIDE	YES	YES	NO	DEALER	RURAL
1298	MAYO	21116	KERBSIDE	YES	YES	NO	DEALER	RURAL
1299	MAYO	21125	KERBSIDE	YES	YES	NO	DEALER	RURAL
1300	MAYO	21127	KERBSIDE	NO	YES	NO	DEALER	RURAL
1301	MAYO	21409	KERBSIDE	YES	YES	NO	DEALER	RURAL
1302	MAYO	19725	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1303	MAYO	21154	KERBSIDE	YES	YES	NO	DEALER	RURAL
1304	MAYO	21179	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1305	MAYO	19798	KERBSIDE	YES	YES	NO	DEALER	RURAL
1306	MAYO	21151	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1307	MAYO	19832	KERBSIDE	YES	YES	NO	DEALER	RURAL
1308	MAYO	21066	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1309	MAYO	18987	KERBSIDE	YES	YES	NO	DEALER	RURAL
1310	MAYO	21183	KERBSIDE	YES	YES	NO	DEALER	RURAL
1311	MAYO	21404	PETROL STATION	YES	YES	NO	DEALER	RURAL
1312	MAYO	21054	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1313	MAYO	21101	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1314	MAYO	21147	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1315	MAYO	18824	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1316	MAYO	21100	PETROL STATION	YES	YES	NO	DEALER	RURAL
1317	MAYO	21098	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1318	MAYO	21083	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1319	MAYO	21096	PETROL STATION	YES	YES	NO	DEALER	RURAL
1320	MAYO	22102	PETROL STATION	YES	YES	NO	DEALER	RURAL
1321	MAYO	19273	PETROL STATION	YES	YES	NO	DEALER	RURAL
1322	MAYO	19270	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1323	MAYO	19269	PETROL STATION	YES	YES	YES	DEALER	RURAL
1324	MAYO	19267	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1325	MAYO	19266	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
1326	MAYO	19265	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1327	MAYO	18850	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1328	MAYO	21092	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1329	MAYO	19576	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1330	MAYO	21084	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1331	MAYO	18967	PETROL STATION	YES	YES	NO	DEALER	RURAL
1332	MAYO	21097	PETROL STATION	YES	YES	NO	DEALER	RURAL
1333	MAYO	21111	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1334	MAYO	21110	PETROL STATION	YES	YES	NO	DEALER	RURAL
1335	MAYO	21107	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1336	MAYO	21106	PETROL STATION	YES	YES	NO	DEALER	RURAL
1337	MAYO	21105	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1338	MAYO	21115	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1339	MAYO	21117	PETROL STATION	YES	YES	NO	DEALER	RURAL
1340	MAYO	21119	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1341	MAYO	19724	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1342	MAYO	19263	PETROL STATION	YES	YES	NO	DEALER	RURAL
1343	MAYO	18904	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1344	MAYO	21126	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1345	MAYO	21102	PETROL STATION	YES	YES	NO	DEALER	RURAL
1346	MAYO	21128	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1347	MAYO	21129	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1348	MAYO	18820	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1349	MAYO	21133	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1350	MAYO	21138	PETROL STATION	YES	YES	NO	DEALER	RURAL
1351	MAYO	21410	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1352	MAYO	18803	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1353	MAYO	21879	PETROL STATION	YES	YES	NO	DEALER	RURAL
1354	MAYO	21091	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1355	MAYO	22055	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1356	MAYO	22034	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1357	MAYO	19257	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1358	MAYO	21156	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1359	MAYO	21159	PETROL STATION	YES	YES	NO	DEALER	RURAL
1360	MAYO	21070	PETROL STATION	YES	YES	NO	DEALER	RURAL
1361	MAYO	21160	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1362	MAYO	21161	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1363	MAYO	21094	PETROL STATION	YES	YES	NO	DEALER	RURAL
1364	MAYO	19048	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1365	MAYO	19616	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1366	MAYO	21068	PETROL STATION	YES	YES	NO	DEALER	RURAL
1367	MAYO	19677	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1368	MAYO	19754	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1369	MAYO	21056	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1370	MAYO	19260	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1371	MAYO	19259	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1372	MAYO	21152	PETROL STATION	YES	YES	NO	DEALER	RURAL
1373	MAYO	19682	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1374	MAYO	21063	PETROL STATION	YES	YES	NO	DEALER	RURAL
1375	MAYO	21153	PETROL STATION	YES	YES	NO	DEALER	RURAL
1376	MAYO	19772	PETROL STATION	YES	YES	NO	DEALER	RURAL
1377	MAYO	19261	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1378	MAYO	19671	PETROL STATION	NO	YES	NO	DEALER	RESIDENTIAL
1379	MAYO	19670	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1380	MAYO	22058	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1381	MAYO	19258	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1382	MAYO	21075	PETROL STATION	YES	YES	NO	DEALER	RURAL
1383	MAYO	21053	PETROL STATION	YES	YES	NO	DEALER	RURAL
1384	MAYO	21072	PETROL STATION	YES	YES	NO	DEALER	RURAL
1385	MAYO	19055	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1386	MAYO	21182	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1387	MAYO	19633	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1388	MAYO	19256	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1389	MAYO	18999	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1390	MAYO	22060	PETROL STATION	YES	YES	NO	DEALER	RURAL
1391	MAYO	19641	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1392	MAYO	22059	PETROL STATION	YES	YES	NO	DEALER	RURAL
1393	MAYO	21082	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1394	MAYO	21074	PETROL STATION	YES	YES	NO	DEALER	RURAL
1395	MAYO	19034	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1396	MAYO	19639	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1397	MAYO	21080	PETROL STATION	YES	YES	NO	DEALER	RURAL
1398	MAYO	19640	PETROL STATION	YES	YES	NO	DEALER	RURAL
1399	MAYO	21076	PETROL STATION	YES	YES	NO	DEALER	RURAL
1400	MEATH	19994	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1401	MEATH	20022	KERBSIDE	YES	YES	NO	DEALER	RURAL
1402	MEATH	21738	KERBSIDE	YES	YES	NO	DEALER	RURAL
1403	MEATH	19835	KERBSIDE	YES	YES	NO	DEALER	RURAL
1404	MEATH	19806	KERBSIDE	YES	YES	NO	DEALER	RURAL
1405	MEATH	20003	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1406	MEATH	19993	KERBSIDE	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
1407	MEATH	18971	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1408	MEATH	19984	PETROL STATION	YES	YES	NO	DEALER	RURAL
1409	MEATH	18856	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1410	MEATH	21334	PETROL STATION	YES	YES	NO	DEALER	RURAL
1411	MEATH	18978	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1412	MEATH	19985	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1413	MEATH	19988	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1414	MEATH	19983	PETROL STATION	YES	YES	NO	DEALER	RURAL
1415	MEATH	19982	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1416	MEATH	19989	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1417	MEATH	19991	PETROL STATION	YES	YES	NO	DEALER	RURAL
1418	MEATH	19979	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1419	MEATH	18897	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1420	MEATH	19997	PETROL STATION	YES	YES	NO	DEALER	RURAL
1421	MEATH	19992	PETROL STATION	YES	YES	NO	DEALER	RURAL
1422	MEATH	18931	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1423	MEATH	21735	PETROL STATION	YES	YES	NO	DEALER	RURAL
1424	MEATH	21893	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1425	MEATH	19743	PETROL STATION	YES	YES	NO	DEALER	RURAL
1426	MEATH	20019	PETROL STATION	YES	YES	NO	DEALER	RURAL
1427	MEATH	21722	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1428	MEATH	20021	PETROL STATION	YES	YES	NO	DEALER	RURAL
1429	MEATH	20023	PETROL STATION	YES	YES	NO	DEALER	RURAL
1430	MEATH	21731	PETROL STATION	YES	YES	NO	DEALER	RURAL
1431	MEATH	21732	PETROL STATION	YES	YES	NO	DEALER	RURAL
1432	MEATH	21734	PETROL STATION	YES	YES	NO	DEALER	RURAL
1433	MEATH	20024	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1434	MEATH	21921	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1435	MEATH	19875	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1436	MEATH	19276	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1437	MEATH	20026	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1438	MEATH	21736	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1439	MEATH	20027	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1440	MEATH	19862	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1441	MEATH	21737	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1442	MEATH	20028	PETROL STATION	YES	YES	NO	DEALER	RURAL
1443	MEATH	21922	PETROL STATION	YES	YES	NO	DEALER	RURAL
1444	MEATH	18605	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1445	MEATH	21968	PETROL STATION	YES	YES	NO	DEALER	RURAL
1446	MEATH	19642	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1447	MEATH	20002	PETROL STATION	YES	YES	NO	DEALER	RURAL
1448	MEATH	19976	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1449	MEATH	19975	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1450	MEATH	19974	PETROL STATION	YES	YES	NO	DEALER	RURAL
1451	MEATH	19973	PETROL STATION	YES	YES	NO	DEALER	RURAL
1452	MEATH	19972	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1453	MEATH	19970	PETROL STATION	YES	YES	NO	DEALER	RURAL
1454	MEATH	21874	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1455	MEATH	19998	PETROL STATION	YES	YES	NO	DEALER	RURAL
1456	MEATH	19628	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1457	MEATH	21857	PETROL STATION	YES	YES	NO	DEALER	RURAL
1458	MEATH	20001	PETROL STATION	YES	YES	NO	DEALER	RURAL
1459	MEATH	19603	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1460	MEATH	20699	PETROL STATION	YES	YES	NO	DEALER	RURAL
1461	MEATH	19978	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1462	MEATH	18799	PETROL STATION	YES	YES	NO	DEALER	RURAL
1463	MEATH	18785	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1464	MEATH	18783	PETROL STATION	YES	YES	NO	DEALER	RURAL
1465	MEATH	20004	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	COMPANY	RURAL
1466	MEATH	21792	PETROL STATION	YES	YES	NO	DEALER	RURAL
1467	MEATH	19933	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1468	MEATH	19705	PETROL STATION	YES	YES	YES	DEALER	RURAL
1469	MEATH	19281	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1470	MEATH	19280	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1471	MEATH	19277	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1472	MEATH	19563	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1473	MONAGHAN	19286	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
1474	MONAGHAN	21715	KERBSIDE	YES	YES	NO	DEALER	RURAL
1475	MONAGHAN	21717	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1476	MONAGHAN	20773	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
1477	MONAGHAN	20772	KERBSIDE	YES	YES	NO	DEALER	URBAN TRANSIENT
1478	MONAGHAN	20760	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1479	MONAGHAN	20755	KERBSIDE	YES	YES	NO	DEALER	RURAL
1480	MONAGHAN	21716	PETROL STATION	YES	YES	NO	DEALER	RURAL
1481	MONAGHAN	20743	PETROL STATION	YES	YES	NO	DEALER	RURAL
1482	MONAGHAN	19288	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1483	MONAGHAN	19287	PETROL STATION	YES	YES	NO	DEALER	RURAL
1484	MONAGHAN	19284	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1485	MONAGHAN	19283	PETROL STATION	YES	YES	NO	DEALER	RURAL
1486	MONAGHAN	21709	PETROL STATION	YES	YES	NO	DEALER	RURAL
1487	MONAGHAN	21710	PETROL STATION	YES	YES	NO	DEALER	RURAL
1488	MONAGHAN	21712	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1489	MONAGHAN	20741	PETROL STATION	YES	YES	NO	DEALER	RURAL
1490	MONAGHAN	18826	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1491	MONAGHAN	21718	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1492	MONAGHAN	21719	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1493	MONAGHAN	21721	PETROL STATION	YES	YES	NO	DEALER	RURAL
1494	MONAGHAN	22048	PETROL STATION	NO	YES	NO	DEALER	RESIDENTIAL
1495	MONAGHAN	22039	PETROL STATION	YES	YES	NO	DEALER	RURAL
1496	MONAGHAN	21987	PETROL STATION	YES	YES	NO	DEALER	RURAL
1497	MONAGHAN	21978	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1498	MONAGHAN	21943	PETROL STATION	YES	YES	NO	DEALER	RURAL
1499	MONAGHAN	21942	PETROL STATION	YES	YES	NO	DEALER	RURAL
1500	MONAGHAN	21714	PETROL STATION	YES	YES	NO	DEALER	RURAL
1501	MONAGHAN	20764	PETROL STATION	YES	YES	NO	DEALER	RURAL
1502	MONAGHAN	21335	PETROL STATION	NO	YES	NO	DEALER	RESIDENTIAL
1503	MONAGHAN	21340	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1504	MONAGHAN	21341	PETROL STATION	YES	YES	NO	DEALER	RURAL
1505	MONAGHAN	20770	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1506	MONAGHAN	20768	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1507	MONAGHAN	20767	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1508	MONAGHAN	22101	PETROL STATION	YES	YES	NO	DEALER	RURAL
1509	MONAGHAN	20765	PETROL STATION	YES	YES	NO	DEALER	RURAL
1510	MONAGHAN	19056	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1511	MONAGHAN	20763	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1512	MONAGHAN	18864	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1513	MONAGHAN	20759	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1514	MONAGHAN	20758	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1515	MONAGHAN	20757	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1516	MONAGHAN	20756	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1517	MONAGHAN	19542	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1518	MONAGHAN	20752	PETROL STATION	YES	YES	NO	DEALER	RURAL
1519	MONAGHAN	20766	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1520	OFFALY	21856	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
1521	OFFALY	20901	KERBSIDE	YES	YES	NO	DEALER	RURAL
1522	OFFALY	21593	KERBSIDE	YES	YES	NO	DEALER	RURAL
1523	OFFALY	21969	KERBSIDE	YES	YES	NO	DEALER	RURAL
1524	OFFALY	18901	KERBSIDE	YES	YES	NO	COMPANY	RESIDENTIAL
1525	OFFALY	21473	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1526	OFFALY	21474	KERBSIDE	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
1527	OFFALY	19081	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1528	OFFALY	21580	KERBSIDE	YES	YES	NO	DEALER	RURAL
1529	OFFALY	21584	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1530	OFFALY	21589	KERBSIDE	YES	YES	NO	DEALER	RURAL
1531	OFFALY	21590	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1532	OFFALY	20444	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1533	OFFALY	21617	PETROL STATION	YES	YES	NO	DEALER	RURAL
1534	OFFALY	20972	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1535	OFFALY	21611	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1536	OFFALY	21600	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1537	OFFALY	21601	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1538	OFFALY	21604	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1539	OFFALY	21605	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1540	OFFALY	21606	PETROL STATION	YES	YES	NO	DEALER	RURAL
1541	OFFALY	21597	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1542	OFFALY	21615	PETROL STATION	YES	YES	NO	DEALER	RURAL
1543	OFFALY	21932	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1544	OFFALY	21960	PETROL STATION	YES	YES	NO	DEALER	RURAL
1545	OFFALY	21963	PETROL STATION	YES	YES	NO	DEALER	RURAL
1546	OFFALY	22035	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1547	OFFALY	22067	PETROL STATION	YES	YES	UNSURVEYED	DEALER	RESIDENTIAL
1548	OFFALY	21610	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1549	OFFALY	21579	PETROL STATION	YES	YES	NO	DEALER	RURAL
1550	OFFALY	18949	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1551	OFFALY	21476	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1552	OFFALY	21574	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1553	OFFALY	21598	PETROL STATION	YES	YES	NO	DEALER	RURAL
1554	OFFALY	21578	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1555	OFFALY	21583	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1556	OFFALY	21585	PETROL STATION	YES	YES	NO	DEALER	RURAL
1557	OFFALY	21587	PETROL STATION	YES	YES	NO	COMPANY	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1558	OFFALY	21575	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1559	OFFALY	19537	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1560	OFFALY	19578	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1561	OFFALY	19551	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1562	OFFALY	19840	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1563	OFFALY	19957	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1564	OFFALY	19345	PETROL STATION	YES	YES	NO	DEALER	RURAL
1565	OFFALY	19707	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1566	OFFALY	19612	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1567	OFFALY	19295	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1568	OFFALY	19293	PETROL STATION	YES	YES	NO	DEALER	RURAL
1569	OFFALY	19290	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1570	ROSCOMMON	18780	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1571	ROSCOMMON	21503	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1572	ROSCOMMON	21504	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1573	ROSCOMMON	21508	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1574	ROSCOMMON	21505	KERBSIDE	YES	YES	NO	DEALER	RURAL
1575	ROSCOMMON	21417	KERBSIDE	YES	YES	NO	DEALER	RURAL
1576	ROSCOMMON	19299	KERBSIDE	YES	YES	NO	DEALER	RURAL
1577	ROSCOMMON	21494	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1578	ROSCOMMON	21498	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1579	ROSCOMMON	21519	KERBSIDE	YES	YES	NO	DEALER	RURAL
1580	ROSCOMMON	21532	KERBSIDE	YES	YES	NO	DEALER	RURAL
1581	ROSCOMMON	21531	KERBSIDE	YES	YES	NO	DEALER	RURAL
1582	ROSCOMMON	21502	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1583	ROSCOMMON	19309	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1584	ROSCOMMON	21511	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1585	ROSCOMMON	19828	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1586	ROSCOMMON	19710	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1587	ROSCOMMON	21514	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1588	ROSCOMMON	19306	PETROL STATION	YES	YES	NO	DEALER	RURAL
1589	ROSCOMMON	19305	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1590	ROSCOMMON	19033	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1591	ROSCOMMON	19534	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1592	ROSCOMMON	21924	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1593	ROSCOMMON	21484	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1594	ROSCOMMON	21060	PETROL STATION	YES	YES	NO	DEALER	RURAL
1595	ROSCOMMON	19746	PETROL STATION	YES	YES	NO	DEALER	RURAL
1596	ROSCOMMON	21048	PETROL STATION	NO	YES	NO	DEALER	URBAN TRANSIENT
1597	ROSCOMMON	21049	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1598	ROSCOMMON	21050	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1599	ROSCOMMON	21527	PETROL STATION	YES	YES	NO	DEALER	RURAL
1600	ROSCOMMON	21524	PETROL STATION	YES	YES	NO	DEALER	RURAL
1601	ROSCOMMON	19304	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1602	ROSCOMMON	21481	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1603	ROSCOMMON	21479	PETROL STATION	YES	YES	NO	DEALER	RURAL
1604	ROSCOMMON	18899	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1605	ROSCOMMON	18905	PETROL STATION	YES	YES	NO	DEALER	RURAL
1606	ROSCOMMON	19308	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1607	ROSCOMMON	19301	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1608	ROSCOMMON	19298	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1609	ROSCOMMON	19302	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1610	ROSCOMMON	21528	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1611	ROSCOMMON	21491	PETROL STATION	YES	YES	NO	DEALER	RURAL
1612	ROSCOMMON	21522	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1613	ROSCOMMON	21521	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1614	ROSCOMMON	21501	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1615	ROSCOMMON	19679	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1616	ROSCOMMON	21534	PETROL STATION	YES	YES	NO	DEALER	RURAL
1617	ROSCOMMON	19599	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1618	ROSCOMMON	21998	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	RURAL
1619	ROSCOMMON	19297	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1620	SLIGO	21166	KERBSIDE	YES	YES	NO	DEALER	RURAL
1621	SLIGO	21165	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1622	SLIGO	19747	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1623	SLIGO	21196	KERBSIDE	YES	YES	NO	DEALER	RURAL
1624	SLIGO	21493	KERBSIDE	YES	YES	NO	DEALER	RURAL
1625	SLIGO	21192	KERBSIDE	YES	YES	NO	DEALER	RURAL
1626	SLIGO	21193	KERBSIDE	YES	YES	NO	DEALER	RURAL
1627	SLIGO	21186	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1628	SLIGO	21174	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1629	SLIGO	21172	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1630	SLIGO	21489	KERBSIDE	YES	YES	NO	DEALER	RURAL
1631	SLIGO	21487	KERBSIDE	YES	YES	NO	DEALER	RURAL
1632	SLIGO	21169	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1633	SLIGO	21949	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1634	SLIGO	19590	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1635	SLIGO	19780	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1636	SLIGO	21947	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1637	SLIGO	21191	PETROL STATION	YES	YES	NO	DEALER	RURAL
1638	SLIGO	19634	PETROL STATION	YES	YES	NO	DEALER	RURAL
1639	SLIGO	18800	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1640	SLIGO	19271	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1641	SLIGO	19617	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1642	SLIGO	18875	PETROL STATION	YES	YES	YES	DEALER	RURAL
1643	SLIGO	18963	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1644	SLIGO	19613	PETROL STATION	YES	YES	NO	DEALER	RURAL
1645	SLIGO	19696	PETROL STATION	YES	YES	NO	DEALER	RURAL
1646	SLIGO	19006	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1647	SLIGO	19389	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1648	SLIGO	21189	PETROL STATION	YES	YES	NO	DEALER	RURAL
1649	SLIGO	21188	PETROL STATION	YES	YES	NO	DEALER	RURAL
1650	SLIGO	21187	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1651	SLIGO	21185	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1652	SLIGO	19740	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1653	SLIGO	21184	PETROL STATION	YES	YES	NO	DEALER	RURAL
1654	SLIGO	21175	PETROL STATION	YES	YES	NO	DEALER	RURAL
1655	SLIGO	21170	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1656	SLIGO	19733	PETROL STATION	YES	YES	NO	DEALER	RURAL
1657	SLIGO	19316	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1658	SLIGO	19311	PETROL STATION	YES	YES	NO	DEALER	RURAL
1659	SLIGO	19313	PETROL STATION	YES	YES	NO	DEALER	RURAL
1660	SLIGO	19314	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1661	SLIGO	19315	PETROL STATION	YES	YES	NO	DEALER	RURAL
1662	SLIGO	19559	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1663	SLIGO	19866	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1664	SLIGO	19884	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1665	SLIGO	19896	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1666	TIPPERARY	21634	KERBSIDE	YES	YES	NO	DEALER	RURAL
1667	TIPPERARY	21625	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1668	TIPPERARY	20994	KERBSIDE	YES	YES	NO	DEALER	RURAL
1669	TIPPERARY	20235	KERBSIDE	YES	YES	NO	DEALER	RURAL
1670	TIPPERARY	19319	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1671	TIPPERARY	19748	KERBSIDE	YES	YES	NO	DEALER	RURAL
1672	TIPPERARY	21929	KERBSIDE	YES	YES	NO	DEALER	RURAL
1673	TIPPERARY	20460	KERBSIDE	YES	YES	NO	DEALER	RURAL
1674	TIPPERARY	19771	KERBSIDE	YES	YES	NO	DEALER	RURAL
1675	TIPPERARY	20458	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1676	TIPPERARY	21624	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1677	TIPPERARY	21925	KERBSIDE	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1678	TIPPERARY	21003	KERBSIDE	YES	YES	NO	DEALER	RURAL
1679	TIPPERARY	21001	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1680	TIPPERARY	20996	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1681	TIPPERARY	19013	KERBSIDE	YES	YES	NO	DEALER	RURAL
1682	TIPPERARY	21031	KERBSIDE	YES	YES	NO	DEALER	RURAL
1683	TIPPERARY	21622	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1684	TIPPERARY	20195	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1685	TIPPERARY	20982	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1686	TIPPERARY	20280	PETROL STATION	YES	YES	NO	DEALER	RURAL
1687	TIPPERARY	20983	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1688	TIPPERARY	18974	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1689	TIPPERARY	21637	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1690	TIPPERARY	21636	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1691	TIPPERARY	20984	PETROL STATION	YES	YES	YES	DEALER	RURAL
1692	TIPPERARY	20986	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1693	TIPPERARY	20988	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1694	TIPPERARY	22017	PETROL STATION	YES	YES	NO	DEALER	RURAL
1695	TIPPERARY	19722	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1696	TIPPERARY	21628	PETROL STATION	YES	YES	NO	DEALER	RURAL
1697	TIPPERARY	21878	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE
1698	TIPPERARY	18990	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1699	TIPPERARY	21627	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1700	TIPPERARY	20191	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1701	TIPPERARY	20989	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1702	TIPPERARY	20158	PETROL STATION	YES	YES	NO	DEALER	RURAL
1703	TIPPERARY	19585	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1704	TIPPERARY	20991	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1705	TIPPERARY	20992	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1706	TIPPERARY	20454	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1707	TIPPERARY	18859	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1708	TIPPERARY	20268	PETROL STATION	YES	YES	NO	DEALER	RURAL
1709	TIPPERARY	19878	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1710	TIPPERARY	18891	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1711	TIPPERARY	20272	PETROL STATION	YES	YES	NO	DEALER	RURAL
1712	TIPPERARY	20273	PETROL STATION	YES	YES	NO	DEALER	RURAL
1713	TIPPERARY	19622	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1714	TIPPERARY	19873	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1715	TIPPERARY	20275	PETROL STATION	YES	YES	NO	DEALER	RURAL
1716	TIPPERARY	20981	PETROL STATION	YES	YES	NO	DEALER	RURAL
1717	TIPPERARY	21329	PETROL STATION	YES	YES	NO	DEALER	RURAL
1718	TIPPERARY	19618	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1719	TIPPERARY	20263	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1720	TIPPERARY	22014	PETROL STATION	YES	YES	NO	DEALER	RURAL
1721	TIPPERARY	19661	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1722	TIPPERARY	20270	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1723	TIPPERARY	20277	PETROL STATION	YES	YES	NO	DEALER	RURAL
1724	TIPPERARY	19855	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1725	TIPPERARY	18953	PETROL STATION	YES	YES	NO	DEALER	RURAL
1726	TIPPERARY	19854	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1727	TIPPERARY	18825	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1728	TIPPERARY	19570	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1729	TIPPERARY	19668	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1730	TIPPERARY	22023	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1731	TIPPERARY	20112	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1732	TIPPERARY	20995	PETROL STATION	YES	YES	NO	DEALER	RURAL
1733	TIPPERARY	20269	PETROL STATION	YES	YES	NO	DEALER	RURAL
1734	TIPPERARY	19652	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1735	TIPPERARY	19318	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1736	TIPPERARY	19066	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1737	TIPPERARY	20271	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1738	TIPPERARY	19085	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1739	TIPPERARY	19322	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1740	TIPPERARY	21953	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1741	TIPPERARY	20455	PETROL STATION	YES	YES	NO	DEALER	RURAL
1742	TIPPERARY	20457	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1743	TIPPERARY	21618	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1744	TIPPERARY	19317	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1745	TIPPERARY	20113	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1746	TIPPERARY	20459	PETROL STATION	YES	YES	NO	DEALER	RURAL
1747	TIPPERARY	19320	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1748	TIPPERARY	19327	PETROL STATION	YES	YES	NO	DEALER	RURAL
1749	TIPPERARY	18838	PETROL STATION	YES	YES	NO	DEALER	RURAL
1750	TIPPERARY	19596	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1751	TIPPERARY	19332	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1752	TIPPERARY	19329	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1753	TIPPERARY	19323	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1754	TIPPERARY	19328	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1755	TIPPERARY	21927	PETROL STATION	YES	YES	NO	DEALER	RURAL
1756	TIPPERARY	20038	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1757	TIPPERARY	19326	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1758	TIPPERARY	20040	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1759	TIPPERARY	19325	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1760	TIPPERARY	19324	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1761	TIPPERARY	21005	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1762	TIPPERARY	21019	PETROL STATION	YES	YES	NO	DEALER	RURAL
1763	TIPPERARY	21017	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1764	TIPPERARY	21016	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1765	TIPPERARY	21014	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1766	TIPPERARY	19023	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1767	TIPPERARY	21024	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1768	TIPPERARY	19015	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1769	TIPPERARY	20111	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1770	TIPPERARY	21013	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1771	TIPPERARY	21036	PETROL STATION	YES	YES	NO	DEALER	RURAL
1772	TIPPERARY	21025	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1773	TIPPERARY	21030	PETROL STATION	YES	YES	NO	DEALER	RURAL
1774	TIPPERARY	21046	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1775	TIPPERARY	21032	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1776	TIPPERARY	21045	PETROL STATION	YES	YES	NO	DEALER	RURAL
1777	TIPPERARY	21621	PETROL STATION	YES	YES	NO	DEALER	RURAL
1778	TIPPERARY	21043	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1779	TIPPERARY	21042	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1780	TIPPERARY	21039	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1781	TIPPERARY	20110	PETROL STATION	YES	YES	NO	DEALER	RURAL
1782	WATERFORD	21789	HYPERMARKET	YES	YES	NO	HYPERMARKET	URBAN TRANSIENT
1783	WATERFORD	20823	KERBSIDE	YES	YES	NO	DEALER	RURAL
1784	WATERFORD	20833	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1785	WATERFORD	18975	KERBSIDE	YES	YES	YES	DEALER	RESIDENTIAL
1786	WATERFORD	20808	KERBSIDE	YES	YES	NO	DEALER	RURAL
1787	WATERFORD	18902	KERBSIDE	YES	YES	NO	DEALER	RURAL
1788	WATERFORD	19594	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1789	WATERFORD	20844	PETROL STATION	YES	YES	NO	DEALER	RURAL
1790	WATERFORD	19530	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1791	WATERFORD	19532	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1792	WATERFORD	18804	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1793	WATERFORD	19554	PETROL STATION	YES	YES	NO	DEALER	RURAL
1794	WATERFORD	18872	PETROL STATION	YES	YES	NO	DEALER	RURAL
1795	WATERFORD	20826	PETROL STATION	YES	YES	NO	DEALER	RURAL
1796	WATERFORD	20820	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1797	WATERFORD	20821	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1798	WATERFORD	20822	PETROL STATION	YES	YES	NO	DEALER	RURAL
1799	WATERFORD	19626	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1800	WATERFORD	19031	PETROL STATION	YES	YES	YES	DEALER	URBAN TRANSIENT
1801	WATERFORD	20819	PETROL STATION	YES	YES	NO	DEALER	RURAL
1802	WATERFORD	20840	PETROL STATION	YES	YES	NO	DEALER	RURAL
1803	WATERFORD	20825	PETROL STATION	YES	YES	NO	DEALER	RURAL
1804	WATERFORD	21934	PETROL STATION	YES	YES	NO	DEALER	RURAL
1805	WATERFORD	19342	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1806	WATERFORD	19341	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1807	WATERFORD	19336	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1808	WATERFORD	19335	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1809	WATERFORD	19574	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1810	WATERFORD	19931	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1811	WATERFORD	20831	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1812	WATERFORD	20795	PETROL STATION	YES	YES	NO	DEALER	RURAL
1813	WATERFORD	20789	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1814	WATERFORD	20790	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1815	WATERFORD	20791	PETROL STATION	YES	YES	NO	DEALER	RURAL
1816	WATERFORD	20827	PETROL STATION	YES	YES	NO	DEALER	RURAL
1817	WATERFORD	20787	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1818	WATERFORD	20793	PETROL STATION	YES	YES	NO	DEALER	RURAL
1819	WATERFORD	19662	PETROL STATION	YES	YES	NO	DEALER	RURAL
1820	WATERFORD	20812	PETROL STATION	YES	YES	NO	DEALER	RURAL
1821	WATERFORD	20797	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1822	WATERFORD	20817	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1823	WATERFORD	20792	PETROL STATION	YES	YES	NO	DEALER	RURAL
1824	WESTMEATH	22100	HYPERMARKET	YES	YES	NO	HYPERMARKET	RESIDENTIAL
1825	WESTMEATH	21586	KERBSIDE	YES	YES	NO	DEALER	RURAL
1826	WESTMEATH	21743	KERBSIDE	YES	YES	NO	DEALER	RURAL
1827	WESTMEATH	19759	KERBSIDE	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1828	WESTMEATH	20737	KERBSIDE	YES	YES	NO	DEALER	RURAL
1829	WESTMEATH	21739	KERBSIDE	YES	YES	NO	DEALER	RURAL
1830	WESTMEATH	21740	KERBSIDE	YES	YES	NO	DEALER	RURAL
1831	WESTMEATH	20690	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1832	WESTMEATH	20685	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1833	WESTMEATH	19577	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
1834	WESTMEATH	20684	PETROL STATION	YES	YES	NO	DEALER	RURAL
1835	WESTMEATH	20681	PETROL STATION	YES	YES	NO	DEALER	RURAL
1836	WESTMEATH	19580	PETROL STATION	YES	YES	YES	DEALER	RURAL
1837	WESTMEATH	20683	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1838	WESTMEATH	19584	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1839	WESTMEATH	21529	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1840	WESTMEATH	20691	PETROL STATION	YES	YES	NO	DEALER	RURAL
1841	WESTMEATH	20678	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1842	WESTMEATH	20676	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1843	WESTMEATH	20686	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1844	WESTMEATH	20675	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1845	WESTMEATH	20687	PETROL STATION	YES	YES	UNSURVEYED	COMPANY	RESIDENTIAL
1846	WESTMEATH	18784	PETROL STATION	YES	YES	YES	DEALER	RURAL
1847	WESTMEATH	20688	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1848	WESTMEATH	20679	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1849	WESTMEATH	19347	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1850	WESTMEATH	20105	PETROL STATION	YES	YES	NO	DEALER	RURAL
1851	WESTMEATH	20674	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1852	WESTMEATH	20104	PETROL STATION	YES	YES	YES	COMPANY	RURAL
1853	WESTMEATH	18998	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1854	WESTMEATH	20103	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1855	WESTMEATH	19781	PETROL STATION	YES	YES	NO	DEALER	RURAL
1856	WESTMEATH	19353	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1857	WESTMEATH	19352	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1858	WESTMEATH	19351	PETROL STATION	YES	YES	NO	DEALER	RURAL
1859	WESTMEATH	21959	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1860	WESTMEATH	19348	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1861	WESTMEATH	21961	PETROL STATION	YES	YES	YES	DEALER	RURAL
1862	WESTMEATH	19344	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1863	WESTMEATH	19343	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1864	WESTMEATH	22000	PETROL STATION	YES	YES	NO	DEALER	RURAL
1865	WESTMEATH	20037	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1866	WESTMEATH	20036	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1867	WESTMEATH	20035	PETROL STATION	YES	YES	NO	DEALER	RURAL
1868	WESTMEATH	20034	PETROL STATION	YES	YES	YES	COMPANY	URBAN TRANSIENT
1869	WESTMEATH	20032	PETROL STATION	YES	YES	NO	DEALER	RURAL
1870	WESTMEATH	19350	PETROL STATION	YES	YES	NO	DEALER	RURAL
1871	WESTMEATH	19755	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1872	WESTMEATH	18909	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1873	WESTMEATH	21742	PETROL STATION	YES	YES	NO	DEALER	RURAL
1874	WESTMEATH	20694	PETROL STATION	YES	YES	NO	DEALER	RURAL
1875	WESTMEATH	19002	PETROL STATION	YES	YES	NO	DEALER	RURAL
1876	WESTMEATH	20693	PETROL STATION	YES	YES	NO	DEALER	RURAL
1877	WESTMEATH	18911	SERVICE AREA	YES	YES	NO	DEALER	URBAN TRANSIENT
1878	WEXFORD	22096	HYPERMARKET	UNSURVEYED	UNSURVEYED	UNSURVEYED	HYPERMARKET	UNSURVEYED
1879	WEXFORD	21428	KERBSIDE	YES	YES	NO	DEALER	RURAL
1880	WEXFORD	21266	KERBSIDE	YES	YES	NO	DEALER	RURAL
1881	WEXFORD	21426	KERBSIDE	YES	YES	NO	DEALER	RURAL
1882	WEXFORD	21256	KERBSIDE	YES	YES	NO	DEALER	RURAL
1883	WEXFORD	21258	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1884	WEXFORD	21260	KERBSIDE	YES	YES	NO	DEALER	RURAL
1885	WEXFORD	21270	KERBSIDE	YES	YES	NO	DEALER	RURAL
1886	WEXFORD	20782	KERBSIDE	YES	YES	NO	DEALER	RURAL
1887	WEXFORD	20781	KERBSIDE	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1888	WEXFORD	18950	KERBSIDE	YES	YES	NO	DEALER	RURAL
1889	WEXFORD	20853	KERBSIDE	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1890	WEXFORD	20852	KERBSIDE	YES	YES	NO	DEALER	RURAL
1891	WEXFORD	19086	KERBSIDE	YES	YES	NO	DEALER	RURAL
1892	WEXFORD	19355	KERBSIDE	YES	YES	NO	DEALER	RURAL
1893	WEXFORD	20885	KERBSIDE	YES	YES	NO	DEALER	RURAL
1894	WEXFORD	18889	KERBSIDE	YES	YES	NO	DEALER	RURAL
1895	WEXFORD	20868	KERBSIDE	YES	YES	NO	DEALER	RURAL
1896	WEXFORD	20863	KERBSIDE	YES	YES	NO	DEALER	RURAL
1897	WEXFORD	20860	KERBSIDE	YES	YES	NO	DEALER	RURAL
1898	WEXFORD	21432	KERBSIDE	YES	YES	NO	DEALER	RURAL
1899	WEXFORD	21453	KERBSIDE	YES	YES	NO	DEALER	RURAL
1900	WEXFORD	21444	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1901	WEXFORD	22051	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1902	WEXFORD	19908	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1903	WEXFORD	22095	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	COMPANY	RESIDENTIAL
1904	WEXFORD	19847	PETROL STATION	YES	YES	YES	COMPANY	RURAL
1905	WEXFORD	19593	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1906	WEXFORD	19597	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1907	WEXFORD	22004	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1908	WEXFORD	19648	PETROL STATION	YES	YES	NO	COMPANY	RURAL
1909	WEXFORD	19664	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1910	WEXFORD	19698	PETROL STATION	YES	YES	NO	DEALER	RURAL
1911	WEXFORD	19702	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1912	WEXFORD	21802	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1913	WEXFORD	21884	PETROL STATION	YES	YES	NO	DEALER	RURAL
1914	WEXFORD	21892	PETROL STATION	YES	YES	NO	DEALER	RURAL
1915	WEXFORD	19646	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1916	WEXFORD	21261	PETROL STATION	YES	YES	NO	DEALER	RURAL
1917	WEXFORD	21262	PETROL STATION	YES	YES	NO	DEALER	RURAL

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1918	WEXFORD	21263	PETROL STATION	YES	YES	NO	DEALER	RURAL
1919	WEXFORD	21264	PETROL STATION	YES	YES	NO	DEALER	RURAL
1920	WEXFORD	20899	PETROL STATION	YES	YES	NO	DEALER	RURAL
1921	WEXFORD	20897	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1922	WEXFORD	19339	PETROL STATION	YES	YES	NO	DEALER	RURAL
1923	WEXFORD	21267	PETROL STATION	YES	YES	NO	DEALER	RURAL
1924	WEXFORD	21268	PETROL STATION	YES	YES	NO	DEALER	RURAL
1925	WEXFORD	20784	PETROL STATION	YES	YES	NO	DEALER	RURAL
1926	WEXFORD	18903	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1927	WEXFORD	20778	PETROL STATION	YES	YES	NO	DEALER	RURAL
1928	WEXFORD	20775	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1929	WEXFORD	19366	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1930	WEXFORD	20859	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1931	WEXFORD	19035	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1932	WEXFORD	19372	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1933	WEXFORD	19371	PETROL STATION	YES	YES	NO	DEALER	RURAL
1934	WEXFORD	19370	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1935	WEXFORD	20898	PETROL STATION	YES	YES	NO	DEALER	RURAL
1936	WEXFORD	19367	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1937	WEXFORD	20774	PETROL STATION	UNSURVEYED	UNSURVEYED	UNSURVEYED	DEALER	URBAN TRANSIENT
1938	WEXFORD	19365	PETROL STATION	YES	YES	NO	COMPANY	INDUSTRY/OFFICE
1939	WEXFORD	19362	PETROL STATION	YES	YES	NO	DEALER	RURAL
1940	WEXFORD	19360	PETROL STATION	YES	YES	NO	DEALER	RURAL
1941	WEXFORD	19359	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1942	WEXFORD	19357	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1943	WEXFORD	19356	PETROL STATION	YES	YES	NO	DEALER	RURAL
1944	WEXFORD	21431	PETROL STATION	YES	YES	NO	DEALER	RURAL
1945	WEXFORD	19354	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1946	WEXFORD	19369	PETROL STATION	YES	YES	NO	DEALER	RURAL
1947	WEXFORD	20876	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1948	WEXFORD	19544	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1949	WEXFORD	20776	PETROL STATION	YES	YES	NO	DEALER	RURAL
1950	WEXFORD	20883	PETROL STATION	YES	YES	NO	DEALER	RURAL
1951	WEXFORD	20882	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1952	WEXFORD	20881	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1953	WEXFORD	20880	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1954	WEXFORD	19562	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1955	WEXFORD	18819	PETROL STATION	YES	YES	YES	DEALER	RURAL
1956	WEXFORD	18796	PETROL STATION	YES	YES	NO	DEALER	RURAL
1957	WEXFORD	20891	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1958	WEXFORD	20875	PETROL STATION	YES	YES	NO	DEALER	RURAL
1959	WEXFORD	20874	PETROL STATION	YES	YES	NO	DEALER	RURAL
1960	WEXFORD	20872	PETROL STATION	YES	YES	NO	DEALER	RURAL
1961	WEXFORD	20869	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1962	WEXFORD	20864	PETROL STATION	YES	YES	NO	DEALER	RURAL
1963	WEXFORD	20861	PETROL STATION	YES	YES	NO	DEALER	RURAL
1964	WEXFORD	20879	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1965	WEXFORD	21435	PETROL STATION	YES	YES	NO	DEALER	RURAL
1966	WEXFORD	21427	PETROL STATION	YES	YES	NO	DEALER	RURAL
1967	WEXFORD	21429	PETROL STATION	YES	YES	NO	DEALER	INDUSTRY/OFFICE
1968	WEXFORD	18878	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
1969	WEXFORD	20896	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1970	WEXFORD	20886	PETROL STATION	YES	YES	NO	DEALER	RURAL
1971	WEXFORD	21434	PETROL STATION	YES	YES	NO	DEALER	RURAL
1972	WEXFORD	20893	PETROL STATION	YES	YES	NO	DEALER	RURAL
1973	WEXFORD	21438	PETROL STATION	YES	YES	YES	COMPANY	RESIDENTIAL
1974	WEXFORD	20894	PETROL STATION	YES	YES	NO	DEALER	RURAL
1975	WEXFORD	21433	PETROL STATION	YES	YES	NO	DEALER	RURAL
1976	WEXFORD	21456	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1977	WEXFORD	21440	PETROL STATION	YES	YES	YES	DEALER	INDUSTRY/OFFICE

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
1978	WEXFORD	21452	PETROL STATION	YES	YES	NO	DEALER	RURAL
1979	WEXFORD	21451	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1980	WEXFORD	21450	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1981	WEXFORD	21447	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
1982	WEXFORD	21446	PETROL STATION	YES	YES	NO	DEALER	RURAL
1983	WICKLOW	21466	KERBSIDE	YES	YES	NO	DEALER	RURAL
1984	WICKLOW	21467	KERBSIDE	YES	YES	NO	DEALER	RURAL
1985	WICKLOW	21471	KERBSIDE	YES	YES	NO	DEALER	RURAL
1986	WICKLOW	21204	KERBSIDE	YES	YES	NO	DEALER	RURAL
1987	WICKLOW	21210	KERBSIDE	YES	YES	NO	DEALER	RURAL
1988	WICKLOW	21225	KERBSIDE	YES	YES	NO	DEALER	RURAL
1989	WICKLOW	21250	KERBSIDE	YES	YES	NO	DEALER	RURAL
1990	WICKLOW	21253	KERBSIDE	YES	YES	NO	DEALER	RESIDENTIAL
1991	WICKLOW	21251	PETROL STATION	YES	YES	NO	DEALER	RURAL
1992	WICKLOW	19374	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
1993	WICKLOW	19376	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1994	WICKLOW	19378	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1995	WICKLOW	19379	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1996	WICKLOW	18688	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
1997	WICKLOW	21249	PETROL STATION	YES	YES	NO	DEALER	RURAL
1998	WICKLOW	21459	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
1999	WICKLOW	21460	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2000	WICKLOW	21462	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2001	WICKLOW	21463	PETROL STATION	YES	YES	NO	DEALER	RURAL
2002	WICKLOW	21468	PETROL STATION	YES	YES	NO	DEALER	RURAL
2003	WICKLOW	18945	PETROL STATION	YES	YES	NO	DEALER	RURAL
2004	WICKLOW	18808	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2005	WICKLOW	21255	PETROL STATION	YES	YES	NO	DEALER	RURAL
2006	WICKLOW	18689	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
2007	WICKLOW	18690	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT

No.	County	Cat No	Site Type	Petrol	Diesel	LPG	Ownership	Location Type
2008	WICKLOW	18691	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
2009	WICKLOW	18692	PETROL STATION	YES	YES	NO	COMPANY	RURAL
2010	WICKLOW	18752	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2011	WICKLOW	18751	PETROL STATION	YES	YES	NO	COMPANY	URBAN TRANSIENT
2012	WICKLOW	18749	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2013	WICKLOW	18742	PETROL STATION	YES	YES	NO	COMPANY	RURAL
2014	WICKLOW	18741	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT
2015	WICKLOW	21472	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2016	WICKLOW	21886	PETROL STATION	YES	YES	NO	DEALER	RURAL
2017	WICKLOW	19381	PETROL STATION	YES	YES	NO	DEALER	RURAL
2018	WICKLOW	19382	PETROL STATION	YES	YES	NO	DEALER	RURAL
2019	WICKLOW	19386	PETROL STATION	YES	YES	NO	DEALER	RURAL
2020	WICKLOW	19387	PETROL STATION	YES	YES	NO	DEALER	RURAL
2021	WICKLOW	21203	PETROL STATION	YES	YES	NO	DEALER	RURAL
2022	WICKLOW	21211	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2023	WICKLOW	21214	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2024	WICKLOW	18874	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2025	WICKLOW	21887	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2026	WICKLOW	19380	PETROL STATION	YES	YES	NO	COMPANY	RURAL
2027	WICKLOW	21219	PETROL STATION	YES	YES	NO	DEALER	RURAL
2028	WICKLOW	18992	PETROL STATION	YES	YES	NO	DEALER	RESIDENTIAL
2029	WICKLOW	21220	PETROL STATION	YES	YES	NO	DEALER	RURAL
2030	WICKLOW	21222	PETROL STATION	YES	YES	NO	COMPANY	RESIDENTIAL
2031	WICKLOW	21226	PETROL STATION	YES	YES	NO	DEALER	RURAL
2032	WICKLOW	19579	PETROL STATION	YES	YES	YES	DEALER	RESIDENTIAL
2033	WICKLOW	21215	PETROL STATION	YES	YES	NO	DEALER	URBAN TRANSIENT

Arup Consulting Engineers

APPENDIX C

Bulk Petroleum Store Survey

C1. BULK PETROLEUM STORE SURVEY

No.	Distributor	Town	County	Brand
1	Vale Oil Co. Ltd.	Carlow	Co. Carlow	Irish Shell Ltd
2	Murphy Bros. Oil Ltd	Bagnelstown	Co. Carlow	Statoil
3	O'Reilly Oil	Graigcullen	Co. Carlow	Campus Oil
4	Carlow Oil	Bennekerry	Co. Carlow	Top
5	Candy Oil	Carlow	Co. Carlow	Top
6	Dobbs Oils	Tullow	Co. Carlow	Jet
7	Hennessy Oil Distributors Ltd.	Carlow	Co. Carlow	Maxol
8	Dobbs Oil Ltd.	Tullow	Co. Carlow	Statoil
9	Oriel Oil Co. Ltd.	Killeshandra	Co. Cavan	Irish Shell Ltd
10	Cloverhill Oils Ltd.	Belturbet	Co. Cavan	Statoil
11	Skelly Oil Distributors Ltd	Ballyjamesduff	Co. Cavan	
12	Stradone Oil	Stradone	Co. Cavan	Top
13	Breffni Oil Distributors Ltd	Killeshandra	Co. Cavan	Emo
14	Shannonside Oil Ltd.	Ennis	Co. Clare	Irish Shell Ltd
15	Vaughan Oil Co. Ltd.	Milltown Malbay	Co. Clare	Statoil
16	Michael O'Reilly Oil Co. Ltd	Edenvale, Ennis	Co. Clare	Statoil
17	Clare Oil	Ennis	Co. Clare	Statoil
18	Banner Oil	Ennis	Co. Clare	Campus Oil
19	Mid Western Oil Products	Ennis	Co. Clare	Top
20	Ennistymon Oil	Ennistymon	Co. Clare	Top
21	Clare Oil Co. Ltd.	Ennis	Co. Clare	Jet
22	Peadar O'Keeffe Oil Ltd.	Ennis	Co. Clare	Maxol
23	South of Ireland Petroleum	Bantry	Co. Cork	Irish Shell Ltd
24	South of Ireland Petroleum	Cork	Co. Cork	Irish Shell Ltd
25	South of Ireland Petroleum	Clonakilty	Co. Cork	Irish Shell Ltd
26	South of Ireland Petroleum	Mallow	Co. Cork	Irish Shell Ltd
27	South of Ireland Petroleum	Skibbereen	Co. Cork	Irish Shell Ltd
28	East Cork Oil	Middleton	Co. Cork	Statoil
29	Coislea Oil Products Ltd.	Ballick, Middleton	Co. Cork	Statoil
30	Marina Oil dietribution Ltd.	Bishopstown	Co. Cork	Statoil
31	Mills Oil Ltd.	Macroom	Co. Cork	Statoil
32	Ross Oil	Bandon	Co. Cork	Statoil
33	Shreelawn Oil	Kildorrery	Co. Cork	Statoil
34	Shreelawn Oil	Newmarket	Co. Cork	Statoil
35	John O'Neill Oil	Charleville	Co. Cork	Top
36	John O'Neill Oil	Newmarket	Co. Cork	Top
37	Eagle Oil	Cork	Co. Cork	Top
38	Mc Donalds	Cork	Co. Cork	Top
39	Marina Oil Distribution Ltd.	Cork	Co. Cork	JET/TOP
40	Tattons Oils	Middleton	Co. Cork	Jet

No.	Distributor	Town	County	Brand
41	Lee Oil	Cork	Co. Cork	Emo
42	M & J Kelleher Ltd.	Macroom	Co. Cork	Maxol
43	Inisowen Oil Co. Ltd.	Carndonagh	Co. Donegal	Irish Shell Ltd
44	A & N Fuels Ltd	Buncrana	Co. Donegal	Statoil
45	Jones Oil	Letterkenny	Co. Donegal	Esso
46	Donegal Oil Co.	Letterkenny	Co. Donegal	
47	Whoriskey Oils	Letterkenny	Co. Donegal	Texaco
48	Finn Valley Oil Co.	Castlefinn	Co. Donegal	
49	Clarke Oils	Buncrana	Co. Donegal	
50	Gallagher Oil	Mountcharles	Co. Donegal	
51	Boyce Oil	Falcarragh	Co. Donegal	
52	Stinsons Fuels/Ballintra Fuels	Ballintra	Co. Donegal	
53	E & J Oil Services Ltd.	Ballintra	Co. Donegal	Statoil
54	Errigal Oil	Letterkenny	Co. Donegal	Emo
55	Inver Oil	Mount Charles	Co. Donegal	Maxol
56	North City	Lucan	Co. Dublin	Campus Oil
57	O'Neills Oil	Dun Laoghaire	Co. Dublin	Campus Oil
58	Emo Oil	Dublin	Co. Dublin	Emo
59	Emo Oil	Balbriggan	Co. Dublin	Emo
60	Gordon Fuel Merchants	Harold's Cross Bridge	Co. Dublin	Top
61	M&M Butterly Oil	Rush	Co. Dublin	Top
62	Accstar Oil Ltd.	Dublin 3	Co. Dublin	Top
63	Clarke Oil	Sandyford	Co. Dublin	Top
64	Emo Oil	Swords	Co. Dublin	EMO
65	Maxol Authorised Distributor	Balbriggan	Co. Dublin	Maxol
66	EMO Oil	Galway	Co. Galway	Emo
67	All Star Oil Ltd.	Galway	Co. Galway	Burmah
68	Connell Oil	Galway	Co. Galway	
69	Cloonan Oil	Galway	Co. Galway	Estuary
70	Corrib Oil	Galway	Co. Galway	Irish Shell Ltd
71	Corrib Oil	Loughrea	Co. Galway	Irish Shell Ltd
72	Corrib Oil	Claremorris	Co. Galway	Irish Shell Ltd
73	Corrib Oil	Gort	Co. Galway	Irish Shell Ltd
74	Corrib Oil	Tuam	Co. Galway	Irish Shell Ltd
75	Gort Oil Co. Ltd.	Gort	Co. Galway	Burmah
76	Muldoon Oil Ltd.	Loughrea	Co. Galway	
77	East Galway Petroleum	Loughrea	Co. Galway	Statoil
78	Connolly Oil	Tuam	Co. Galway	
79	Sweeney Oil Ltd.	Clifden	Co. Galway	Statoil
80	Geraghty Oil Co. Ltd.	Williamstown	Co. Galway	Texaco
81	Rabbitt Oil Ltd.	Galway	Co. Galway	Statoil
82	McCormack Fuels Ltd.	Mountbellew	Co. Galway	Emo

No.	Distributor	Town	County	Brand
83	Hi-Way (Galway)	Galway	Co. Galway	Campus Oil
84	Hi-Way (Tuam)	Tuam	Co. Galway	Campus Oil
85	EMO Oil (Kirrane)	Claremorris	Co. Galway	Emo
86	Joyce Oil	Claremorris	Co. Galway	Campus Oil
87	Flannagan	Loughrea	Co. Galway	
88	T.O.P. Galway (No Tanks ?)	Galway	Co. Galway	Top
89	Sweeney Oil Ltd..	Galway	Co. Galway	Statoil
90	Sweeney Oil Ltd..	Inverin	Co. Galway	Statoil
91	Sweeney Oil Ltd..	Moycullen	Co. Galway	Statoil
92	Galway Oil Company Ltd	Galway	Co. Galway	Top
93	Hi-Way Oil	Galway	Co. Galway	Jet
94	O'Grady Oil Co.	Tuam	Co. Galway	Burmah
95	Hi-Way Oil (Tuam) Ltd.	Tuam	Co. Galway	Jet
96	Ollie's Oil Co. Ltd.	Ballinasloe	Co. Galway	
97	Shines Oils (PJ)	Ballinasloe	Co. Galway	Jet
98	Garbally Oil Co.	Ballinasloe	Co. Galway	
99	Kelly Oil Ltd.	Knocknacarra	Co. Galway	Maxol
100	Mitchell Oil Co. Ltd.	Loughrea	Co. Galway	Maxol
101	Ola Arainn	Inismore	Co. Galway	Campus Oil
102	East Galway Petroleum Ltd.	Loughrea	Co. Galway	
103	Ward Fuels	Loughrea	Co. Galway	
104	Kerry Petroleum Ltd.	Tralee	Co. Kerry	Irish Shell Ltd
105	Kerry Petroleum Ltd.	Cahirciveen	Co. Kerry	Irish Shell Ltd
106	CRL Oil Ltd.	Killarney	Co. Kerry	Statoil
107	Sceilg Ola	Killarney	Co. Kerry	Top
108	Killarney Oil	Killarney	Co. Kerry	Campus Oil
109	Flesk Fuels	Killarney	Co. Kerry	Top
110	Geaney Oil	Dingle	Co. Kerry	Maxol
111	Capital Oil Supplies Ltd.	Newbridge	Co. Kildare	Irish Shell Ltd
112	Boylan Oils	Celbridge	Co. Kildare	Statoil
113	Mallen Oil	Carbury	Co. Kildare	Campus Oil
114	Conway Oil	Kildare	Co. Kildare	Top
115	Conlan Fuel Oils Ltd.	Athy	Co. Kildare	Maxol
116	Kilcock Oil Distributors	Kilcock	Co. Kildare	Maxol
117	Vale Oil Co. Ltd.	Kilkenny	Co. Kilkenny	Irish Shell Ltd
118	Young Oil Co. Ltd	Kilkenny	Co. Kilkenny	Statoil
119	Hennessy Fuels	Kilkenny	Co. Kilkenny	Campus Oil
120	McConville's Fuels	Graignamanagh	Co. Kilkenny	Top
121	T.O.P. Kilkenny	Kilkenny	Co. Kilkenny	Top
122	Hennessy Oil Distributors Ltd.	Kilkenny	Co. Kilkenny	Maxol
123	W.H. Deverell Ltd.	Portarlington	Co. Laois	Statoil
124	Ormond Oil	Portlaoise	Co. Laois	Campus Oil

No.	Distributor	Town	County	Brand
125	W H Deverell Ltd.	Portarlington	Co. Laois	Jet
126	Leppington Ltd.	Portlaoise	Co. Laois	Maxol
127	Mohill Fuel Oils Ltd	Mohill	Co. Leitrim	Maxol
128	Shannonside Oil Ltd.	Limerick	Co. Limerick	Irish Shell Ltd
129	Nick Hayes Oil Products	Kilmallock	Co. Limerick	Statoil
130	Hogan Oil Co. Ltd.	Limerick	Co. Limerick	Statoil
131	C&L Murphy	Hospital	Co. Limerick	Campus Oil
132	O'Dwyer Oil	Pallas Grean	Co. Limerick	Top
133	Power Oil	Crecora	Co. Limerick	Campus Oil
134	Cosgrave Bros Oil Prs Ltd.	Castleconnel	Co. Limerick	Maxol
135	Mervyn Shorten Fuel Ltd.	Croom	Co. Limerick	Maxol
136	Irish Shell Ltd	Limerick	Co. Limerick	Irish Shell Ltd
137	Fourways Oil	Edgeworthstown	Co. Longford	Campus Oil
138	Longford Oil Distributors Ltd.	Longford	Co. Longford	JET/Statoil
139	Mohill Fuel Oils Ltd	Longford	Co. Longford	Maxol
140	Four Counties Oil Ltd.	Dundalk	Co. Louth	Statoil
141	Halpin Oil	Dunleer	Co. Louth	Campus Oil
142	Butterly Oil	Drogheda	Co. Louth	Top
143	Carpen Petroleum Ltd	Dundalk	Co. Louth	
144	Four Counties Oil Co. Ltd	Dundalk	Co. Louth	Jet
145	Emo Oil/Calani Oil Distributors	Dundalk	Co. Louth	Emo
146	Oriel Oil Co. Ltd.	Greenore	Co. Louth	Irish Shell Ltd.
147	Niall Clarke Oils	Dundalk	Co. Louth	
148	Murphy Bros. Fuel Ltd	Dundalk	Co. Louth	Maxol
149	Leinster Petroleum Co. Ltd.	Drogheda	Co. Louth/Meath	Irish Shell Ltd
150	LMS Oil Co. Ltd.	Ballina	Co. Mayo	Irish Shell Ltd
151	Hughes-O'Boyle Fuels Ltd.	Ballina	Co. Mayo	Statoil
152	Major Fuels Dist' Ltd.	Claremorris	Co. Mayo	Statoil
153	Suttons Oil Ltd	Claremorris	Co. Mayo	
154	Coyne Gerard Oil Sales	Blaayhaunis	Co. Mayo	
155	Sweeney's Fuel Merchants	Castlebar	Co. Mayo	
156	Castlebar Oil	Castlebar	Co. Mayo	Top
157	Corrib Oil	Ballinrobe	Co. Mayo	Irish Shell Ltd
158	Moran Roddy Oils	Ballinrobe	Co. Mayo	
159	EMO Oil	Ballindine	Co. Mayo	Emo
160	Erris Fuels	Belmullet	Co. Mayo	Top
161	T&J Balla	Balla	Co. Mayo	Top
162	C & F Oil Ltd/Freeman Fuels	Kilkelly	Co. Mayo	Jet/Top
163	Hughes-O'Boyle Fuels Ltd.	Ballina	Co. Mayo	Jet
164	Burke & Coyne	Kiltimagh	Co. Mayo	Burmah
165	L.M.S. Oil Ltd.	Ballina	Co. Mayo	Irish Shell Ltd.
166	Hughs O'Boyle Fuel Oil Ltd.	Ballina	Co. Mayo	

No.	Distributor	Town	County	Brand
167	Jones Oil/Gillespies	Ballina	Co. Mayo	Esso
168	Castlebar Oil Co. Ltd.	Castlebar	Co. Mayo	
169	T & J Oil Co. Ltd	Castlebar	Co. Mayo	Jet
170	John Dunne Oil	Castlebar	Co. Mayo	Burmah
171	Swinford Oil Co. Ltd.	Swinford	Co. Mayo	Maxol
172	Gaughan Oil	Foxford	Co. Mayo	
173	Brooklands Oil Co. Ltd.	Ballina	Co. Mayo	Maxol
174	Sammon Sean Fuel & Cycles	Westport	Co. Mayo	
175	Corrib Oil	Westport	Co. Mayo	Irish Shell Ltd.
176	Moran Fuel and Pallet	Ballinrobe	Co. Mayo	Maxol
177	Leinster Petroleum Co. Ltd.	Navan	Co. Meath	Irish Shell Ltd
178	Ashbourne Oil Company	Ashbourne	Co. Meath	Top
179	V Keating Oil Ltd.	Navan	Co. Meath	Statoil
180	Halpin Oil	Kells	Co. Meath	Campus Oil
181	Curran Oils	Oldcastle	Co. Meath	Top
182	V. Keating & Sons Ltd.	Navan	Co. Meath	Jet
183	Jet Oil Distributors Ltd.	Athboy	Co. Meath	Jet
184	Jet Oil Distributors Ltd.	Dunshaughlin	Co. Meath	Jet
185	Gibney of Oldcastle	Oldcastle	Co. Meath	Emo
186	Maxol Authorised Distributor	Oldcastle	Co. Meath	Maxol
187	Oriel Oil Co. Ltd.	Carrickmacross	Co. Monaghan	Irish Shell Ltd
188	Moore Oil Ltd.	Ballybay	Co. Monaghan	Statoil
189	Cooltrim Oil	Castleblaney	Co. Monaghan	Top
190	Clones Oil	Clones	Co. Monaghan	Maxol
191	Midland Oil	Birr	Co. Offaly	Irish Shell Ltd
192	Irish Shell Ltd	Birr	Co. Offaly	Irish Shell Ltd
193	Shinrone Oil Co. Ltd.	Shinrone	Co. Offaly	Statoil/Let
194	Lambe's Oil Ltd.	Tullamore	Co. Offaly	Top
195	Mahon Oil	Tullamore	Co. Offaly	Maxol
196	McGarry Oil	Banagher	Co. Offaly	Maxol
197	Geraghty Oil Co. Ltd.	Roscommon	Co. Roscommon	Texaco
198	L.M.S. Oil Ltd.	Carrick-on-Shannon	Co. Roscommon	Irish Shell Ltd.
199	Jones Oil	Carrick-on-Shannon	Co. Roscommon	Esso
200	O'Gara Oils Ltd.	Frenchpark	Co. Roscommon	
201	Roscommon Oil Co.	Strokestown	Co. Roscommon	Emo
202	Flanagan Oil Co. Ltd.	Castlerea	Co. Roscommon	Statoil
203	Corrib Oil	Castlerea	Co. Roscommon	Irish Shell Ltd.
204	LMS Oil Co. Ltd.	Sligo	Co. Sligo	Irish Shell Ltd
205	Coast Oil (Major Fuels)	Carraroe	Co. Sligo	Statoil
206	Sligo Fuel Sales	Sligo	Co. Sligo	
207	Coast Oil	Aughamore	Co. Sligo	
208	Jones Oil	Sligo	Co. Sligo	Esso

No.	Distributor	Town	County	Brand
209	McCormack Fuels Ltd.	Sligo	Co. Sligo	Maxol
210	Vale Oil Co. Ltd.	Thurles	Co. Tipperary	Irish Shell Ltd
211	Clonmel Oil Co. Ltd.	Ferryhouse	Co. Tipperary	Statoil
212	Young Oil Co. Ltd	Templemore	Co. Tipperary	Statoil
213	Shreelawn Oil	Bansha	Co. Tipperary	Statoil
214	Tipperary Oil	Thurles	Co. Tipperary	Campus Oil
215	Mullinahone Co-Op	Mullinahone	Co. Tipperary	Jet
216	Cahir Oil	Cahir	Co. Tipperary	Top
217	O'Meara Oil Company	Thurles	Co. Tipperary	
218	T F Costello & Sons Ltd.	Nenagh	Co. Tipperary	Jet/Top
219	Murphy Fuels	Cahir	Co. Tipperary	Maxol
220	Vale Oil Co. Ltd.	Waterford	Co. Waterford	Irish Shell Ltd
221	Sheridan Oil Distribution Ltd.	Waterford	Co. Waterford	Statoil
222	Comeragh Oil	Clonmel	Co. Waterford	Top
223	Comeragh Oil	Dungarvan	Co. Waterford	Top
224	T.O.P. Waterford (Relocated ?)	Waterford	Co. Waterford	Top
225	Sheridan Oil Distributors	Waterford	Co. Waterford	Jet
226	Hennessy Oil Distributors Ltd.	Waterford	Co. Waterford	Maxol
227	Leinster Petroleum Co. Ltd.	Mullingar	Co. Westmeath	Irish Shell Ltd
228	Midland Oil	Athlone	Co. Westmeath	Irish Shell Ltd
229	Westmeath Oil Co.	Athlone	Co. Westmeath	Texaco
230	Jones Oil	Athlone	Co. Westmeath	Esso
231	Lir Oil Ltd.	Mullingar	Co. Westmeath	Statoil
232	Midland Farm Feeds Ltd.	Athlone	Co. Westmeath	Maxol
233	Mc Manus Oil	Athlone	Co. Westmeath	Campus Oil
234	A. Browne Ltd./Browne Oils	Moate	Co. Westmeath	Texaco
235	Rustic Oil Products	Mullingar	Co. Westmeath	Jet
236	Rustic Oil Products	Athlone	Co. Westmeath	Jet
237	Shine's Oil	Athlone	Co. Westmeath	Top
238	Lakeland Fuels	Mullingar	Co Westmeath	Top
239	James Kilroy Oils	Athlone	Co. Westmeath	Maxol
240	Vale Oil Co. Ltd.	New Ross	Co. Wexford	Irish Shell Ltd
241	Irish Shell Ltd/Glen Fuel Services	Gorey	Co. Wexford	Irish Shell Ltd
242	Newline Oil Co. Ltd.	Bridgetown	Co. Wexford	Statoil
243	Newline Oil Co. Ltd.	Enniscorthy	Co. Wexford	Statoil
244	County Wexford Marts	Bunclody	Co. Wexford	Jet
245	Loftus Oils	Enniscorthy	Co. Wexford	Jet
246	Clarke Oil	Gorey	Co. Wexford	Top
247	WFC Oil Ltd.	Enniscorthy	Co. Wexford	Emo
248	J Holohan Oils Ltd.	Enniscorthy	Co. Wexford	Maxol
249	Maxol Authorised Distributor	Gorey	Co. Wexford	Maxol
250	Richard Downes Oil Ltd.	Gorey	Co. Wexford	Maxol

No.	Distributor	Town	County	Brand
251	Clarke Oil	Tinakilly	Co. Wicklow	Top
252	Clarke Oil	Blessington	Co. Wicklow	Top
253	Limerick & Kilmallock Oil Co.		Co. Limerick	Jet

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APPENDIX D

LPG Installation Survey

D1. LPG MOTOR VEHICLE OUTLETS

No.	Distributor	Town	County
1	Michael Mara Motors	Kilree	Carlow
2	Joe O' Toole & Sons	Tullow	Carlow
3	Burke and Lynch Ltd.	Moynehall	Cavan
4	The Pound Ltd (Maxol)	Ballyjamesduff	Cavan
5	Ballinagh Service Station	Ballinagh	Cavan
6	Ballyvaughan Service Station	Ballyvaughan	Clare
7	Halpins Service Stations	Newmarket on Fergus	Clare
8	Marino Motor Works	Bantry	Cork
9	Joe Morrison Motors	Fermoy	Cork
10	Racecourse Service Station	Mallow	Cork
11	Chris Maloney	Midleton	Cork
12	O'Callaghan's Garage	Ballyvolane	Cork
13	Roches Garage	Carrigtwohill	Cork
14	Shell Filling Station	Skibbereen	Cork
15	James Bradley	Buncrana	Donegal
16	Car Gas Burt	Burt	Donegal
17	Tamway Motor Co	Killybegs	Donegal
18	Lakeview Country Stores	Bancridge	Down
19	Supervalu	Newcastlewest	Down
20	Bangor Fuels	Bangor	Down
21	Balloo Service Station	Newry	Down
22	Mountainview Motors	Brittas	Dublin
23	Blakes Cross Service Station	Blakes Cross	Dublin
24	Goldenbridge Motors	Inchicore	Dublin
25	Castle Service Station	Artane	Dublin
26	Mountain View Motors	Ballinascorney	Dublin
27	Emerald Service station	Loughrea	Galway
28	James Somers & Sons	Athenry	Galway
29	Statoil Service Station	Ardrahan	Galway
30	Mor Oil	Atalia Road	Galway
31	Claregalway Service Station	Claregalway	Galway
32	John Kelleher	Salthill	Galway
33	Joyce's Grocery	Recess	Galway
34	Castle Garage	Killarney	Kerrry
35	Hegarty's Texaco Garage	Killarney	Kerrry
36	Nolans Garage	Tralee	Kerrry
37	Phil Horan	Castleisland	Kerrry
38	O'Shea Filling Station	Tralee	Kerrry
39	Shell Service Station	Dingle	Kerrry
40	JH McLoughlin	Newbridge	Kildare
41	Terence Boylan Motors	Celbridge	Kildare
42	Moyvalley Auto Centre	Moyvalley	Kildare
43	Blackquarry Service station	Gallows Hill	Kilkenny
44	W J O'Mahony	Bennettsbridge	Kilkenny
45	Talbot's Inch Filling Station	Freshford Road	Kilkenny
46	Tom Chalke	Castletroy	Limerick
47	Michael Hayes Service station	Ardagh	Limerick
48	Maurice Lyons	Newcastlewest	Limerick
49	Longford Service station	Strokestown Road	Longford

No.	Distributor	Town	County
50	Tedcastle Service Station (Maguires)	Stonepark	Longford
51	Treanor Garage	Ballymahon	Longford
52	Carrick Road Service Station	Ardee	Louth
53	Darby Service station	Dunleer	Louth
54	Flanagan Motors	Dundalk	Louth
55	Dealga Service station	Dundalk	Louth
56	Mulroy's Service station	Castlebar	Mayo
57	Rochford Garage	Ballyhaunis	Mayo
58	Moy Service Station	Ballina	Mayo
59	Fortune Motors	Navan	Meath
60	Gormanstown Service Station	Gormanstown	Meath
61	Luke Mahon Service Station	Athboy	Meath
62	McDonnells Service Station	Enfield	Meath
63	Royal Auto Service Station	Trim	Meath
64	Oriel Service Station	Dublin Road	Monaghan
65	John Bogue (Monaghan)	Dublin Road	Monaghan
66	Enda Clerkin (The Plant)	Clones Road	Monaghan
67	Heffernan Service Station	Tullamore	Offaly
68	Mangans Filling Station	Edenderry	Offaly
69	William Walsh Service station	Racecourse Road	Roscommon
70	Cooney Motors	Boyle	Roscommon
71	Calor Gas Sligo	Bundoran Road	Sligo
72	Moloney's Service Station	Thurles	Tipperary
73	Bretts Filling Station	Thurles	Tipperary
74	Cleary's Garage	Nenagh	Tipperary
75	Nenagh Service Station	Nenagh	Tipperary
76	P Cooney & Sons Ltd	Carrick-On-Suir	Tipperary
77	Carrick Service Station	Rosscrea	Tipperary
78	Walsh Car Sales	Cork Road	Waterford
79	Walshe's Maxol Service Station	Ferrybank	Waterford
80	Brown Service Station	Moate	Westmeath
81	The Winning Post	Mullingar	Westmeath
82	Maxol Service Station	Mullingar	Westmeath
83	Hugh Boggan Motors	Newtown Road	Wexford
84	W F C Farm Machinery	Enniscorthy	Wexford
85	Woodlands Service Station	Enniscorthy	Wexford
86	Killinick Service Station	Killinick	Wexford
87	Michael Sidney & Son (Car Sales)	New Ross	Wexford

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APPENDIX E

Petroleum Retail Outlets Risk Assessments

E1. FORECOURT NO. 1

FORECOURT NO. 1

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from underground tank - instantaneous release of the complete inventory
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from petroleum tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement (automatic gauge)
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from underground tank - tank overfill
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Overfill protection on tank
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	None
Means of Suppression	N/A
Likelihood	No published data available
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$3 \times 10^{-7} m^{-1} y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$2x10^{-6}m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$1x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	51.4t (petroleum spirit), 16.5t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO 1
ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$4x10^{-6}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$4x10^{-5}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	4
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	The frequency of loss of containment from road tanker wagons in an establishment are determined by the local situation. In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. For this establishment, road tanker wagon unloading takes place at times when the forecourt is closed. Therefore, external impact is not considered a credible scenario.

FORECOURT NO. 1
ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	36000L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	12
Comments	

E2. FORECOURT NO. 2

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from underground tank - instantaneous release of the complete inventory
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

FORECOURT NO. 2

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from petroleum tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement (automatic gauge)
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from underground tank - tank overfill
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	10^{-6} to 10^{-4} y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	52.7t (petroleum spirit), 29.4t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$4x10^{-6}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$4x10^{-5}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	4
Comments	All road tanker wagons used at the facility are ADR compliant.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	The frequency of loss of containment from road tanker wagons in an establishment are determined by the local situation. In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. For this establishment, road tanker wagon unloading takes place at times when the forecourt is closed. Therefore, external impact is not considered a credible scenario.

FORECOURT NO. 2
ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	36000L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site drainage and petrol interceptors
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

E3. KERBSIDE NO. 1

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from underground tank - instantaneous release of the complete inventory
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	Unlikely to be detected for some time as measuring tank contents with a dipstick is not as accurate as an automatic gauge.

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from underground tank - tank overfill
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Supervision of petroleum transfer by site personnel and road tanker drivers
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$3 \times 10^{-7} m^{-1} y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	3.75t (petroleum spirit), 1.68t (diesel)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$4x10^{-6}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$4x10^{-5}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	4
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 1
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	The frequency of loss of containment from road tanker wagons in an establishment are determined by the local situation. In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits. For this establishment, road tanker wagon unloading may take place on the public road. Therefore, external impact is a credible scenario.

KERBSIDE NO. 1

ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	36000L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	12
Comments	

E4. KERBSIDE NO. 2

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from underground tank - instantaneous release of the complete inventory
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5)
Quantities involved	5.1t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel
Means of Isolation	Some containment provided by bund
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from underground tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5)
Quantities involved	5.1t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from underground tank - continuous release from a hole with an effective diameter of 10 mm
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5)
Quantities involved	5.1t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from underground tank - tank overfill
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5)
Quantities involved	5.1t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Not known
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from above ground tank - instantaneous release of the complete inventory into the bund
Materials involved (names, CAS No)	Gas oil (CAS 68334-30-5)
Quantities involved	2.3t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	Bund
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from above ground tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund
Materials involved (names, CAS No)	Gas oil (CAS 68334-30-5)
Quantities involved	2.3t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	Bund
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from above ground tank - continuous release from a hole with an effective diameter of 10 mm into the bund
Materials involved (names, CAS No)	Gas oil (CAS 68334-30-5)
Quantities involved	2.3t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Observation by site personnel from tank measurement
Means of Isolation	Bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	Detection is not likely to occur for some time as tanks are measured using a dipstick.

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from above ground tank - tank overfill
Materials involved (names, CAS No)	Gas oil (CAS 68334-30-5)
Quantities involved	2.3t
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Supervision of petroleum transfer by site personnel and road tanker drivers
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	Bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from a pipe - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	2.3t (diesel), 5.1t (petroleum spirit)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$4x10^{-6}\ h^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	2.3t (diesel), 5.1t (petroleum spirit)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	2.3t (diesel), 5.1t (petroleum spirit)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	2.3t (diesel), 5.1t (petroleum spirit)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 15

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$4x10^{-6}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 16

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$4x10^{-5}\ h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	4
Comments	All road tanker wagons used at the facility are ADR compliant.

KERBSIDE NO. 2
ACCIDENT HAZARD REFERENCE NO: 17

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	The frequency of loss of containment from road tanker wagons in an establishment are determined by the local situation. In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits. For this establishment, road tanker wagon unloading takes place on the public road. Therefore, external impact is a credible scenario.

KERBSIDE NO. 2

ACCIDENT HAZARD REFERENCE NO: 18

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Gas oil (CAS 68334-30-5)
Quantities involved	36000L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	None
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	12
Comments	

Arup Consulting Engineers

APPENDIX F

Bulk Petroleum Stores Risk Assessments

F1. BULK STORE NO. 1 AND JETTY

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Bulk tank inventory (refer to Table 17, section 3)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Some containment provided by bund and surface water drainage system
Means of Suppression	N/A
Likelihood	$5x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Bulk tank inventory (refer to Table 17, Section 3)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$5x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Bulk tank inventory (refer to Table 17, Section 3)
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from bulk storage tank - tank overfill
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Max. fill rate is 350 T/hr. Max. duration of overfill estimated to be 1 min. = approx. 8 m^3 of material
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Overfill protection on tanks
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	No published data available
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe – full bore rupture
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Max. fill rate is 350 T/hr. Max. duration of overfill estimated to be 1 min. = approx. 8 m^3 of material
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard Piping maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Containment provided by bund and surface water drainage system
Means of Suppression	N/A
Likelihood	$3x10^{-7}m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	Product transfer operations are continuously manned.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	<< 8 m^3
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard Piping maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Containment provided by bund and surface water drainage system
Means of Suppression	N/A
Likelihood	$2x10^{-6}m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	Product transfer operations are continuously manned.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard Pump maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Containment provided by bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	Product transfer operations are continuously manned.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard Pump maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if leak occurs within bund
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	Product transfer operations are continuously manned.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system
Means of Suppression	N/A
Likelihood	$1x10^{-5}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by drainage gulleys.
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by drainage gulleys.
Means of Suppression	N/A
Likelihood	$4x10^{-6}h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	Product transfer operations are continuously manned. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by dished drains
Means of Suppression	N/A
Likelihood	$4x10^{-5}h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	4
Comments	Product transfer operations are continuously manned. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by dished drains
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. Speed limits are in place on-site. Therefore, this scenario is not considered credible.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Up to 36,000 L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by dished drains.
Means of Suppression	N/A
Likelihood	$1x10^{-5}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 15

Item	Description
Description of incident	Loss of containment from ship - full bore rupture of the loading/unloading flexible hose
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Max. fill rate is 350 T/hr. Max. duration of overfill estimated to be 1 min. = approx. 8 m^3 of material
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of hose Correct connection of hose to hard pipes
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Shutting down of transfer operation and use of oil absorption and pollution prevention equipment
Means of Suppression	N/A
Likelihood	$6x10^{-5}$ per transhipment
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	Product transfer operations are continuously manned. 30 shipments per year to the site on average.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 16

Item	Description
Description of incident	Loss of containment from ship - leak of the loading/unloading arm
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Max. fill rate is 350 T/hr. Max. duration of overfill estimated to be 1 min. = approx. 8 m^3 of material
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of hose Correct connection of hose to hard pipes
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Shutting down of transfer operation and use of oil absorption and pollution prevention equipment
Means of Suppression	N/A
Likelihood	$6x10^{-4}$ per transhipment
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	Product transfer operations are continuously manned.

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 17

Item	Description
Description of incident	Loss of containment from ship - external impact, large spill
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	75 m^3 in 1800 s
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	N/A
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Shutting down of transfer operation
Means of Suppression	N/A
Likelihood	0.006 x f_0
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	Product transfer operations are continuously manned. The assistance of Irish Coast Guard/Harbour Master is likely to be required in the event that a major pollution incident resulting in significant pollution occurring in the river develops into a scale likely to involve major river/marine environment pollution damage and/or danger to wildlife and vegetation in the tidal estuary.

f_0, the base accident failure rate, is equal to 6.7 x 10^{-11} x T x t x N where T is the total no. ships per year on the transport route or harbour, t is the average duration of loading/unloading per ship (in hours) and N, the number of transhipments per year.
T value obtained from Central Statistics Office [9].
t = 9.7 hr
N = 30

BULK STORE 1 AND JETTY
ACCIDENT HAZARD REFERENCE NO: 18

Item	Description
Description of incident	Loss of containment from ship - external impact, small spill
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Single-walled liquid tanker, continuous release of 30 m^3 in 1800 s Double-walled liquid tanker, continuous release of 20 m^3 in 1800 s
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	N/A
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Shutting down of transfer operation
Means of Suppression	N/A
Likelihood	0.0015 x f_0
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	4
Comments	Product transfer operations are continuously manned. The assistance of Irish Coast Guard/Harbour Master is likely to be required in the event that a major pollution incident resulting in significant pollution occurring in the river develops into a scale likely to involve major river/marine environment pollution damage and/or danger to wildlife and vegetation in the tidal estuary.

f_0, the base accident failure rate, is equal to 6.7 x 10^{-11} x T x t x N where T is the total no. ships per year on the transport route or harbour, t is the average duration of loading/unloading per ship (in hours) and N, the number of transhipments per year.
T value obtained from Central Statistics Office [9].
t = 9.7 hr
N = 30

F2. BULK STORE NO. 2

BULK STORE 2

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	55,000 L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Leak detection on tanks Observation by site personnel
Means of Isolation	Some containment provided by bund Oil interceptor provided
Means of Suppression	N/A
Likelihood	$5x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	55,000 L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Leak detection on tanks Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	Oil interceptor provided
Likelihood	$5x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm into the bund
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	55,000 L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard
Means of Detection	Leak detection on tanks Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from bulk storage tank - tank overfill
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined. As tank overfilling is a continuously manned operation, a large spill is considered unlikely.
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank filling is a continuously manned operation
Means of Detection	Observation by site personnel Observation by road tanker driver
Means of Isolation	Bund
Means of Suppression	N/A
Likelihood	No published data available
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe – full bore rupture
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined Not determined. As tank/road tanker overfilling are continuously manned operations, a large spill is considered unlikely.
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pipework design standard
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if rupture occurs within bund Oil interceptor provided
Means of Suppression	N/A
Likelihood	$3x10^{-7}m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined. As tank/road tanker overfilling are continuously manned operations, a large spill is considered unlikely.
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if rupture occurs within bund Oil interceptor provided
Means of Suppression	N/A
Likelihood	$2x10^{-6}m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined. As tank/road tanker overfilling are continuously manned operations, a large spill is considered unlikely.
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if rupture occurs within bund Oil interceptor provided
Means of Suppression	N/A
Likelihood	$1x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Not determined. As tank/road tanker overfilling are continuously manned operations, a large spill is considered unlikely.
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard and maintenance
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if rupture occurs within bund Oil interceptor provided
Means of Suppression	N/A
Likelihood	$5x10^{-4}$ y^{-1}
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	$1x10^{-5}$ y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	$4x10^{-6}h^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	$4x10^{-5}h^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. Road tanker unloading takes places to the rear of retail petroleum store. External impact is not considered credible.

BULK STORE 2
ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Petroleum spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6) DERV (CAS 68334-30-5) Gas oil (CAS 68334-30-5)
Quantities involved	Up to 36,000 L [8]
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Oil interceptor provided
Means of Suppression	N/A
Likelihood	$1x10^{-5}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

F3. BULK STORE NO. 3

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from bulk storage tank - instantaneous release of the complete inventory into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Bulk tank inventory
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$5x10^{-6}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release of the complete inventory in 10 min at a constant rate of release from the primary container into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Bulk tank inventory
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$5x10^{-6}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Loss of containment from bulk storage tank - continuous release from a hole with an effective diameter of 10 mm into the bund
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Bulk tank inventory
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Tank design standard Tank maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}\ y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	9
Comments	

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from bulk storage tank - tank overfill
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Overfill protection on tanks Manned operation
Means of Detection	Observation by site personnel
Means of Isolation	Release contained by bund
Means of Suppression	N/A
Likelihood	No published data available
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe – full bore rupture
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard Piping maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Containment provided by bund and surface water drainage system
Likelihood	$3x10^{-7}\ y^{-1}$
Means of Suppression	N/A
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	4
Comments	Product transfer operations are continuously manned.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Piping design standard Piping maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Containment provided by bund and surface water drainage system
Means of Suppression	N/A
Likelihood	$2x10^{-6}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	Product transfer operations are continuously manned.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard Pump maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if rupture occurs within bund
Means of Suppression	N/A
Likelihood	$1x10^{-4}\ y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	2
Risk Factor (R) = (F x C)	6
Comments	Product transfer operations are continuously manned.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Pump design standard Pump maintenance and inspection regime
Means of Detection	Observation by site personnel
Means of Isolation	Bund, if leak occurs within bund
Means of Suppression	N/A
Likelihood	$5x10^{-4}\ y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	3
Comments	Product transfer operations are continuously manned.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system
Means of Suppression	N/A
Likelihood	$1x10^{-5}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	6
Comments	All road tanker drivers hold a valid ADR Training certificate. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by drainage gulleys
Means of Suppression	N/A
Likelihood	$5x10^{-7}\ y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	3
Comments	All road tanker wagons used at the facility are ADR compliant.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading/unloading hose
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by drainage gulleys
Means of Suppression	N/A
Likelihood	$4x10^{-6} h^{-1}$
Frequency Factor (F) (0-5)	4
Consequence factor (C) (0-5)	3
Risk Factor (R) = (F x C)	12
Comments	Product transfer operations are continuously manned. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading/unloading hose
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Surface water drainage system. Road tanker loading gantry is surrounded by dished drains.
Means of Suppression	N/A
Likelihood	$4x10^{-5}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	1
Risk Factor (R) = (F x C)	2
Comments	Product transfer operations are continuously manned. All road tanker wagons used at the facility are ADR compliant.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	Approximately 7,000 litre i.e. largest tanker compartment size
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site surface water drainage system
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. Speed limits are in place on-site. Therefore, this scenario is not considered credible.

BULK STORE 3

ACCIDENT HAZARD REFERENCE NO: 14

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	Motor spirit (CAS 86290-81-5) Kerosene (CAS 8008-20-6)
Quantities involved	36,000 L
Risk – Human (H), Environmental (E) or both	H and E
Means of Prevention	Design standard of road tanker wagons
Means of Detection	Observation by road tanker wagon driver and/or site personnel
Means of Isolation	Site surface water drainage system
Means of Suppression	N/A
Likelihood	$1x10^{-5}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

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APPENDIX G

LPG Jetty Risk Assessment

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Loss of containment from ship - full bore rupture of the loading /unloading arm
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Maximum transfer is 1,568 tonnes over a 20 hour off-load
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Design standard of loading arm Correct connection of loading arm to LPG flange
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Limit switches on arm; this is interlocked with the slamshut valve on the jetty. Emergency stop button on ship
Means of Suppression	N/A
Likelihood	$6x10^{-5}$ m^{-1} y^{-1}
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	Transfer operations are continuously manned.

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Loss of containment from ship - leak of the loading/unloading arm the outflow is from a leak with an effective diameter of 10% of the nominal diameter, with a maximum of 50 mm
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Maximum transfer is 1,568 tonnes over a 20 hour off-load
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Design standard of loading arm Correct connection of loading arm to LPG flange
Means of Detection	Observation by ship and/or site personnel The loading/unloading arm is constantly checked for leaks at flanges using soapy water
Means of Isolation	Limit switches on arm, this is interlocked with the slamshut valve on the jetty Emergency stop button on ship
Means of Suppression	N/A
Likelihood	$6x10^{-4}\ m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	Transfer operations are continuously manned.

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	External impact, large spill
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Single walled liquid tanker, continuous release of 75m^3 in 1800 s Double walled liquid tanker, continuous release of 75 m^3 in 1800 s
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Design standard of loading arm Correct connection of loading arm to LPG flange
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Limit switches on arm, this is interlocked with the slamshut valve on the jetty Emergency stop button on ship
Means of Suppression	N/A
Likelihood	0.006 x f_0
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	Product transfer operations are continuously manned.

f_0, the base accident failure rate, is equal to 6.7 x 10^{-11} x T x t x N where T is the total no. ships per year on the transport route or harbour, t is the average duration of loading/unloading per ship (in hours) and N, the number of transhipments per year.
T value obtained from Central Statistics Office [9].
t = 20 hr
N = 30

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	Loss of containment from ship - external impact, small spill
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Single-walled liquid tanker, continuous release of 30 m^3 in 1800 s Double-walled liquid tanker, continuous release of 20 m^3 in 1800 s
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Design standard of loading arm Correct connection of loading arm to LPG flange
Means of Detection	Observation by ship and/or site personnel
Means of Isolation	Limit switches on loading arm, this is interlocked with the slamshut valve on the jetty Emergency stop button on ship
Means of Suppression	N/A
Likelihood	0.0015 x f_0
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	4
Comments	Product transfer operations are continuously manned.

f_0, the base accident failure rate, is equal to $6.7 \times 10^{-11} \times T \times t \times N$ where T is the total no. ships per year on the transport route or harbour, t is the average duration of loading/unloading per ship (in hours) and N, the number of transhipments per year.
T value obtained from Central Statistics Office [9].
t = 20 hr
N = 30

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe – full bore rupture
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Maximum transfer is 1,568 tonnes over a 20 hour off-load. Slam shut valves would isolate the pipe. Entire contents of pipe would be released.
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Pipework design standard
Means of Detection	Pressure indicators on the tanks on-site Observation by ship and/or site personnel
Means of Isolation	Emergency stop button on ship
Means of Suppression	N/A
Likelihood	$1x10^{-7}\ m^{-1}\ y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	The pipework from the jetty services many sites at the port to facilitate this, the pipework runs along the roads. Thus making it more exposed to external impact.

LPG JETTY 1

ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Pipework design standard
Means of Detection	Pressure indicators The transfer pipe is constantly checked during the transfer operation for leaks using soapy water
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-7}$ m^{-1} y^{-1}
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	The pipework from the jetty services many sites at the port to facilitate this, the pipework runs along the roads. Thus making it more exposed to external impact.

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APPENDIX H

LPG Installation Risk Assessments

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 1

Item	Description
Description of incident	Instantaneous release of the complete inventory of a bulk storage tank
Materials involved	LPG (CAS 68476-85-7)
Quantities involved	Maximum capacity of each of the buried tanks is 504 tonnes
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Tank design standard Pressure relief valves
Means of Detection	Leak detection on tanks Pressure indicators Distinct odour
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-7}y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	Internal inspection of the tanks every 10 years Bulk tanks filled to 90% capacity to allow for thermal expansion

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 2

Item	Description
Description of incident	Continuous release of the complete inventory in 10 min at a constant rate of release
Materials involved	LPG (CAS 68476-85-7)
Quantities involved	Tank storage capacity. Tanks on-site are 125-500 t capacity.
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Tank design standard Pressure relief valves
Means of Detection	Leak detection on tanks Pressure indicators Distinct odour
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-7}y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	Internal inspection of the tanks every 10 years Bulk tanks filled to 90% capacity to allow for thermal expansion

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 3

Item	Description
Description of incident	Continuous release from a hole with an effective diameter of 10 mm
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Tank storage capacity. Tanks on-site are 125-500 t capacity.
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Tank design standard Pressure relief valves
Means of Detection	Leak detection on tanks Pressure indicators Distinct odour
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$1x10^{-5}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	Internal inspection of the tanks every 10 years Bulk tanks filled to 90% capacity to allow for thermal expansion

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 4

Item	Description
Description of incident	External fire leading to BLEVE in bulk storage tank
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Tank storage capacity. Tanks on-site are 125-500 t capacity.
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Tank design standard Pressure relief valves on tank Fire resistance coating on the exterior of tanks
Means of Detection	Leak detection on tanks Pressure indicators
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$<1x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	5
Comments	4 of the tanks are buried underground. The tanks are design to be able to withstand a blow torch flame for 3 hours.

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 5

Item	Description
Description of incident	Loss of containment from a pipe – leak
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Small release expected due to emergency response procedure employed on-site
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Pipework design standard
Means of Detection	Pressure indicators Distinct odour
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$2x10^{-6}$ $m^{-1}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 6

Item	Description
Description of incident	Loss of containment from compressing pump - full bore rupture of the largest connecting pipeline
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Not determined
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Pipework design standard Suitable pump used High purity product Preventative maintenance
Means of Detection	Pressure indicators Distinct odour
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$1x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	10
Comments	

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 7

Item	Description
Description of incident	Loss of containment from a pump – leak from a connecting pipeline or pump seal
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Small release expected due to emergency response procedure employed on-site
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Pump design standard and maintenance Pipework design standard High purity product
Means of Detection	Distinct odour Pressure indicators
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-4}y^{-1}$
Frequency Factor (F) (0-5)	3
Consequence factor (C) (0-5)	5
Risk Factor (R) = (F x C)	15
Comments	

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 8

Item	Description
Description of incident	Loss of containment from road tanker wagon - instantaneous release of complete inventory of a single compartment
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	7,500 L
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker specially adapted for LPG transport by the facility Road tanker filled by dedicated personnel
Means of Detection	Distinct odour Pressure indicators Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$1x10^{-5}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	Tankers are filled to 80% capacity to prevent over-pressurised of the road tanker

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 9

Item	Description
Description of incident	Loss of containment from road tanker wagon - continuous release from a hole the size of the largest connection
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	7,500 L
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker specially adapted for LPG transport by the facility Road tanker filled by dedicated personnel
Means of Detection	Distinct odour Pressure indicators Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$5x10^{-7}y^{-1}$
Frequency Factor (F) (0-5)	1
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	4
Comments	Possible to seal the hole temporarily by pouring a small quantity of water on the area. The cooling associated with the expanding LPG will cause the water to freeze and seal the leak

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 10

Item	Description
Description of incident	Loss of containment from road tanker wagon - full bore rupture of the loading hose
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Small volume release expected due to mitigation prevention measures employed
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker specially adapted for LPG transport by facility Road tanker filled by dedicated personnel
Means of Detection	Distinct odour Pressure indicators Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$4x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 11

Item	Description
Description of incident	Loss of containment from road tanker wagon - leak of the loading hose
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	7,500 L
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker specially adapted for LPG transport by facility Road tanker filled by dedicated personnel
Means of Detection	Distinct odour Pressure indicators Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$4x10^{-5}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 12

Item	Description
Description of incident	Loss of containment from road tanker wagon – external impact
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	7,500 L
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker filled by dedicated personnel Road tanker has crash barrier to protect cargo
Means of Detection	Distinct odour Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	N/A
Frequency Factor (F) (0-5)	N/A
Consequence factor (C) (0-5)	N/A
Risk Factor (R) = (F x C)	N/A
Comments	In general, this hazard does not have to be considered if measures have been taken to reduce road accidents e.g. speed limits [4]. Speed limits are in place on-site. Therefore, this scenario is not considered credible.

LPG DEPOT

ACCIDENT HAZARD REFERENCE NO: 13

Item	Description
Description of incident	Loss of containment from road tanker wagon – fire under vehicle
Materials involved (names, CAS No)	LPG (CAS 68476-85-7)
Quantities involved	Entire contents of road tanker – 34 t
Risk – Human (H), Environmental (E) or both	H
Means of Prevention	Road tanker specially adapted for LPG transport by facility Road tanker filled by dedicated personnel
Means of Detection	Distinct odour Pressure indicators Observation by site personnel
Means of Isolation	N/A
Means of Suppression	N/A
Likelihood	$1x10^{-6}y^{-1}$
Frequency Factor (F) (0-5)	2
Consequence factor (C) (0-5)	4
Risk Factor (R) = (F x C)	8
Comments	

Arup Consulting Engineers

APPENDIX 2

Review of Legislative Controls in Selected Other Countries

Arup Consulting Engineers

Department of Enterprise, Trade and Employment

Review of Dangerous Acts 1972 and 1979 and Related Regulations

Review of Legislative Controls in Selected Other Countries

REV A

Arup Consulting Engineers

Department of Enterprise, Trade and Employment

Review of Dangerous Acts 1972 and 1979 and Related Regulations

Review of Legislative Controls in Selected Other Countries

July 2008

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CONTENTS

EXECUTIVE SUMMARY

This report presents findings of a review of legislative controls applicable to suppliers of petroleum spirit and LPG in selected other countries.

Australia

The following legislation governs petroleum and LPG handling and storage in the State of Queensland:

- The Dangerous Goods Safety Management Act, 2001;
- The Dangerous Goods Safety Management Regulation, 2001.

The legislation prescribes a risk assessment based approach to determine an "acceptable level of risk" at a major hazard facility or dangerous goods location. Itplaces safety obligations on manufacturers, importers and suppliers of dangerous goods; manufacturers, importers, suppliers and installers of storage or handling systems for use at major accident facilities and dangerous goods locations. The legislation allows for recognised standards to be used as evidence in court proceedings if an occupier fails to achieve an acceptable level of risk as defined in the Dangerous Goods Safety Management Act, 2001.

According to the legislation, dangerous goods locations and major hazard facilities may not operate without a licence. An application for a licence must be made to the chief executive officer. The chief executive officer may appoint an authorised officer for the administration and enforcement of the legislation. The authorised officer is then responsible for enforcing the legislation, for monitoring safety, for inspecting and auditing of premises and procedures and for investigating accidents or near misses. Administrative arrangements covering the implementation of the Act and Regulation are provided in various Memoranda of Understanding (MoUs) which confirm the role of each enforcing and licensing agency. Under these MoUs, the Queensland Department for Emergency (CHEM) Services becomes the agency responsible for the enforcement of legislation relating to major hazard facilities. Dangerous goods locations are the responsibility of the relevant local authorities.

The Dangerous Goods Safety Management Regulation, 2001 prescribes minimum quantities to determine if a facility is a dangerous goods location, a large dangerous goods location or a major hazard facility.

Canada

The Province of Ontario is representative of the controls applied in Canada. In this Province, hydrocarbon fuel handling is regulated under the Technical Standards and Safety Act, 2000 published by the Government of Ontario. Under the Act, Ontario Regulation 217/01 - Liquid Fuels regulates the following aspects of liquid hydrocarbon fuel handling:

- Licensing and registration procedures for petroleum handling and storage facilities, including retail outlets;
- Requirement to register as a contractor;
- Use of approved equipment;
- Accident reporting;
- Safe operating conditions and definition of unacceptable operating conditions.

A licence may be granted by the inspector provided an inspection of the facility shows that it complies with the requirements of the Regulation.

Ontario Regulation 211/01 – Propane Storage and Handling applies to the:

- Storage, handling, transportation and transfer of propane;
- Installation of appliances, equipment, components, accessories and containers on highway vehicles, recreational vehicles, mobile housing, outdoor food service units, and wash-mobiles when propane is to be used for fuel purposes;

- Installation of containers and equipment to be used for propane in distribution locations and filling plants and on tank trucks, tank trailers, and cargo liners; and
- Conversion of highway and industrial vehicles to propane from gasoline or other hydrocarbon fuels.

Under this Regulation a licence is required in order to operate a facility handling propane or transporting propane.

Ontario's Technical Standards & Safety Authority (TSSA) is the administrative authority under the Technical Standards and Safety Act, 2000. Responsibilities of the TSSA include:

- Inspection and licensing of petroleum facilities;
- Enforcement procedures against non-compliant sites;
- Incident investigation;
- Contractor registration.

In addition, the TSSA publishes technical guidance documents for use by the petroleum industry.

France

France is divided into administrative units or *départements*. Each *département* is administered by a general council, and its executive is headed by the president of that council. Enforcement of safety in potentially dangerous facilities, like petroleum and LPG storages, is under the remit of the president of the council.

The following legislation governing petroleum and LPG storage and handling in France was consulted:

- The Environmental Code 2008: Sets out the environmental requirements for classified facilities;
- Decree 1434 and/or Decree 1413: Sets out the requirements for facilities, which fill or distribute flammable liquids, natural gas or biogas;
- Arrêté du 23 Août 2005: Sets out the requirements for small LPG storage facilities i.e. less than 50 tonnes;
- Decree 1412: Sets out the requirements for large LPG storage facilities i.e. facilities storing greater than 50 tonnes;
- Decree 1414: Sets out the requirements for facilities which fill or distribute flammable liquefied gas;
- Law Nº 2003-669: Reinforces the Seveso II Directive. Sets the requirement for implementation of Technological Risk Prevention Plans and land use planning in the vicinity of Seveso sites.

The owner of a facility storing or dispensing petroleum or LPG is required to declare the facility to the Préfect who determines the safety measures to be taken, depending on which category the particular facility is classified as under the "Installations Classified for the Protection of the Environment" (ICPE) and the particular hazards associated with the facility. The owner or responsible person must prepare a file of declaration which contains documentation detailing *inter alia* any conditions imposed on the facility, noise measurements, effluent measurements and equipment safety checks.

The above legislation also sets out the various requirements applicable to each type of facility for electrical equipment, discharge of water, waste segregation and disposal, odour limits and noise limits. Technical specifications are also given i.e. separation distances, venting requirements, overpressure devices, dispensing pump requirements.

The legislation also sets out emergency measures and devices which the owner of a petroleum or LPG storage or handling facility is required to have in place. The legislation makes provisions for the implementation of emergency procedures, alarms and for the identification and documentation of hazardous areas.

Germany

The storage of petroleum and LPG is regulated within the legal framework of the Act on the "Reorganisation of the Safety of Technical Work Equipment and Consumer Products". The Act also applies to the building and operation of installations subject to mandatory inspection which may endanger employees. Installations subject to mandatory inspection include piping under internal overpressure for flammable liquids and installations for the storage, filling and transportation of flammable liquids. For such facilities, the Federal Government is authorised to determine the following statutory ordinance:

- That notification be given of the construction of such installations, their commissioning, the implementation of modifications to existing installations;
- That construction, operation and modifications to such installations be subject to permission from the governing authority;
- That facilities meet the conditions for operation and maintenance and pass a type approval test;
- That the facility itself, equipment, operations carried out and materials are state of the art;
- That such installations be subject to pre-commissioning inspection, regular in-service inspections and inspections from the regulatory authorities.

The competent authority may order the facility to cease activity or even demolish an installation which has been constructed, operated or modified without the permission required or fails to comply with an order for improvement.

The State of Baden-Württemberg was selected as being representative of other German states. Vorschriftensammlung der Gewerbeaufsicht Baden-Württemberg is the body responsible for publication of regulations and technical guidance in the areas of environmental protection, workplace safety and product safety for the State of Baden-Württemberg. TRbF 40 is the guidance document for petrol stations. It specifies guidance for petrol stations with respect to the following parameters:

- Storage of fuels;
- Delivery of fuels;
- Flame arresting tank openings;
- Delineation of potentially explosive atmospheres;
- Avoidance of electrical sources of ignition;
- Lightning protection;
- Fire protection;
- Marking, prohibition signs;
- Operating instruction;
- Cleaning and maintenance;
- Decommissioning;
- Controls to be implemented by the operator of a petrol station e.g. provision of fire extinguishers, keeping fire exits clear, maintaining hard standing surfaces, ensuring only permissible containers are filled with fuel.

TRD 404 establishes technical guidance for the establishment and operation of LPG filling stations.

TRG 280 establishes Technical Rules for Operation of Pressurised Gas Containers.

UK

The following legislation governs petroleum and LPG storage and transfer in England and Wales:

- Petroleum (Consolidation) Act, 1928;
- Petroleum (Transfer of Licences) Act, 1936;
- Regulatory Reform (Fire Safety) Order, 2005;
- The Dangerous Substances and Explosive Atmospheres Regulations, 2002 (S.I. No. 2776 of 2002);
- Control of Major Accident Hazards (Amendment) Regulations, 2005.

The Petroleum (Consolidation) Act, 1928, requires the operator of a service station to hold a valid petroleum licence issued by the local petroleum licensing authority (currently the fire and rescue authority for that area). The authority may attach conditions to the licence. The Petroleum (Transfer of Licences) Act, 1936 provides for the transfer of licences granted by a local authority under the Petroleum (Consolidation) Act, 1928.

The Regulatory Reform (Fire Safety) Order, 2005 places duties on the owner of a facility where a dangerous substance exists, to provide the relevant fire safety measures and to conduct risk assessments to establish the overall risk associated with the facility. Risks must be eliminated, reduced or mitigated using preventative or protective measures. The Order prescribes the fire fighting and emergency measures, training and procedures needed.

The Dangerous Substances and Explosive Atmospheres Regulations, 2002 place obligations on owners to identify zones where explosive atmospheres are likely to occur and to categorise these zones based on the potential frequency and duration of the explosive atmosphere.

The Control of Pollution (Oil Storage) (England) Regulations, 2001 apply to the storage of oil, including petrol. The Regulations stipulate safety requirements for storage tanks.

The Control of Major Accident Hazards Regulations, 2005 require the operator of facilities where dangerous substances are present above the threshold quantities to take all measures necessary to prevent major accidents and to limit their consequences. Operators are required to prepare a major accident prevention policy document addressing issues relating to the safety management system. Operators of "top-tier" facilities are also obliged to prepare a safety report. The competent authority for facilities falling under these regulations in England and Wales is the Health and Safety Executive and the Environment Agency.

There are a number of guidance documents, standards and approved Codes of Practice available in the UK to assist operators and enforcing authorities.

Legislation in Scotland and Northern Ireland is similar.

USA

The State of Massachusetts was selected as being representative of the USA. The following legislation governs petroleum and LPG handling and storage in the state of Massachusetts:

- The General Laws of Massachusetts (MGL);
- The Code of Massachusetts Regulation.

The General Laws of Massachusetts provide for the establishment of a Department of Fire Services which must be set up within the Executive Office of Public Safety. The Department of Fire Services is under the supervision and control of the state fire marshal. The Department must appoint a Board of Fire Prevention Regulations (the Board) who are responsible for the making of rules and regulations governing storage, use, sale, transportation and handling of crude petroleum and any of its products. According to the MGL, no building or structure may be used for storage or sale of petroleum and its products unless the local licensing authority (city council) has granted a license to the applicant. The marshal or head of department

may direct that appropriate measures are taken to ensure public safety in the event of a fire or explosion hazard at the facility. The city council or head of the fire department must ultimately report to the marshal.

The MGL provide for the publication of the Code of Massachusetts Regulations (CMR). Chapter 4.00 of the CMR adopts the NFPA standards and makes a few modifications to NFPA 58, 2001 edition for LPG, and NFPA 54, 2002 edition for fuel gas.

The following Chapters of 527 CMR set out the technical requirements for petroleum and LPG storage and handling:

- 527 CMR 1.00 Administration and Enforcement;
- 527 CMR 5.00 Operation and Maintenance of Buildings or Other Structures Used as Garages, Service Stations and the Related Storage, Keeping and Use of Gasoline or Other Motor Fuel;
- 527 CMR 6.00 LPG Containers and Systems;
- 527 CMR 8.00 Transportation of Flammable and Combustible Liquids;
- 527 CMR 9.00 Tanks and Containers;
- 527 CMR 10.00 Fire Prevention, General Provisions;
- 527 CMR 14.00 Flammable and Combustible Liquids, Flammable Solids or Flammable Gases;
- 527 CMR 15.00 Keeping, Handling and Transportation of Flammable and Combustible Liquids, and the Disposition of Crude Petroleum or any of its Products in Harbours or other Waters of the Commonwealth;
- 527 CMR 18.00 Flammable Liquids in Bulk Plant Loading and Unloading Facilities.

1. INTRODUCTION

Arup Consulting Engineers (Arup) was commissioned by the Department of Enterprise, Trade and Employment to provide advice and recommendations to the Department in support of its review of the Dangerous Substances Acts 1972 and 1979 and related Regulations.

This report has been prepared in accordance with agreed report phasing for the work and presents findings of a literature search of legislative controls applying to petroleum spirit and LPG in the following countries:

- Australia
- Canada
- France
- Germany
- United Kingdom
- USA.

Applicable legislation from each country was identified and reviewed. The key findings are presented below.

2. AUSTRALIA

The Australian legal system comprises Australian common law, federal laws enacted by the Parliament of Australia and laws enacted by the Parliaments of the Australian states and territories. As such the practices and licensing are specific to each state and territory. Legislation and standards applicable to petroleum/LPG storage and handling enacted under the Parliament of Queensland are therefore discussed for the purpose of this report in order to exemplify typical Australian legislative controls applying to petroleum/LPG storage and licensing.

Queensland is the second largest and most decentralised state in Australia comprising a total land area of approximately 1.9 million km^2. It has a population of approximately 4.2 million which is predominantly concentrated in the south-east, which includes the capital Brisbane. Currently, there are 32 major hazard facilities and some 2,400 large dangerous goods locations in Queensland. Notification of a large dangerous goods location or major hazard facility must be made to The Queensland Department of Emergency Services (Chemical Hazards and Emergency Management (CHEM) Services). According to statistics produced by the Australian Institute of Petroleum (AIP), there were 1,521 service stations in Queensland in 2000. Of these, 925 were in rural locations. Anecdotal evidence[1] suggests that kerbside stations are rare in Queensland and only exist in very small rural communities where the larger chains have yet to move in. The remaining rural service stations comprise large truck stops.

The following legislation governs petroleum and LPG storage and handling in Queensland:

- The Dangerous Goods Safety Management Act, 2001;
- The Dangerous Goods Safety Management Regulation, 2001.

2.1 Dangerous Goods Safety Management Act, 2001

The Dangerous Goods Safety Management Act, 2001 (the Act) applies to occupiers and employees of major hazard facilities and dangerous goods locations; manufacturers, importers and suppliers of dangerous goods; manufacturers, importers, suppliers and installers of storage or handling systems for use at a major accident facilities and dangerous goods locations. According to the Act, goods are "dangerous goods" if they are defined under the Australian Dangerous Goods (ADG) Code as:

- Dangerous goods; or
- Goods too dangerous to be transported.

A "hazardous material" is defined in the Act as "*a substance with potential to cause harm to persons, property or the environment because of one or more of the following:*

- *The chemical properties of the substance;*
- *The physical properties of the substance;*
- *The biological properties of the substance"*

The classification criteria used in the ADG is based on the United Nations Recommendations for the Transport of Dangerous Goods. According to the Act an "acceptable level of risk" at a major hazard facility or dangerous goods location is achieved when "*risk is minimised as far as reasonably practicable*". To determine if a risk has been minimised as far as reasonably practicable the following must be taken into consideration:

- The likelihood of harm to persons, property or the environment related to the risk; and

[1] Personal communication with representative of Australasian Association of Convenience Stores (AACS) and Australian Petroleum Agents and Distributors Association (APADA)

- The severity of the harm.

An acceptable level of risk may also be prescribed under a Regulation. However, in the event that the risk cannot be estimated or that a regulation does not prescribe an acceptable level or set of performance objectives, good industry practice and compliance with recognised standards may be used to assess the acceptability of the risk. Penalties for contravention of the Act in the event that an acceptable level of risk has not been achieved are also prescribed. The severity of the penalty is related to the extent of the harm to persons, property or the environment.

An occupier is defined in the Act as "*an employer or other person, who has overall management of the major hazard facility, dangerous goods location, facility or place*". The safety obligations on occupiers of dangerous goods locations or major hazard facilities are:

(a) to minimise the risk, as far as is reasonably practicable, associated with a major hazard facility or dangerous goods location;

(b) to provide and maintain a safe place of work for both the occupier and employees including safe storage and handling systems;

(c) to be able to demonstrate how the occupier has complied with the occupier's obligations specified in the Act;

(d) to provide appropriate induction, supervision, education and training to all employees;

(e) to develop, implement and maintain a safety management system at the facility;

(f) to develop, implement and maintain emergency plans and procedures;

(g) to review and update emergency plans and procedures in the event of any modification of the facility.

The obligations of employers and other persons at a major hazard facility or dangerous goods location are also prescribed in the Act as follows:

(a) to comply with procedures that are part of the safety management system for the facility;

(b) to comply with instruction for the safety of persons given by the occupier or supervisor at a facility;

(c) to report any matter likely to give rise to a major accident to a supervisor at the facility;

(d) to take any reasonable and necessary course of action at the facility to ensure that nobody is exposed to an unacceptable level of risk.

The obligations of manufacturers, importers and suppliers of dangerous goods are:

(a) to ensure dangerous goods are in a condition safe for storage and handling;

(b) to ensure appropriate information regarding the safe storage and handling of dangerous substances is provided.

The obligations of designers, manufacturers, importers, suppliers and installers of storage and handling equipment specified in the Act are described below:

(a) a designer or importer of a storage or handling system for use at a major hazard facility or dangerous goods location is obliged to ensure that the system, when used properly does not pose an unacceptable risk to persons, property or the environment;

(b) a manufacturer or importer of a storage or handling system for use at a major hazard facility or dangerous goods location is obliged to ensure that the system is constructed in such a way that it does not pose an unacceptable risk to persons, property or the environment;

(c) a designer, manufacturer, importer or supplier of a storage or handling system for use at a major hazard facility or dangerous goods location must take all reasonable steps to ensure that appropriate information about the safe use of the system is available to the occupier of the facility or location including the use for which the storage or handling system has been designed and tested and any conditions that must be complied with if the system is to be used safely;

(d) the installer of a storage or handling system for use at a major hazard facility or dangerous goods location must ensure that the system is installed in such a way that proper use will minimise risk to persons, property and the environment to an acceptable level.

In addition, the obligations of suppliers and installers for known hazards include the precaution to take all necessary steps to inform the occupier of the nature of the hazard and any known modifications or controls to manage the hazard and minimise the associated risk.

The Act states that the Minister can make standards ("*recognised standards*") stating ways to achieve an acceptable level of risk. Recognised standards may be used as evidence in court proceedings if an occupier fails to achieve an acceptable level of risk as defined in the Act (refer to Section 2.3 for recognised standards).

Part 4 of the Act sets out the requirements for major hazard facilities and possible major hazard facilities. A major hazard facility is defined as "*a facility that is classified by the chief executive under this division as a major hazard facility"*. A possible major hazard facility is defined as "*a facility where a hazardous material is stored or handled if the quantity of the material is more than the quantity prescribed under a Regulation or a facility that the occupier intends to use for the storage or handling of a hazardous material if the quantity of the material that is likely to be stored or handled is more than the quantity prescribed under a regulation"* (refer to Section 2.2).

According to the Act, the chief executive may classify a facility as a major hazard facility if:

- The quantity of hazardous materials stored or handled, or that is likely to be stored or handled, at the facility is more than the quantity prescribed under a regulation; and
- A hazardous materials emergency at the facility could pose a risk to persons, property or the environment outside the facility.

The occupier of a new or existing possible major hazard facility is obliged to notify the chief executive about the facility to allow him to decide whether to classify the facility as a major hazard facility.

The occupier must also prepare a systematic risk assessment of the facility in consultation with employees. The risk assessment must:

- Identify all hazards that may lead to a major accident at the facility;
- Assess the likelihood of a major accident occurring at the facility, and the effects if it does happen; and
- Assess the overall risk from the major hazard facility.

The occupier must also establish an emergency plan and procedures which detail the following:

(a) the dangerous goods stored or handled at the facility;

(b) the potential hazardous materials emergencies for the goods;

(c) the organisational structure in place to deal with a hazardous materials emergency;

(d) the resources and equipment available to deal with a hazardous materials emergency;

(e) the procedures that must be followed if a hazardous materials emergency occurs;

(f) the site layout of the facility showing where:

(i) the dangerous goods are stored or handled; and

(ii) the resources and equipment available to deal with a hazardous materials emergency are located;

(g) the telephone or other contact details of emergency services.

In addition, the occupier must maintain training records which indicate standards of competency of persons at the facility and must provide appropriate education and training to persons at the facility. He must also establish a safety management system which details the following:

(a) safety objectives;

(b) procedures to achieve safety objectives;

(c) performance criteria;

(d) maintenance of performance criteria;

(e) other items prescribed under a Regulation.

The occupier must provide the chief executive with a safety report, at least once every five years, which is to be updated in the event of any modifications to the facility. The preparation and updating of any safety report is to be conducted in consultation with employees at the facility.

Part 5 of the Act sets out the requirements for dangerous goods locations and large dangerous goods locations. According to the Act a facility is a dangerous goods location if "*stated dangerous goods or combustible liquids are stored or handled at the place, or are likely to be stored or handled at the place, in quantities that are more then the minimum quantities prescribed under a regulation"* (refer to Section 2.2). A dangerous goods location is a large dangerous goods location if "*stated dangerous goods or combustible liquids are stored or handled at the location, or are likely to be stored or handled at the location, in quantities that are more than the minimum quantities prescribed under a regulation"* (refer to Section 2.2). Similarly to the requirements for a major hazard facility, the occupier of a large dangerous goods location is obliged to prepare an emergency plan and procedures and a safety management system, however, he is not obliged to prepare a systematic risk assessment of the facility.

Part 6 of the Act sets out the requirements for enforcement of the Act. Accordingly, it states that the chief executive officer may appoint the following as authorised officers for the administration and enforcement of the Regulations:

(a) public service officers or employees;

(b) fire officers;

(c) employees of a local government;

(d) other persons prescribed under a regulation.

The responsibilities for enforcing and licensing bodies are set out in various memoranda of understanding (refer to Section 2.3). A person may only be appointed as an authorised officer if he is considered appropriately qualified and if the person has completed training approved by the executive. The duties of the authorised officer are as follows:

(a) to enforce the Act;

(b) to monitor safety;

(c) to inspect and audit facilities to ensure risk is at an acceptable level;

(d) to inspect and audit systems and procedures to ensure risk is at an acceptable level;

(e) to help persons achieve the requirements of the Act by providing advice and guidance;

(f) to investigate major accidents, near misses and complaints.

An authorised officer is responsible for enforcing the Act, for monitoring safety, for inspecting and auditing of the premises and procedures and for investigating accidents or near misses. Having entered a facility the authorised officer may undertake to do the following:

(a) search any part of the facility;

(b) inspect, measure, test, or photograph anything within the facility;

(c) remove an object for testing/analysis;

(d) copy a document at the facility;

(e) take any persons, equipment or materials onto the facility which he/she deems necessary to assess compliance with the Act;

(f) require a person at the facility to provide assistance in exercising the authorised officer's powers.

The authorised officer may issue a directive to reduce the risk, to review the safety management system, to review the systematic risk assessment, to review emergency plans and procedures, to suspend operations, to stop and secure storage and handling systems, to isolate the site or to provide an independent audit. An authorised officer may also take immediate action if he/she considers the facility poses an unacceptable risk to humans, property or the environment.

The chief executive may also appoint a hazardous materials emergency advisor (hazmat advisor) to provide technical and scientific advice to assist in the management of hazardous materials emergencies. A hazmat advisor is subject to the directions of the chief executive officer. A hazmat advisor may also exercise the same powers as an authorised officer when entering a facility; however he/she cannot issue directives or take immediate action in the event that the facility poses an unacceptable risk.

2.2 Dangerous Goods Safety Management Regulation, 2001

This Regulation prescribes minimum quantities of dangerous goods or combustible liquids to determine if a facility is:

- A dangerous goods location;
- A large dangerous goods location; or
- A major hazard facility.

as described in the Act (refer to Section 2.1).

According to this regulation the 'class' means the class allocated to dangerous goods under the ADG Code. LPG is classified as Class 2.1 (Flammable Gas). Petroleum is classified as Class 3 (Flammable Liquid) in the ADG Code. Schedule 1 of the Regulation prescribes the quantities to determine if a facility is a dangerous goods location or large dangerous goods location. Similarly, Schedule 2 of the Regulation prescribes the quantities to determine if a facility is a major hazard facility. Table 1 below outlines the threshold quantities for petroleum and LPG.

Table 1 Classification of facilities according to Dangerous Goods Safety Management Regulation, 2001

Type of Facility	Threshold Quantity of LPG	Threshold Quantity of Petroleum
Dangerous goods location	500 L	250L
Large dangerous goods location	5,000 L	2,500L
Major hazard facility	200 tonnes	50,000 tonnes

The majority of service stations, including kerbside stations, are considered large dangerous goods locations according to these criteria.

The Regulations place obligations on manufacturers and suppliers to pack and mark dangerous goods in accordance with the ADG Code and to prepare a material safety data sheet (MSDS) for the stated dangerous goods.

The Regulations also place obligations on occupiers of major hazard facilities and dangerous goods locations to identify and record hazards associated with dangerous goods and to conduct a risk assessment for every identified hazard. Risk assessments must be reviewed and updated regularly and made available to every person likely to be exposed to the risk. The occupier is also obliged to ensure that all risks are reduced to an acceptable level as defined in the Dangerous Goods Safety Management Act, 2001 (refer to Section 2.1) and that all equipment used for the storage and handling of dangerous goods has been suitably designed, installed and tested so that an acceptable level of risk exists. All storage and handling equipment and dangerous goods must also be protected from impact and all decommissioned equipment must be made safe. All employees and visitors must be suitably inducted, trained and provided with appropriate safety equipment. The occupier must also provide for spill containment of the dangerous goods and must have on-site, appropriate equipment for clean up in the event of a spill. He must maintain a register of all the dangerous goods held on site and an MSDS for each type of dangerous goods.

The occupier of a major hazard facility or dangerous goods location is obliged to ensure that any accident at the facility is investigated and a written record of the investigation made. The chief executive officer may request particulars of the accident which the occupier is obliged to supply.

The occupier must ensure that appropriate fire protection measures are available on-site and that the fire protection system is properly installed, tested and maintained. He must also ensure that emergency plans and procedures described in the Act (refer to Section 2.1) are in place. The occupier of a large dangerous goods location must notify the chief executive officer of the location within 3 months of commencement of activity at the site.

The licensing and enforcement system for facilities which store or handle flammable substances is discussed in Part 4 of the Regulations. According to the Regulations, the administration and enforcement for facilities storing or handling flammable substances lies with the local government. The responsibilities for enforcing bodies are set out in the various memoranda of understanding (refer to Section 2.3). The occupier of a facility is not permitted to store or handle flammable substances without a licence which he must obtain from the chief executive officer. The application for a flammable substances licence must detail the following:

(a) the location of the premises;

(b) a site plan;

(c) maximum quantities to be stored;

(d) description of storage conditions;

(e) Australian standards used to design any tanks;

(f) fire protection systems on site.

The chief executive officer may impose conditions on a licence which the occupier is obliged to comply with. Each licence is valid for 1 year only and must be renewed with the chief executive officer annually.

2.3 Memoranda of Understanding

Administrative arrangements covering the implementation of the Act and Regulation are provided in the Memoranda of Understanding (MoUs) which confirm the role of each enforcing and licensing agency. Under these MoUs, the Queensland Department for Emergency Services (DES) becomes the agency responsible for the enforcement of legislation relating to major hazard facilities. Large Dangerous Goods Locations and Dangerous Goods Locations are the responsibility of the relevant local authorities.

2.4 Relevant Standards and Guidance

As discussed in Section 2.1, Part 3 of the Dangerous Goods Safety Management Act, 2001 states that the Minister must notify the making of a recognised standard. Recognised standards may be used as evidence in court proceedings if an occupier failed to achieve an acceptable level of risk as outlined in the Act. The following Australian standards referenced in Section 2.3.1 to Section 2.3.8 are particularly relevant to the storage and handling of petroleum and LPG.

2.4.1 AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids

This Standard provides recommendations and requirements for the safe storage and handling of flammable and combustible liquids of dangerous goods Class 3 (flammable liquid), as classified in the ADG Code. The Standard provides minimum tolerable safety requirements for the design, construction and operation of facilities as well as minimum safety requirements for storage facilities, emergency planning, operating procedures and fire protection. It provides technical guidance that may assist in the storage and handling of flammable and combustible liquids in accordance with the risk management requirements of the National Occupational Health and Safety Commission 1015: Storage and Handling of Workplace Dangerous Goods, 2001 (NOHSC:1015).

2.4.2 AS 1596-2002: The Storage and Handling of LP Gas

This Standard provides recommendations and requirements for the location, design, construction, commissioning and operation of installations for the storage and handling of LP Gas. The Standard also provides special requirements for storage in cylinders and tanks, cylinder filling and automotive filling.

2.4.3 AS1692-1989: Tanks for Flammable and Combustible Liquids

Prior to installation, all underground tanks must be tested in accordance with the provisions in this standard. A certificate of compliance must be signed by an authorised person on behalf of the tank manufacturer. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

2.4.4 AS/NZS3000-2007: Wiring Rules

All electrical and wiring equipment for the dispensers and all electrical and wiring equipment for use in a hazardous zone must comply with this standard. A certificate of compliance must be obtained from an approved electrical contractor or the electrical supply authority. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

2.4.5 AS/NZ2229-2004: Fuel Dispensing Equipment for Explosive Atmospheres

Equipment used for dispensing of flammable liquids must comply with this standard. A certificate of compliance must be obtained by the supplier before use in a hazardous zone. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

2.4.6 AS1670-2004: Fire Detection, Warning, Control and Intercom Systems – Systems Design, Installation and Commissioning

The fixed fire/detection system must be installed in compliance with this standard. A certificate of compliance is required from the installer. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

2.4.7 AS2118-2000: Automatic Fire Sprinkler Systems – General Requirements

The fixed fire/detection system must be installed in compliance with this standard. A certificate of compliance is required from the installer. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

2.4.8 CP 22 – Removal and Disposal of Underground Petroleum Storage Tanks

The decommissioning of any underground storage tanks must be conducted in accordance with this standard. A certificate of compliance is required from the contractor. This certificate must be provided to the inspecting officer in order to obtain a flammable and combustible liquids licence.

3. CANADA

The Canadian legal system is based on the British common law system. There is also a civil system for issues of private law. Both legal systems are subject to the Constitution of Canada, from which all laws formally derive their power. Individual provinces also have the right to create their own legislation, therefore legislation on the storage, handling and use of liquid and gaseous hydrocarbon fuels can differ from province to province. In order to provide an in-depth review of applicable legislation, the province of Ontario was chosen to be representative of typical laws governing petroleum and LPG storage and handling in Canada.

Ontario, located in central Canada, is the country's second largest province by area and the country's largest by population. The capital, Ontario, is the highest populated municipality. The Technical Standards and Safety Act, 2000 published by the Government of Ontario regulates petroleum and LPG storage and handling in Ontario. The provisions of the pertinent Regulations are summarised below.

3.1 Ontario Regulation 217/01 - Liquid fuels

This Regulation applies to facilities where gasoline or an associated product is handled, loaded or dispensed to be used as a fuel for motor vehicles or as a fuel oil. Gasoline is defined in the regulation as "*a product of petroleum that may include oxygenates and gasoline additives that has a flash point below 37.8 degrees C, that is a liquid at standard temperatures and pressures and that is designed for use in an engine*".

According to the regulation, the director[2] must, upon application, issue a licence to operate a retail outlet, a marina or a bulk plan, to transport gasoline or associated products; or to register a contractor, subject to Ontario Regulation 216/01 (Certification of Petroleum Equipment Mechanics). Licences are issued subject to an inspection of the facilities or of the tanker (vehicle) to which the application relates and subject to confirmation that the facility or vehicle complies with the requirements of the regulation.

A contractor i.e. a person involved in installing, removing, repairing, altering or servicing petroleum handling equipment is obliged to register as such. In addition, all vehicles operated by a registered contractor must be clearly marked with the name and registration number as recorded on the contractor's registration certificate. No person can install, alter, purge, activate, repair, service or remove any equipment employed in the handling or use of gasoline or an associated product unless they hold a licence, registration or certificate for that purpose or are in the presence of someone who does.

In the event of asphyxiation, explosion or fire at the premises the owner or operator of the facility or the holder of the licence, registration or certificate must notify an inspector. The operator or licence holder is obliged to have in place procedures for such notification. The Technical Standards & Safety Authority (TSSA) provides guidance on the severity of incident that it is required to report on. The discovery of a leak or spillage of petroleum product into the environment or within a building must also be reported to the director by the operator or the licence holder. The scene of the incident must not be interfered with, except in the interest of public safety.

The Regulation also states that only approved equipment may be used in a private outlet, retail outlet, marina or bulk plant. The operator or licence holder must also ensure that every container/equipment employed in the handling of gasoline or associated products is maintained in a safe working condition. A supplier, a certificate holder or a contractor who

[2] a designated administrative authority may appoint directors, inspectors and investigators for the purposes of the Technical Standards and Safety Act and associated Regulations including for the purpose of determining whether authorisation holders continue to meet the requirements for authorisation and of this Act, the Regulations and Minister's orders. A director has general supervisory and administrative responsibility in respect of all or any part of the Act or Regulations.

finds that equipment is in an unacceptable condition that constitutes an immediate hazard must, immediately stop the supply of gasoline or an associated product to the equipment or facility, give the operator oral notice of the condition and give written notice of the condition to the user and forward a copy of the warning notice to the designated administrative authority i.e. the TSSA. A fuel supplier, a certificate holder or a contractor who finds that equipment or a facility is in an unacceptable condition but that it does not constitute an immediate hazard must issue a written notice to the operator. A copy of which must be sent to the TSSA, stipulating the time within which gasoline supply to the equipment will be shut off if the condition is not rectified.

An application for a licence to operate a retail outlet, a cardlock/keylock, a marina or a bulk plant or to transport gasoline or an associated product must be made to the director in the form published by the TSSA and must be accompanied by the fee.

The licence application must include a plan setting out the following information:

(a) The location of all storage tanks and pump islands;

(b) Details of the storage tanks, including their capacity and material of construction;

(c) The location of property lines, buildings, kiosks and wells located within 30 metres of the storage tanks and pump;

(d) The distance from storage tanks and dispensers to property lines, buildings and wells;

(e) The location of vent pipes; and

(f) The location of the control equipment for self-service stations.

The above does not apply where the director is satisfied that:

- The TSSA has plans for the facility in its files and that the plans accurately depict the facility; or
- The equipment has been previously approved.

The director must issue a licence where he confirms that a facility complies with the regulations or where the facility or vehicle does not comply with the requirements but the non-compliance is minor, does not constitute an immediate hazard and is corrected in the time required by the inspector.

The director may issue a licence where an inspection has not been carried out if the director is satisfied that the requirements of the Regulation have otherwise been met. The holder of a licence for a facility to handle gasoline and associated products may not make a modification to the facility until they apply for and receive written permission from the director to make the modification. A licence holder must post the licence (or a copy), ensuring that it is readily visible at facility. In the case of a licence to transport gasoline or an associated product, the licence (or a copy) must be carried with the tanker.

Licences and registrations under this Regulation are valid for one year from the date of issue or for a shorter period if stipulated on the licence and are non-transferable.

3.2 Ontario Regulation 211/01 – Propane Storage and Handling

This Regulation applies to:

(a) The storage, handling, transportation and transfer of propane;

(b) The installation of appliances, equipment, components, accessories and containers on highway vehicles, recreational vehicles, mobile housing, outdoor food service units, and wash-mobiles when propane is to be used for fuel purposes;

(c) The installation of containers and equipment to be used for propane in distribution locations and filling plants and on tank trucks, tank trailers, and cargo liners; and

(d) The conversion of highway and industrial vehicles to propane from gasoline or other hydrocarbon fuels.

The operation, installation, alteration, repair, service or removal of any appliance or equipment employed in the use, supply, transport, storage, handling or transfer propane are all provided for in this Regulation In order to carry out any of these activities a person must hold a certificate or record of training (ROT) for that purpose or be in the presence of someone who does. The director may issue a renewal of a registration to a contractor or propane vehicle conversion contractor if the holder of the registration applies for a renewal in the form published by the TSSA, pays the set fees and is not in arrears of any fees. A licence is required in order to operate a facility handling propane or transporting propane.

The Regulation states that where it appears that carbon monoxide poisoning, asphyxiation, explosion, fire, accidental release, venting or spillage has occurred because of the manner of use, handling or storage of propane, the registration, licence, certificate or ROT holder must notify an inspector. In addition, no person must interfere with or disturb the scene of an accident except in the interest of public safety.

The owner of a propane cylinder handling facility is obliged to hold a licence to operate that facility. An application for such a licence must be made to the director. The applicant is obliged to:

(a) Submit the application in the form published by the TSSA;

(b) Pay the fee set by the TSSA; and

(c) Provide a letter from the municipality where the applicant's cylinder handling facility is located indicating that the use of the facility for its intended purpose does not contravene the zoning by-laws of the municipality.

Permission of the director is required in order to make a modification to a cylinder handling facility. The Regulation also stipulates that the original or a copy of the licence must be displayed at the site.

A license is also required in order to operate a container refill centre or filling plant. The licence application must contain a site plan showing the following:

(a) The location of each propane storage tank, cylinder storage facility, underground piping or tubing and other propane handling facilities on site;

(b) The distance from each propane storage tank and cylinder storage facility to the site boundary;

(c) Each building or structure located within 50 feet of a propane storage tank;

(d) The location of each site where flammable or combustible substances are stored;

(e) The capacity of each propane storage tank within the centre or plant; and

(f) Any other relevant information requested by the director.

A licence to operate a container refill centre or a filling plant expires one year after the date of issue. A person who operates such a facility must maintain records and plans of the location of the underground piping and tubing of the plant or centre, at the plant or centre for examination. These may be reviewed by an inspector upon request.

An operator of a propane vehicle situated at a container refill centre or a filling plant must ensure that the engine of the vehicle is switched off when the vehicle is being refuelled with propane. While a propane vehicle is being refuelled, naked flames are prohibited within 10 feet of:

(a) The propane dispenser used to refuel the vehicle;

(b) The propane tank of the vehicle; or

(c) The propane fill point of the vehicle.

A propane vehicle should not be refuelled with propane if:

a) The vehicle's engine ignition is on;

b) The main-burner or pilot light of a fuel-fired appliance on board the vehicle is on;

c) There is a naked flame within 10 feet of the propane dispenser, vehicle propane container or fill point.

Propane may only be transported in licensed tank trucks or cargo liners. An application for a licence to transport propane in tank trucks or cargo liners must be made to the director. Separate applications must be made in respect of each tank truck or cargo liner. Tank trucks, cargo liners and facilities must be inspect, by the owner or supplier of propane at least once a year, to determine that they comply with this Regulation or its predecessor, where applicable. A person who carries out the inspection must prepare a report detailing the inspection, dated and signed. No person must supply propane to a tank truck, cargo liner or propane facility unless the report indicates that it complies with this Regulation.

A holder of a licence to operate any propane facility must ensure that each employee involved in propane handling is trained in the safe handling of propane and in the use of emergency shut-down switches, valves and procedures with respect to propane.

3.3 Enforcement of the Technical Standards and Safety Act, 2000

Ontario's Technical Standards & Safety Authority (TSSA) is a non-profit, self-funded 'designated administrative authority'[3] under the Technical Standards and Safety Act, 2000. The TSSA's Fuels Safety Program administers the Technical Standards and Safety Act, 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of hydrocarbon fuels (such as gasoline, diesel, propane and natural gas). Under this Act, the TSSA regulates fuel suppliers, storage facilities, road tankers, pipelines, contractors and equipment or appliances that use fuels. It aims to protect the public, the environment and property from fuel-related hazards such as spills, fires and explosions.

Further to its work in the area of petroleum storage and transfer, the TSSA is responsible for safety inspections of pressure vessels, boilers, upholstered and stuffed articles and elevating equipment (e.g. ski lifts) and amusement devices (e.g. roller coasters).

TSSA inspectors carry out inspections and licenses new or existing gas stations, marinas, bulk plants, compressed natural gas (CNG) or propane fuelling stations and road tankers that utilise gasoline-related products, compressed natural gas or propane used in vehicles. It also licenses propane dispensing facilities and propane cylinder exchange sites. Inspections of new facilities are conducted prior to licensing. Existing facilities are also inspected on a periodic basis, the frequency of which is determined using a risk-based model. Contractors who work on these facilities are also registered by the TSSA and periodically audited. The Fuels Inspection Team also investigates incidents or reports of non-compliance at these facilities.

New equipment must be approved to a recognised standard by a testing agency. Where equipment has not been certified, the TSSA provides a Field Approval. The TSSA's Field Approval Program was developed to accommodate the need for approval of appliances that are custom-made, built on-site or in limited numbers not conducive to certification by designated certification organisations. The certificate holder provides inspections of repaired equipment and its associated piping, etc. The TSSA will periodically perform inspections to

[3] 'Designated administrative authority' means a not-for-profit corporation without share capital,
(a) incorporated under the laws of Ontario or Canada that operates in Ontario but that does not form part of the Government of Ontario, any other government or an agency of a government, and
(b) designated by the Lieutenant Governor in Council

ensure that equipment remains in compliance with the initial approval and is being operated within current codes and standards.

In the event of non-compliance, the TSSA orders appropriate corrective actions to be implemented. In the worst-case scenarios the TSSA orders a device or facility to stop operating until compliant. The person responsible for the non-compliance will be invoiced the cost of this inspection.

Incident such as a fire, explosion, carbon monoxide poisoning, fuel leak or spill must be reported to the TSSA's Fuels Safety Division immediately in order for an investigation to be conducted. Tampering with the scene of the accident, except to save property or ensure safety, is prohibited.

Under current safety legislation, anyone who installs, repairs, services, removes or maintains an appliance or equipment used in the handling or use of a hydrocarbon fuel must be registered as a contractor. The TSSA maintains a database of contractors registered under the Technical Standards and Safety Act and associated Regulations. This registry is used to communicate relevant information to the contractors, track incidents or safety issues and address public inquiries.

In support of its strategic objectives to improve safety outcomes and recognising the need for strategic oversight and management of safety regulations and issues, the TSSA actively solicits the advice and input of the key stakeholders from the liquid fuels and propane industry through Advisory Councils. The purpose of the Advisory Councils is to provide a forum through which the TSSA can consult with industry relative to its safety strategies, and receive valuable input and advice to help guide the TSSA's decision making and operations.

All bulk plants, marinas, cardlock/keylock, full-serve, self-serve and split-serve retail facilities require a valid license issued by the TSSA's fuels safety program in order to operate legally. The license must be prominently displayed at the facility.

3.4 Relevant Standards and Guidance

3.4.1 TSSA Guidance for the Petroleum Industry

3.4.1.1 Location of Facilities Handling Propane

The TSSA's *Propane Branch Standard No. 9 Requirements for Location of Propane Filling Plants, Container Refill Centres and Vehicle Conversion Centres (VCC) in Heavily Populated Areas* defines minimum separation distances between occupied buildings and propane facilities in built up areas. A propane filling plant, container refill centre or VCC may only be located in accordance with the requirements set out below.

An aboveground propane tank must not be located where:

(a) any part of a school building is within 300 feet of the tank;

(b) any part of a residential occupancy building is within 25 feet of the tank.

Restriction is also placed on locating aboveground tanks, buried tanks and VCCs within a 75 foot radius of industrial and non-industrial occupied buildings of a certain footprint.

A buried propane tank shall not be located where:

(a) any part of a school building is within 100 feet of the tank

(b) any part of a residential building is within 25 feet of a tank.

A vehicle conversion centre must not be located where any part of a school building is located within 300 feet of the VCC.

3.4.1.2 Incident Reporting Guidelines

The TSSA details the circumstances and procedures for reporting hydrocarbon fuel-related incidents in its publication *Guideline for Incident Reporting Criteria for Hydrocarbon Fuels Industry Technical Standards and Safety Act.*

The TSSA has an information sharing agreement in place with the Ontario Ministry of Environment's Spills Action Centre (SAC) to receive notifications under the Act. All reporting of incidents involving hydrocarbon fuels or their utilisation equipment is done through the SAC. Reporting an incident to the SAC meets the regulatory requirement of reporting to the TSSA.

Pipeline strikes must be reported immediately through the SAC where the strike leads to evacuation, injuries, or media attention. All other pipeline strikes must be reported to the TSSA within two weeks of the occurrence following the protocol accepted by the TSSA. Homeowner strikes are the only exception, and do not need to be reported.

Explosions must be reported where they have caused injury, damage to equipment, or resulted in a fire. Minor 'delayed ignitions' would not normally be considered to be reportable.

Any spill of a petroleum product in excess of:

- 100 litres at sites restricted from public access (e.g. bulk facility)
- 25 litres at sites with public access (e.g. retail service station, marina, etc.)

must be immediately reported to the SAC. Spills of lesser quantities need not be reported to the TSSA fuels safety, unless the spill would:

- create a hazard to public health or safety;
- contaminate any fresh water source or waterway;
- interfere with the rights of any person; or
- allow entry of product into a sewer system or underground stream or drainage system.

All confirmed leaks, regardless of quantity released, must be immediately reported to the SAC. The discovery of a petroleum product that has escaped to the environment or within a building must be reported as noted in GA1/99, the TSSA's protocol for remediation of contamination.

4. FRANCE

France is made up of the European metropolitan territory and several overseas islands in other continents. Metropolitan France covers a land area of approximately 543,965 km^2 and has a population of 61.9 million. France is divided into administrative departments or *départments.* Each *département* is administered by a general council or *conseil general* and its executive is headed by the president of that council (formerly by the *Préfect*). Enforcement of safety in potentially dangerous facilities, like petroleum and LPG storages, is under the remit of the Préfect or president of the relevant council.

In France, the State defines the legal framework for measures for the prevention of risk from dangerous facilities. Depending on the types of product stored or manufactured, facilities may be classified as follows:

- Facilities subject to declaration - operations involving low level risks;
- Facilities subject to authorisation – operations involving significant risks;
- Seveso sites - operations involving major risks and control of urban planning around the site.

In each case, the facility declares its activities to the Préfect of the area who determines the safety measures to be taken. In order to define the level of danger applicable to the site, the nomenclature "ICPE" (installations classified for the protection of the environment) is used. ICPE defines the quantities of product or types of activity in order to identify which of the danger categories listed above which a facility may be classified as.

The following French legislation was consulted for the purpose of this report:

- Code De L'Envirronement 2008 (The Environmental Code);
- Arrêté du 7 Janvier 2003 relatif aux prescriptions générales applicables aux installations classées soumises à déclaration sous les rubriques n° 1434 (installation de remplissage ou de distribution de liquides inflammables) et/ou n° 1413 (installation de distribution de gaz naturel ou de biogaz) de la nomenclature des installations classées (Decree of January 7th, 2003 relating to the general regulations applicable to the classified installations subjected to declaration under the headings n° 1434 (installations for the filling or distribution of flammable liquids) and/or n° 1413 (installations for the distribution of natural gas or biogas);
- Arrêté du 23 Août 2005 relatif aux prescriptions générales applicables aux installations classées pour la protection de l'environnement soumises à déclaration sous la rubrique n° 1412 de la nomenclature des installations classées (Decree of August 23rd, 2005 relating to the general regulations applicable to the installations classified for environmental protection subjected to declaration under the heading n° 1412 of the nomenclature of the classified installations);
- Arrêté du 2 Janvier 2008 relatif aux stockages contenant plus de 50 tonnes de gaz inflammables liquéfiés relevant du régime de l'autorisation au titre de la rubrique 1412 de la nomenclature des installations classées à l'exception des stockages réfrigérés ou cryogéniques (Decree of January 2nd, 2008 relating to stores containing more than 50 tonnes of flammable liquefied gas);
- Arrêté du 24 Août 1998 relatif aux prescriptions générales applicables aux installations classées pour la protection de l'environnement soumises à déclaration sous la rubrique n° 1414: Installations de remplissage ou de distribution de gaz inflammables liquéfiés (Decree of August 24th, 1998 relating to the general regulations applicable to the installations classified for environmental protection subjected to declaration under the heading n° 1414: Installations for the filling or distribution of flammable liquefied gas) ;

- Loi n°2003-699 du 30 Juillet 2003 relative à la prévention des risques technologiques et naturels et à la réparation des dommages EC Council communication n°2002/C 28/01. (Law n° 2003-699 of July 30 2003 relating to the prevention of the technological and natural risks and to the compensation for the damages).

4.1 The Environmental Code

Book V of the Environmental Code sets out the requirements for the prevention of pollution, risks and nuisances. The provisions apply to any facility which might present a hazard. According to the Code, a facility is subject to authorisation or declaration depending on the severity of the hazards that facility might present.

Authorisation is granted only if the hazards can be prevented by measures which are specified in the ruling of the Préfecture. The applicant must provide a risk assessment of the facility which must justify appropriate measures to reduce risk. Authorisation is often dependent on the location of a facility, particularly the proximity of the facility to private dwellings, buildings occupied by third parties, public establishments or waterways. Authorisation also takes into account the technical and financial capacities of the applicant to conduct his business in compliance with the code.

Authorisation is granted by the Préfet, following a public enquiry and after the relevant municipal councils have expressed their opinion. A département-level commission is also consulted. This commission may vary in accordance with the type of facility in question and includes representatives of the State, local authorities, industry professionals, environmental protection associations and competent persons. If several départements or regions are affected, the authorisation is granted by the Minister responsible for classified facilities, after an opinion has been given by the Higher Council of Classified Facilities.

The Code states that facilities which do not present a serious hazard are subject to declaration only, however these facilities must continue to comply with any regulations enacted by the Préfect. The Minister responsible for classified facilities may set out regulations applicable to certain categories of facilities subject to declaration, after consultation with the Ministers concerned and the High Council of Classified Facilities. A facility can be subject to periodical inspections which must be conducted by accredited organisations at the expense of the operator.

If a classified facility is operated without declaration or authorisation, the Préfet can serve the operator with an official notice to remedy the situation before a given date or he can suspend operation of the facility until the declaration has been submitted or until a decision relating to the application has been made.

Articles L515-15 to L515-26 of the Code enact Act Number 2003-699 of 30th July 2003 (refer to Section 4.6). According to these articles the State must draw up and implement a technological risk prevention plan in accordance with to limit the effects of accidents that could occur at a facility likely to create a very serious risks to public health and safety or the environment. The plans must be drawn up in consultation with the owner and operators of the facility, public cooperation bodies and the local committee for the supply and exchange of information. These plans must define the risk exposure perimeter by taking into account the nature and intensity of the risk and the existing prevention measures. Within the perimeter of risk exposure, the technological risk prevention plans may, according to the type of risks, their severity and their probability:

- Define the zones in which development is forbidden or is conditional based on compliance with certain stipulations regarding the construction, use or operation of the development;
- Define, within the zones provided for above, sectors where, due to the existence of high risks, public cooperation bodies may relinquish buildings or parts of existing buildings;
- Define, within the zones, sectors where, due to the existence of high risks, the State can declare that it is in the public interest for the public cooperation bodies to carry out

compulsory purchase orders, because the means required to safeguard and protect the public are impossible or more costly than the compulsory purchase order. This land may then be sold on to the owner or operator at cost price but must not be used in any way that would increase the risk;

- Prescribe measures for the protection of the public from the risks posed by the development, which must be taken into account by the owners or operators. These measures can include conditions relating to the circulation and parking of vehicles transporting hazardous goods;
- Define recommendations for protection of the public from the risks relating to the development which can be implemented by the owners or operators.

The Code also places obligations on owners or operators of facilities to provide information about the origin, nature, characteristics, quantities, destination and methods of disposal of the waste that they produce, hand over to third parties, or handle. The Code also sets out provisions for waste handling facilities, cross-border transport of waste and noise.

According to the Code, the operation of a facility without appropriate authorisation is punishable by 1 year's imprisonment and a fine of €75,000. In the case where the rulings of the Préfecture are not abided by, the court may prohibit operations at the facility until compliance is achieved. The continued operation of a classified facility where operations have been prohibited is punishable by 2 years imprisonment and a fine of €150,000. The continued operation of a classified facility while failing to comply with a summons to meet certain conditions is punishable by 6 months imprisonment and a fine of €75,000.

4.2 Decree of 7th January 2003

Service stations, bulk petroleum storage depots and any facility which has the capacity to distribute flammable liquids fall within the scope of this legislation. The full title is Arrêté du 7 Janvier 2003 Relatif aux Prescriptions Générales Applicables aux Installations Classées Soumises à Déclaration sous les Rubriques n° 1434 et/ou n° 1413 de la Nomenclature des Installations Classées, which translates as "The decree of January 7th, 2003 relating to the general regulations applicable to the classified installations subjected to declaration under the headings n° 1434 (installations for the filling or distribution of flammable liquids) and/or n° 1413 (installations for the distribution of natural gas or biogas)".

The legislation prescribes the various safety requirements necessary at installations where the filling or distribution of flammable liquids and natural or biogas occurs. The owner of such a facility is required to hold on-site, a file containing the following details:

- The file of declaration (declaring the facility to the relevant Préfect);
- Drainage and waste purification details;
- An up-to-date plan of the facility;
- Maintenance programmes;
- Receipt of declaration;
- Conditions imposed on the declaration by the enforcing authority;
- Results of the most recent effluent and noise measurements;
- Results of testing/commissioning of electrical equipment;
- Documentation relating to all know electrical/equipment checks, MSDSs, site inventories.

The legislation requires that electrical equipment is installed in accordance with the decree n° 88-1056 of November 14th, with regard to the protection of workers. Electrical equipment which may be in use in potentially explosive atmospheres must be in conformity with the

provisions of the decree n° 96-1010 of November 19th, 1996 relating to the apparatuses and the protective system intended to be used in explosive atmosphere. Electrical equipment must have suitable emergency shut off devices which are easily accessible by employees. Electrical equipment should not present any ignition source and should be appropriately protected from shocks. It must also be maintained in good working order and periodically checked

The legislation prescribes separation distances for filling installations and public establishments, roads and administrative buildings and also requires that the owner takes the necessary action to preserve the aesthetics of the surrounding area. Generally, for equipment on-site, the distances specified in the decree of June 22nd 1998 relating to underground tanks storing flammable liquids and their secondary equipment must be adhered to. The legislation of June 22nd 1998 prescribes distances between 3 m-6 m for storage of flammable liquids and biogas with other fuels and in respect to other buildings.

The owner is also obliged to ensure the appropriate fire detection and fire prevention measures are taken i.e. smoke detectors, fire doors. Areas where dispensing of flammable liquids or biogas occurs, must be suitably sized to allow for the safe parking and movement of vehicles. Filling and distribution systems must be anchored and protected from collision from vehicles. All distribution systems for biogas or natural gas must be placed in open air.

Part 3 of the legislation states that the owner of a facility must hold documents which describe the hazardous properties associated with the stored substances. He must ensure the site is kept clean at all times and must maintain an up to date inventory of all substances present on site at any given time. A comprehensive check of safety equipment is required annually. Visual checks must also be conducted monthly to ensure the absence of corrosion. Records of these checks must be kept on-site.

Part 4 of the legislation details the safety measures which must be undertaken by owners to reduce the risk to persons or the environment. They include the provision of appropriate fire warning signals, loudspeakers, fire extinguishers at each island, absorbing product capable of absorbing at least 100 litres and site plans with a description of the dangers in each building to facilitate emergency services.

The owner of the facility is obliged to report to the prefect, the areas of the facility likely to pose a risk to people or the environment as a result of the equipment used or the material present. Any maintenance or repair works to be carried out on a site where flammable liquids or biogas/natural gas is present must only be undertaken after a “prevention plan” (similar to a method statement) for the work has been established.

Employees at the facility must be suitably trained and must be able to recall all safety details i.e. means of extinction, precautions to be taken, and procedures for emergency stopping of equipment. The employees must also have emergency services numbers at his disposal. Operating instructions for the use of equipment must be documented.

Pumping systems for flammable liquids must be designed to prevent siphoning of the material, have appropriate ventilation within the interior body and the electrical components must be separated from the flammable substance. Pumping systems for biogas or natural gas must be designed to prevent the dispersion of vapours into the electrical components, must support natural ventilation and must have an overpressure detection system. All flexible hoses used for supply systems must be maintained in good working order and must be equipped with a high-level control that automatically stops the filling of a tank when the maximum level has been reached.

Water which is likely to be polluted must be collected and directed through a separator. Liquids which are unlikely to be polluted may be collected by another means. The quantity of water released from the site must be recorded and documented on site. All provisions must be taken to limit water consumption. The number of waste water outlets must be as limited as possible to facilitate sampling and flow measurement. The decree also sets out limits for certain water quality parameters e.g. pH, total hydrocarbons which must be complied with.

Provisions must also be made to ensure that no dangerous substances enter public sewers or the environment even in the event of an accident on-site.

Part 6 of the legislation states that the recovery of the vapours must be carried out according to the provisions in the decree n° 2001-349 of April 18th, 2001 and in the two decrees of May 17th, 2001 (1 and 2) relating to the reduction of the emissions of volatile organic compounds related to the gasoline supply of the motor vehicles in the service station. Part 6 also sets out odour thresholds which must be complied with. Owners must also put in place mitigation measures to prevent the formation of dust where there is considerable movement of heavy goods vehicles around the site.

Part 7 of the legislation states that the owner must take all reasonable measures to reduce, recover and recycle waste where possible. All provisions must also be taken to limit the quantities of produced waste. Waste which cannot be reused or recycled must be eliminated at appropriately licensed waste facilities.

Part 8 of the legislation sets out the requirements for noise. The owner must ensure that the noise level within the property boundary does not exceed 70 dB (A) during the day and 60 dB (A) during the night, except in the event that the background noise for the period considered is higher than this limit. When several classified installations are located within the same establishment, the total noise level emitted by these installations will have to adhere to the same limiting values.

4.3 Decree of 23rd August 2005

Small LPG storage facilities fall within the scope of this legislation. The full title is Arrêté du 23 Août 2005 Relatif aux Prescriptions Générales Applicables aux Installations Classées pour la Protection de L'environnement Soumises à Déclaration sous la Rubrique n° 1412 de la Nomenclature des Installations Classées, which translates as the "Decree of August 23rd, 2005 relating to the general regulations applicable to the installations classified for environmental protection subjected to declaration under the heading n° 1412 of the nomenclature of the classified installations".

According to the legislation, the owner of a facility where small quantities (less than 50 tonnes) of LPG is stored is required to declare the facility and to hold the following documentation on site:

- The file of declaration;
- Drainage and waste purification details;
- An up-to-date plan of the facility;
- Maintenance programmes;
- Receipt of declaration;
- Conditions imposed on the declaration by the enforcing authority;
- Results of effluent and noise measurements;
- Results of testing/commissioning of electrical equipment;
- Documentation relating to all know electrical/equipment checks, MSDSs, site inventories.

The legislation states that if a facility changes owner, the new owner is obliged to declare the change in ownership. If operations at the facility cease, the owner is obliged to declare so a month prior to closure. The owner must have at his disposal, documents describing the nature and the risks of the hazardous substances present. Barrels, tanks and other storage equipment must bear the name of the products and, if necessary, the danger symbols.

If less than 15 tonnes of LPG is stored at the facility, there must be a minimum of 5 m between all tanks and the site boundary. If the capacity of the site is greater than 15 tonnes there must be a minimum of 7.5 m between all tanks and the site boundary. The owner of the facility is also obliged under the legislation, to preserve the aesthetics of the site where possible.

LPG is also required to be stored in such a way that access to all tanks by emergency services is possible in the event of a fire. If LPG is stored in an enclosed room, appropriate ventilation must be in place and all ventilating pipes must be positioned no less than 1 m above the parapet of the building.

All metal equipment (tanks, drains) must be earthed in accordance with applicable standards, taking into account the particular explosive/flammable nature of the products. The ground surface below mobile tanks must be horizontal, of fireproof or bituminous material and on a level equal or higher than that of the surrounding ground to avoid the accumulation of gas.

According to the legislation, the following conditions apply to fixed tanks:

- The tanks must stabilised by means of feet or supports;
- The foundations, if they are necessary, must be calculated to support the weight of the tank when filled with water;
- All the valves must be easily manoeuvrable by operators;
- The tanks must be moored if they are located in an area likely to be flooded;
- The walls of connecting tanks must be sufficient distance apart to allow easy access, maintenance and periodic monitoring of the tanks. This separation distance must not be less than the radius of the largest of the two tanks;
- The tanks, as well as piping and their supports must be protected from corrosion.

The facility must be maintained and cleaned so as to avoid the accumulation of dangerous matter, dust, and combustible materials. Cleaning agents used must be suitable and should not give rise to cross contamination issues due to other materials on-site. The owner must also hold an up to date inventory of products stored on site.

The legislation requires that electrical equipment is installed in accordance with the decree n° 88-1056 of November 14th, with regard to the protection of workers. Electrical equipment which may be in use in potentially explosive atmospheres must be in conformity with the provisions of the decree n° 96-1010 of November 19th, 1996 relating to the apparatuses and the protective system intended to be used in explosive atmospheres. All electrical equipment must also be maintained in a good state and must be managed, after installation, by a qualified person only. The frequency, extent and records of any checks of electrical equipment must be in conformity with the regulations in force for the protection of workers. Safety equipment for protection of individuals from electrical equipment or hazardous substances must be kept near the place of use, maintained in a good condition and checked periodically.

The legislation also states that the facility must be equipped with backup fire fighting equipment appropriate to the risks present and in conformity with the standards in force for each type of facility. Any facility for the storage of LPG must also be equipped with a means for alerting the emergency services. The fire fighting equipment necessary for external storage of mobile tanks must at minimum consist of:

- Two powder extinguishers located at less than 20 m from storage;
- A water source within 200 m of the tank if the capacity of the tank is greater than 15 tonnes.

The fire fighting equipment for indoor fixed tanks must at minimum consist of:

- Two powder extinguishers;
- A water source within 200 m of the tank;
- A fixed system of tank watering for capacities greater than 15 tonnes;
- A fixed system of tank watering with a minimum flow of 6 L/m^2/min for capacities greater than 35 tonnes. This system should also be capable of being operated remotely.

The owner must carry out an ATEX assessment of the facility and must have a general plan of the workshop and storage areas indicating the various hazardous zones. Any maintenance or repair work leading to an increase in risk (use of a flame or a hot source, purges circuit) can only be carried out after issuing of a "license of fire"(similar to a hot work permit). When work is carried out by a contractor, the "license of fire" and the particular instruction relating to the safety of the installation, must be co-signed by the owner and the contractor. When the work has been completed a check of the installation must be carried out by the owner or his representative.

Operations involving handling of dangerous products or maintenance of the installation (starting and stop, normal functioning, maintenance) must be detailed in written operating instructions. These instructions must include in particular:

- Procedures;
- The appropriate treatment of pollution and harmful effects generated;
- Instructions for maintenance and cleaning;
- Recommended storage conditions for the products;
- The frequency of checks required for tank seals and retention devices.

According to the legislation, the water collection system must be capable of separating polluted waste water from unpolluted rain water. There must be as few wastewater outlets as possible and they must be arranged to facilitate sampling and flow measurement. Provisions must be taken to ensure that dangerous matter is not discharged to public sewers or the natural environment even in the event of an accident. The quantity of waste stored on the site should not exceed the monthly capacity produced. An up-to-date register of hazardous waste produced on-site must be maintained. The owner must also be capable of producing evidence which details the safe disposal of hazardous waste. Any such documentation must be held for 3 years.

Similarly to the requirements of the Decree of August 23rd 2005 (refer to Section 4.3), the noise level at the facility must not exceed 70 dB (A) during the day and 60 dB (A) during the night, except if the background noise for the period considered is higher than this limit. When several classified installations are located within the same establishment, the total noise level emitted by these installations will also have to respect these limiting values.

4.4 Decree of 2nd January 2008

The full title of this legislation is Arrêté du 2 Janvier 2008 relatif aux Stockages Contenant plus de 50 tonnes de Gaz Inflammables Liquéfiés relevant du Régime de L'autorisation au Titre de la Rubrique 1412 de la Nomenclature des Installations Classées à L'exception des Stockages Réfrigérés ou Cryogéniques. It applies to installation storing more than 50 tonnes of LPG. The legislation states tank storing LPG may not be filled beyond 85% capacity in order to allow for natural thermal expansion. The prefect is also responsible for enforcement for these facilities. The legislation also prescribes two maximum allowable capacities for facilities storing over 50 tonnes of LPG as:

- A "high" threshold where 90% of the tank is filled; and

- A “very high” threshold where 95% of the tank is filled.

If the “high” level threshold is exceeded there must be appropriate automatic high level shut off devices in place which immediately alarm the operator. In addition to the high level alarms and shut off devices, a sprinkler system must also be activated if the “very high” threshold has been exceeded. The failure of transmission or treatment of the alarm must result in the immediate closing of all valves on the loading pipe and an immediate warning signal to the owner.

Each tank must also be equipped with a sufficient number of valves to prevent overpressure. The legislation states that all valves except for one must be capable of releasing gas. Each tank must also be equipped with a pressure measuring device.

Each site storing LPG is required to be completely enclosed by a fence greater than 2.5 m high. Leak detectors must be installed on tanks. The owner must also establish a gas detection plan indicating the locations of all detectors and the necessary equipment in place to control leaks.

According to the legislation, all LPG lines connected directly to the liquid phase of the tank (other than the lines for purging and sampling) must be equipped with two automatic closing devices.

For establishments constructed after the legislation has been implemented, a separation distance of 50 m between LPG tanks and the nearest boundary fence is required. All tanks are also required to be protected from thermal flux by either the design of the tank or by a permanent supply of cooling water which may be controlled remotely.

4.5 Decree of 24th August 1998

The full title of this legislation is Arrêté du 24 Août 1998 Relatif aux Prescriptions Générales Applicables aux Installations Classées pour la Protection de L'Environnement Soumises à Déclaration sous la Rubrique n° 1414: Installations de Remplissage ou de Distribution de Gaz Inflammables liquefies. This translates as the Decree of August 24th, 1998 relating to the general regulations applicable to the installations classified for environmental protection subjected to declaration under the heading n° 1414: Installations for the filling or distribution of flammable liquefied gas.

According to the legislation the owner must compile an up-to-date file containing the following documents:

- The file of declaration;
- Up-to-date site plans;
- The receipt of declaration;
- Any conditions imposed on the site,
- Results of the most recent effluent and noise monitoring.

The legislation also requires a 9 m separation distance between the pumping system and the site boundary. However, if the site is located adjacent to a public road, the minimum distance required between the pumping system and the road is reduced to 5 m.

The ground surface should be such to prevent the accumulation of LP gases, particularly in areas where the presence of such substances could be a source of danger e.g. cellar openings, gutters. The owner must also have at his disposal, documentation describing the nature and the risk associated with any hazardous substances present on-site. The owner must be able estimate the quantity of LPG held in all tanks at all times.

Electrical equipment must be installed in accordance with the decree n° 88-1056 of November 14th, 1988 relating to the protection of workers. All electrical equipment must be maintained and controlled by a qualified person.

Personal protective equipment (PPE) should be supplied in areas where hazardous substances are present, correctly maintained and checked periodically to enable safe handling of the substance. The site must also be equipped with the following fire fighting facilities:

- 2 powder extinguishers located at less than 20 meters from the pumping systems;
- An alarm system

These must be maintained in good working order and checked at least once per annum.

All repair work leading to an increase in the risks can only be carried out with a "work permit" and by complying with the rules and instructions on the permit or licence. The permit and the particular instructions must be established by the owner or the person he has appointed. When work is carried out by a contractor, the permit or licence and any particular instructions associated with the permit or licence must be co-signed by the owner and the contractor. The owner or his representative is responsible for checking any repair work after it has been completed.

Any operations involving dangerous handling or control of substances or equipment must be subject to written instructions. These instructions must include:

- Operating procedures;
- Appropriate treatment of pollution and harmful effects generated;
- Instructions for maintenance and cleaning.

The quantity of water released to sewers must be measured, recorded and documented on-site. All drains must have petrol interceptors. The number of outlets must be as few as possible facilitate flow measurement and sampling. All provisions must be taken to limit water consumption and to ensure that dangerous substances cannot enter public sewers or the environment even in the event of an accident on-site.

The legislation states that the quantities of waste produced must be limited as far as is reasonably practicable. Waste must be reduced, recovered or recycled where possible. Waste which cannot be recycled must be sent to an appropriately licensed facility to be disposed of.

The noise level from the site must not exceed 70 dB (A) during the day and 60 dB (A) during the night. When several classified installations are located within the same establishment, the total noise level emitted by these installations will have to respect the same limiting values.

The freight vehicles and equipment must comply with the provisions in force regarding limitation of their sound levels. The use of any communication systems is prohibited unless the system is reserved for the prevention of serious incidents or accidents.

4.6 Law n°2003-699 of 30th July 2003

The full title of this legislation is Loi n°2003-699 du 30 Juillet 2003 relative à la prévention des risques technologiques et naturels et à la réparation des dommages EC Council communication n°2002/C 28/01 which translates as Law n° 2003-699 of July 30th 2003 relating to the prevention of the technological and natural risks and to the compensation for damages

This law was implemented following the European Commission (2002), Report on the application in the Member States of Directive 82/501/EEC of 24 June 1982 on the major-accident hazards of certain industrial activities for the period 1997-1999 (2002/C 28/01). The law reinforces the existing legislation on industrial risks (Seveso II) by establishing local consultation committees "*Comités Locaux d'Information et de Concertation (CLIC)*", which

keep the public involved in the prevention of industrial risks. The prefect for the area is responsible for setting up these committees. The law also allows for protective measures to be taken by local people if their property does not provide sufficient protection in the event of an accident.

The law promotes the participation of the Local Committees in implementation of Technological Risk Prevention Plans (PPRT, similar to the major accident prevention plan under Seveso II Directive). The PPRT for a facility must establish an explosion perimeter. Within the explosion perimeter, the PPRT must take account of the magnitude and consequences of the risk present. All PPRTs must be approved by the prefect for that area. PPRTs must also be made available to town mayors and annexed in any local area plans.

The law also provides for control measures for urban planning which restrict the construction of dwellings around dangerous sites. These measures can also impact on existing planning to safeguard or displace existing populations. If a facility encroaches on a land use planning perimeter it will be liable for compensation. PPRTs must also define no-go or reduced access zones in the vicinity of Seveso sites. There is also scope for financial incentives to encourage people to accept voluntary dispossession orders. The relevant firms and local and national government will share costs.

5. GERMANY

Germany is a Federal Republic made up of 16 States, known in German as *Länder*. Federal and State legislation for the State of Baden-Württemberg relating to storage and handling of petroleum products was reviewed. Baden-Württemberg is the third largest State in both area and population, with an area of 35,742 square kilometres and 10.7 million inhabitants. The State capital is Stuttgart.

5.1 Equipment and Product Safety Act

The storage of petroleum and LPG is regulated within the legal framework of the Act on the "Reorganisation of the Safety of Technical Work Equipment and Consumer Products" i.e. "Gesetz zur Neuordnung der Sicherheit von technischen Arbeitsmitteln und Verbraucherprodukten, January 9, 2004, Bundesgesetzbla" (TBTGBl, official law gazette of the Federal Republic of Germany I at 2, as last amended by Gesetz, Jan. 7, 2005, BGBl I at 1970, hereinafter: "Equipment and Product Safety Act").

This Act governs the bringing into circulation and display of products. The Act also applies to the building and operation of installations subject to mandatory inspection which serve commercial or economic purposes which may endanger employees. Installations subject to mandatory inspection include piping under internal overpressure for flammable liquids and installations for the storage, filling and transportation of flammable liquids. The requirements of pertinent sections of the Act are summarised below.

Section 14 Authorisation to Adopt Statutory Ordinances

To protect employees and third parties from hazards arising from installations requiring mandatory inspections, the Federal Government is authorised to determine the following statutory ordinance:

- That notification be given of the construction of such installations, their commissioning, the implementation of modifications to existing installations and that the notification be accompanied by the relevant documents;
- That construction, operation and modifications to such installations be subject to permission from the governing authority;
- That facilities meet the conditions for operation and maintenance and pass a type approval test;
- That the facility itself, equipment, operations carried out and materials are state of the art;
- That such installations be subject to pre-commissioning inspection, regular in-service inspections and inspections from the regulatory authorities.

Regulations can be established in order to assign technical committees. The technical committee must advise the Federal Government or the competent Federal Ministry in technical matters. In addition to representatives of the Federal Authorities, Supreme State ('Land') authorities and the approved inspection bodies, representatives of employers, trade unions and statutory accident insurance bodies must also be appointed to the committees. Technical rules set out by the committees are published by the Federal Ministry of Economics and Technology.

Permits granted to installations requiring mandatory inspections expire if the owner has not commenced construction of the installation within a period of two years from when the permit was issued, stops construction for two years or does not operate the installation for a period if three years. The period may be extended in exceptional circumstances upon approval from the permitting authority.

Section 15 Powers of the Competent Authorities

The competent authorities may order the necessary measures for the implementation of obligations imposed by the statutory ordinance. It may also impose further measures needed in individual cases to mitigate hazards for employees or third party protection.

The competent authority may order a facility to cease activity or even demolish an installation which has been constructed, operated or modified without the permission required by statutory ordinance according to Section 14 without inspection by an approved inspection body.

The competent authority may prohibit operations at the installation concerned until the installation complies with an order under Section 14 or other relevant regulations.

Section 16 Right of Access of the Officers of the Approved Inspection Body

Owners and operators of installations subject to mandatory inspection are obliged to make the installations accessible on demand to the representatives of approved inspection bodies, to permit the inspection, to make available necessary labour and aids for inspection purposes and to provide all the necessary details and documents as required.

Section 17 Performance of Inspection and Surveillance

Inspections of facilities subject to mandatory inspection under the Act are carried out by approved inspection bodies. An approved inspection body is any inspection body named by the competent State Authority to the Federal Ministry of Economics and Technology as an inspection body for a certain area of work and published by the latter in the Bundesanzeiger (Federal Gazette). To qualify as an inspection body the organisation has to undergo an accreditation procedure demonstrating compliance with the following requirements:

- Independence of the inspection body;
- Availability of organisation structure required for an appropriately independent performance of tasks;
- Adequate technical expertise, professional integrity and experience;
- Existence of third party liability insurance;
- Safeguarding of company or business secrets from unauthorised disclosure;
- Compliance with the procedures laid down for the performance of inspections and the issue of certificates;
- Collection and evaluation of the knowledge gained in the inspections and instruction of the personnel in a regular exchange of experience;
- Collaboration of the approved inspection bodies to exchange knowledge gained in the context of the work where this can help prevent damage.

Under the Act the State Government may also stipulate the following with respect to the obligations of inspection bodies:

- To check the timely organisation of inspections including follow-up inspections relating to the rectification of deficiencies and notification of the competent authority in the case of non-compliance;
- Guarantee a blanket provision of inspection services;
- To create and maintain installation files;
- To involve file-maintaining bodies in bearing the costs for the creation and management of installation files.

The Equipment and Product Safety Act is implemented by numerous regulations, and depending on the circumstances, several of these may apply to equipment for storing

petroleum and LPG. The latter, in particular, is governed by the Fourteenth Regulation to the Equipment and Product Safety Act (Pressurised Equipment Regulation) (Druckgerateverordnung, Sept 27, 2002, BGBl I at 3777, as last amended by Gesetz, Jan. 9, 2004, BGBI I at 2).

In addition, relevant provisions may also be found in the Eleventh Regulation to the Equipment and Product Safety Act (Protection Against Explosion Regulation) (Explosionsschutzverordnung, December 12, 1996, BGBl I at 1914, as last amended by, January 9, 2004, BGBl I at 2). This Regulation stipulates the requirements for equipment and protective systems intended for use in potentially explosive atmospheres. As such, it is pertinent to the petroleum industry.

Another pertinent regulation is the Workplace Safety Regulation (Betriebssicherheitsverordnung, September 27, 2002, BGBI I at 3777, as last amended by Gesetz, January 9 2004, BGBl I at 2). The Workplace Safety Regulation contains provisions that apply to all equipment used in the workplace and these include licensing, labelling, and testing requirements. In addition, the Regulation contains special provisions for pressurised equipment and for environments that are at risk from explosions.

These legal enactments that provide the safety rules for industrial production, workplace environments and consumer products do not contain a complete listing of all the safety requirements that are imposed on particular products or processes. Instead, these enactments often refer to specifications contained in European Union Directives and Regulations and also to best available technology and technical rules. A compilation of these rules is available on a subscription basis at http://www.umwelt-online.de/recht/index.htm, a website maintained by UWS Umweltmanagement GmbH (a private company). This database specialises in providing laws, regulations and rules relating to occupational safety, environmental protection, transport of hazardous materials and technology.

The Seveso Directive (*Seveso Directive was replaced by Council Directive 96/82/EC*, so-*called Seveso II Directive*) is enacted in German law through Zwölfte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes, (Störfall-Verordnung - 12. BimSchV). This legislation is similar to the Irish Seveso Legislation.

5.2 Relevant Standards and Guidance

5.2.1 TRbF 40 Technical Rules for Combustible Liquids - Petrol Stations

Gewerbeaufsicht Baden-Württemberg is the body responsible for publication of regulations and technical guidance in the areas of environmental protection, workplace safety and product safety for the State of Baden-Württemberg. Technical guidance document *TRbF 40, Technical Rules for Combustible Liquids - Petrol Stations* (*Technische Regeln für brennbare Flüssigkeiten – Tankstellen*) specifies guidance for petrol stations with respect to the following parameters:

- Storage of fuels;
- Delivery of fuels;
- Flame arresting tank openings;
- Delineation of potentially explosive atmospheres;
- Avoidance of electrical sources of ignition;
- Lightning protection;
- Fire protection;
- Marking, prohibition signs;
- Operating instruction;

- Cleaning and maintenance;
- Decommissioning;
- Controls to be implemented by the operator of a petrol station e.g. provision of fire extinguishers, keeping fire exits clear, maintaining hardstanding surfaces, ensuring only permissible containers are filled with fuel.

With regard to unsupervised self-service delivery, TRbF 40 requires that this must only take place from particular vending units. The definition of the appropriate vending unit is a delivery mechanism which delivers fuel after switching on by inserting money or by use of a key or other appropriate mechanism. The following requirements are also specified:

- Vending units for the delivery of fuels of danger class A l, A II or B[4] may be operated only in such a way that the conveyer system switches off 3 minutes after its engagement or after a delivery quantity of 90 litres;
- Readable operating instructions are to be attached to the vending unit or safe operation of the vending unit must be ensured by 'ergonomic prompting';
- Vending units must be sufficiently lit;
- At service stations with exclusive or partial use of unsupervised self service vending units, the emergency call number of the operator must be made available.

5.2.2 TRD 404 Technical Rules for Pressurised Gases

Technical Rules for Pressurised Gases (*Technische Regeln Druckgase*) TRD 404 establishes technical guidance for the establishment and operation of LPG filling stations. Elements of this guidance document are summarised below.

- Pumps may not be present within a potentially explosive atmosphere Zone 1 resulting from storage tanks;
- Site layout must be such that vehicles can be refuelled outside the Zone 1 and 2 of fuel storage vessels;
- A 1m distance should be maintained between a vehicle door and the dispensing pump;
- Equipment must be adequately protected from vehicle impact using pump islands at least 12 cm in height with lateral protection of at least 20 cm;
- The equipment must be such that LPG can only be dispensed with full extension of the hose;
- The electrical equipment of the LPG filling station must be easily reachable with emergency stop;
- Persons dispensing LPG must be 18 or older. Dispensing does not need to be carried out by the service station attendant if the station is appropriately furnished for self-service.

[4] Danger class A I – flash point under 21°C
Danger class A II – flash point 21-55°C
Danger class A III – flash point 55-100°C

Fluids, that are miscible with water at 15°C and have a flash point less than 21°C, are assigned Danger Class B.

5.2.3 TRG 280 Technical Rules for Operation of Pressurised Gas Containers

TRG 280 establishes *Technical Rules for Operation of Pressurised Gas Containers*. General requirements of the guidance are as follows:

- Pressurised gas tanks may only be operated by trained persons;
- Persons must be familiar with the:
    - operation of the pressurised gas containers;
    - dangers associated with pressurised gas containers;
    - appropriate measures to be taken in the event of an accident.
- Pressurised gas containers must be operated in accordance with the intended operation. They must be operated in such a way that employees or third parties are not at risk;
- Pressurised gas containers must be operated in such a way that they remain in good condition, that dangerous corrosion does not arise and they can withstand sudden external stresses;
- In the case of fire, pressurised gas containers should be moved to a safe distance. If this is not possible, then the tanks should be sprayed with cooling water by suitable means from a protected position;
- In the event of a fire, the fire-brigade is to be made aware of the presence of pressurised gas containers;
- Pressurised gas containers, which were exposed to fire heat must be clearly marked accordingly and examined before further use.

Transport requirements for pressurised gas containers are as follows:

- Pressurised gas containers may only manually rolled by the suitable mechanism for doing so. Pressurised gas containers may not be thrown;
- Lifting devices used must reliably prevent damage to gas containers or falling of containers;
- Pressurised gas containers are to be stowed for transport in such a way that they cannot tilt, fall down or shift position;
- Ventilation in vehicles must be adequate to ensure that a flammable atmosphere or atmosphere in which personnel cannot breath will not develop; and
- Pressurised gas containers may not be transported with combustible loads e.g. wood chips or paper.

Requirements for pressurised gas container warehouses are as follows:

- Pressurised gas containers may not be stored:
    - in stairways, house and floor corridors, yards as well as passages;
    - at stairs of outdoor installations;
    - on emergency exit routes;
    - in garages; and
    - in work spaces;
- For warehouses housing pressurised gas containers, at a minimum provision, a suitable fire extinguisher must be easily attainable. A fire-hydrant must be present in close

proximity to warehouses with more as 500 filled compressed gas bottles or more than 50 filled barrels. These requirements are also fulfilled by the presence of a site fire brigade;

- Potential ignition sources must be excluded from areas in which pressurised gas containers are stored;
- Vehicles with combustion or electric motors may operate in protected areas around pressurised gas containers provided a flammable concentration of gas cannot occur in the area;
- Explosion danger warnings are to be provided as necessary;
- Areas for storing pressurised gas containers must be separated from adjacent areas by, at least, fire-retardant construction units;
- The external walls of stockrooms must be fire-retardant;
- The roofing must be sufficiently resistant against spreading fires and radiating heat;
- The floor covering in stockrooms must flame retardant and offer a firm base to allow gas containers to stand;
- Combustible materials e.g. combustible liquids, wood, wood chips, paper, hay, straw and rubber may not be stored with flammable gases.

6. UNITED KINGDOM

The UK has three distinct legal systems – English law which applies to England and Wales, Northern Irish Law which applies to Northern Ireland and Scots Law which applies to Scotland. English Law has been researched for the purpose of this report to exemplify typical legislation and practices governing petroleum and LPG storage and handling in the UK.

General fire safety for petroleum and LPG storage and handling in England and Wales is delivered through compliance with the following legislation:

- Petroleum (Consolidation) Act, 1928;
- Petroleum (Transfer of Licences) Act, 1936;
- Regulatory Reform (Fire Safety) Order, 2005 (the Order);
- The Dangerous Substances and Explosive Atmospheres Regulations, 2002 (S.I. No. 2776 of 2002);
- Control of Major Accident Hazards (Amendment) Regulations, 2005.

The Petroleum Spirit (Motor Vehicles etc) Regulations 1929 no longer apply to workplaces including petrol filling stations. The Regulations do apply to the domestic storage of petrol.

The Petroleum Spirit (Plastic Containers) Regulations 1982, no longer apply to workplaces including petrol filling stations. The Regulations do apply to the domestic storage of petrol.

The local fire and rescue authority is the petroleum licensing authority for that area in England and Wales. They undertake an assessment to determine the level of risk associated with each site. Each risk score is determined based on various safety requirements e.g. throughput, location, equipment, management etc. which can be obtained from the relevant standards and codes of practice (refer to Section 6.7). A prioritised inspection regime is then implemented by the authority according to the level of risk associated with the site.

6.1 Petroleum Consolidation Act, 1928

The Petroleum (Consolidation) Act, 1928, as amended by the Dangerous Goods and Explosive Atmospheres Regulations, 2002 (refer to Section 6.4) requires anyone who operates a service station to hold a valid petroleum licence issued by the local petroleum licensing authority (currently the fire and rescue authority for that area). The petroleum licensing authority may attach conditions e.g. storage, maintenance, dispensing to any such licence to provide for the safe handling of petroleum at the site. The licence is required to be renewed at regular intervals and is required for dispensing petroleum at both retail and non-retail sites.

6.2 Petroleum (Transfer of Licences) Act, 1936

This Act provides for the transfer of licences granted by a local authority under the Petroleum (Consolidation) Act, 1928. According to the Act, the licence is valid for the storage of petroleum by the transferee from the date on which it was transferred. It shall also cease to authorise the storage of petroleum from any other person on that date. The Act also makes a requirement for a transfer fee which is payable to the local authority or secretary of state.

6.3 Regulatory Reform (Fire Safety) Order, 2005

The Order defines a responsible person as "*in relation to a workplace, the employer, if the workplace is to any extent under his control the person who has control of the premises (as occupier or otherwise) in connection with the carrying on by him of a trade, business or other undertaking (for profit or not) or the owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business or other undertaking*".

The Order defines a dangerous substance as "*a substance or preparation which meets the criteria in the approved classification and labelling guide for classification as a substance or preparation which is explosive, oxidising, extremely flammable, highly flammable or flammable, whether or not that substance or preparation is classified under the CHIP Regulations, a substance or preparation which because of its physico-chemical or chemical properties and the way it is used or is present in or on premises creates a risk; and any dust, whether in the form of solid particles or fibrous materials or otherwise, which can form an explosive mixture with air or an explosive atmosphere*".

The Order places a duty on the responsible person to undertake the relevant fire precautions to ensure the safety of himself and his employees and to conduct a risk assessment of the premises to establish the risk posed by the presence of dangerous substances. The information to be contained in the risk assessment is detailed below:

(a) the hazardous properties of the substance;

(b) safety data provided by the supplier;

(c) circumstances of the work;

(d) activities which are likely to give rise to high risk;

(e) the effect of measures which have been taken or will be taken;

(f) the likelihood of occurrence of an explosive atmosphere;

(g) the likelihood of ignition sources being present;

(h) the scale of anticipated effects;

(i) any area which may be connected via openings, to an explosive atmosphere;

(j) any additional safety information needed to complete the risk assessment.

The risk assessment must be updated and reviewed where there is reason to suspect that it is no longer valid or if there have been significant changes to the matters to which it relates. In addition, no work activity involving dangerous substances may commence until the risk assessment is complete. The Order also requires the implementation of preventative or protective measures on the basis of the principles of prevention and the reduction or elimination of risk where practicable. The responsible person is obliged to have arrangements in place for the effective planning, organisation, control, monitoring and review of protective and preventative measures. He/she must eliminate or reduce the risk associated with a dangerous substance as far as is reasonably practicable. Where the risk cannot be eliminated he/she must control the risk and mitigate the effects of the risk.

Each facility where dangerous substances are handled or stored must have appropriate fire fighting equipment, fire detectors and alarms. All fire fighting equipment should be easily accessible and simple to use. A competent person to implement fire fighting measures must also be nominated. That person must be trained in the use of the equipment and the specific hazards associated with the facility. The responsible person must also ensure that emergency routes and exits are kept clear at all times, that emergency procedures are established in the event of serious danger and that suitable warning systems and alarms are in place to enable an effective response. Appropriate safety training and comprehensive safety information must also be provided to all employees. The responsible person is also obliged to establish and give effect to appropriate procedures, including safety drills, to be followed in the event of serious danger. A sufficient number of competent people must also be nominated to ensure that these procedures may be followed through. Procedures must also be in place to ensure no person may gain access to a restricted area unless he or she has been appropriately trained or inducted.

Additional emergency measures required under the Order include the following:

- Identification of relevant work hazards;
- Identification of specific hazards likely to arise in the event of an accident;
- Activation of suitable warning or communication systems to enable appropriate response;
- Activation of visual or audible warnings before explosion conditions have been reached;
- Provision of escape facilities.

All of the above information must be made available to the emergency services and at the facility.

The employees of a facility where dangerous substances are present are obliged to co-operate with any duties or requirements imposed by the employer and to inform the employer of any risks associated with a work situation which are considered a serious risk.

The enforcing authority for industrial, retail and commercial premises (including service stations) in the UK is the fire and rescue authority for that area. An enforcing inspector is permitted to undertake inspections, make inquiries, request records and take samples from a facility where dangerous substances are present. The enforcing authority may serve an "alterations notice" to the responsible person if he considers the premises to pose a significant risk. This notice must detail the particular items the inspector considers poses a serious risk. The responsible person must provide the enforcing authority with a revised risk assessment and a summary of the changes he/she proposes to make before undertaking the changes. In the event of the responsible person not undertaking the recommendations presented in the alterations notice, the enforcing authority may then issue an "enforcement notice" which can require the person to undertake all recommendations the enforcing authority considers necessary within 28 days of the notice being issued. The enforcing authority may withdraw the notice or extend the period specified in the notice if they consider it necessary. If the enforcing authority considers a facility to pose a significant risk to persons or the environment they may issue a "prohibition notice". A prohibition notice may prohibit or restrict activities with immediate effect. The prohibition notice must specify the matter which the enforcing authority considers will give rise to a significant risk. It may also include directions to be taken to remedy the matter.

Part 4 of the Order states that a person on whom an alterations notice, an enforcement notice, a prohibition notice or a notice given by the fire and rescue authority is served may, within 21 days from the day on which the notice is served, appeal to the magistrates' court. A person aggrieved by an order made by a magistrates' court on determining a complaint may then appeal to the Crown Court. The secretary of state may also settle disputes where the enforcing authority and the responsible person cannot agree on the measures which are necessary to remedy the failure

6.4 The Dangerous Substances and Explosive Atmospheres Regulations, 2002

The Dangerous Substances and Explosive Atmospheres Regulations, 2002 (DSEAR) implement Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work and apply to employers and the self-employed at facilities where a dangerous substance or explosive atmosphere is likely to be present. DSEAR places various obligations on employers to undertake measures to eliminate or reduce the risk at the facility.

A dangerous substance is defined in the regulations as "*a substance or preparation which meets the criteria in the approved classification and labelling guide for classification as a substance or preparation which is explosive, oxidising, extremely flammable, highly flammable or flammable, whether or not that substance or preparation is classified under the CHIP Regulations; a substance or preparation which because of its physico-chemical or chemical properties and the way it is used or is present at the workplace creates a risk, or any*

dust, whether in the form of solid particles or fibrous materials or otherwise, which can form an explosive mixture with air or an explosive atmosphere"

An explosive atmosphere is defined as "*a mixture, under atmospheric conditions, of air and one or more dangerous substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture*".

DSEAR requires each employer to carry out a risk assessment of the facility. The risk assessment must include the same detail prescribed in the Regulatory Reform (Fire Safety) Order, 2005 (refer to Section 6.3). The risk assessment must also be maintained by the employer and amended and updated as required.

In addition to the requirements of the Regulatory Reform (Fire Safety) Order, 2005, DSEAR requires the employer to classify any areas where an explosive atmosphere may occur according to the zoning classifications provided in Schedule 2 i.e. according to the frequency and duration of an occurrence of an explosive atmosphere. Any employer at a facility likely to store or handle a dangerous substance is also obliged to provide the appropriate equipment for each classified zone in accordance with the requirements set out in the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations, 1996 (S.I. No. 192 of 1996). The employer must also ensure that overall explosion safety is verified by a person competent in the field of explosion protection.

DSEAR also prescribes the same arrangements to deal with accidents, incidents and emergencies as the Regulatory Reform (Fire Safety) Order i.e. appropriate emergency procedures, provision of information on emergency arrangements, suitable warning and communication systems, visual or audible warnings for employees to alert them of an explosive atmosphere, provision of escape facilities. The employer must also ensure that employees are provided with the following:

(a) Suitable and sufficient information, instruction and training on the appropriate precautions and actions to be taken by the employee in order to safeguard himself and other employees at the workplace;

(b) The details of any such substance including:

  (i) The name of the dangerous substance and the risk which it presents;

  (ii) Access to any relevant safety data sheet;

  (iii) Legislative provisions which concern the hazardous properties of the dangerous substance.

(c) The significant findings of the risk assessment.

Enforcement of DSEAR was the obligation of the petroleum licensing authorities in the case of retail and non-retail service stations and the Health and Safety Executive or Local Authorities in the case of industrial premises. However, the Regulatory Reform (Fire Safety) Order, 2005 has amended this to allow for the enforcement of all retail, commercial and industrial premises by the local fire and rescue authority.

6.5 Control of Major Accident Hazards Regulations (COMAH), 1999

The COMAH Regulations and associated amendments (2005) implement Directive 96/82/EC and 2003/105/EC on the Control of Major Accident Hazards (the Seveso Directive) in the UK. Similarly to the Irish Seveso Regulations they prescribe the requirements for facilities where dangerous substances are present above the threshold quantities outlined in Schedule 1. The Regulations require the operator to take all measures necessary to prevent major accidents and to limit their consequences.

A dangerous substance is defined in this regulation as "*a substance, mixture or preparation listed in column 1 of Part 2 of Schedule 1 or within a category specified in column 1 of Part 3*

of Schedule 1". Part 2 Schedule 1 of the regulation contains a list of named dangerous substances. Part 3 of Schedule 1 contains a list of categories of dangerous substances.

The regulations place obligations on "operators" of facilities where dangerous substances exist. According to the regulation "*any reference in these Regulations to an operator is a reference to a person who is in control of the operation of an establishment or installation (or in relation to an establishment or installation which is to be constructed or operated, the person who proposes to control its operation or, if that person is not known, the person who in the course of a trade, business or other undertaking carried on by him has commissioned its design and construction); and any duty imposed by these Regulations on him shall extend only in relation to that establishment or installation*".

According to the Regulations, the operator of a lower tier site i.e. a site operating below the threshold quantities outlined in Column 2 of Schedule 1 Part 2 and Part 3, is obliged to notify the competent authority (Health and Safety Executive and the Environment Agency) of the facility. The items to be included in the notification are:

(a) the name and address of the operator;

(b) the address of the establishment concerned;

(c) the name or position of the person in charge of the establishment;

(d) information sufficient to identify the dangerous substances or category of dangerous substances present;

(e) the quantity and physical form of the dangerous substances present;

(f) a description of the activity or proposed activity at the installation;

(g) details of the elements of the immediate environment liable to cause a major accident or to aggravate the consequences of a major accident.

Every operator is also required to prepare a major accident prevention policy document detailing the operator's overall aims and how he ensures a high level of protection for personnel and the environment. The MAPP must address issues relating to the safety management system. These details are given in Schedule 2 of the Regulations as:

(a) organisation and personnel;

(b) identification and evaluation of major hazards;

(c) operational control;

(d) management of change;

(e) planning for emergencies;

(f) monitoring performance;

(g) audit and review.

Any operator of a top-tier site i.e. a facility storing above the threshold quantities specified in Column 3 of Schedule 1 Part 2 and Part 3 of the regulations must also prepare a safety report for the facility demonstrating that a safety management system has been implemented, that an inventory of the dangerous substances has been prepared and that a risk analysis has been conducted. The contents of the safety report must include the following:

(a) information on the management system and on the organisation of the establishment with a view to major accident prevention;

(b) presentation of the environment of the establishment:

(i) description of the site and its environment including the geographical location, meteorological, geographical, hydrographic conditions and, if necessary, its history;

(ii) identification of installations and other activities of the establishment which could present a major accident hazard;

(iii) description of areas where a major accident may occur.

(c) description of the installation including the main activities, processes and dangerous substances present;

(d) identification and accidental risks analysis and prevention methods;

(e) measures of protection and intervention to limit the consequences of an accident.

Top-tier sites must also prepare and test an on-site emergency plan. This emergency plan must include the following details:

(a) names or positions of persons authorised to set emergency procedures in motion and the person in charge of and co-ordinating on-site mitigation;

(b) name or position of the person with responsibility for liaising with the local authority responsible for preparing the off-site emergency plan;

(c) for foreseeable conditions or events which could be significant in bringing about a major accident, a description of the action which should be taken to control the conditions or events and to limit their consequences, including a description of the safety equipment and the resources available;

(d) arrangements for limiting the risks to persons on site including how warnings are to be given and the actions persons are expected to take on receipt of a warning;

(e) arrangements for providing early warning of the incident to the local authority responsible for setting the off-site emergency plan in motion, the type of information which should be contained in an initial warning and the arrangements for the provision of more detailed information as it becomes available;

(f) arrangements for training staff in the duties they will be expected to perform, and where necessary co-ordinating this with the emergency services;

(g) Arrangements for providing assistance with off-site mitigation.

In England and Wales the competent authority are the Health and Safety Executive and the Environment Agency. In Scotland the Health and Safety Executive and the Scottish Environment Protection Agency undertake this role. The obligations of the competent authority are to review the safety report and communicate the conclusions of its examination to the operator; to prohibit the operation of an establishment if they consider that the measures for prevention of major accidents are deficient and to provide an adequate system of inspection of establishments.

The main effect of the COMAH (Amendment) Regulations (2005) was to broaden the scope of the Regulations to include the following:

- The addition of new named substances;
- Changes to some existing named substances and categories of substance and to qualifying quantities;
- Changes to the aggregation rule;
- A broadening of scope at mines quarries, boreholes and landfill sites.

6.6 The Control of Pollution (Oil Storage) (England) Regulations, 2001

These Regulations apply to the storage of oil on any premises with the exception of the following:

(a) if the oil is waste oil within the meaning of regulation 1(3) of the Waste Management Licensing Regulations 1994;

(b) in any container which is situated in a building or wholly underground;

(c) in any container with a storage capacity of 200 litres or less;

(d) on any premises used

(i) mainly as a private dwelling if the storage capacity of the container in which it is stored is 3500 litres or less;

(ii) for refining oil; or

(iii) for the onward distribution of oil to other places; or

(e) on any farm if the oil is for use in connection with agriculture within the meaning of the Agriculture Act 1947.

Oil is defined in the regulations as "*any kind of oil including petrol*".

According to the Regulations, any container used to store oil must be situated within a secondary containment system which satisfies the following criteria:

(a) it must have a capacity of not less than 110% of the largest container's storage capacity or 25% of the aggregate storage capacity of all containers, whichever is the greater;

(b) it must be positioned or protected from external impact;

(c) it must be impermeable to water;

(d) there must be no drainage valves, pipes or any other equipment penetrating the base and walls;

(e) if any pipe does penetrate its base or any of its walls, the pipe must be adequately sealed to prevent oil escaping from the system.

The Regulations prescribe the requirements for fixed tanks as follows:

(a) any sight gauge must be properly supported and fitted with a valve which is automatically closed when not in use;

(b) any fill pipe, draw off pipe or overflow pipe must be positioned or protected from external impact;

(c) all above ground tanks must be properly supported;

(d) all underground tanks must:

(i) not have mechanical joints, except at a place which is accessible for inspection;

(ii) be adequately protected from physical damage;

(iii) have an appropriate leak detection system;

(iv) if fitted with a leak detection system which is used continuously, the device must be maintained in good working order and tested regularly;

(v) if not fitted with a leak detection system, it must be tested for leaks before it is first used and further tests for leaks must be undertaken, in the case of

pipes which have mechanical joints, at least once every 5 years or, in other cases, at least once every 10 years;

(vi) be adequately protected against corrosion.

(e) the tank must be fitted with an automatic overfill prevention device if the filling operation is controlled from an area where observation is not possible;

(f) where oil from the tank is delivered through a flexible pipe which is permanently attached to the container:

(i) the pipe must be fitted with a tap or valve at the delivery end which closes automatically when not in use;

(ii) the tap or valve must not be capable of being fixed in the open position unless the pipe is fitted with an automatic shut off device;

(iii) the pipe must be secured and locked shut when not in use and must be equipped with a drip tray or the pipe must:

i. have a lockable valve where it leaves the container which is locked shut when not in use;

ii. be kept within the secondary containment system when not in use.

(g) any pump must be:

(i) fitted with a non-return valve in its feed line;

(ii) positioned or protected from external impact; and

(iii) protected from unauthorised use.

(h) any permanent vent pipe, tap or valve through which oil can be discharged from the tank to the open must satisfy the following requirements:

(i) it must be situated within the secondary containment system;

(ii) it must be arranged so as to discharge the oil vertically downwards; and

(iii) in the case of a tap or valve, it must be locked shut when not in use.

6.7 Relevant Standards and Guidance

There are a number of guidance documents, standards and approved Codes of Practice available in the UK to assist operators in the safe design, construction, modification, commissioning and operation of facilities storing and handling petroleum and LPG and to assist local fire and rescue authorities design their risk assessments. They include:

- Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations. The Association for Petroleum and Explosives Administration (APEA) and Energy Institute, 2005;
- Dispensing Petrol. Assessing and Controlling the Risk of Fire and Explosion at Sites where Petrol is Stored and Dispensed as a Fuel HSG146. HSE Books, 1996;
- Unloading Petrol from Road Tankers. Approved Code of Practice and guidance L133. HSE Books, 2003;
- Safe Use and Handling of Flammable Liquids HSG140. HSE Books, 1996;
- The Storage of Flammable Liquids in Tanks HSG176. HSE Books, 1998;
- Dangerous Substances and Explosive Atmospheres. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L138. HSE Books, 2003;

- Design of Plant, Equipment and Workplaces. Dangerous Substances and Explosives Atmospheres Regulations 2002. Approved code of Practice and Guidance L134. HSE Books, 2003;
- Storage of Dangerous Substances. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L135. HSE Books, 2003;
- Control and Mitigation Measures. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L136. HSE Books, 2003;
- Code of Practice 1. Bulk LPG Storage at Fixed Installations Part 1: Design, Installation and Operation of Vessels Located above Ground. LP Gas Association;
- Code of Practice 7. Storage of Full and Empty LPG Cylinders and Cartridges. LP Gas Association;
- Petrol Filling Stations - Dispensing Control Measures LAC number 65/59a, 2005.

It is not mandatory to follow these guidance documents and codes of practice, however the fire and rescue authorities often consider them best practice and by following them, the operator of a facility will normally be doing enough to comply with relevant legislation.

A number of investigative reports have also been published by the Buncefield Major Incident Investigations Board following the explosions and fires at Buncefield Oil Storage and Transfer Depot at Hemel Hempstead in December 2005. In addition, the Buncefield Standards Task Group has published “Safety and Environmental Standards for Fuel Storage Sites” (2007). The purpose of this report is to specify minimum standards of control expected at establishments where large quantities of petroleum or other substances capable of producing flammable vapours are stored.

The introduction of biofuels has also prompted the publication of the new APEA guidance document “APEA/IP Guidance on Storage and Dispensing of High Blend Ethanol Fuels including E85 at Filling Stations”. This document is intended for inclusion in the APEA/IP guidance document “Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations” when republished. The storage of high blend ethanol fuels requires a petroleum license under the Petroleum (Consolidation) Act 1928 (Petroleum Mixtures Order 1929). Currently, only one station in the UK is approved for the storage of biofuels.

7. USA

The Supremacy Clause, Article VI of the United States Constitution, provides for the establishment of federal law and treaties. Federal law empowers Congress to enact statutes. Almost all statutes have been codified in the United States Code. Many statutes give executive branch agencies the power to create regulations, which are published in the Federal Register and codified into the Code of Federal Regulations. Each American state also has its own State constitutions and governments. They retain complete power to create laws governing anything not pre-empted by the federal Constitution or international treaties. At a local level, each state may delegate lawmaking powers to townships, agencies, cities, counties and special districts.

The State of Massachusetts was chosen for the purpose of this report in order to illustrate typical legislative controls governing LPG and petroleum storage and handling in the U.S.

The State of Massachusetts covers an area of approximately 27,336km^2 and has a population of approximately 6.4 million. Most of the population lives in the Boston metropolitan area. The eastern half of the state is predominantly urban and suburban.

The following legislation was consulted for the purpose of this report:

- The General Laws of Massachusetts (MGL);
- The Code of Massachusetts Regulation.

7.1 The General Laws of Massachusetts

The general laws governing fire prevention are set out in Chapter 148 of the MGL. The laws state that a Department of Fire Services must be set up within the Executive Office of Public Safety. The Department of Fire Services (the Department) is under the supervision and control of the State Fire Marshal. The Department must appoint a Board of Fire Prevention Regulations (the Board) who are responsible for the making of rules and regulations governing storage, use, sale, transportation and handling of crude petroleum and any of its products. The Board is made up of the following 14 members:

1) State fire marshal;
2) Head of a fire department from a community with a population of <25,000;
3) Head of a fire department from a community with a population between 25,000 and 50,000;
4) Head of a fire department from a community with a population > 50,000;
5) A member of the Massachusetts Fire Prevention Association;
6) A registered professional fire protection engineer;
7) A registered professional chemical engineer;
8) A registered professional electrical engineer;
9) A registered professional mechanical engineer;
10) A person representative of the public;
11) A graduate chemist with fire testing experience;
12) An inspector of wires who holds an electrician’s licence;
13) A representative of a national, regional or state association of the blasting industry;
14) An electrical contractor who has held a master electrician’s licence.

The Board may prescribe the location, materials and construction of buildings for storage and handling of crude petroleum and any of its products. The MGL also states that any regulations made should require that the quantity and location of petroleum be reported to the Department. Cities and towns within the Commonwealth of Massachusetts are permitted to prepare their own by-laws relative to the above but must submit them to the Board for approval.

The head of the fire department where a fire or explosion has occurred is responsible for investigating the cause and circumstances of the fire or explosion. If he is unable to determine the cause, he must notify the marshal. The marshal must maintain a record of all fires or explosions occurring in the commonwealth, with the results of investigations, and records. This must be available for public inspection.

The licensing procedure for crude petroleum or any of its products described in the MGL, states that no building or structure may be used for storage or sale of petroleum and its products unless the local licensing authority has granted a license to the applicant. The licensing authority in Massachusetts may be any one of the following:

(a) the board of street commissioners;

(b) the city council;

(c) the Board of Aldermen (governing body/city council);

(d) the Board of Selectmen (the executive arm of town government. The board typically consists of three to five members).

A license may be granted after a public hearing which the applicant is obliged to publish details of in a local newspaper 7 days prior to the hearing and by post to all land owners adjoining the land. Currently, the licensing of crude petroleum or any of its products in Massachusetts is undertaken by the municipal licensing authority. Inspections are carried out by the municipal fire department, and on some occasions, the State Fire Marshal. The regulations do provide for small quantities of flammable substances to be kept for domestic use without a license.

The marshal or head of department may direct that appropriate measures are taken to ensure public safety in the event of a fire or explosion hazard at the facility. Any such measures must be taken at the expense of the owner. Any building or structure used for storing or handling petroleum and its products are subject to all regulations prescribed by the Board for the protection against fire and explosion hazards. The fire marshal is responsible for studying all matters relating to fire hazard and prevention, for hearing complaints and for advising the Board on improvements to laws relating to fire departments, construction of buildings, and licensing of trades with an associated fire hazard.

The licensee is obliged to eliminate all hazardous conditions at the site within 3 weeks of cessation of activity at the site. If he fails to do so, the local licensing authority may organise for appropriate decommissioning of the site at the expense of the owner.

Unmanned stations are not permitted in the State of Massachusetts.

7.2 Code of Massachusetts Regulations

The MGL provides for the publication of the Code of Massachusetts Regulations (CMR). Chapter 148 of the MGL states that the Board must provide regulations for the preparation of a particular comprehensive Fire Safety Code within the CMR. The pertinent sections of the CMR governing petroleum and LPG storage and handling are:

- 248 CMR Rules and Regulations Governing Plumbers and Gas Fitters;
- 527 CMR Board of Fire Prevention Regulations.

7.2.1 248 CMR Rules and Regulations Governing Plumbers and Gas Fitters

Chapter 4.00 of 248 CMR governs the Board's adoption of the ANSI Z223.1-2002 NFPA-54-2002 National Fuel Gas Code 2002 Edition and NFPA 58 Liquefied Petroleum Gas Code 2001 Edition, 248 CMR 7.00 Massachusetts Code for Gas Utilization Equipment in Large Boilers and the modifications of 248 CMR 4.00 and 248 CMR 5.00 which comprise the Massachusetts Fuel and Gas Code. Generally any modifications made to the NFPA Standards made in the CMR take precedence if there is any conflict between the Standards and the CMR.

7.2.2 527 CMR Board of Fire Prevention Regulations

The purpose of 527 CMR is to prescribe minimum requirements and controls to protect property and public welfare from fire and explosion hazards associated with the storage, handling or use of dangerous substances and materials. The following Chapters of 527 CMR are particularly pertinent in the context of petroleum and LPG storage and handling:

(a) 527 CMR 1.00 Administration and Enforcement;

(b) 527 CMR 5.00 Operation and Maintenance of Buildings or Other Structures Used as Garages, Service Stations and the Related Storage, Keeping and Use of Gasoline or Other Motor Fuel;

(c) 527 CMR 6.00 LPG Containers and Systems;

(d) 527 CMR 8.00 Transportation of Flammable and Combustible Liquids;

(e) 527 CMR 9.00 Tanks and Containers;

(f) 527 CMR 10.00 Fire Prevention, General Provisions;

(g) 527 CMR 14.00 Flammable and Combustible Liquids, Flammable Solids or Flammable Gases;

(h) 527 CMR 15.00 Keeping, Handling and Transportation of Flammable and Combustible Liquids, and the Disposition of Crude Petroleum or any of its Products in Harbours or other Waters of the Commonwealth;

(i) 527 CMR 18.00 Flammable Liquids in Bulk Plant Loading and Unloading Facilities.

The content of each chapter is summarised below.

7.2.2.1 527 CMR 1.00 Administration and Enforcement

According to this chapter, it is the responsibility of the Marshal or head of the fire department to enforce the provisions of the code. As part of this duty he may enter a premises, investigate the cause and circumstances of every fire and explosion, keep records of all fires and explosions, grant permits and conduct inspections as required under MGL 148, approve plans, revoke permits, order the elimination of dangerous or hazardous conditions and order evacuations. He may also inform other authorities or other delegates within the jurisdiction of facilities he considers unsafe.

7.2.2.2 527 CMR 5.00 Operation and Maintenance of Buildings or Other Structures Used as Garages, Service Stations and the Related Storage, Keeping and Use of Gasoline or Other Motor Fuel

527 CMR 5:00 applies to all service stations where flammable and combustible fuels are stored and dispensed to motor vehicles, and all buildings and structures used for the storage, parking or servicing of motor vehicles.

According to this chapter, aboveground tanks, at a bulk plant, must not be connected by piping to a service station. Apparatus for dispensing Class I fluids into fuel tanks of vehicles of the public is not permitted at a bulk plant unless separated by a fence or similar barrier from the area in which bulk operations are conducted. In addition, Class I fluids must not be stored

or handled within a building having a basement or pit into which flammable vapours can travel, unless this area is provided with ventilation.

All underground storage facilities must be installed and monitored for the prevention and detection of leakages. This chapter also describes the measures to be taken in the event that an unexplained loss in inventory occurs. In general, records must be first checked. If there is no discrepancy in the records, readily accessible equipment must be checked. If equipment checks show no defect piping systems must then be checked. The final step is a storage tank check which may or may not involve excavation. At this point the fire marshal must have been notified of the loss. It is the responsibility of the owner and operator to remedy any defects and restore all equipment to its original state.

The owner and operator must also conduct an inventory verification program on a scheduled basis, at least once every year.

Dispensing devices must not be installed inside a building or less than ten feet from the outside of a building unless specifically approved by the head of the fire department. At public garages, fuel dispensing areas must be located on the level nearest grade. A clearly identified and easily accessible switch or circuit breaker must also be provided at a location remote from pumping devices to shut off the power to all pumping devices in the event of an emergency.

According to this chapter, self service facilities are permitted provided the following conditions are applied:

(a) the service station is under the control of the owner, operator, or authorized employee who shall be on duty at all times while motor fuel is being sold or dispensed;

(b) the motor fuel is dispensed only by a competent licensed driver or in the absence of a licensed driver by the service station attendant;

(c) the controlling mechanism console providing power to the pump motor is in constant attendance by the owner, operator or authorized employee while motor fuel is being dispensed and is properly protected against physical damage from motor vehicles;

(d) dispensing systems for which plans have been submitted subsequent to June 20, 1975, must be equipped with an overhead fixed fire extinguishing system of a type approved by the Marshal, details of which shall be included with plans submitted to the Marshal for approval.

The use of automatic credit card reading devices as a means of payment at the pump island are also permitted provided that:

(a) each sale is individually authorized by the self-serve attendant;

(b) the automatic credit card reading device is not used as physical authorization for the dispensing of motor fuel; and

(c) the automatic credit card reading devices are included on plans submitted to and approved by the Marshal

7.2.2.3 527 CMR 6.00 LPG Containers and Systems

This chapter applies to the design, construction, location, installation and operation of LPG systems. According to this chapter the marshal or head of the fire department is obliged to approve all LPG installations. Approved installations will then be granted a permit. Approval of LPG equipment and appliances is based on compliance with accepted principles or recognised engineering practices. The marshal may order the responsible person to meet additional requirements if unusual circumstances exist. The NFPA 58 Standards (refer to Section 7.2.1) are adopted as safety standards under this chapter.

7.2.2.4 527 CMR 8.00 Transportation of Flammable and Combustible Liquids

According to this chapter a permit to transport flammable or combustible liquids must be obtained from the marshal. Each permit must be renewed every 2 years. Each cargo tank transporting flammable or combustible liquids must also be marked with a United Nations (UN) hazardous material identification number. Cargo tanks must have suitable static protection and must be equipped with one or more fire extinguishers. This chapter also sets out requirements for auxiliary internal combustion engines, electrical generators and motors. The regulations also place obligations on the driver, operator or attendant of a tanker to bond the tank when filling and to ensure ullage of at least 1%. He must also be trained in the proper method of loading and unloading the vehicle. The head of the fire department may limit the quantity of flammable or combustible liquid to be stored overnight within a cargo tank, portable tank or transfer tank.

7.2.2.5 527 CMR 9.00 Tanks and Containers

527 CMR 9.00 applies to the design, construction, installation, testing and maintenance of tanks and containers storing hazardous substances.

Aboveground storage tanks for storage of flammable liquids must meet the requirements of UL-142, Standards for Safety, Steel Aboveground Tanks for Flammable and Combustible Liquids. For the aboveground storage of Class I liquids at facilities other than motor fuel dispensing facilities, local fire departments may accept the installation practices outlined in NFPA 30: Flammable and Combustible Liquids Code, 2000. An aboveground tank storing greater than 10,000 gallons of combustible material may only be constructed after a permit has been granted by the fire marshal.

The chapter also states that physical barriers must be erected if the tanks are exposed to vehicular impact. Tanks storing Class I liquids at an individual site are limited to a maximum individual capacity of 10,000 gallons and an aggregate capacity of 40,000 gallons. In addition, tanks must be located at least:

(a) 15 m from the nearest important building on the same property;

(b) 15 m from any fuel dispenser;

(c) 15 m from the nearest side of a public way;

(d) 30 m from any property line that is or may be built upon, including the opposite side of a public way.

According to this chapter, all underground tanks must be designed and built in accordance with approved engineering standards for the materials of construction being used. All new and replacement tank installations must be equipped with an overfill prevention device. No new or replacement tank or piping may be installed, whether as part of a new or existing storage facility, unless the owner has given notice of its installation to the head of the fire department. Every new or replacement tank and its piping must be tested separately, at the owner's expense, prior to being buried. Steel tanks completely underground must be covered with a minimum of two feet of earth or be covered with not less than one foot of earth and a slab of reinforced concrete not less than four inches thick. Leak detection must also be incorporated into each tank. Underground storage tanks subject to corrosion must be provided with a properly engineered and installed cathodic protection system capable of providing continuous protection to the metal components. Each storage tank must also be provided with a filler pipe and a vent pipe.

7.2.2.6 527 CMR 10.00 Fire Prevention, General Provisions

According to this chapter any building or premises where the head of the fire department considers it necessary to be provided with a fire extinguisher must do so in accordance with NFPA 10. No object must obstruct access or egress from a building. The storage of flammable or combustible material must be confined to approved storage areas and a permit

obtained if more than 2500 m^3 of flammable or combustible material is present. All fire doors must also be maintained in good working order. Smoking must also be prohibited in area handling flammable or combustible liquids. Fire exit drills must be conducted at least 6 times per year and a written copy of an evacuation plan must also be in place.

7.2.2.7 527 CMR 14.00 Flammable and Combustible Liquids, Flammable Solids or Flammable Gases

527 CMR 14.00 applies to the storage and handling of flammable liquids, combustible liquids, flammable solids and flammable gases.

According to this chapter, except as otherwise provided for, no flammable or combustible liquids, flammable solids or flammable gases may be kept, stored, manufactured or sold without first obtaining a permit from the head of the fire department. The application for the permit must clearly describe the quantities of flammable and combustible liquids, flammable solids or gases proposed to be kept or stored. The permit must also prescribe the conditions and specify the amounts to be kept or stored. There are provisions for smaller quantities to be kept without a licence. For petrol the maximum quantity to be stored without a licence is 793 gallons. For LPG within a building, the maximum quantity that may be stored without a licence is 3,000 cubic feet. For LPG outside a building the maximum quantity is 10,000 cubic feet.

All tanks, equipment, and apparatus and all piping, fittings and appliances used or intended for use for the storage, handling, use or movement of flammable or combustible liquids must be constructed, tested and approved in accordance with provisions of 527 CMR 9.00 (refer to Section 7.2.2.4). In the case of industrial/commercial buildings, the responsible person must comply with the following sections in NFPA 30-2000:

(a) *Flammable storage utilizing hazardous material storage lockers*: Section 4.6 Hazardous Materials Storage Lockers;

(b) *Storage Cabinets*: Section 4.3 Design, Construction, and Capacity of Storage Cabinets;

(c) *Outside storage*: Section 4.7 Outdoor Storage;

(d) *Inside protected storage*: Section 4.4 Design Construction, and Operation of Inside Liquid Storage Areas and Section 4.8 Automatic Fire Protection;

(e) *Inside unprotected storage*: Section 4.4 Design Construction, and Operation of Inside Liquid Storage Areas and Section 4.4.4 Allowable Quantities and Storage Heights, subsections 4.4.4.1, 4.4.4.2., 4.4.4.3, 4.4.4.4, and Table 4.4.4.1 Indoor Unprotected Storage of Liquids in Containers, Portable Tanks, and Intermediate Bulk Containers.

Class I flammable liquids must not be dispensed by gravity from tanks, drums, barrels or similar containers. Flammable and combustible liquid spills and leaks must be promptly reported to the head of the fire department and to the Office of Incident Response of the Department of Environmental Protection. Suitable fire control devices, such as small hose or portable fire extinguishers, must also be available at locations where flammable fluids are stored.

7.2.2.8 527 CMR 15.00 Keeping, Handling and Transportation of Flammable and Combustible Liquids, and the Disposition of Crude Petroleum or any of its Products in Harbours or other Waters of the Commonwealth

According to this chapter, flammable or combustible materials must not be kept, handled or stored in any harbour without a permit from the marshal. All vessels, barges etc for the storage of flammable or combustible materials in a harbour must be approved by the marshal. No Class I flammable liquid may be delivered to any to any vessel having its tanks located below deck unless each tank is equipped with a separate fill pipe. The Regulations state that a competent person, trained in dispensing mechanisms and shut-off controls must supervise fuelling operations. In addition, ullage of at least 2% must also be provided in all tanks. The fire department must be notified immediately in the event of a leak or spill. Fuel barges,

vessels and filling activities are open to inspection by the marshal, head of the fire department or the harbour master. Fire extinguishers must be available on each vessel or barge. Fueling facility installations must also comply with NFPA 30, Flammable and Combustible Liquids Code and NFOPA 30A, Automotive and Marine Service Station Code.

7.2.2.9 527 CMR 18.00 Flammable Liquids in Bulk Plant Loading and Unloading Facilities

This chapter sets out separation distances for tank vehicle and tank car loading and unloading facilities and separation of flammable materials in pipelines. The Regulations also state that static protection must be in place during loading and unloading operations. Any room in which a flammable or combustible liquid is stored must be equipped with appropriate exit facilities and ventilation. Any heating appliance must also not provide an ignition source. Provisions must also be made to prevent flammable or combustible material entering or accumulating in drains, sewers or natural waterways. Suitable fire control devices must also be in place and access to loading bays must be prevented from collision.

7.3 Relevant Standards and Guidance

7.3.1 NFPA 54 National Fuel Gas Code

NFPA 54 is a safety code that applies to the installation of fuel gas piping systems, fuel gas utilization equipment, and related accessories. The standard provides guidance for gas piping system design, materials and components, pipe sizing, inspection, testing and purging, appliance, equipment and accessory installation, venting of appliances and sizing of venting systems. The most recent version of this standard is the 2006 edition.

7.3.2 NFPA 58 Liquefies Petroleum Gas Code

NFPA 58 applies to the storage and handling of LPG. The Standard makes provisions for equipment and appliances, installation of equipment, transfer of LPG, storage of cylinders, vehicular transport of LPG, requirements for buildings or structures housing LPG, marine shipping of LPG and piping. The appendices to NFPA 58 provide comprehensive information regarding, *inter alia*, the properties of LPG, the design and spacing of containers and pressure relief devices. The most recent version of this standard is the 2008 edition.

7.3.3 NFPA 30 Flammable and Combustible Liquids Code

NFPA 30 applies to the storage, handling and use of flammable and combustible liquids. The code provides for, *inter alia*, fire prevention and fire risk control, electrical systems, storage of flammable liquids in containers, outdoor storage, automatic fire protection for indoor storage facilities, dispensing, handling, transfer and use of flammable liquids, aboveground and underground tanks, bulk loading and unloading and wharves. The most recent version of this code is the 2008 edition.

7.3.4 NFPA 30A Code for Motor Fuel Dispensing Facilities and Repair Garages

NFPA 30A applies to motor fuel dispensing facilities, marine/motor fuel dispensing facilities and motor fuel dispensing facilities located inside buildings, at fleet vehicle motor fuel facilities, and at farms and isolated construction sites. The code also applies to motor repair garages. The code provides guidance on, *inert alia*, storage and piping of liquids, fuel dispensing systems, building construction requirements, electrical installations, operational requirements, vapour processing and recovery and additional requirements for LNG, hydrogen and LPG.

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APPENDIX 3

London Fire Brigade's Risk Assessment Methodology

INSPECTION PROGRAMME PROFORMA FOR PETROL FILLING STNS

COMPLETE ALL SECTIONS SHADED IN BLUE

ADDITIONAL INFO MAY BE ADDED TO NOTES COLUMN

SITE OPERATOR(S):

SITE ADDRESS:

FILE REF No: **INSPECTION DATE:**

SCORE: 150

Quarterly Inspection Period

Highest Hazard/ Risk Level

>95 = Quarterly (Highest Hazard/ Risk)

76-94 = 6 Monthly (Intermediate Hazard/ Risk)

51-75 = Annual (Intermediate Hazard/ Risk)

21-50 = 18 Monthly (Intermediate Hazard/ Risk)

<20 = 3 Yearly (Lowest Hazard/ Risk)

RRO RISK CATEGORY: A

RRO RELATIVE RISK LEVEL SCORE: 7.00

SECTION 1	NOTES	SCORE
TYPE OF SITE (Unattended self-service should be at least annual)		
Attendant Service		**1**
TYPE OF STORE		
Kiosk		**1**
THROUGHPUT (Petroleum Spirit only per annum)		
Less than 500,000 litres		**1**
SECTION TOTAL		**3**

SECTION 2	NOTES	SCORE
* It is up to the Inspectors discretion as to the scoring under these headings.		
**The Inspector must justify below what factors should be taken into consideration and why		
LOCATION		
Watercourses		
Within 10m of water course		**10**
Below ground risks		
Within 6m of basement		**30**
Proximity of Buildings		
***School**		**10**
Living accommodation		
Within 9m living accommodation		**20**
****Other** **Score**		
		0
SECTION TOTAL		**70**

SECTION 3	NOTES	SCORE
EQUIPMENT (* Worst case)		
***AGE OF TANKS**		
20 - 30 years		**3**
***AGE OF PIPEWORK**		
20 - 30 years		**3**
***CONSTRUCTION OF TANKS**		
Above ground		**3**
***CONSTRUCTION OF PIPEWORK**		
		0

TYPE OF PIPEWORK		
Suction system		**1**
LPG TANKS		
		0
MONITORING/ OBSERVATION WELLS		
Neither		**5**
LEAK DETECTION - INTERSTITIAL MONITORING		
No		**3**
OVERFILL DEVICE		
No		**5**
GAUGING SYSTEM		
Dipstick		**5**
DRIVER ONLY DELIVERY		
Yes		**5**
DISPENSING EQUIPMENT		
Hand operated		**1**
DRAINAGE		
Interceptor of 2400 litres or less		**10**
SECTION TOTAL		**44**

SECTION 4	**NOTES**	**SCORE**
PAST RECORD		
RECORD OF ANY LEAK		
Within last 5 years		**1**
RECORD OF ANY OVERSPILL		
N/A		**0**
RECORD OF PROSECUTIONS		
Within last 10 years		**1**
RECORD OF OTHER INCIDENTS		
N/A		**0**
MANAGEMENT CONFIDENCE		
Track record of Organisation	**2**	**2**
RECORD OF STAFF		
Staff competence	**2**	**2**
Staff turnover	**0**	**0**
STAFF TRAINING/TRAINING RECORDS		
Knowledge of hazards	**3**	**3**
Knowledge of emergency procedures	**2**	**2**
Knowledge of safety policies	**2**	**2**
PAPERWORK PRESENT		
Risk Assessment	**No**	**5**
Electrical Cert	**No**	**5**
Drainage Cert	**No**	**3**
Training Records	**No**	**3**
Visitors Book	**No**	**1**
GENERAL HOUSEKEEPING	**3**	**3**
SECTION TOTAL		**33**

PREVIOUS INSPECTIONS	
	0

SCORE SUMMARY	**NOTES**	**SCORE**
SECTION ONE		**3**
SECTION TWO		**70**
SECTION THREE		**44**
SECTION FOUR		**33**
PREVIOUS SCORE WEIGHTING		**0**
FINAL TOTAL:		**150**

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APPENDIX 4

Incidents at Retail Stations and Private Fuel Depots

1. 2006 INCIDENTS AT RETAIL STATIONS AND PRIVATE FUEL OUTLETS BY FUEL TYPE IN ONTARIO, CANADA

	Discovery of a product	Fire	Leak	Spill	Other	Pipeline Strike	Vapour Release	Vehicle Incident	Total
Gasoline	2	2	9	7	2			1	23
Diesel			1	6					7
Propane		3					1		4
Natural gas		1			1	1			3
Fuel oil			1						1
Undetermined		1							1
Total	2	7	11	13	3	1	1	1	39

2. FIRES AT PETROL STATIONS/GARAGES ATTENDED BY LOCAL AUTHORITY FIRE BRIGADES

Fire Authority	2005	2004	2003	2002	2001	2000	Average
Athlone Town Council	0	0	0	0	1	0	0
Carlow County Council	3	3	0	0	3	0	2
Cavan County Council	0	0	0	1	4	0	1
Clare County Council	3	1	1	1	1	1	1
Cork City Council	2	3	5	9	4	2	4
Cork County Council	0	0	1	0	0	0	0
Donegal County Council	4	4	1	4	9	2	4
Drogheda Borough Council	1	2	0	0	1	0	1
Dublin City Council	10	19	15	29	9	14	16
Dundalk Town Council	0	2	2	0	0	2	1
Galway County Council	3	4	5	8	11	7	6
Kerry County Council	1	10	2	3	1	2	3
Kildare County Council	0	1	1	0	0	2	1
Kilkenny County Council	16	11	2	0	3	1	5
Laois County Council	0	0	0	0	2	0	0
Leitrim County Council	1	0	0	0	0	5	1
Limerick City Council	2	1	0	1	3	1	1
Limerick County Council	1	0	0	1	1	0	1
Longford County Council	0	1	0	0	1	0	0
Louth County Council	0	0	0	0	1	0	0
Mayo County Council	1	3	0	1	0	3	1
Meath County Council	0	0	0	2	0	3	1
Monaghan Co. Co.	0	4	3	0	7	4	3
Offaly County Council	0	1	0	0	0	0	0
Roscommon Co. Co.	0	0	4	0	4	3	2
Sligo County Council	0	1	0	2	1	0	1
Nth Tipperary Co. Co.	0	0	0	0	2	2	1
Sth Tipperary Co. Co.	0	0	0	0	2	0	0
Waterford City Council	0	4	2	0	0	0	1
Waterford County Council	0	0	0	0	0	0	0
Westmeath Co. Co.	0	0	0	0	1	0	0
Wexford County Council	4	0	2	2	4	2	2
Wicklow County Council	1	0	0	1	0	0	0
Total	**53**	**75**	**46**	**65**	**76**	**56**	**62**
Total no. petrol stations[18]	**2216**	**2302**	**2388**	**2474**	**2560**	**2646**	**2431**
Fraction experiencing a fire	**1 in 42**	**1 in 31**	**1 in 52**	**1 in 38**	**1 in 34**	**1 in 47**	**1 in 41**

[18] These figures are approximate. In 2007 there were 2,044 (Catalist ROI Market Survey Report V2 August 2007) retail petrol stations in the country. In August 2007 the Irish Times reported that 1,200 petrol stations closed over the period 1994-2007 i.e. an average of 86 closures per year. The numbers of petrol stations have therefore been calculated by working back from 2007, assuming 86 closures per year.

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APPENDIX 5

Recommendations Provided by the Buncefield Standards Task Group for Bulk Stores

1. BUNCEFIELD STANDARDS TASK GROUP RECOMMENDATIONS

A number of investigations and recommendations have been published following on from Buncefield. The recommendations for bulk stores published by the BSTG are discussed below.

The report sets out the actions required to prevent further incidents and for the transfer and storage of fuel under the following headings:

- Systematic assessment of safety integrity levels
- Protecting against loss of primary containment using high-integrity systems
- Engineering against loss of secondary and tertiary containment
- High reliability organisations
- Emergency arrangements

All recommendations are provided below under the appropriate headings:

- Systematic assessment of SILs:
  - Assessment of the SIL requirements for overfill prevention systems against BS EN 61511:2004[19]
  - Relevant maintenance and testing regimes to meet BS EN 61511:2004
  - Review of existing safety reports to incorporate a demonstrations that:
    - The overall systems for tank filling control are of high integrity, with sufficient independence to ensure timely and safe shutdown to prevent tank overflow
    - The overall systems for tank filling control meet BS EN 61511: 2004
- Protecting against loss of primary containment using high-integrity systems:
  - Inspection and maintenance systems of equipment should be established
  - The capacities of storage tanks should be clearly defined and appropriate safety margins put in place to prevent a release
  - Assessment of fire-safe valves
  - Assessment of remotely operated shut-off valves (ROSOVs) on tank outlets as per HSG244[20]
  - Inspection and maintenance systems for overfill protection devices
  - Adopt minimum good practice for fuel transfer as follows:
    - Adopt the principles for safe management of fuel transfer;
    - For shared pipelines develop consignment transfer agreements
    - Ensure that suitable 'job factors' are considered and incorporated into systems and procedures to facilitate safe fuel transfer;

[19] BS EN 61511-1:2004 *Functional Safety Instrumented systems for the Process Industry Sector. Framework, Definitions, Systems, Hardware and Software Requirements*. British standards Institution.
[20] *Remotely Operated Shut-Off Valves for Emergency Isolation of Hazardous Substances: Guidance on Good Practice* HSG244 HSE Books.2004.

- Use an agree on the nomenclature for all product types;
- For ship transfers, carry out a terminal-specific review to ensure compliance with the *International Shipping Guide for Oil Tankers and Terminals* (ISGOTT)[21];
- Develop and instigate procedures for transfer planning
- Ensure that written procedures are in place and consistent with current good practice for safety-critical operating activities in the transfer and storage of fuel.

- Engineering against loss of secondary and tertiary containment
  - Bund wall and floor construction and penetration joints should be leak tight
  - Joints in bunds must be capable of resisting fire
  - Bund capacity should be a minimum of 110% of the largest contained tanks
  - Site-specific planning of firewater management and control measures should be undertaken with active participation of the local fire and rescue service and should include:
    - Bund design factors
    - Recommended firewater/foam additive application rates and firewater flows at worst case credible scenarios
    - Controlled burn options appraisal
    - Planning/media implications
    - Assessment of sites and action plans for improvement
- High reliability organisations:
  - Clearly identified roles and responsibilities
  - Implementation of a competence management system
  - Demonstrate adequate staffing arrangements. Ensure that shift work is managed to control risk from fatigue.
  - Demonstrate Effective and safe shift handover
  - Organisational change and management of contractors - policies and procedures
  - Performance evaluation and process safety performance measurement – ensure suitable monitoring programme
  - Provide procedures for investigation of incidents and near misses

[21] *International Shipping Guide for Oil Tankers and Terminals* (ISGOTT) (Fifth Edition). International Chamber of Shipping. 2006.