

Hazardous Installations Directorate
Gas & Pipelines Unit

Major Hazard Safety Performance Indicators in
Great Britain's Onshore Gas and Pipelines
Industry

Annual Report 2007/08

Contents

Executive Summary

1.0 Introduction

- 1.1 Safety Performance Indicators
- 1.2 This Report
- 1.3 Great Britain's Gas and Pipelines Industry
- 1.4 The Gas & Pipelines Unit

2.0 Gas and Pipelines Safety Performance Indicators

- 2.1 Background
- 2.2 Public Service Agreement Targets
- 2.3 Additional Safety Performance Indicators

3.0 Safety Performance in 2007/08

- 3.1 Dangerous Occurrences at sites subject to the Control of Major Accident Hazards Regulations 1999
- 3.2 UK Onshore Pipeline Operators' Association Third Party Damage Database
- 3.3 UK Onshore Pipeline Operators' Association Product Loss Database
- 3.4 Gas National Transmission System
- 3.5 Gas Safety (Management) Regulations 1996 Reports
- 3.6 Iron Mains Replacement Programme
- 3.7 Gas Distribution Network Reports
 - 3.7.1 Iron Mains Remaining
 - 3.7.2 Gas in Buildings Incidents
 - 3.7.3 Number of Mains and Service Related Major Incidents
 - 3.7.4 Public Reported Escapes Permanently Repaired
 - 3.7.5 Third Party Damage Incidents

4.0 Conclusions

Appendix 1 – Gas Distribution Network Operator Reporting Definitions

Executive Summary

This report presents a broad range of safety performance indicators (SPIs) across Great Britain's gas transmission, distribution and other hazardous pipelines sectors. The Health and Safety Executive (HSE) publishes this report annually in order to monitor and compare the sector's safety performance year-on-year. Where necessary the Gas & Pipelines Unit will incorporate the findings of this report into its operational strategy.

In 2007/08 the following improvements in the safety performance of Great Britain's gas and pipelines industry have been reported:

- The Gas & Pipelines Unit recorded five relevant Dangerous Occurrences (DOs) at its Control of Major Accident Hazard (COMAH) sites. This contribution to HSE's Public Service Agreement has exceeded the Unit's target of a 15% reduction by the end of 2007/08 against the 2001/2 baseline.
- Reports made under the Gas Safety (Management) Regulations have fallen to their lowest level since 2002/03
- Collectively the gas Distribution Network Operators' (DNOs') progress with the Mains Replacement Programme was above target by 39.1 km
- There has been a 15% fall in Gas in Buildings incidents reported by all of the gas DNOs. This is the second fall since 2000/01 and is the lowest level recorded since 2002/03.

The other key findings of this report are:

- The UKOPA has enlarged its infringement database over the last three years to include infringement reports made by high-pressure gas pipeline operators. Future years' data should now begin to reveal any developing trends in the number of infringements reports and their respective risk categorisation.
- The UK Onshore Pipeline Operators' Association (UKOPA) pipeline fault database continues to show a gradual decrease in the frequency of pipeline loss incidents.
- The number of Mains and Service related incidents reported by all of the gas DNOs rose slightly in 2007/08. One member of the public died as a result of a mains failure in 2007/08.
- Collectively the gas DNOs have again reported a small decrease in the percentage of permanent repairs made within 12 hours to gas escapes reported on their networks. However, individually, some gas DNOs have reported an improvement in their 12-hour performance despite an increase in the number of reported gas escapes requiring repair.

The other safety performance indicators covered in this report are broadly similar to previous years.

1.0 Introduction

1.1 Safety Performance Indicators

Major incidents in the UK gas and pipelines industry occur infrequently and as such do not provide sufficient data with which to monitor the sector's safety performance. SPIs can be used to monitor trends, provide assurance that the arrangements to minimise the risk of a major incident are effective. SPIs can be chosen from near-miss data such as low-level incidents or from precursors which might, in combination, give rise to a major incident.

HSE's definition of a major incident and further information on HSE's response to such an event can be found at the following web-address:

<http://www.hse.gov.uk/foi/internalops/og/ogprocedures/majorincident/>

1.2 This Report

This report covers the period from April 2007 to March 2008 with the exception of SPI data provided by National Grid Gas plc for the National Transmission System (NTS) and pipeline data provided by UKOPA, which cover calendar years. The purpose of this report is to monitor and present a broad range of major hazard safety performance indicators across Great Britain's gas transmission, distribution and other hazardous pipelines sectors.

1.3 Great Britain's Gas and Pipelines Industry

The gas and pipelines industry in Great Britain operates both natural gas and other hazardous pipelines across the country. It also includes natural gas import and storage facilities. In Great Britain there are approximately 22,000 km of pipelines defined as Major Accident Hazard Pipelines (MAHPs) by the Pipelines Safety Regulations 1996. Approximately 20,000 km of these MAHPs transport natural gas at above 7 barg. The remainder transport ethylene and other dangerous fluids. In addition to the MAHPs, eight gas DNOs transport natural gas at pressures below 7 barg.

Prior to 1 June 2005, Transco plc operated nearly all of the natural gas MAHPs in the UK and owned all eight gas distribution networks (DNs). After 1 June 2005 four of the DNs were sold to Southern Gas Networks plc, Scotland Gas Networks plc, Wales & West Utilities Ltd and Northern Gas Networks Ltd respectively. National Grid Gas plc retained DNs in London, the West Midlands, the East of England and the North West. National Grid Gas plc also retained the NTS which delivers high pressure gas throughout the country to each of the DNs and other direct off-takes such as power stations.

1.4 The Gas & Pipelines Unit

As a part of HSE the Gas and Pipelines Unit regulates Health and Safety in Great Britain's gas and pipelines industry. The focus of the Gas and Pipelines Unit's efforts are to improve health and safety outcomes in Great Britain through progressive

improvements in the control of risks. This is achieved by ensuring that risks are properly controlled at onshore major hazards sites (including pipelines) and working with Offshore Division (OSD) to ensure the safety integrity of installations and associated pipelines. The Gas & Pipelines Unit contributes to OSD's targets by ensuring the integrity of emergency shutdown valves; pig traps; risers; pressure protection systems; sub-sea isolation valves; and wellhead pipework.

More information about the work of the Gas & Pipeline Unit can be found on HSE's website at:

<http://www.hse.gov.uk/gas/supply/> and <http://www.hse.gov.uk/pipelines/index.htm>.

2.0 Gas and Pipelines Unit Safety Performance Indicators

2.1 Background

HSE is required by its parent department, the Department of Work and Pensions (DWP), to monitor and set targets for the reduction of the number of DOs reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995 at onshore COMAH sites. These targets contribute to HSE's Major Hazards Strategic Programme and provide a good foundation for the Gas & Pipeline Unit's SPI report. However, DOs in the gas and pipelines sector occur in limited numbers and do not provide a sufficiently broad base against which to monitor the safety performance of the industry as a whole. As a result the Gas & Pipelines Unit has adopted an additional range of SPIs to reflect the principal risks in the sector. Some of the additional SPIs take account of recent changes to the gas distribution industry. The SPIs also include damage and loss data provided by UKOPA, as well as information which is required to be sent to HSE under the Gas Safety (Management) Regulations 1996 (GS(M)R) and the Iron (gas) Mains Replacement Programme.

HSE held extensive discussions with duty holders and other stakeholders in the gas and pipelines sector to ensure that the SPIs contained in this report are:

- Indicative of the principal risks generated and faced by the sector,
- Reasonably practicable for the dutyholders to produce, and
- Where possible, use information already provided to other regulators, such as Ofgem.

2.2 Public Service Agreement and Departmental Strategic Objective Targets

HSE's DO targets for COMAH sites were set by DWP against a 2001/2 baseline for both upper and lower tier sites. 19 DOs were reported to HSE's Gas & Pipelines Unit in 2001/02.

HSE's Public Service Agreement (PSA2) target requires the Gas & Pipelines Unit to achieve a 15% reduction in the number of relevant DOs reported to it by the end of 2007/08. Set against the 2001/2 baseline the number of DOs reported to the Gas & Pipelines Unit should be reduced to 16 by 2007/08.

HSE's Departmental Strategic Objective (DSO) target (which carried on from the PSA2 target in April 2008) requires the Gas & Pipelines Unit to achieve a 45% reduction in the number of relevant DOs reported to it by the end of 2010/11. Set against the 2001/2 baseline the number of DOs reported to the Gas & Pipelines Unit should be reduced to 10 by 2010/11.

The RIDDOR DO categories relevant to the Gas & Pipelines Unit are:

- i. Electrical short circuit or overload;
- ii. Pipelines or pipeline works;
- iii. Explosion or fire;
- iv. Escape of flammable substances;
- v. Escape of substances.

2.3 Additional Safety Performance Indicators

Additional SPIs have been selected to be indicative of the sector's safety performance and relate to the potential occurrence of a major incident. They are:

- i. The number of MAHP infringements caused by third parties and recorded by UKOPA in their Infringement Database.
- ii. The number of pipeline failure incidents arising from corrosion and other causes and reported every four years by UKOPA in their Pipeline Fault Database.
- iii. Numbers of incidents on the NTS where:
 - a. Terminal Flow Advice (TFA) has been issued to prevent off specification gas entering the NTS,
 - b. Gas transmission pressure has risen above 102.5% of the pipeline maximum operating pressure,
 - c. Off-take pressure has fallen below the 38-barg "drop-off" point.
- iv. The number of GS(M)R reports submitted by gas DNOs.
- v. Annual reports on progress with the Mains Replacement Programme made by all five gas DNOs.
- vi. Annual SPI reports made by all five gas DNOs. This includes:
 - a. Total km of iron mains remaining in each DN,
 - b. Number of gas in buildings (GIB) incidents,
 - c. Number of mains and service related major incidents,
 - d. Number of public reported escapes (PREs) permanently repaired within and after 12 hours,
 - e. Number of third party damage incidents to pipelines and mains.

Note: These reporting categories are defined in Appendix 1.

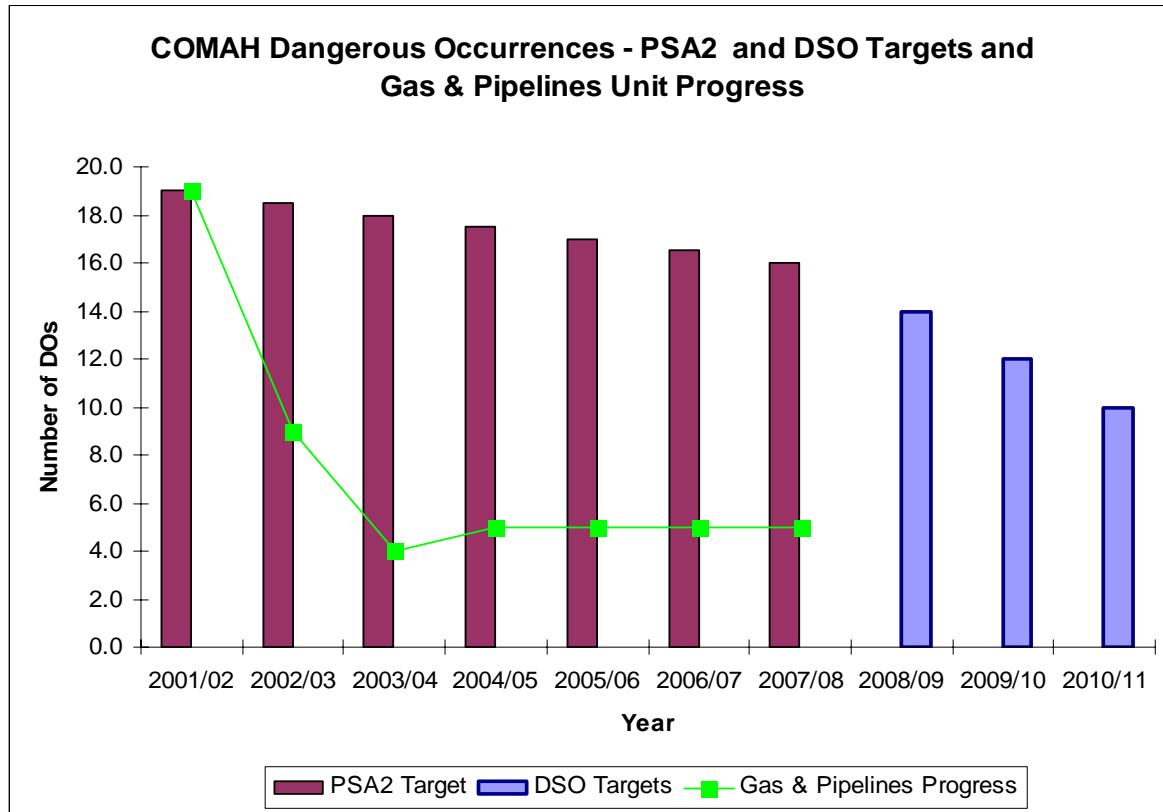
3.0 Safety Performance in 2007/08

3.1 COMAH Site Dangerous Occurrences

In 2007/08 there were five DOs reported to HSE's Gas & Pipelines Unit by upper and lower tier COMAH site operators. The graph below shows that the Gas & Pipelines

Unit has exceeded its contribution to HSE’s PSA2 target by recording less than 16 reported COMAH DOs in 2007/08. The graph also shows the Gas & Pipelines Unit’s DSO targets from 2008/09 to 2010/11.

Graph 3.1.1: Contribution by Gas & Pipelines Unit to HSE’s PSA2 and DSO Targets



3.2 UKOPA Infringement Database

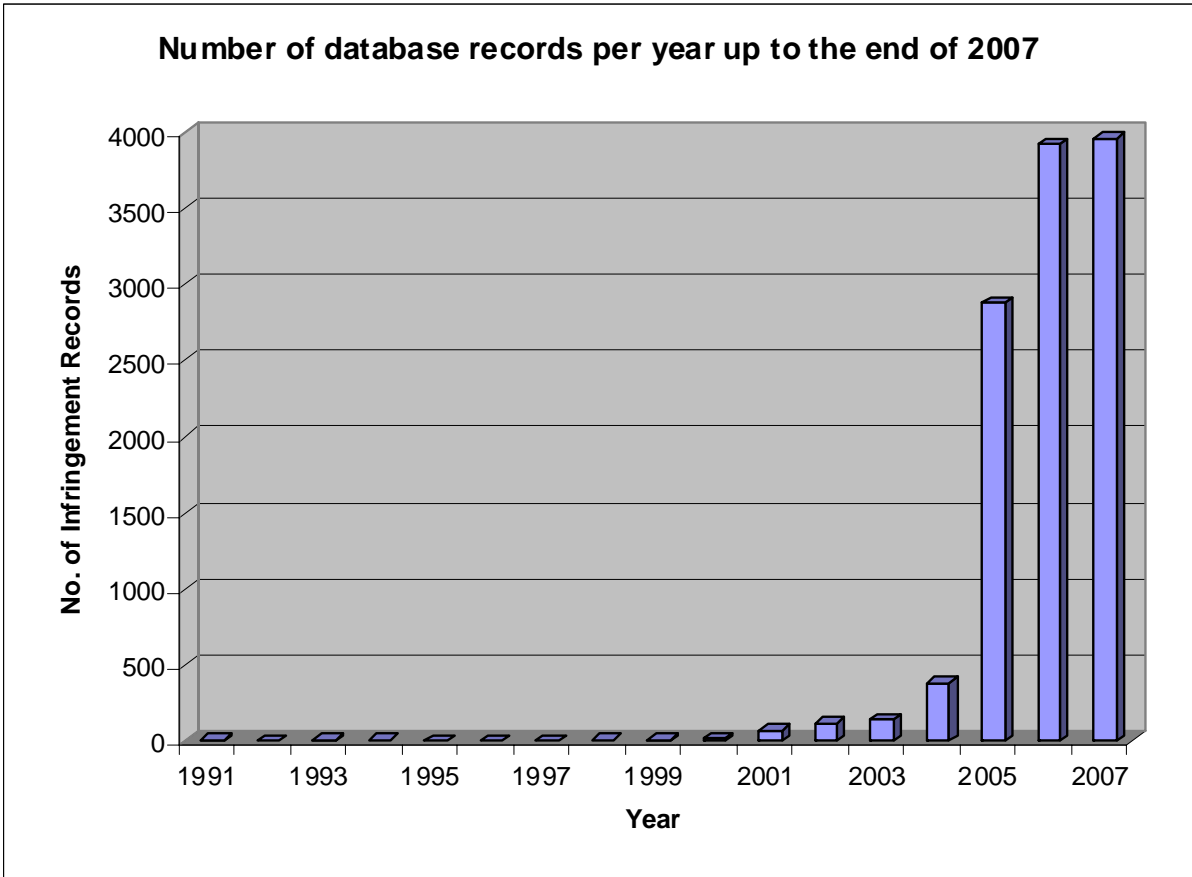
Third party infringement is one of the largest causes of pipeline damage and rupture in the UK and abroad. An infringement is any activity that either causes damage to a pipeline or pipeline coating or may be a precursor to such damage. UKOPA collects data on infringements within the legal easement around a pipeline or in the pipeline operator’s declared zone of interest and includes activities such as excavation; ditch digging; post-hole boring; directional drilling and earth movement or levelling activities in general. Not all of the data included in the UKOPA infringement database refers to MAHPs. However, all pipelines included in the infringement database have the potential to give rise to a major incident if ruptured.

The UKOPA infringement database provides a framework for recording third party infringements and enables the collection of pipeline data on a national basis. The purpose of the database is to build on year-by-year data to identify trends in pipeline infringement and key factors leading to damage incidents. The UKOPA infringement database report is compiled from data annually, the first report having been produced for 2004. Prior to 2005 contributions to the database were from chemical and oil sector pipeline operators only. With the addition of data from the high-pressure natural gas pipeline operators from 2005 the database content has increased significantly. The high-pressure natural gas pipeline networks now represent the

overwhelming majority of source data for the infringement database and account for the increase in the overall number of infringements seen since 2005. The complete UKOPA reports can be found at on the UKOPA internet website at the following address: [UKOPA :: ukopa excavation safety ::](http://ukopa.gov.uk/ukopa_excavation_safety)

The graph below shows the total number of incidents of third party infringement reported annually and recorded on the UKOPA database.

Graph 3.2.1: Numbers of Third Party Infringements Recorded on the UKOPA Database – 1991 to 2007



There is no significant difference in the number of infringements reported in 2006 and 2007 with 3929 and 3964 incidents recorded respectively. Given the changes to the composition of the data contributed to the UKOPA database since 2005 this indicates that the infringement reporting processes adopted by the high-pressure gas and other pipeline operators are now established. Future years' data should reflect the number of infringements reported rather than any changes in data reporting.

UKOPA has further categorised the third party infringement data it collects in order to create a more detailed picture of the severity of infringements around pipelines. Table 3.2.1 shows the categories used to describe actual damage or potential risk of damage to pipelines. Table 3.2.2 shows the categories used to describe the location of excavations in relation to a pipeline. Graph 3.2.2 shows the number of reported third party infringements by risk and location for 2007 and cumulatively for 1991 to 2006.

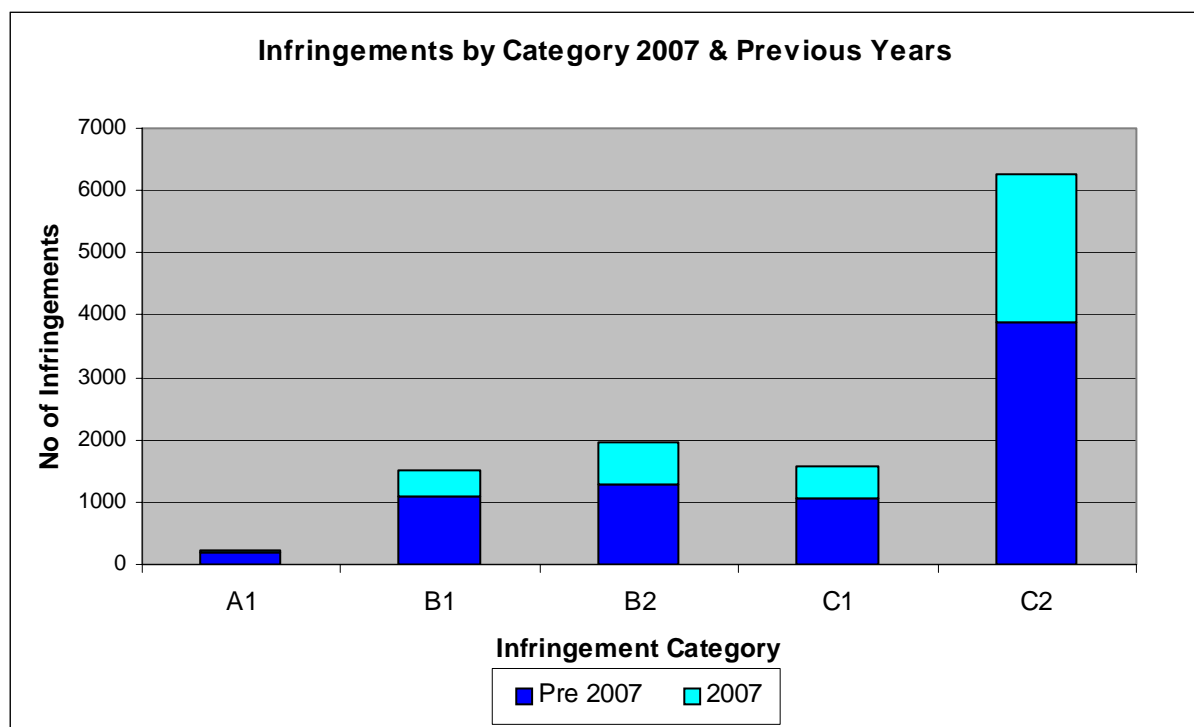
Table 3.2.1: UKOPA Infringement Risk Categories

Risk Index	Infringement Type	Infringement Description
A	Pipeline Damage or Leak	Includes damage to wrap or protective sleeve
B	Serious Potential for Damage	Methods or equipment used could cause significant damage had excavation taken place
C	Limited Potential for Damage	Methods or equipment would not have resulted in serious damage

Table 3.2.2: UKOPA Infringement Location Categories

Location Index	Location Description
1	Within the pipeline wayleave or easement. Typically, this is the zone within which the pipeline operator has legal rights, including a requirement by the landowner to notify planned work (although may be different for non-Pipelines Act lines laid by Statutory Undertakers).
2	Within the pipeline operators zone of interest, but outside the pipeline wayleave or easement. It is the area within which the operator would have reasonably expected a competent third party to have given notification in the prevailing circumstances.

Graph 3.2.2: Third Party Infringements by Location and Risk Category



In the most serious infringement category, A1, there were 16 incidents recorded in 2007 compared to 197 incidents recorded between 1991 and 2006. Of the other infringement categories, C2 continues to make the largest contribution to the number of recorded infringements.

3.3 UKOPA Pipeline Fault Database

One of UKOPA's objectives is to develop a comprehensive view on risk assessment and risk criteria as they affect Land Use Planning aspects adjacent to high hazard pipelines. To help meet this objective UKOPA has compiled a pipeline fault database. This was first published as a report in 2000 for incidents which occurred between 1962 and 1998. Since then UKOPA has updated the report approximately every two years. The purpose of the UKOPA pipeline fault database is to:

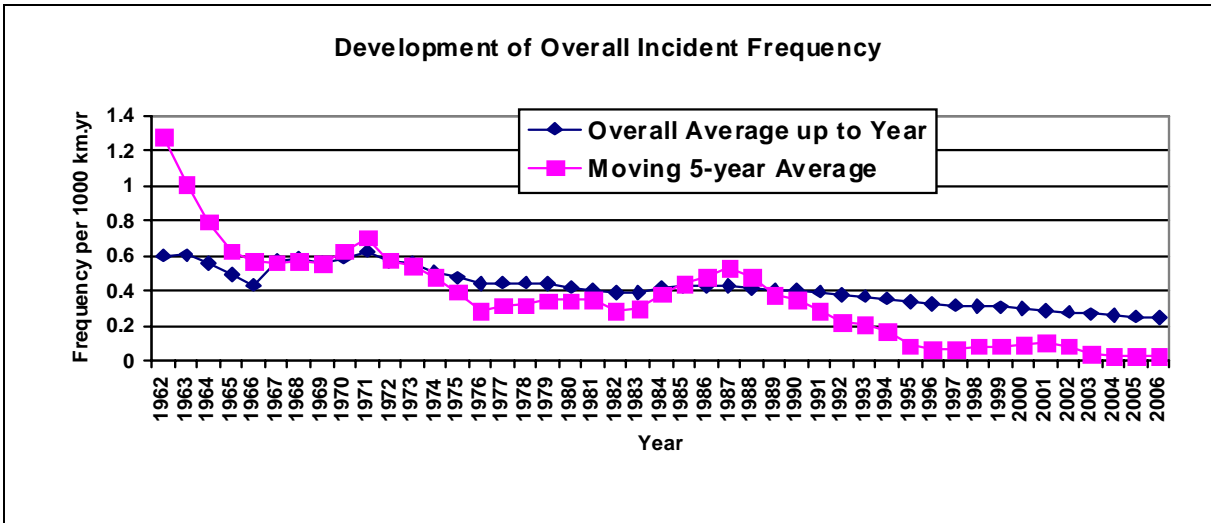
- Estimate leak and pipeline rupture frequencies for UK pipelines, based directly on historical failure rate data for UK pipelines
- Provide the means to estimate failure rates for UK pipelines for risk assessment purposes based on analysis of damage data for UK pipelines
- Provide a more realistic and rigorous approach to design and routing
- Provide the means to test design intentions and determine the effect of engineering changes (e.g. wall thickness of pipe, depth of burial, diameter, protection measures, inspection methods and frequencies, design factor etc.)

UKOPA define a product loss incident as:

- an unintentional loss of product from the pipeline
- within the public domain and outside the fences of installations
- excluding associated equipment (e.g. valves, compressors)

The pipeline fault data shown in the graphs below is an extract from the report published by UKOPA and covers the period 1962 to 2006.

Graph 3.3.1: UK Product Loss – Incident Frequency 1962 – 2006



Over the period 1962 to 2006 a clear decrease in the frequency of pipeline failures is seen. The failure frequency over the last 5 years (2002-2006) is 0.028 incidents per 1000 km per year compared to 0.248 incidents per 1000 km per year during the period 1962-2006.

In 2006 there was one product loss incident recorded on UKOPA pipeline fault database.

Note: The full UKOPA pipeline fault report can be found at:
<http://www.ukopa.co.uk/publications/pdf/UKOPA-07-0050.pdf>.

3.4 Gas National Transmission System Gas Quality and Pressure Excursions

3.4.1 Gas Quality

National Grid Gas manages the quality of gas entering the NTS by issuing TFA communications to the Delivery Facility Operators (DFO). If the gas supplied to the NTS by a DFO has the potential to fall below the standard required by GS(M)R, a TFA is issued requesting the DFO to reduce or cease supply.

In the 2007 calendar year National Grid Gas issued thirty-one TFAs for the following reasons.

Table 3.4.1: Summary of TFAs issued for Gas Quality reasons

Gas Characteristic	Number of TFAs Issued		
	2005	2006	2007
Hydrocarbon Dewpoint	13	17	6
Hydrogen Sulphide	7	4	3
Carbon Dioxide *	3	4	0
Incomplete Combustion Factor	7	4	16
Wobbe Number	5	2	3
Calorific Value **	1	3	0
Water Dewpoint	1	2	3
TOTAL	37	36	31

* not required under GS(M)R Schedule 3.

** not required under GS(M)R Schedule 3 but used to calculate Wobbe Number.

A gradual decrease in the number of TFAs issued by National Grid Gas is seen between 2005 and 2007, although there is some variance in the categories under which they were issued.

3.4.2 Pipeline Maximum Operating Pressure (MOP)

The Institution of Gas Engineering Recommendations on Transmission and Distribution Practice for Steel Pipeline for High Pressure Gas Transmission, IGE/TD/1 Edition 4 states “The sustained operating pressure for a pipeline system should not exceed Maximum Operating Pressure (MOP)”. However, the sustained operating pressure is the maximum set pressure for the pressure regulating devices,

and when operating at or near the MOP, this pressure may be exceeded by no more than 2.5% of its value due to the variations of pressure regulating devices and instruments. IGE/TD/1 Edition 4 also allows for an incidental pressure rise, above MOP plus 2.5%, provided the pressure does not reach the Maximum Incidental Pressure (MIP) of the pipeline. The MIP described in IGE/TD/1 Edition 4 is 10% above the MOP. When an event of this nature occurs it should not last for more than 5 hours in excess of MOP at any one time or for more than 20 hours per year.

The table below shows the number of events where pipeline pressure has risen above the MOP and how many pipelines were affected.

Table 3.4.2: Summary of Pipeline MOP Events

Operating Pressure Level	Number of Events			Number of Pipelines Affected		
	2005	2006	2007	2005	2006	2007
Operating Pressure reached MIP	0	0	0	0	0	0
Operating Pressure exceeded MOP+2.5% for no more than 5 hours	1	0	0	3	0	0
Operating Pressure exceeds MOP but was less than MOP+2.5%	9	29	7	15	46	10

Note: This data does not include any events where instruments have been identified as faulty or where the pipeline pressure was increased to facilitate a planned operation for testing prior to up-rating a pipeline.

Between 2005 and 2007 there were no incidents on NTS pipelines where the operating pressure reached the MIP.

In 2007, as in 2006, there were no incidents where the MOP was exceeded by more than 2.5% on NTS pipelines. This compares with one incident in 2005.

Between 2005 and 2006 the number of events where the operating pressure on NTS pipelines rose above the MOP but by less than 2.5% increased significantly. A large number of these incidents occurred at only two pipeline locations. In order to alleviate this National Grid Gas lowered the pressure override setting at one of the affected locations and pipeline up-rating took place at the other location. National Grid Gas also put in place a process to monitor and review all MOP excursion events so that appropriate action is taken when such events occur. In 2007 there were 7 events where the operating pressure on NTS pipelines rose above the MOP but by less than 2.5%. This is below the 2005 level.

3.4.3 Distribution Network Entry Pressure

National Grid Gas monitors the pressure at the inlet to Distribution Network Offtakes to ensure it does not fall below the recognised normal design operating pressure of

38 barg. There were three such events in 2007 compared to none in 2006 and one in 2005.

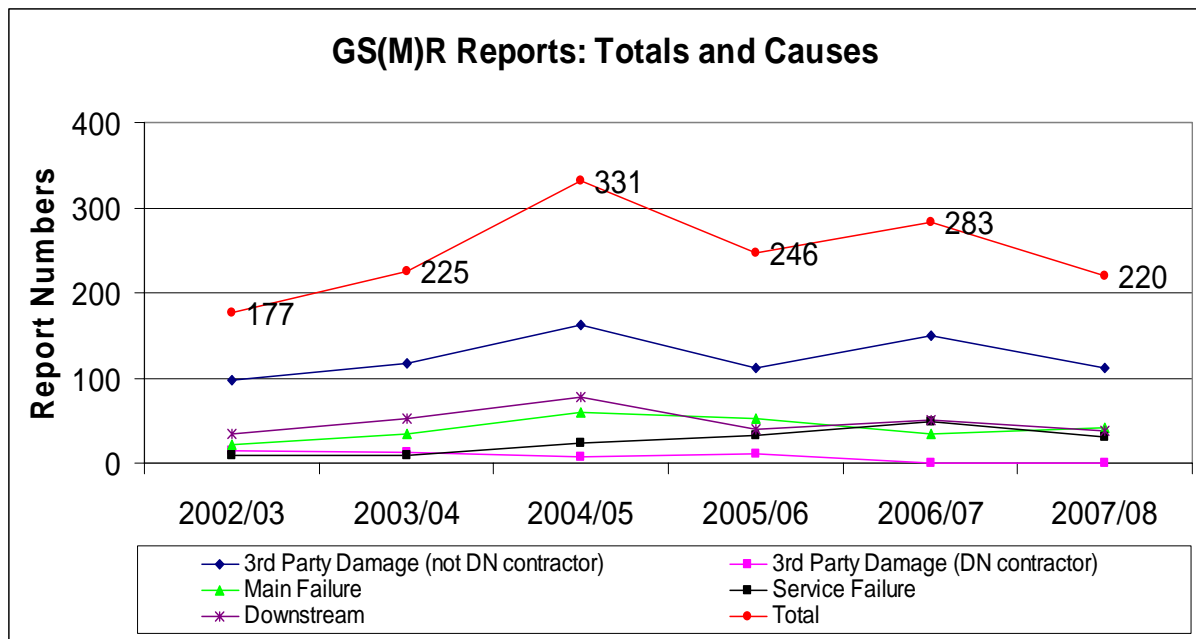
3.5 Gas Safety (Management) Regulations 1996 Reports

Gas Conveyors have a duty under Regulation 7(13) of GS(M)R to investigate and report certain gas escapes that occur on their networks, i.e. those escapes that have, or are likely to have resulted in a fire or explosion. The investigation should be carried out to establish the source of the escape and, so far as is reasonably practicable, the reason for it. The criteria used by gas conveyors to decide whether to make a GS(M)R report are where the following have occurred:

- i. A GIB event where the gas concentration has exceeded 20% of the Lower Explosive Limit (LEL) or where more than 10kg has been released, or,
- ii. An external release exceeding 500kg, or,
- iii. An escape of gas, either within a building or on a network, which has resulted in a fire or explosion.

The graph below show the annual total of reports made from 2002/03 to 2007/08.

Graph 3.5.1: Annual GS(M)R Reports (by incident cause)



The total number of GS(M)R reports made in 2007/08 fell to 220 from 283 in 2006/07. This represents a decrease of 22%.

Third party damage caused by contractors not employed by the DNOs were responsible for 111 GS(M)R reports made in 2007/08. Over the same period the number of GS(M)R reports made because of third party damage incidents caused by contractors employed by the DNOs was zero. The number of GS(M)R reports caused by service failures was 30 in 2007/08. The number of GS(M)R reports made because of mains failures was 42 in 2007/08.

3.6 Iron Mains Replacement Programme

In September 2001 HSE published its enforcement policy for the replacement of iron gas mains for the 30-year period 2002-2032. This followed concern about the potential consequences of gas mains failure. At that time records showed there were about 91,000km of iron mains within 30m of property. Subsequently, a review of records in 2004 showed that there were 101,000km of such mains at the start of the programme. The policy is often referred to as the 30/30 Mains Replacement Programme due to requirement to remove all iron gas mains within 30m of property in 30 years.

The graph below shows the profile for replacement of all 101 000 km of iron gas mains by 2032. Since the changes that occurred to the ownership of the UK's gas DNs in June 2005 the responsibility for meeting the requirements of the MRP now belongs to all five DNOs.

Graph 3.6.1: Profile for replacement of 101 000 km of Iron gas mains by 2032

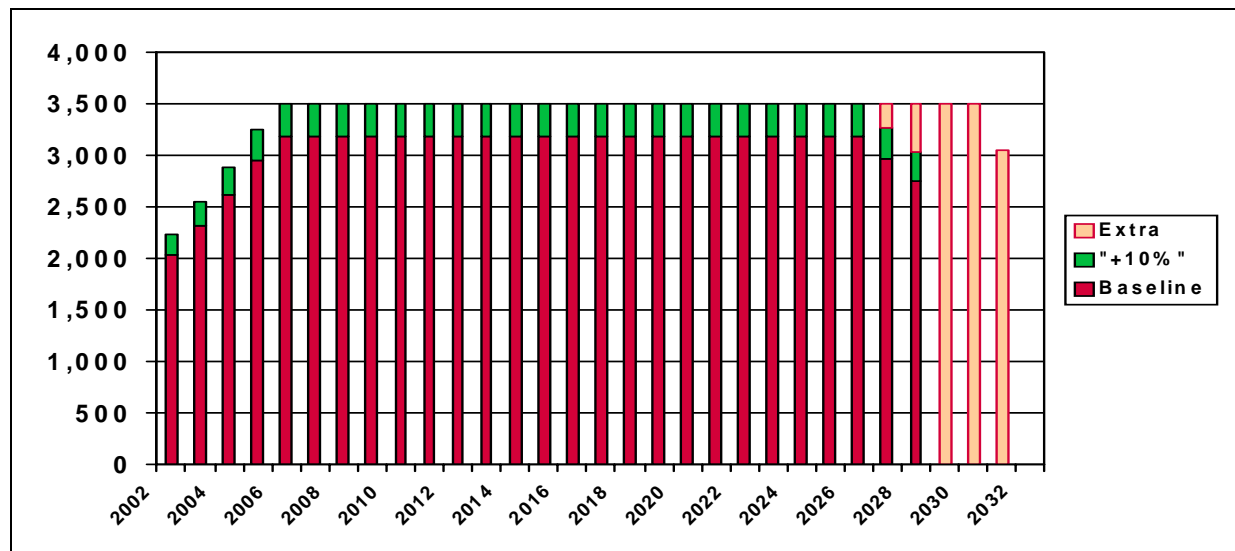


Table 3.6.1 below shows the 30/30 iron mains replacement performance between 1 January 2002 and 31 March 2006. The iron mains decommissioned during the period 1 January 2002 to 31 May 2005 were under Transco plc ownership and afterwards were under the ownership of five gas DNOs.

Table 3.6.1: Mains Replacement Performance 1 Jan 2002 to 31 March 2007

30/30 iron mains decommissioned (km)	Jan 02/ March 03	2003/04	2004/05	2005/06	2006/07	2007/08
Baseline + 10%	2575	2549	2882	3286	3514	3600
Actual	2846	2673	2847	3287	3562	3639*
Variance	271	124	-35	1	48	39*

Table 3.6.2: DNOs' Mains Replacement Performance 1 April 2007 to 31 March 2008

30/30 iron mains decommissioned (km) 1 April 2007 to 31 March 2008	Baseline + 10% target	Actual	Variance
National Grid Gas plc – North West	518.0	527.0	9.0
National Grid Gas plc – East of England	588.0	622.0	34.0
National Grid Gas plc – West Midlands	367.0	369.0	2.0
National Grid Gas plc – London	362.0	341.0	-21.0
<i>(National Grid Gas plc – Total)</i>	<i>(1835.0)</i>	<i>(1859.0)*</i>	<i>(24.0)*</i>
Northern Gas Networks Ltd	528.1	528.9	0.8
Scotland Gas Networks plc	272.0	272.9	0.9
Southern Gas Networks plc	604.0	613.8	9.8
<i>(Scotia Gas Networks plc – Total)</i>	<i>(876.0)</i>	<i>(896.7)</i>	<i>(10.7)</i>
Wales & West Utilities Ltd	361.0	364.6	3.6
Total of all Distribution Networks	3600.1	3639.2*	39.1*

* **Note:** In October 2008 National Grid Gas identified that operational data for an activity in their GB gas distribution business was misreported as at 31 March 2008. This is the subject of an ongoing investigation which may have an impact on the figures given in Tables 3.6.1 and 3.6.2.

In 2007/08 the mains replacement performance for the combined gas distribution networks exceeded the national target by 39.1 km, or by 1.1%.

Further information on the Iron Mains Replacement Programme can be found on HSE's Gas Industry Website at the following address:
<http://www.hse.gov.uk/gas/supply/mainsreplacement/irongasmain.htm>

3.7 Gas Distribution Network Reports

Full definitions for the terms and reporting categories used in this section of the report are given in Appendix 1.

3.7.1 Iron Mains Remaining

Table 3.7.1 shows the length of iron mains remaining within each DN on 31 March for the year reported. The data presented includes all iron mains within a DN regardless of proximity to a building.

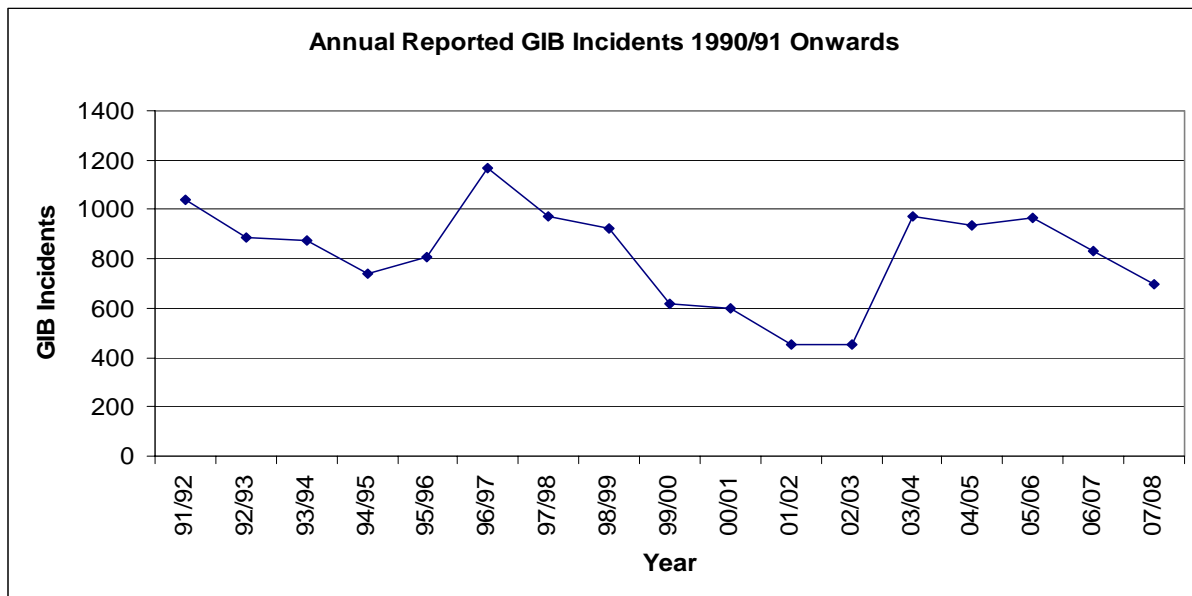
Table 3.7.1: Total Iron Mains Remaining on each gas DN

Remaining Iron Mains (km)	2006	2007	2008
National Grid Gas plc – North West	13,241	12,681	12,208
National Grid Gas plc – East of England	17,000	16,363	15,772
National Grid Gas plc – West Midlands	10,337	9,890	9,534
National Grid Gas plc – London	10,713	10,400	10,102
<i>(National Grid Gas plc – Total)</i>	<i>(51,291)</i>	<i>(49,334)</i>	<i>(47,616)</i>
Northern Gas Networks Ltd	14,571	14,085	13,603
Scotland Gas Networks plc	7,599	7,238	6,934
Southern Gas Networks plc	19,695	18,941	18,297
<i>(Scotia Gas Networks plc - Total)</i>	<i>(27,294)</i>	<i>(26,179)</i>	<i>(25,231)</i>
Wales & West Utilities Ltd	10,471	10,174	9,805
Total of all Distribution Networks	103,627	99,772	96,255

3.7.2 Gas in Buildings Incidents

Prior to the start of the 30/30 Mains Replacement Programme in 2002, Transco plc reported on average approximately 23,000 fractures and corrosion failures each year. These in turn led to about 600 GIB incidents at that time. The graph below shows the number of GIB incidents reported annually since 1990.

Graph 3.7.2: Annual reported GIB incidents 1990/91 to 2007/08



In 2007/08 the number of GIB incidents fell to 700. This is the lowest level recorded since 2002/03. The significant increase in reported GIB incidents which occurred

during 2003 has been attributed to data capture improvements and is not considered to indicate general system deterioration.

Table 3.7.2 below shows the number of Gas in Buildings incidents reported annually by the gas DNOs between. A year-on-year comparison can be made for each Distribution Network. However, since each DN is comprised of varying mixtures of urban and rural pipelines it is not possible to compare fairly the GIB performance of the different DNs on the basis of the length of mains they operate.

Table 3.7.2: Number of GIB incidents across the gas DNs

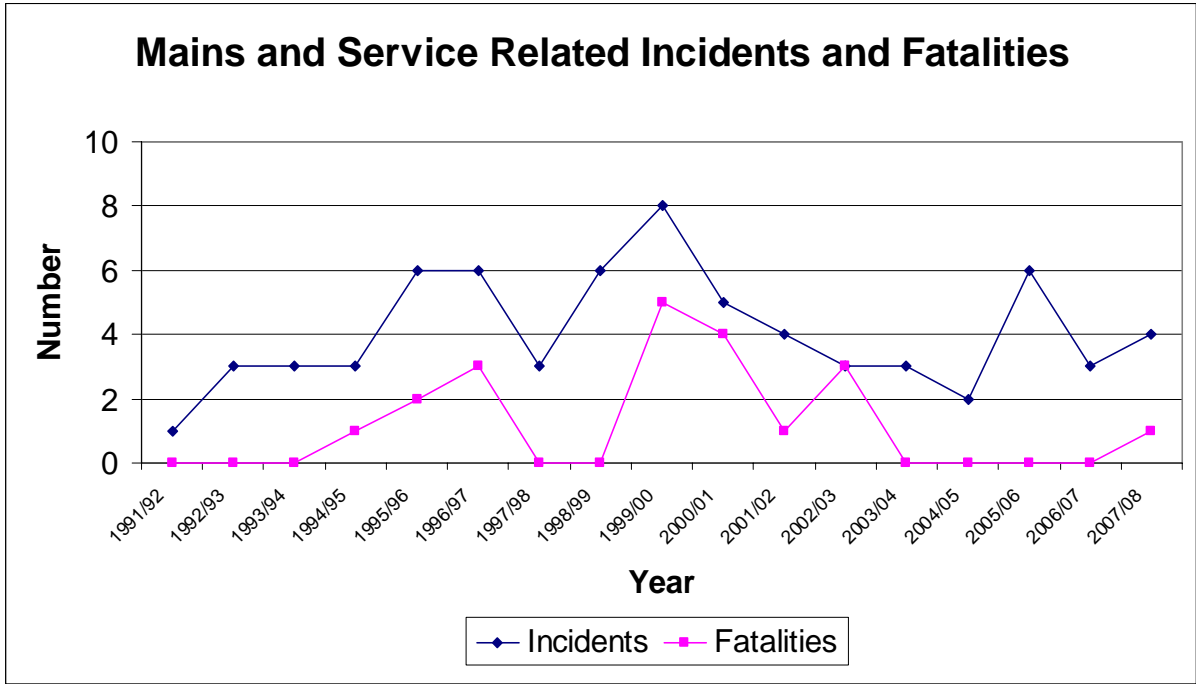
GIB Incidents	2005/06	2006/07	2007/08
National Grid Gas plc – North West	143	104	96
National Grid Gas plc – East of England	198	149	133
National Grid Gas plc – West Midlands	68	97	72
National Grid Gas plc – London	56	72	53
<i>(National Grid Gas plc – Total)</i>	<i>(465)</i>	<i>(422)</i>	<i>(354)</i>
Northern Gas Networks Ltd	207	173	97
Scotland Gas Networks plc	67	62	67
Southern Gas Networks plc	105	99	121
<i>(Scotia Gas Networks plc - Total)</i>	<i>(172)</i>	<i>(161)</i>	<i>(188)</i>
Wales & West Utilities Ltd	119	74	61
Total of all Distribution Networks	963	830	700

Since 2005/06 the number of GIB incidents reported by the gas DNOs has fallen by 27.3%.

3.7.3 Number of Mains and Service Related Major Incidents

The graph below shows the numbers of mains and service related incidents across all of the gas DNs which caused death, major injury or significant structural damage from 1 April 1990 onwards.

Graph 3.7.3: Number of Mains and Service Related Major Incidents and Resulting Fatalities between 1 April 1990 and 31 March 2008



In 2007/08 a member of the public died in Plymouth when a gas escape caused an explosion inside a property and the consequent collapse of a wall. The fractured gas main was operated by Wales & West Utilities Ltd.

3.7.4 Public Reported Escapes Permanently Repaired

When a member of the public makes an emergency call to report a gas escape a Public Reported Escape or PRE is logged by the relevant gas DNO. The DNO then dispatches an engineer to investigate any potential leak. If the engineer finds a leaking gas main, service or Emergency Control Valve (ECV) then a reported gas escape requiring repair will be logged by the DNO.

Each DNO has to comply with regulation 7(4) of GS(M)R. This requires that after a PRE has been reported any gas leak should be attended as soon as is reasonably practicable and prevented within 12 hours unless it is not reasonably practicable to do so. Occasionally no trace of escaping gas is found and sometimes a number of PREs are found to relate to a single gas leak. The PRE safety performance of each DNO is therefore based only on those gas escapes requiring actual repair.

DNOs frequently make safe by carrying out temporary repairs. Since DNOs do not currently have internal reporting systems that allow them to record temporary repairs they are not yet reported here.

The graphs and table below show the number of reported gas escapes requiring repair and the 12-hour permanent repair safety performance for each DNO. The 12-hour permanent repair safety performance is given as a percentage of the number of reported gas escapes requiring repair.

Graph 3.7.4.1: Number of Reported Gas Escapes Requiring Repair in the gas DNs between 1 April 2005 and 31 March 2008

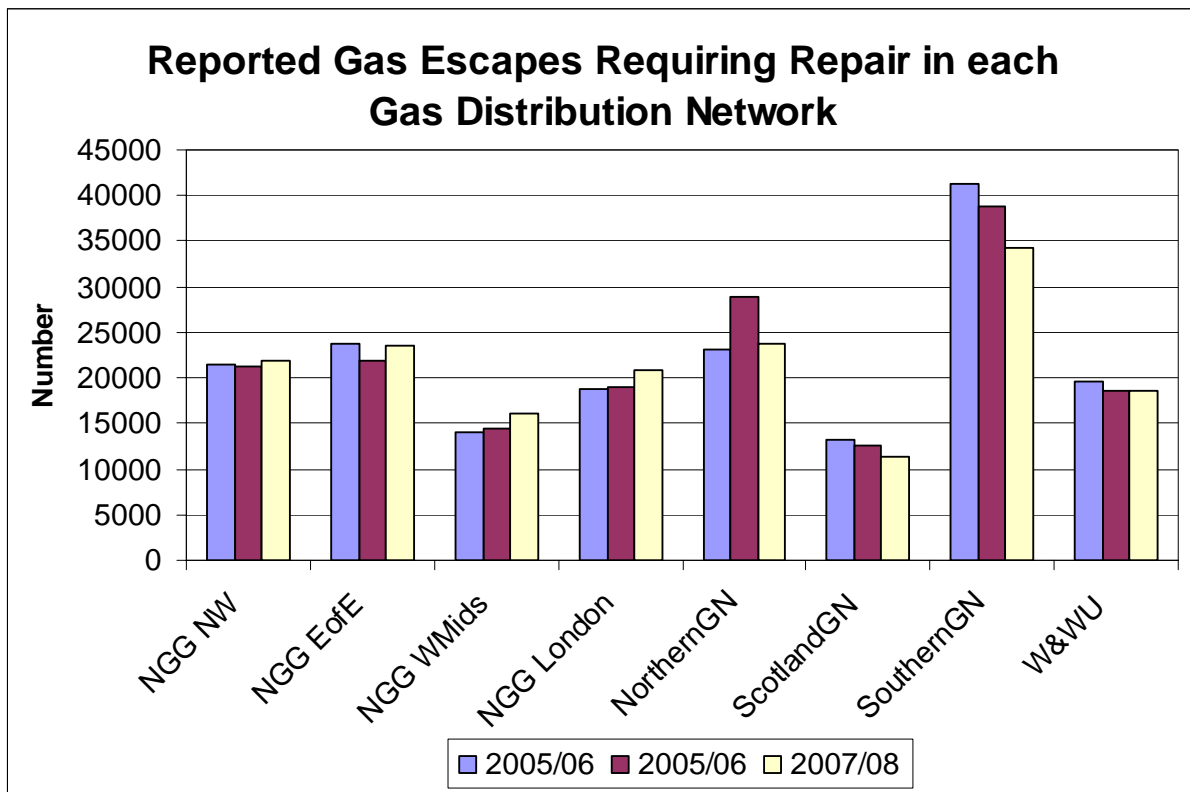
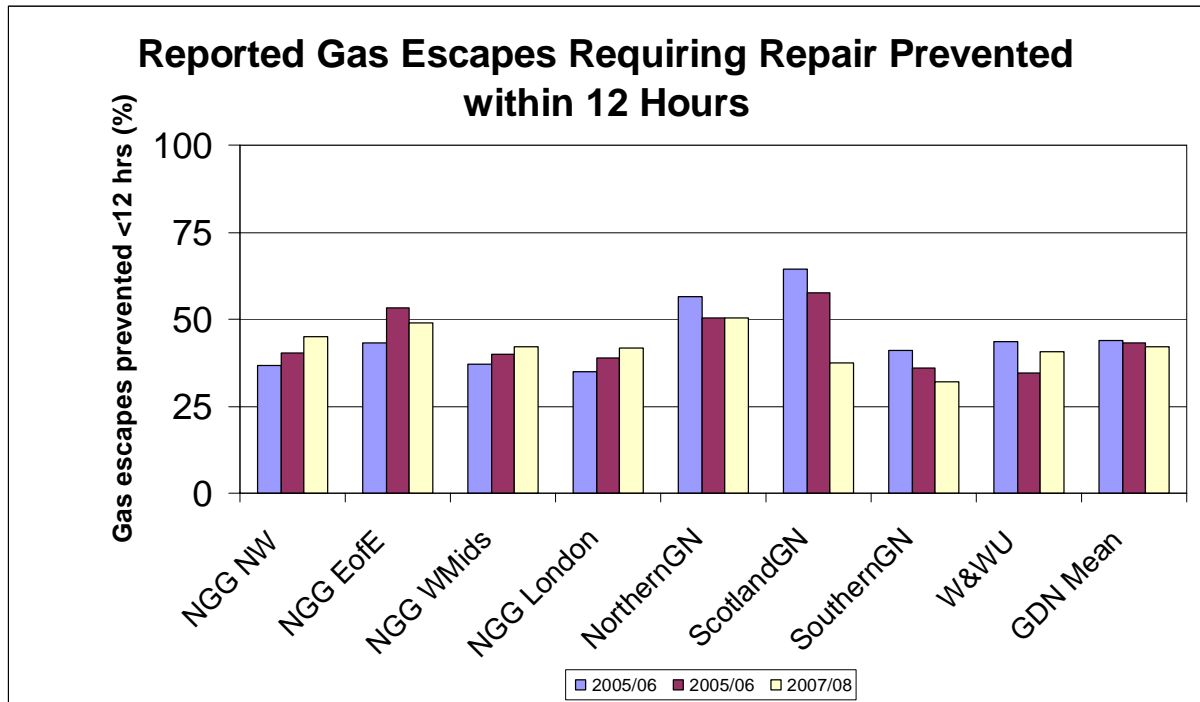


Table 3.7.4.1: Percentage of Reported Gas Escapes Requiring Repair Prevented within 12 hours of receipt of a PRE in the gas DNs between 1 April 2005 and 31 March 2008 (Permanent repairs only)

Gas Distribution Network	2005/06 (%)	2006/07 (%)	2007/08 (%)
National Grid Gas plc – North West	36.7	40.3	44.9
National Grid Gas plc – East of England	43.2	53.4	49.0
National Grid Gas plc – West Midlands	37.0	39.8	41.9
National Grid Gas plc – London	34.8	38.9	41.8
<i>(National Grid Gas plc – Total)</i>	<i>(38.3)</i>	<i>(43.6)</i>	<i>(44.7)</i>
Northern Gas Networks Ltd	56.5	50.3	50.4
Scotland Gas Networks plc	64.3	57.6	37.3
Southern Gas Networks plc	41.0	35.9	31.9
<i>(Scotia Gas Networks plc - Total)</i>	<i>(46.6)</i>	<i>(41.2)</i>	<i>(33.2)</i>
Wales & West Utilities Ltd	43.4	34.5	40.7
Mean of all Distribution Networks	43.8	43.0	42.0

Graph 3.7.4.2: Percentage of Reported Gas Escapes Requiring Repair Prevented within 12 hours of receipt of a PRE in the gas DNs between 1 April 2005 and 31 March 2008 (Permanent repairs only)



Note:

- i. The data provided by National Grid Gas, Northern Gas Networks and Wales & West Utilities includes actions to prevent gas escapes taken by one man operations (e.g. by First Call Operatives (FCOs)) and repairs made to ECVs.
- ii. The data provided by Scotland Gas Networks and Southern Gas Networks does not include actions to prevent gas escapes taken by one man operations and repairs made to ECVs.

Between 2005/06 and 2007/08 the percentage of reported gas escapes requiring repair across all of the gas DNs and permanently repaired within 12 hours fell from 43.8% to 41.5%. Over the same period, the number of reported gas escapes requiring repair across the DNs fell from 175,295 to 170,370.

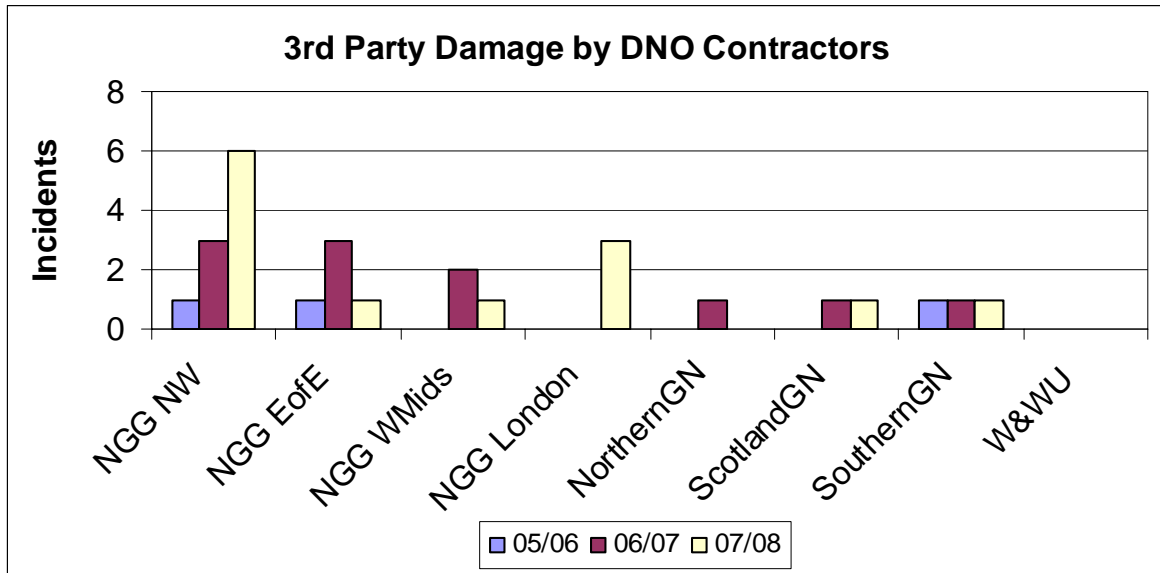
For Scotland Gas Networks and Southern Gas Networks the 12-hour repair performance and the number of reported gas escapes requiring repair have both fallen each year since 2005/06. In the other gas DNs the number of escapes requiring repair and the DNs' 12-hour repair performance have both either risen or remained similar to previous years.

3.7.5 Third Party Damage Incidents

In 2005/06, 2006/07 and 2007/08 the total number of third party damage incidents across all the gas DNs was 173, 178 and 176 respectively.

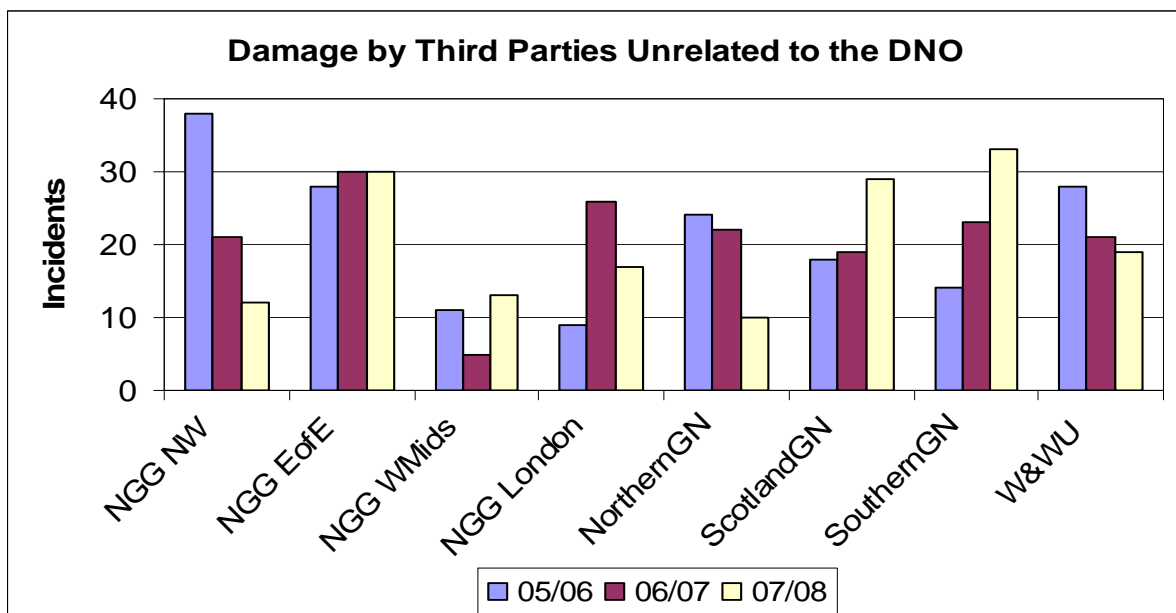
The graphs below show the number of third party damage incidents occurring to mains and pipelines on each gas DN with the data further broken down by whether or not the damage was caused by a contractor working for the gas DNO.

Graph 3.7.5.1: Number of third party damage incidents caused by contractors working for the gas DNOs between 1 April 2005 and 31 March 2008



Between 2005/06 and 2007/08 the total number of third party damage incidents caused by the gas DNOs' own contractors has gradually risen from 3 to 13 although this remains small compared to the damage caused by unrelated third parties. In 2007/08 rises in this category occurred in the London and North West gas Distribution Networks operated by National Grid Gas.

Graph 3.7.5.2: Number of damage incidents caused by third parties unrelated to the gas DNOs between 1 April 2005 and 31 March 2008



Between 2005/06 and 2007/08 the total number of third party damage incidents caused by parties unrelated to the gas DNOs have fallen from 170 to 163. Counter to this overall trend rises in the number of incidents in this category have occurred in the DNs operated by Scotland Gas Networks and Southern Gas Networks.

4.0 Conclusions

This is the third year that the Gas & Pipelines Unit has reported on SPIs in Great Britain's gas and pipeline industry. The report does not make an absolute assessment of the state of the industry's major hazard safety performance although the data collected so far allows for some limited trend identification.

In 2007/08 improvements in safety performance have occurred in:

- The number of DOs reported at Gas & Pipeline industry COMAH sites,
- The number of incident reports made to HSE under GS(M)R,
- The number of km of iron mains decommissioned by the gas DNOs,
- The number of GIB incidents reported nationally.

The other safety performance indicators covered in this report have remained approximately the same as in previous years.

Conclusions on individual safety performance indicators are given below. The Gas & Pipelines Unit will incorporate these into its operational strategy where necessary.

Public Sector Targets:

In 2007/08 the Gas & Pipelines Unit recorded five relevant DOs at COMAH sites. This contribution to HSE's Public Service Agreement has exceeded the Unit's target of a 15% reduction in the number of relevant DOs reported to it by the end of 2007/08 set against the 2001/2 baseline.

Between 2008/09 and 2010/11 the Gas & Pipelines Unit will continue to record the numbers of relevant DOs at COMAH sites as part of its contribution to HSE's DSO targets.

UKOPA Databases:

i. UKOPA Pipeline Infringement Database

The inclusion of infringement data from the gas high-pressure pipeline operators has given rise to a large increase in the total number infringements recorded in the UKOPA database since 2005. However, there is little difference between the total number of infringements reported in 2006 and 2007. This indicates that the infringement reporting processes adopted by the high-pressure gas and other pipeline operators are now established. Future years' data should now begin to reveal any developing trends in the number of infringements reported.

In 2007 there were 16 incidents reported in the most serious risk category (i.e. pipeline damage) compared to 197 incidents recorded in the same category up to 2006. Of the other infringement categories, the least serious risk category (i.e. excavation away from the pipeline) continues to make the largest contribution to the total number of recorded infringements. As with the total number of reported infringements, future years' data should now begin to reveal any developing trends in number of infringements reported in each risk category.

ii. UKOPA Pipeline Fault Database

Over the period 1962 to 2006 a clear decrease in the frequency of pipeline failures is seen. The failure frequency over the last 5 years (2002-2006) is 0.028 incidents per 1000 km per year compared to 0.248 incidents per 1000 km per year during the period 1962-2006. In 2006 there was one product loss incident recorded on the UKOPA pipeline fault database.

National Transmission System:

Safety performance on the gas NTS operated by National Grid Gas has improved slightly between 2005 and 2007.

A gradual decrease in the number of TFAs issued by National Grid Gas has occurred between 2005 and 2007, although there is some variance in the categories under which they were issued.

Between 2005 and 2007 the number of events where the operating pressure on NTS pipelines rose above the MOP but by less than 2.5% has decreased slightly, as has the number of pipelines affected.

In 2007 there were three events on the NTS where the pressure at the inlet to DN Offtakes fell below 38 barg. Since 2005 there has been no significant change in the number of incidents.

Gas Safety (Management) Regulations Reports:

In 2007/08 the number of GS(M)R reports made to HSE fell to 220, the lowest level since 2002/03. The principal cause of these reports remains third party damage and this accounts for more than half of the total reports received in 2007/08.

The number of GS(M)R reports made due to service failures fell from 48 in 2006/07 to 30 in 2007/08 whereas those made due to mains failures rose from 34 in 2006/07 to 42 in 2007/08.

Iron Mains Replacement Programme:

DNO Mains Replacement Programme performance in 2007/08 was again above target when the DNOs are viewed collectively. In 2007/08 a total of 3639.2 km of iron gas mains were decommissioned against the approved programme target of 3600.1 km.

Iron Mains Remaining:

The lengths of all iron mains operated by the gas DNOs has continued to fall due to the Mains Replacement Programme and additional decommissioning works.

Gas in Buildings Incidents:

In 2007/08 the number of GIB incidents reported annually by the gas DNOs fell by 15.6% to 700. This is the second fall in GIB numbers since 2000/01 and is the lowest level recorded since 2002/03.

Mains and Service Related Incidents:

In 2007/08 a member of the public was killed by the failure of a gas main. This follows four years in which there have been no fatalities arising from gas mains or service failures due to fractures or corrosion. Overall, there were four mains and service related incidents in 2007/08.

Public Reported Escapes:

Between 2005/06 and 2007/08 the percentage of reported gas escapes requiring repair across all of the gas DNs and permanently repaired within 12 hours has fallen from 43.8% to 41.5%. Over the same period, the number of reported gas escapes requiring repair across the DNs fell from 175,295 to 170,370.

Collectively the gas DNOs have again reported a small decrease in the percentage of permanent repairs made within 12 hours to gas escapes reported on their networks. However, individually, some gas DNOs have reported an improvement in their 12-hour performance despite an increase in the number of reported gas escapes requiring repair.

Third Party Damage:

Between 2005/06 and 2007/08 the total number of third party damage incidents across all of the gas DNs has remained approximately the same.

Between 2005/06 and 2007/08 the total number of third party damage incidents caused by the gas DNOs' own contractors has gradually risen from 3 to 13, although this remains small compared to the damage caused by unrelated third parties.

Between 2005/06 and 2007/08 the total number of third party damage incidents caused by parties unrelated to the gas DNOs have gradually fallen from 170 to 163.

Appendix 1 - DNO Annual SPI Reporting Definitions

1. IRON MAINS REMAINING

DNOs report the total iron mains population (in km) for each network regardless of proximity to a building.

This information should be useful in allowing HSE to compare safety performance across each DN. However, since the ratio of the $\pm 30\text{m}$ populations will vary across DNs, this will not provide the basis for a precise measure of residual risk.

2. GAS IN BUILDINGS

DNOs report the number of 'Gas in Buildings' (GIB) events where any gas readings have been detected within a building as a result of an iron distribution mains pipe failure, specifically:

- i. A fracture or corrosion of a cast/spun iron main
- ii. Corrosion of a ductile iron main

Reportable GIB events will exclude incidents arising from:

- iii. Non-iron materials (polyethylene, steel, etc)
- iv. Non-pipe specific components (e.g. joints, clamps, encapsulations, internal appliances, etc.)
- v. Services
- vi. Other failure causes such as third party interference

Note: To be consistent with the data already reported to Ofgem, GIB events will be reported regardless of the LEL concentration level.

3. MAINS & SERVICE RELATED INCIDENTS

DNOs report the number of failures upstream of the ECV leading to gas entering a building, where subsequent ignition causes death, major injury (as defined by RIDDOR 1995) or significant structural damage. This category covers only those incidents arising from mains fractures and corrosion and does not include third party damage.

Note: National Grid Gas has previously defined significant structure damage where the estimated cost of repair is in excess of £10,000. Incidents not meeting this criterion but where the concentration of gas is $\geq 20\%$ LEL inside buildings (when evacuation is required) or where 500kg has been released externally will continue to be reported under RIDDOR and GS(M)R.

4. PUBLIC REPORTED ESCAPES

- a) DNOs report the number of 'reported gas escapes requiring repair' made on their Networks instead of the number of 'Escapes on the Network'. The reason for this

is to remove any inflation of numbers caused by multiple 0800 111 999 calls. This also removes any need for the DNOs to report on “No Trace” incidents.

A ‘reported gas escape requiring repair’ is a permanent repair made to a distribution mains or service pipe following a gas escape.

- i. This includes Third Party Damage
- ii. This excludes temporary repairs
- iii. This excludes leaks and repairs downstream of the ECV

Note: This is consistent with the definition used for providing historical external PRE information to Ofgem.

- b) DNOs report the number of escapes on their Networks prevented by a permanent repair within 12 hours from receipt of the first emergency call.

Note: Since this data will be extracted from the emergency call centres it may include situations where multiple calls have been received for a single escape.

5. THIRD PARTY DAMAGE

DNOs report the number of third party damage incidents on their Networks. In this case, “Third Party” excludes the DNO's own employees but includes the DNO's contractors and any other unrelated parties. Only the following categories will be reported:

- a) Incidents on mains operating below 7 barg, and
- b) Incidents where a report of a dangerous occurrence has (or should) have been made under RIDDOR Schedule 2, paragraph 14, parts (a), (b) and (c), specifically where, using GS(M)R criteria:
 - i. Damage resulting in a GIB event where > 20% LEL concentration or >10Kg has occurred,
 - ii. Damage resulting in an external release > 500Kg,
 - iii. Damage and release leading to the ignition of gas.

Note: The DNO should follow a gas measurement procedure which provides the best indication of the risk of ignition in GIB events where > 20% LEL concentration or >10Kg has occurred.

DNOs also categorise the number of incidents in two ways, these being:

- c) Incidents caused by the DNO's own contractors
- d) Incidents caused by unrelated parties.