



**Hazardous Installations Directorate
Gas & Pipelines Unit**

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

Annual Report 2010/11

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Executive Summary

This report presents a broad range of safety performance indicators (SPIs) from 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 appropriate HSE's Gas & Pipelines Unit incorporates the findings of this report into its operational strategy.

In 2010/11 the following indicators of the safety performance of Great Britain's gas and pipelines industry have been reported:

- There were no fatalities as a result of gas mains or service failures due to fractures or corrosion.
- The overall 12-hour gas escape prevention performance by the gas Distribution Network Operators (DNOs) in response to public reported gas escapes is at its highest level since 2005/06, when the current reporting system was implemented.
- There has been no significant change in the number of gas in buildings incidents compared to the previous two years.
- The number of third party damage incidents to pipelines reported across all the DNOs has fallen to 87, the lowest level since 2005.
- There was just one incident in the most serious category of the United Kingdom Onshore Pipeline Operators' Association (UKOPA) transmission pipeline infringement database report, and there were no pipeline ruptures due to third party damage.
- Data collected by UKOPA continues to show a clear downward trend in the frequency of pipeline failures over the period 1962 to 2010.
- The Gas & Pipelines Unit recorded just two dangerous occurrences at sites subject to the Control of Major Accident Hazard Regulations 1999 (COMAH), this was against an industry target of 10.
- The extended period of very cold weather was challenging for the DNOs. Freezing ground and resulting ground movement led to an increased number of public reported gas escapes as iron pipes moved and fractured. To meet

this challenge required resource to be deployed away from the iron mains replacement programme. As a result the DNOs' collective progress with the iron mains replacement programme fell short of the 2010/11 approved target by 98 km (2.6% of the target length of mains to be replaced over the year).

1.0 Introduction

1.1 Safety Performance Indicators (SPIs)

Major incidents in the gas and pipelines industry fortunately do not occur frequently enough to provide reliable data with which to assess the sector's safety performance. SPIs are used to monitor trends and provide assurance that the arrangements in place to minimise the risk of major incidents are effective. Sources of information that can be used to set SPIs include: data on near misses, low consequence incidents and precursor events which might give rise to a major incident; reports of excursions from operating envelopes; and audits of levels of compliance with critical safety procedures.

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

The purpose of this report is to monitor and analyse a broad range of major hazard SPIs across Great Britain's gas transmission, distribution and other hazardous pipelines sectors. This annual report covers the period from 1 April 2010 to 31 March 2011 with the exception of data provided by National Grid Gas plc for the National Transmission System (NTS) and pipeline data provided by the United Kingdom Onshore Pipeline Operators' Association (UKOPA), both of which cover the 2010 calendar year.

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 is also responsible for the operation of natural gas importation and storage facilities. In Great Britain, approximately 22,000km of pipelines are defined as Major Accident Hazard Pipelines (MAHPs) under the Pipelines Safety Regulations 1996 (PSR). In the region of 21,000km of

these MAHPs transport natural gas at pressures above 7 barg. The remainder transport ethylene and other dangerous fluids. In addition to MAHPs, the eight gas DNOs also transport natural gas in pipelines operating at pressures below the MAHP threshold of 7 barg.

Prior to 1 June 2005, Transco plc operated nearly all of the natural gas MAHPs in the UK and owned all eight of the 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 HSE's Gas & Pipelines Unit

HSE's Gas & Pipelines Unit regulates health and safety in Great Britain's gas and pipelines industry. The Gas & Pipelines Unit's interventions aim 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 by working with HSE's Offshore Division (OSD) to ensure the safety integrity of offshore 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/index.htm> and <http://www.hse.gov.uk/pipelines/index.htm>.

2.0 Gas and Pipelines Unit Safety Performance Indicators

2.1 Background

Dangerous occurrences (DOs) in the gas and pipelines sector are infrequent and do not provide a sufficiently broad base against which to monitor the safety performance of the industry. For this reason the Gas & Pipelines Unit has adopted an additional range of SPIs to reflect the principal risks in the sector. Many of these SPIs are specific to the gas distribution industry, although pipeline damage and fault data collected by UKOPA is also monitored.

HSE has held extensive discussions with dutyholders 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 utilise data already provided to other regulators, e.g. Ofgem.

One of the key principles underpinning the use of SPIs is to keep the suite of indicators selected under review to evaluate whether they are still providing useful information. The Gas & Pipelines Unit intends to review the SPIs included in this report during 2011/12 in consultation with the industry and, if necessary, consider revising the suite of SPIs selected.

2.2 Dangerous Occurrences at COMAH sites

The RIDDOR DO categories relevant to this indicator 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.

The Gas & Pipelines industry has been challenged to reduce the number of DOs at COMAH sites from the 2001/02 baseline of 19 to 10 by 2010/11. Their progress has been monitored via this report.

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 as follows.

- i. The number of pipeline infringements caused by third parties and recorded by UKOPA in their Infringement Database report.
- ii. The number of pipeline failure incidents arising from corrosion and other causes and reported by UKOPA in their Pipeline Product Loss Incidents report.
- 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. Numbers of GSMR reports submitted by DNOs.
- v. Annual reports on progress with the iron mains replacement programme made by DNOs.
- vi. Annual SPI reports are made by all five gas DNOs. These include:
 - a. total km of iron mains remaining in each DN;
 - b. number of gas in buildings incidents;
 - c. number of mains and service related major incidents;
 - d. total number of public reported escapes (PREs) requiring repair, and of these the number prevented within 12 hours of the DNO being informed of the escape;

- e. number of third party damage incidents to pipelines and mains.

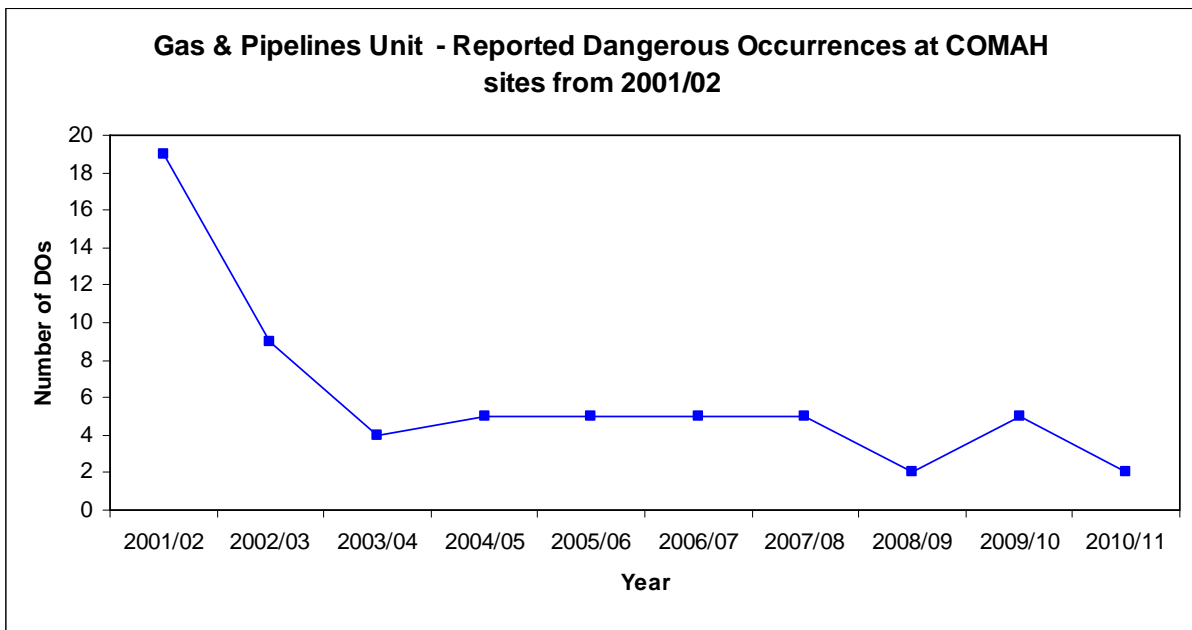
Note: These reporting categories are explained further in Appendix 1.

3.0 Safety Performance in 2010/11

3.1 COMAH Site Dangerous Occurrences

In 2010/11, two DOs were reported to HSE’s Gas & Pipelines Unit by COMAH site operators. The graph below shows the number of DOs reported annually to Gas & Pipelines Unit by COMAH site operators since 2001/02.

Graph 3.1.1: DOs at COMAH sites in the Gas & Pipelines sector since 2001/02



The challenge set to industry of reducing the number of DOs reported at COMAH sites to no more than 10 by 2010/11 has been achieved, and since 2003/04 the

number of DOs has remained at a very low level. This underlines the importance of using SPIs to monitor the effectiveness of safety management systems for major hazards activities.

3.2 UKOPA Infringement Database

Third party infringements are one of the largest causes of transmission pipeline damage and failure, both in the UK and abroad. An infringement is any activity that either causes damage to a pipeline or pipeline coating, or had the potential to lead to damage if the operator had not intervened. The UKOPA Infringement Working Group (IWG) collects data on infringements within the legal easement around a pipeline or in the pipeline operator's declared zone of interest. Activities such as: excavation; ditch digging; post-hole boring; directional drilling; and earth movement or levelling activities in general are of interest because they can damage a pipeline or pipeline coating.

The UKOPA infringement database has been set up to record infringements nationally. The purpose of the database is to identify trends in pipeline infringement and key factors leading to third party damage. This intelligence allows targeted action to be taken to educate potential infringers and gauge the effectiveness of steps taken by pipeline operators to reduce the risk of infringements occurring.

The UKOPA infringement database report has been compiled annually from 2004. Prior to 2005 contributions to the database were from chemical and oil sector pipeline operators only. The database content increased significantly in 2005 with the addition of data from high-pressure natural gas pipeline operators. Not all of the data included in the database relates to MAHPs, however all of the transmission pipelines included have the potential to give rise to a major incident if ruptured.

This year there has been an apparently dramatic fall in the number of infringement reports on the UKOPA database, from well over 2000 incidents reported in 2009 to just 578 in 2010. This is not thought to reflect a true decline in the number of incidents. Instead UKOPA attributes this decrease to a fundamental re-appraisal that took place in 2010 of the gas pipeline operators' reporting mechanism for pipeline

infringements. For this reason no comparison has been drawn between infringement data from previous years and the 2010 figures. Going forwards, it is expected that the UKOPA infringement database will provide a much more accurate reflection of the performance of UK pipeline operators in managing the risks of third party damage to their pipelines. UKOPA IWG reports are published on the UKOPA website: www.ukopa.co.uk

UKOPA categorises 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 posed by the activity carried out by the infringer. Table 3.2.2 shows the categories used to describe the location of activities in relation to a pipeline.

Table 3.2.1: UKOPA Infringement Risk Categories

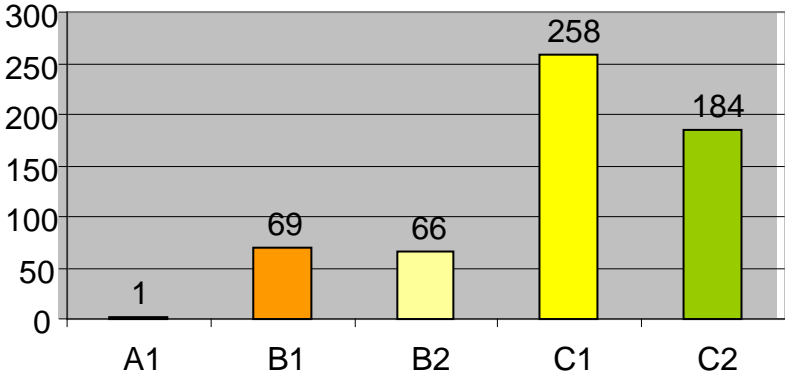
Risk	Infringement Type	Infringement Description
A	Pipeline Damage or Leak	Includes damage to wrap or protective sleeve
B	Serious Potential for Damage	Methods or equipment used could cause significant damage had excavation taken place
C	Limited Potential for Damage	Methods or equipment would not have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

Table 3.2.2: UKOPA Infringement Location Categories

Location	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.
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.

The graph below shows the number of third party infringements reported in 2010 subdivided by the infringement category.

Graph 3.2.2: Third Party Infringements by Location and Risk Category in 2010



Note: the reported number of infringements does not include activities that had been notified to the operator in advance and where the operators' guidance was being followed.

In 2010, there was one reported infringement in the highest 'A1' category. This involved external damage to a UKOPA member's pipeline by a third party, but the pipeline was not ruptured. Of the other infringement categories, C1 made the largest contribution to the number of recorded infringements in 2010, a change from previous years where C2 has been the most prolific type of infringement. A concern with previous years' data has been that infringements may have been incorrectly recorded in cases where the third party activity observed posed no realistic risk of damage to the pipeline. The change in reporting arrangements in 2010 is thought to have addressed this problem which may explain why fewer C2 infringements have been logged.

3.3 UKOPA Pipeline Product Loss Incidents Report

One of UKOPA's objectives is to develop a comprehensive view on risk assessment and risk criteria in the context of land use planning adjacent to high hazard pipelines. To help meet this objective UKOPA has compiled a pipeline fault database, the purpose of which is to:

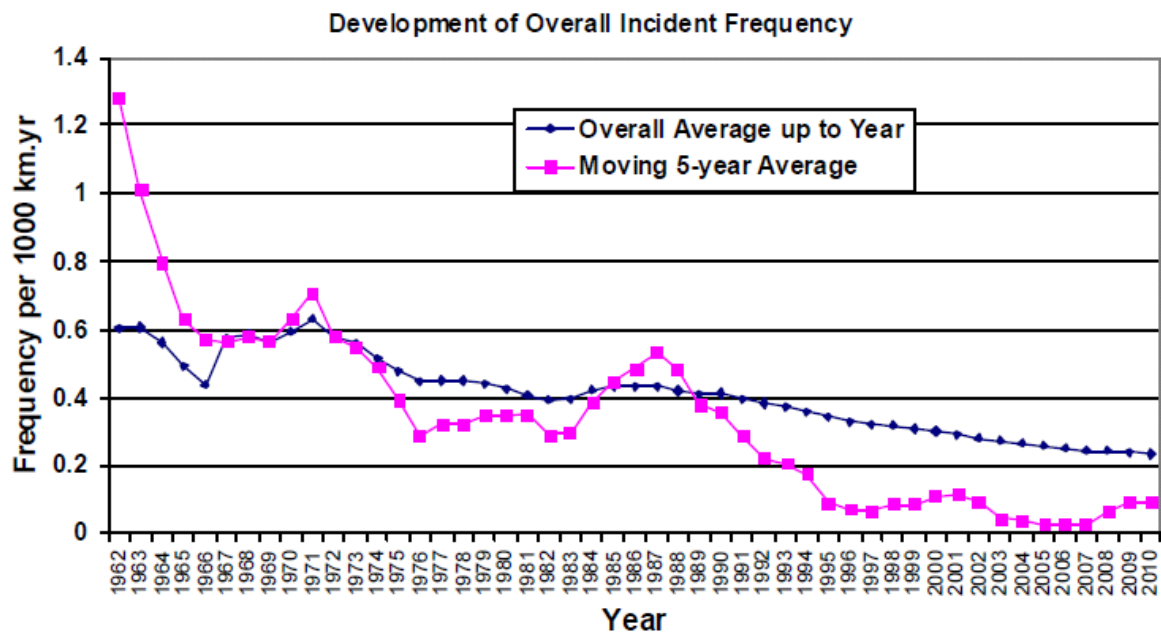
- estimate leak and pipeline rupture frequencies for UK pipelines, based directly on historical failure rate data for UK pipelines;
- provide the means to estimate failure rates for UK pipelines for risk assessment purposes based on analysis of damage data for UK pipelines;
- provide a more realistic and rigorous approach to pipeline design and routing;
- provide the means to test design intentions and determine the effect of engineering changes (e.g. to 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) or parts other than the pipeline itself.

UKOPA has published seven pipeline fault reports since November 2000. The data shown below is an extract from the most recent report published by UKOPA and covers the period 1962 to 2010. A clear decrease in the frequency of pipeline failures can be seen over this period.

Graph 3.3.1: UK Pipeline Product Loss Incidents 1962 to 2010



Note: the full UKOPA pipeline product loss and fault data report for the period 1962-2010 will be published on the UKOPA website: <http://www.ukopa.co.uk>

3.4 Gas National Transmission System

3.4.1 Gas Quality

National Grid Gas manages the quality of gas entering the NTS by issuing terminal flow advice (TFA) communications to the delivery facility operator (DFO). If the gas supplied to the NTS by a DFO has the potential to fall below the specification required by GSMR, a TFA is issued requesting the DFO to reduce or cease supply.

Table 3.4.1: Summary of TFAs issued for gas quality reasons

Gas Characteristic	Number of TFAs Issued					
	2005	2006	2007	2008	2009	2010
Hydrocarbon dewpoint	13	17	6	17	13	9
Hydrogen sulphide	7	4	3	8	5	6
Carbon dioxide **	3	4	0	0	0	0
Incomplete combustion factor	7	4	16	14	11	5*
Wobbe number	5	2	3	0	15	39
Calorific value ***	1	3	0	0	0	0
Water dewpoint	1	2	3	1	0	0
TOTAL	37	36	31	40	44	59

* two of these TFAs were for simultaneous breaches of incomplete combustion factor and other gas properties.

** not required under GSMR Schedule 3.

*** not required under GSMR Schedule 3 but used to calculate Wobbe number.

The overall number of TFAs issued by National Grid Gas in 2010 has increased significantly to 59 from an annual mean between 2005 and 2009 of 38. This is because of a substantial increase in the number of TFAs issued for Wobbe number excursion, a sharp upward trend that started in 2009. This has mainly been attributed to operational issues at certain terminals plus the commissioning of new terminals where Wobbe excursions are the primary risk. The underlying causes are being addressed and preliminary data for 2011 indicates that the number of excursions is declining.

3.4.2 Pipeline Maximum Operating Pressure (MOP)

The Institution of Gas Engineers and Managers publication 'Recommendations on Transmission and Distribution Practice for Steel Pipeline for High Pressure Gas Transmission' (IGEM/TD/1) states: 'the sustained operating pressure for a pipeline system should not exceed Maximum Operating Pressure (MOP)'. The sustained operating pressure is the maximum set pressure for the pressure regulating devices

on the pipeline. When operating at or near the MOP, TD/1 states that this pressure may be exceeded by no more than 2.5% of its value to allow for inevitable variations in the performance of pressure regulating devices and instruments. The current edition of TD/1 also allows for an incidental pressure rise of 2.5% above the MOP, provided the pressure does not reach the Maximum Incidental Pressure (MIP) of the pipeline (TD/1 sets out that the MIP is 10% above the MOP). When an incidental pressure rise occurs, the pressure should not exceed the MOP for more than 5 hours at any one time, or for more than a cumulative total of 20 hours per year.

The table below shows the number of events where pipeline pressure has risen above the MOP on the NTS 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	2008	2009	2010
Operating pressure reached MIP	0/0	0/0	0/0	0/0	0/0	0/0
Operating pressure exceeded MOP + 2.5% for no more than 5 hours	1/3	0/0	0/0	0/0	0/0	0/0
Operating pressure exceeded MOP but was less than MOP + 2.5%	9/15	29/46	7/10	4/5	3/3	3/4

Note: this data does not include events where instruments were found to be faulty or where the pipeline pressure was deliberately increased as part of a planned test.

In 2006 the number of events where the operating pressure on NTS pipelines rose above the MOP but by less than 2.5% was significantly higher than in other years. In 2007 National Grid Gas implemented a process to monitor and review all MOP excursion events and ensure that appropriate action is taken where such events occur. Since 2007, the number of events where the operating pressure on NTS

pipelines rose above the MOP but by less than 2.5% has decreased substantially and remains at a low level year-on-year.

3.4.3 Distribution Network Entry Pressure

National Grid Gas monitors the pressure at the inlet to DN offtakes to ensure it does not fall below the normal operating pressure of 38 barg. There were two such events in 2010, these did not lead to any failures in supply at the offtakes. There is no particular trend in DN entry pressure excursions year-on-year.

Table 3.4.3: Number of incidents where DN inlet pressure fell below 38 barg

Number of DN Offtake Incidents	2005	2006	2007	2008	2009	2010
	1	0	3	2	1	2

3.5 Gas Safety (Management) Regulations 1996 (GSMR) Reports

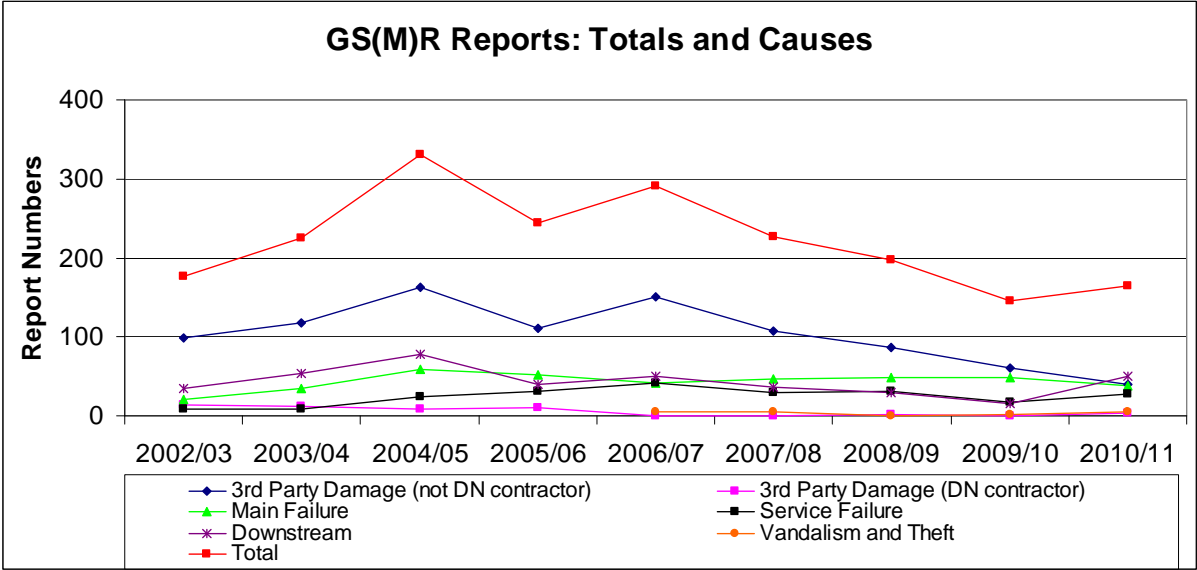
Gas conveyors have a duty under Regulation 7(13) of GSMR to investigate and report certain gas escapes that occur on their networks, i.e. those escapes that have, or are likely to have, resulted in a fire or explosion. The investigation should be carried out to establish the source of the escape and,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

- i. a gas in buildings (GIB) event where the gas concentration has exceeded 20% of the lower explosive limit (LEL) or where more than 10kg of gas has been released; or
- ii. an external release exceeding 500kg of gas; 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 GSMR reports made from 2002/03 to 2010/11. This data was omitted from the 08/09 and 09/10 reports due to data

capture concerns. These have now been resolved by the introduction of the single email address for GSMR reporting.

Graph 3.5.1: Annual number of GSMR Reports (subdivided by incident cause)



The 2010/11 figure of 164 is up slightly on 2009/10, when 146 GSMR reports were received (although as mentioned above there were concerns about the reliability of the 2009/10 data). This increase is due to a rise in the number of GSMR reports relating to incidents where the cause was downstream of the customer's emergency control valve (ECV). The number of reports attributed to third party damage continues to fall which is an encouraging sign, given that historically this has been the most significant cause of GSMR-reportable incidents.

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 between 2002 and 2032. This followed concern about the potentially catastrophic consequences of a gas main failure. At that time,

records showed that there were about 91,000km of iron mains within 30m of property. In 2004 this figure was revised up to 101,000km. Since June 2005 the responsibility for meeting the requirements of the iron mains replacement programme has rested with all five DNOs.

Graph 3.6.1: Profile for the decommissioning of iron gas mains from 2002 to 2032

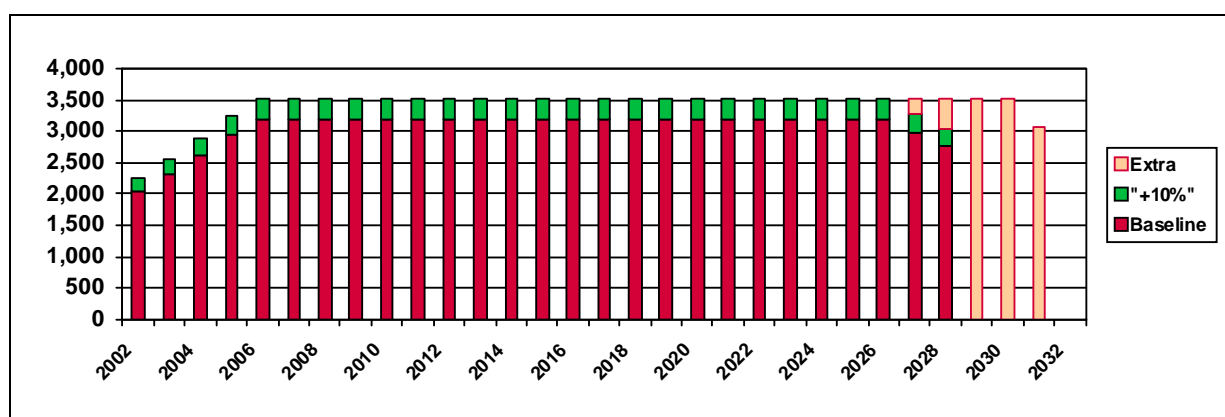


Table 3.6.1 below shows the 30/30 iron mains decommissioning performance (so-called because it relates to the replacement of iron mains within 30m of buildings over a 30 year period) from 1 January 2002. The iron mains decommissioned during the period 1 January 2002 to 31 May 2005 were owned by Transco plc, subsequently they have been under the ownership of the DNOs.

Table 3.6.1: Mains Decommissioning Performance from January 2002

30/30 iron mains decommissioned (km)	Jan 02 - Mar 03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11
Baseline + 10%	2575	2549	2882	3286	3514	3600	3678	3728	3720
Actual	2846	2673	2847	3287	3562	3639	3819	3865	3622
Variance	271	124	-35	1	48	39	141	137	-98

In 2010/11, 3622 km of iron mains were decommissioned nationally against the approved target of 3720 km, a shortfall of 98 km or 2.6% of the target. The DNOs' progress in meeting individual network targets is shown in Table 3.6.2.

Normally HSE approves iron mains replacement targets annually. However, HSE will approve programmes lasting more than one year if:

- the DNOs are able to demonstrate that the length of main decommissioned and risk reduction achieved will be equivalent or greater under a longer programme; and
- the DNOs set annual targets within the longer programme.

In Table 3.6.2 the targets marked with an asterisk (*) form part of 3-year approved programmes running from 1 April 2010 to 31 March 2013.

Table 3.6.2: DNOs' Mains Decommissioning Performance in 2010/11

Gas Distribution Network	Decommissioning target (km)	Decommissioning Actual (km)	Variance (km)
National Grid Gas plc – North West	538	482	-56
National Grid Gas plc – East of England	605	604	-1
National Grid Gas plc – West Midlands	344	316	-28
National Grid Gas plc – London	362	374	+12
<i>(National Grid Gas plc – Total)</i>	<i>1849</i>	<i>1776</i>	<i>-73</i>
Northern Gas Networks Ltd	528	532	+4
Scotland Gas Networks plc	270*	272	+2
Southern Gas Networks plc	712*	687	-25
<i>(Scotia Gas Networks – Total)</i>	<i>982</i>	<i>959</i>	<i>-23</i>
Wales & West Utilities Ltd	361*	355	-6
Total of all Distribution Networks	3720	3622	-98

The winter of 2010/11 included an unusually lengthy and severe spell of cold weather. Some areas of the country were affected more seriously than others, but all of the DNOs scaled back or suspended their planned iron mains decommissioning work as a consequence. Resources and personnel were instead deployed to reactive work associated with the large number of gas escapes that occurred during the cold weather. The DNOs have indicated that this significantly disrupted their iron mains decommissioning activities, hence the shortfall in performance.

Each DNO should, so far as is practicable, comply with a programme approved by HSE under PSR Regulation 13A. This means that if matters beyond their control result in failure to comply with their approved programme, it would be a defence for the DNO to show that they had complied 'so far as is practicable'. An extended spell of severe weather may provide such a defence. As a result HSE has taken the decision not to take enforcement action against those DNOs who have failed to comply with their approved programmes in 2010 – 11.

As part of its monitoring strategy and intervention plans for the DNOs, HSE carries out mains replacement audits to check that mains are decommissioned in accordance with the policies and procedures in the DNOs' GSMR safety cases. Further information on the iron mains replacement programme can be found on HSE's website at:

<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

The table below shows the length of all iron mains remaining within each DN, (regardless of proximity to an occupied building) on 31 March for the year reported. It includes iron mains removed due their condition or as part of other network

maintenance or upgrading activities, as well as those decommissioned as part of the iron mains replacement programme.

Table 3.7.1: Total Iron Mains Remaining in each gas DN from 2006

Gas Distribution Network	2006 (km)	2007 (km)	2008 (km)	2009 (km)	2010 (km)	2011 (km)
National Grid Gas plc – North West	13,241	12,681	12,208	11,567	11,047	10,468
National Grid Gas plc – East of England	17,000	16,363	15,772	15,086	14,405	13,785
National Grid Gas plc – West Midlands	10,337	9,890	9,534	9,141	8,785	8,383
National Grid Gas plc – London	10,713	10,400	10,102	9,739	9,391	8,962
<i>(National Grid Gas plc – Total)</i>	<i>51,291</i>	<i>49,334</i>	<i>47,616</i>	<i>45,533</i>	<i>43,628</i>	<i>41,598</i>
Northern Gas Networks Ltd	14,571	14,085	13,603	12,907	12,355	11,818
Scotland Gas Networks plc	7,599	7,238	6,934	6,608	6,291	6,023
Southern Gas Networks plc	19,695	18,941	18,297	17,601	16,867	16,225
<i>(Scotia Gas Networks - Total)</i>	<i>27,294</i>	<i>26,179</i>	<i>25,231</i>	<i>24,209</i>	<i>23,158</i>	<i>22,248</i>
Wales & West Utilities Ltd	10,471	10,174	9,805	9,381	8,977	8,620
Total of all Distribution Networks	103,627	99,772	96,255	92,030	88,118	84,284
(Mains removed since previous year)		3,855	3,517	4,225	3,912	3,834

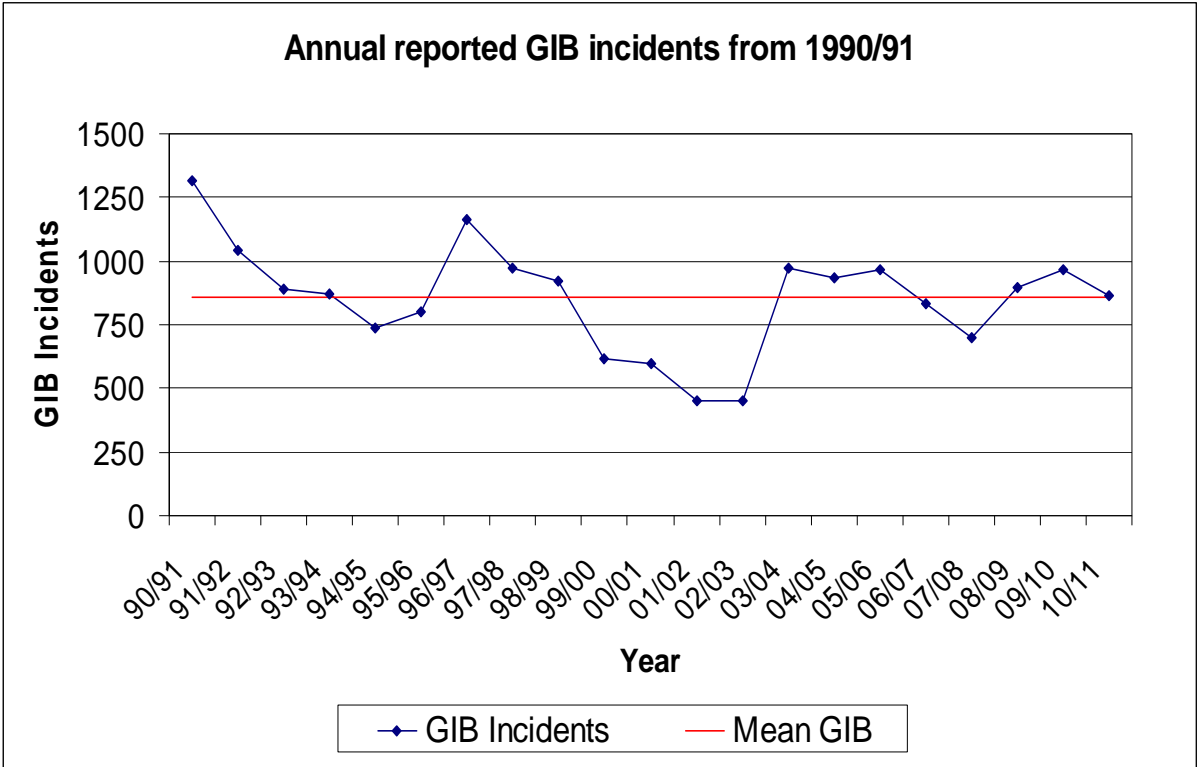
As expected, the total length of iron mains across all DNs continues to gradually decrease year-on-year as a result of the iron mains replacement programme, condition replacement and mains abandonment.

3.7.2 Gas in Buildings (GIB) Incidents

A GIB incident occurs when gas escaping from an outside gas main enters a building (see Appendix 1 for how this is categorised). The graph below shows the annual

number of GIB incidents which have occurred since 1990/91. The mean value for the same period is also shown.

Graph 3.7.2: Annual reported GIB incidents from 1990/91



It should be noted that the sharp increase in reported GIB incidents in 2003 was due to data capture improvements and does not indicate general system deterioration.

The mean annual number of incidents since 1990/91 is 855. In 2010/11 the number of GIB incidents decreased from 963 to 863, this is not significantly higher than the overall mean value and is below the post-2003 mean of 890 incidents per year.

The table below shows the number of GIB incidents reported annually by each gas DNO since 2005/06. A year-on-year comparison can be made for the same DN but since each DN is comprised of varying mixtures of urban and rural pipelines, it is unfair to compare 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

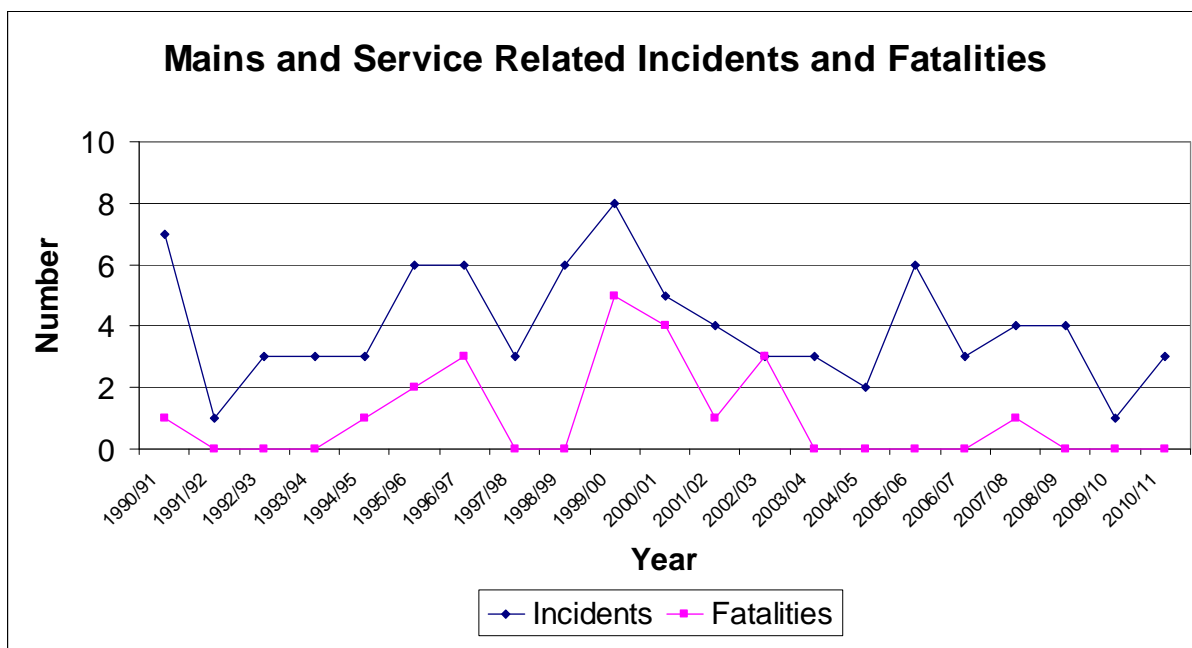
Gas Distribution Network	05/06	06/07	07/08	08/09	09/10	10/11
National Grid Gas plc – North West	143	104	96	150	184	169
National Grid Gas plc – East of England	198	149	133	215	183	139
National Grid Gas plc – West Midlands	68	97	72	115	138	99
National Grid Gas plc – London	56	72	53	73	72	53
<i>(National Grid Gas plc – Total)</i>	<i>465</i>	<i>422</i>	<i>354</i>	<i>553</i>	<i>577</i>	<i>460</i>
Northern Gas Networks Ltd	207	173	97	90	120	135
Scotland Gas Networks plc	67	62	67	54	86	89
Southern Gas Networks plc	105	99	121	127	108	99
<i>(Scotia Gas Networks - Total)</i>	<i>172</i>	<i>161</i>	<i>188</i>	<i>181</i>	<i>194</i>	<i>188</i>
Wales & West Utilities Ltd	119	74	61	73	72	80
Total of all Distribution Networks	963	830	700	897	963	863

Numbers highlighted in green indicate a decrease from the previous year. Numbers highlighted in amber indicate an increase on the previous year and numbers highlighted in red indicate a sequential increase over the previous two years.

3.7.3 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 from April 1990



In 2010/11 there were three mains and service related incidents and no fatalities.

In the 12 years prior to the start of the iron mains replacement programme in 2002, there were, on average, 4.58 mains and service related incidents per year and 1.42 fatalities per year. Since the start of the iron mains replacement programme in 2002 there have been, on average, 3.22 mains and service related incidents per year and 0.44 fatalities per year.

3.7.4 Public Reported Escapes Requiring Repair Prevented Within 12 hours

When a member of the public makes an emergency call to report a gas escape the relevant gas DNO records a public reported escape or PRE. The DNO then

dispatches a first call operative (FCO) to investigate any potential leak. If the FCO finds a gas escape from a main, service or ECV, a reported gas escape requiring repair (RGERR) will be logged by the DNO.

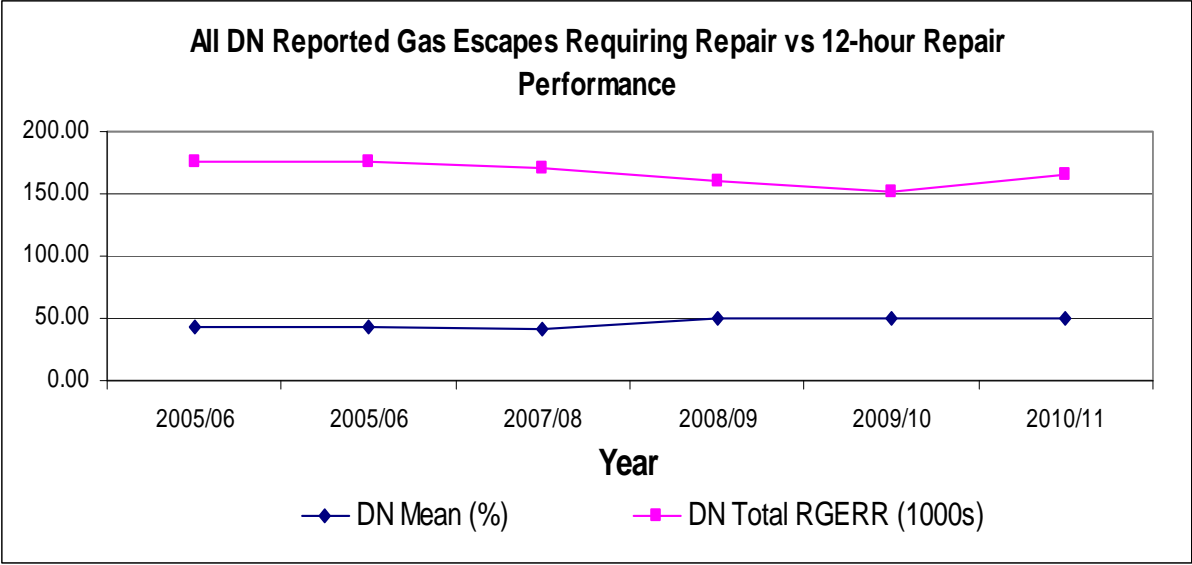
Each DNO has to comply with regulation 7(4) of GSMR. This requires that after a PRE has been reported, the DNO should attend the leak as soon as is reasonably practicable and prevent it within 12 hours of being informed of the escape unless it is not reasonably practicable to do so. Occasionally no trace of escaping gas is found and sometimes a number of PREs are found to relate to a single gas leak. The PRE repair performance of each DNO is therefore based only on RGERRs. In this context repair means:

- i) a permanent repair;
- ii) a temporary repair where the gas escape has been prevented; or
- iii) isolation of the gas supply.

The graph below shows a summary of 12 hour RGERR performance across all of the DNs. The 12 hour repair performance is given as a percentage of the number of reported gas escapes requiring repair.

Between 2005/06 and 2010/11 the percentage of RGERRs prevented within 12 hours across the gas DNs has increased from 43.8% to 50.5%. Over the same period, the number of RGERRs across the DNs has fallen from 175,295 to 164,797, although there was an increase in 2010/11 relative to the previous year. The DNOs have attributed this increase to the effects of the unusually severe period of cold weather experienced in the winter of 2010/11.

Graph 3.7.4.3: DN mean 12-hour repair performance and DN total reported gas escapes requiring repair from 1 April 2005



The table below shows the 12-hour repair performance of each DNO as a percentage of the RGERRs received since 2005/06.

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 from 1 April 2005

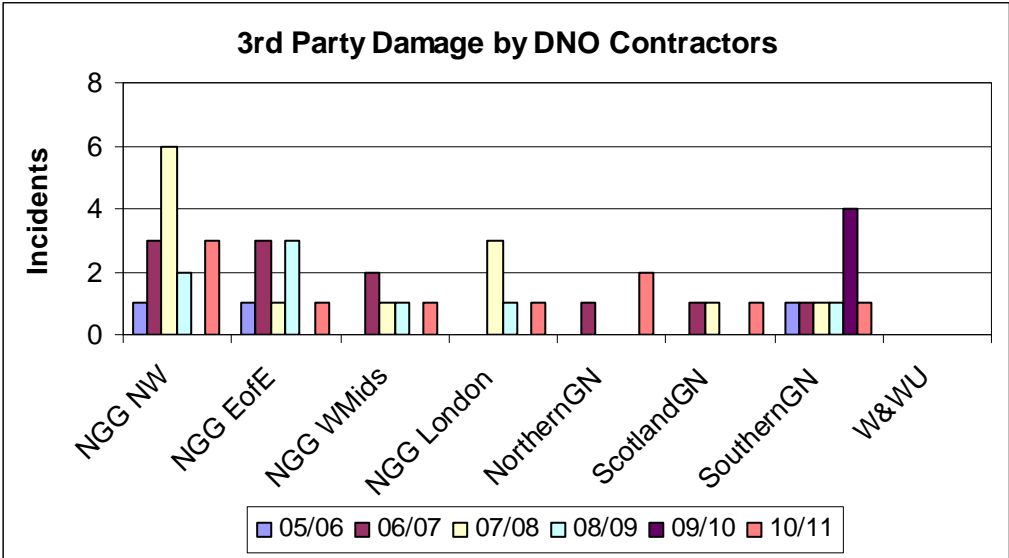
Gas Distribution Network	05/06 (%)	06/07 (%)	07/08 (%)	08/09 (%)	09/10 (%)	10/11 (%)
National Grid Gas plc – North West	36.7	40.3	44.9	48.7	44.8	42.2
National Grid Gas plc – East of England	43.2	53.4	49.0	50.1	52.2	48.3
National Grid Gas plc – West Midlands	37.0	39.8	41.9	42.7	36.4	34.4
National Grid Gas plc – London	34.8	38.9	41.8	42.9	44.6	40.5
<i>(National Grid Gas plc – Total)</i>	<i>38.3</i>	<i>43.6</i>	<i>44.7</i>	<i>46.4</i>	<i>45.4</i>	<i>42.2</i>
Northern Gas Networks Ltd	56.5	50.3	50.4	55.6	57.9	59.1
Scotland Gas Networks plc	64.3	57.6	37.3	54.9	62.3	66.0
Southern Gas Networks plc	41.0	35.9	31.9	53.0	54.1	62.3
<i>(Scotia Gas Networks - Total)</i>	<i>46.6</i>	<i>41.2</i>	<i>33.2</i>	<i>54.0</i>	<i>58.2</i>	<i>63.2</i>
Wales & West Utilities Ltd	43.4	34.5	40.7	47.2	45.4	43.8
Mean of all Distribution Networks	43.8	43.0	42.0	49.6	50.1	50.5

Currently there is significant variation in 12-hour gas escape prevention performance reported by the DNOs. All of the DNOs have now implemented risk-prioritised systems which direct resource towards dealing with those gas escapes which present the highest risk to members of the public. As a result, the DNOs may now defer the repair of relatively low risk and straightforward gas escapes in favour of repairing those that are higher risk and often more complex. This approach, whilst reducing the risk to the public, could also lead to a fall in the percentage of gas escapes prevented within 12 hours. However, not all of the DNOs had fully implemented risk-prioritised systems by the start of the 2010/11 reporting year. The severe winter weather of 2010/11 also had a significant impact on the DNOs' 12-hour gas escape prevention performance by increasing the overall number of RGERRs and, in some cases, hampering their efforts to respond to them. Additionally, the duration and severity of the winter weather was not evenly spread across each of the DNs. These factors may account for some of the variance in the DNOs' reported 12-hour gas escape prevention performance data for 2010/11.

3.7.5 Third Party Damage Incidents

The table and graphs below show the number incidents of third party damage to distribution mains in each gas DN. The data is 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 from 1 April 2005



Graph 3.7.5.2: Number of damage incidents caused by third parties unrelated to the gas DNOs from 1 April 2005

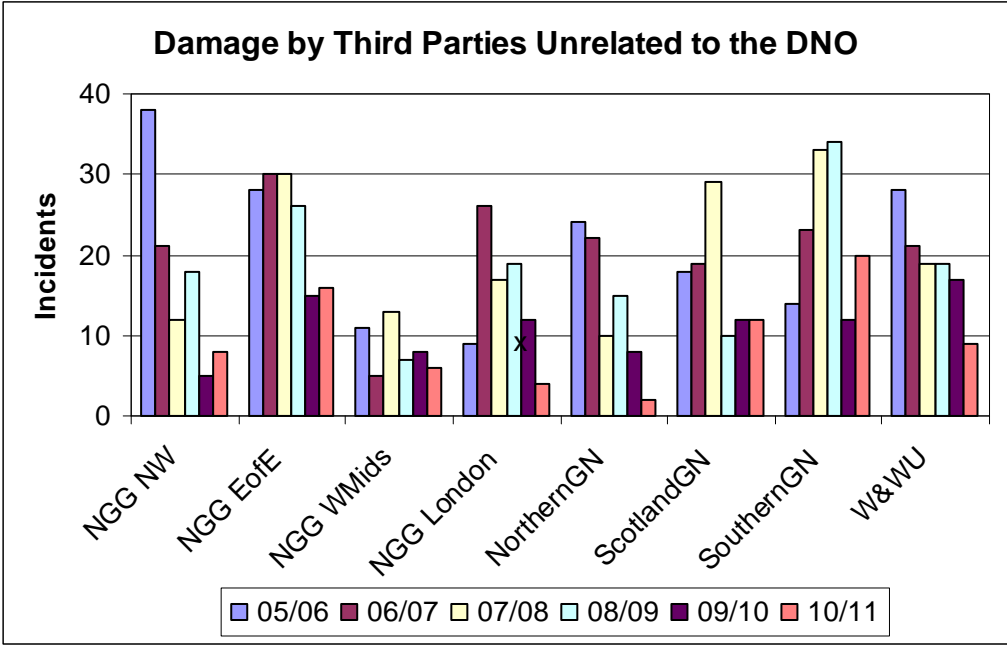


Table 3.7.5.1: Total number of third party damage incidents across all DNOs from 1 April 2005

Number of incidents	05/06	06/07	07/08	08/09	09/10	10/11
	173	178	176	156	93	87

The total number of third party damage incidents reported by all the DNOs has fallen from 93 in 2009/10 to 87 in 10/11.

In 2010/11, ten third party damage incidents were caused by the gas DNOs' own contractors, whilst Wales & West Utilities continues to have no incidents in this

category. This is compared to 77 incidents of damage caused by unrelated third parties in 2010/11.

4.0 Summary of Results

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

In 2010/11 improvements in safety performance have occurred in the following areas.

- The overall 12-hour gas escape prevention performance by the DNOs in response to emergency calls from the public.
- The number of GIB events reported by the DNOs.
- The number of third party damage incidents reported across all DNs.
- Control of the operating pressure levels on the NTS.

A more detailed summary is given below.

COMAH Site DOs

In 2010/11 the Gas & Pipelines Unit recorded two DOs at COMAH sites. This shows that the industry has exceeded its target of a 47.5% reduction in the number of relevant DOs reported to it by 2010/11, set against the 2001/02 baseline of 19.

UKOPA Databases

i. UKOPA Pipeline Infringement Database

In 2010 there was a sharp decrease in the total number of pipeline infringements reported in the UKOPA infringement database report. This has been attributed largely to revised reporting arrangements designed to ensure that only events that fully meet the relevant criteria are recorded as infringements on the database.

In 2010 there was just one incident recorded in the most serious 'A1' infringement category, compared to nine in 2009. Spurious reporting of 'A1' infringements is unlikely so this may reflect a real improvement in the onshore pipeline industry's arrangements for managing the risk of third party damage to pipelines.

ii. UKOPA Pipeline Product Loss Incidents report

The data for the period 1962 to 2010 shows a clear downward trend in the frequency of pipeline failures.

National Transmission System

Overall the safety performance indicators reported by the gas NTS operated by National Grid Gas have not changed significantly between 2005 and 2010.

In 2010 the number of events where the operating pressure on NTS pipelines rose above the MOP but by less than 2.5% matched the 2009 number, which was its lowest level since 2005. However, for the second year running there has been a sharp increase in the number of TFAs issued for Wobbe Number excursions. This is not thought to have safety implications for the NTS.

Gas Safety (Management) Regulations Reports

The number of GSMR reports showed a slight increase in 2010/11 compared to 2009/10, although this finding should be treated with caution because of problems with data collection in 2009/10. Incidents caused by third party damage fell, whilst incidents due to causes downstream of the ECV rose significantly this year.

Iron Mains Replacement Programme

The DNOs have reported that their iron mains replacement performance in 2010/11 was affected by the unusually severe winter weather. The total length of iron mains decommissioned fell short of the DNOs' approved target by 98km (or 2.6% of the target).

Iron Mains Remaining

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

Gas in Buildings Incidents

In 2010/11 the number of GIB incidents reported by the gas DNOs fell to 863 from 963 in the previous year. This is below the 2003/4 to 2010/11 mean of 890 incidents per year.

Mains and Service Related Incidents

In 2009/10 there were no fatalities as a result of gas mains or service failures due to fractures or corrosion. Overall, there were three mains and service related incidents.

Public Reported Escapes

Between 2005/06 and 2010/11 the percentage of RGERRs across all of the gas DNs and repaired within 12 hours has risen from 43.8% to 50.5%. Over the same period, the number of reported gas escapes requiring repair across the DNs has decreased by 6%, although there was an increase in 2010/11 relative to the previous year which was due to the effects of severe cold weather.

Third Party Damage

Between 2005/06 and 2010/11 the total number of third party damage incidents across all of the gas DNs has decreased from 173 to 87, with the most significant reduction occurring in 2009/10.

The number of third party damage incidents caused by the gas DNOs' own contractors has remained small compared to the damage caused by unrelated third parties. Wales & West Utilities have reported no contractor third party damage since the start of this report.

Appendix 1 - DNO Annual SPI Reporting Definitions

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 iron pipeline population that is within 30m of a building will vary across DNs, this will not provide the basis for a precise measure of residual risk.

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. service pipes
- 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 concentration of gas relative to the LEL.

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 as being 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 of gas has been released externally will continue to be reportable under RIDDOR and GSMR.

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 for the same gas escape. This also removes any need for the DNOs to report on "No Trace" incidents.

A 'reported gas escape requiring repair' is a repair made to a distribution main or service pipe following a gas escape. This includes third party damage but excludes leaks and repairs downstream of the ECV. In this context repair means:

- i. a permanent repair
 - ii. a temporary repair where the gas escape has been prevented
 - iii. isolation of the gas supply
- b) DNOs report the number of escapes on their Networks and prevented 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 gas 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 GSMR criteria:
 - i. damage resulting in a GIB event where > 20% LEL gas in air concentration or >10Kg gas escape has occurred; or
 - ii. damage resulting in an external release > 500Kg; or
 - 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 a >10Kg gas escape has occurred.

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

- incidents caused by the DNO's own contractors; and
- Incidents caused by unrelated parties.