NORTHERN GAS NETWORKS ACTUAL LEAKAGE VOLUME REPORT FOR 2008/09

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NGN LEAKAGE ASSESSMENT

1. DOCUMENT SUMMARY

This document describes the leakage model used to calculate the Leakage Incentive Baseline figures for the 2008-2013 GDPCR.

2. LEAKAGE MODEL

The Northern Gas Networks leakage model, NGN LDZ Leakage Model v1.3, will be used to generate the leakage assessment for each Distribution Network. This model uses the same methodology, fixed model input values, variable model inputs and assumptions used for determining the Leakage Incentive Baselines for National Grid[1].

The leakage model comprises four main leakage components.

I. Leakage from Low Pressure (LP) Systems

II. Leakage from Medium Pressure (MP) Systems

III. Leakage from Above Ground Installations (AGI)

IV. Leakage as a result of Interference Damage

Each of these components has a number of elements or inputs, some of which are 'fixed' (e.g. Leakage Rates) and some 'variable' that change annually (e.g. Average System Pressure, MEG Saturation). Also, there are a number of assumptions that are associated with the implementation within the leakage model or calculation of these elements.

The leakage model calculates the leakage in standard cubic metres per annum. Therefore, variations in Calorific Value and Gas Density do not directly impact the leakage calculation[2]. However, the leakage model has the functionality to input CV, Gas Density and 'Methane by Mass' for reporting purposes only. For the purpose of measuring Performance against the Leakage Incentive Baselines, the 'Baseline Target CV's' are annually updated with Forecasted LDZ Calorific Values, sourced from the 2006 (Demand Statements), which were used to estimate our forecasted leakage volumes (see section 7) for details of Forecasted CV values.

[1] Submitted in response to Supplementary Questions OP-NGG-1042 and OP-NGG-1043 on 18 October 2007

[2] With the exception of gas release events in excess of 500kg, see section 6.1, where the gas density is used to convert the calculated leakage from Tonnes to m^3

3. LEAKAGE FROM LOW PRESSURE (LP) SYSTEMS

Leakage from LP systems is calculated in two parts; mains leakage and service leakage.

3.1 LP Mains Leakage

3.1.1 LP Mains Leakage Fixed Elements and Assumptions

<table>
<tr><th>Element/ Assumption</th><th>Value(s)/Comments</th><th>Source(s)</th></tr>
<tr><td>Leakage Rates</td><td>
<table>
<tr><th></th><th colspan="5">Leakage Rate m^3/annum/km @ 30mbarg</th></tr>
<tr><th>Material</th><th><=3"</th><th>4"-5"</th><th>6"-7"</th><th>8"-11"</th><th>>=12"</th></tr>
<tr><td>PE</td><td>63.51</td><td>63.51</td><td>63.51</td><td>63.51</td><td>63.51</td></tr>
<tr><td>Steel</td><td>3416.34</td><td>3854.34</td><td>3854.34</td><td>3854.34</td><td>3854.34</td></tr>
<tr><td>Ductile</td><td>719.18</td><td>719.18</td><td>576.40</td><td>576.40</td><td>576.40</td></tr>
<tr><td>Pit Cast</td><td>2407.21</td><td>1639.85</td><td>2525.47</td><td>2203.98</td><td>7463.40</td></tr>
<tr><td>Spun Cast</td><td>1075.71</td><td>1075.71</td><td>1075.71</td><td>1075.71</td><td>1075.71</td></tr>
</table>
Pit Cast leakage rates are assumed to apply only to lead-yarn jointed cast iron main; Spun Cast leakage rates are applied to all non-lead-yarn jointed cast iron main.
There are fixed assumptions in the model with regard to how much Pit Cast and how much Spun Cast main is lead-yarn jointed; see below.
</td><td>2002/03 National Leakage Tests[Ref1]</td></tr>
<tr><td>Reference Pressure</td><td>30mbarg.
Although this is an input to the model, it needs to be consistent with the leakage rates above.</td><td>2002/03 National Leakage Tests[Ref1]</td></tr>
<tr><td>Assumed MEG Concentration</td><td>25%
The level of MEG concentration at which the leakage rates applied to lead-yarn jointed mains are considered to be representative.</td><td>Historic</td></tr>
<tr><td>MEG Benefit</td><td>MEG Benefit is applied to lead-yarn jointed main. Essentially, the leakage rate is adjusted to reflect the measured MEG saturation, according to the formula below:
$MEGBenefit = \frac{e^{-0.8994 \times MEGSaturation}}{e^{-0.8994 \times AssumedMEG}}$</td><td>IGE Communication 1244 Vapour phase glycol treatment of leaking lead/yarn joints in gas mains[Ref2]</td></tr>
</table>

Element/ Assumption	Value(s)/Comments	Source(s)
Assumed percentage of Pit Cast population that is lead yarn jointed	88.5%	Historic
Assumed percentage of Spun Cast population that is lead yarn jointed	18.5%	Historic

3.1.2 LP Mains Leakage Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Reporting Networks	For the purposes of calculating LP leakage, each LDZ is divided into a number of Reporting Networks; these Reporting Networks may represent a single 'network' or multiple 'networks', as defined within the Distribution Networks' mains asset recording systems. Each year, the list of reporting networks needs to be identified and included in the leakage model. *Note: The Leakage Incentive Baselines were determined using the reporting networks as determined for the 2006/07 leakage model.*	Responsible Department - Records Mains Asset Recording Systems – SAP
Mains Asset Data	The length of live LP main is extracted from Distribution Networks' mains asset recording system by Network. The mains asset data is reflective of the mains asset at the end of the leakage period being assessed; i.e. 31 March. Note: The Leakage Incentive Baselines were calculated by applying the programmed mains replacement percentages year-on-year from 31 March 2007 mains asset statistics. The leakage model requires the mains asset lengths to be summated by reporting network into the diameter/material combinations associated with the LP mains leakage rates. Any live mains not included within a Reporting Network are incorporated within default reporting networks, referred to as NONET.	Responsible Department – United Utilities (Records) Mains Asset Recording Systems – SAP

Element/ Assumption	Value(s)/Comments	DN Specific Information
Average System Pressure (ASP)	The Average System Pressure (ASP) is determined for each reporting Network. The ASP is an output from running an appropriate network analysis model with all sources (governors) set at the weighted average pressure for the calendar year, and demand scaled to 25% 1 in 20 peak (the average demand level for the normal year). The following is the hierarchical method of calculating average governor pressures: 1. The company Electronic Pressure Recording system (PMAC), where actual pressures are available, is used to calculate individual governor average pressures from the previous year's pressure data. *Note: This is the preferred method, with the alternatives below being used only when the quantity of data for an individual governor is less than 70 %* 2. Where the quantity of data available is between >50% & <70% consideration will be given to using PMAC pressures (for e.g. where the data is evenly spread across both winter and summer), otherwise recommended seasonal settings will be used. 3. Where the quantity of data is 50% or less, recommended seasonal settings will be used. 4. Where no data is available recommended seasonal settings will be used. 5. The average governor pressure for the network is calculated by dividing the sum of the individual weighted average governor pressures by the number of governors. One-off industrial & commercial service governors will be applied the average governor pressure for the network. 6. All PE isolated/discrete network sections within the main network shall be identified and removed from the network analysis models prior to the execution of the analysis software to determine the ASP.	Responsible Department – United Utilities (Network Planning/Validation) Approved Network Analysis Tools – SYNERGEE

Element/ Assumption	Value(s)/Comments	DN Specific Information
% Lead yarn jointed main treated	There is a requirement within the leakage model to input the quantity of lead yarn jointed cast iron main within each reporting network that has been treated with MEG. The leakage model deems 88.5% of pit cast and 18.5% of spun cast to be lead yarn jointed. However, the network analysis models do not differentiate between Pit Cast and Spun Cast iron pipe, and are not populated with joint type. Therefore, the percentage of lead yarn jointed main treated is assumed to be the same as the ratio of cast iron main treated, which can be determined from the network analysis models as outlined below. The network analysis model is set up in the same configuration as for ascertaining average system pressures; i.e. time-weighted average governor pressures and 25% demand condition. Governors that input MEG into the network are identified (within the spreadsheet used to calculate MEG Saturation levels) and highlighted on the relevant network analysis model. 'Zones of Influence' functionality within the network analysis tool is used to establish the length of cast iron mains modelled as being treated with MEG. The percentage of cast iron mains treated within the Reporting Network is calculated and input into the leakage model.	Responsible Department - Network Planning Approved Network Analysis Tools – SYNERGEE
% MEG Saturation	The Meg Saturation is calculated by averaging all the MEG samples taken within a network during the course of the year in question. The sample points are located as per the relevant Procedure & sampled as a minimum quarterly.	Responsible Department - Network Planning Approved Network Analysis Tools – SYNERGEE Other Systems/Tools – Meg Saturation.xls Relevant Procedures - T/PR/GQ/5 (Recommended Procedures for the Sampling and analysis of gas conditioning agents)

Element/ Assumption	Value(s)/Comments	DN Specific Information
Excluded PE Lengths	Some reporting networks contain sections of isolated All-PE mains that, if included in the ASP calculations would skew the results unrealistically. Therefore, these isolated sections are removed from the model for the ASP calculations. Within the leakage model, these mains are assumed to operate with an ASP that is equal to the length-weighted ASP that the All-PE networks operate at.	Responsible Department - Network Planning

3.2 Low Pressure Service Leakage

3.2.1 LP Service Fixed Elements and Assumptions

Element/ Assumption	Value(s)/Comments	Source
LP Service Leakage Rates	**Type** / **Rate m3/annum/service at 30mbarg** Metal - Metal: 10.592 Metal - PE: 0.000 PE - Metal: 2.194 PE – PE: 0.000	2002/03 National Leakage Tests[Ref1]]
Baseline No. of Metallic Services	The number of metallic services assumed in setting the baselines is in an embedded document in Appendix D.	2006/07 Leakage Estimate
Metallic services attached to PE mains on mixed material networks	The number of metallic services attached to PE mains is calculated by multiplying the assumed number of metallic services by 0.187097. This was the proportion determined when the original leakage model was created.	Historic
Services on All-PE Networks	It is assumed that on an All-PE network all services are PE. The leakage model used for setting the baselines assumed that any network with a PE proportion greater than 99.5%[3] is All-PE	Historic

[3] This was thought to have been 95%, however, the difference is not believed to be material enough (~0.2% for National Grid Networks) to warrant changing the model.

Element/ Assumption	Value(s)/Comments	Source
Excluded Services	These are services associated with the Excluded PE mains detailed above. This is calculated as a straight proportion by length of the total number of services on the Reporting Network: $S_{Exc} = S_{RN} \cdot \frac{L_{Exc}}{L_{RN}}$ Where S_{Exc} is the number of excluded services, S_{RN} is the total number of services on the reporting network, L_{Exc} is the length of excluded PE main and L_{RN} is the total length of main in the reporting network. These are subtracted from the total number of services on the reporting network before the services are apportioned as detailed above.	

3.2.2 LP Service Leakage Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Number of Services	The number of services connected to each reporting network as of 31 March of the current year is determined. The number of consumers on a network is determined from the relevant demand management system. For the purposes of the leakage calculation, the number of services is deemed to be the same as the number of connected consumers. Consumer numbers are extracted for each network as defined within the relevant demand management system; Where a Reporting Network aligns to one or more Demand Management Network, the number of consumers is the sum of the number of consumers in each of the relevant Demand Management Networks Where a Demand Management Network is aligned to multiple Reporting Networks, the number of consumers is apportioned by length of main within each Reporting Network.	Demand Management System - Demand Derivation System (DDS)
Number of Metallic Services Replaced	This is the total number of services replaced since 2006/07. The number of services replaced within each financial year is entered into the model. The service replacement is applied cumulatively.	

Element/ Assumption	Value(s)/Comments	DN Specific Information
No. Metallic Services	[Baseline No.] – [Number of services replaced in LDZ since 2006/07] x [% of total number of services]	
No. PE Services	[Total Number of Services] – [Excluded Services] – [No. Metallic Services]	
Services PE to PE	[No. of PE Services] x [PE Proportion of Network]	
Services PE to Metal	[No. of PE Services] – [Services PE to PE]	
Services Metal to PE	[Number of Metallic Services] x 0.187097 (see assumption in section 3.2.1)	
Services Metal to Metal	[Number of Metallic Services] – [Services Metal to PE]	
Un Noded Customers	NGN use the Demand Derivation System (DDS) to determine customer numbers (services or supplies) in each Low Pressure (LP) network. If a new meter (supply) is added to the physical network this point then becomes an un-noded point within DDS, as it is not assigned to a LP network. The "normal process" for getting customers Noded is; every three years or less each LP Network is validated, in which the competent person extracts a list of un-noded points from Demand Derivation System (DDS) by post code and applies these to the LP Network model, either as an additional load to an existing demand node or creates a new demand, noded on the model. The validation process determines that all <7 bar demands are noded to our models in three years or less. Un-noded points are 'almost' always plastic services. Under the Gas Safety Management Regulations any steel service not delivering a supply for a period of 12 months is cut off. If a new meter is fitted to this location a new PE supply is made. All other un-noded points are to new properties. It should be noted that un noded customers are excluded in line with our baseline assumptions.	Demand Management System - Demand Derivation System (DDS)

4. MEDIUM PRESSURE MAINS LEAKAGE

Medium pressure leakage is calculated for an entire LDZ.

For the Leakage Incentive Baselines the MP leakage was calculated using linear extrapolation of MP leakage calculated over the last price control period.

4.1 MP Leakage Fixed Elements and Assumptions

<table>
<tr><th>Element/ Assumption</th><th>Value(s)/Comments</th><th>Source(s)</th></tr>
<tr><td>Leakage Rates</td><td>
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<tr><td>Ductile</td><td>719.18</td><td>719.18</td><td>576.40</td><td>576.40</td><td>576.40</td></tr>
<tr><td>Cast Iron</td><td>1075.71</td><td>1075.71</td><td>1075.71</td><td>1075.71</td><td>1075.71</td></tr>
</table>
LP leakage rates, at 30mbarg, are applied directly to medium pressure mains lengths.

Spun Cast leakage rates are applied to all medium pressure cast iron mains.
</td><td>2002/03 National Leakage Tests[Ref1]</td></tr>
</table>

4.2 MP Leakage Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Mains Asset Data	The length of live MP main is extracted from the Distribution Networks Mains Asset Recording System The mains asset data is reflective of the mains asset at the end of the leakage period being assessed, i.e. 31 March. The leakage model requires the mains asset lengths to be summated into the diameter/material combinations associated with the mains leakage rates.	Responsible Department – Records Mains Asset Recording Systems – SAP

5. ABOVE GROUND INSTALLATION EMISSIONS

AGI emissions are calculated in two parts:

I. AGI Leakage, and

II. AGI Working losses.

5.1 AGI Leakage

5.1.1 AGI Leakage Fixed Elements and Assumptions

Element/ Assumption	Value(s)/Comments	Source(s)
Leakage Rates	See table below	2002/03 AGI Leakage Leak Tests[Ref3]

Asset Type	Leakage m^3/year/site
Holder station	7,692
NTS offtake	31,075
Local Transmission	6,485
District Governor	407
Service Governor	8

5.1.2 AGI Leakage Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Asset Numbers	The number of each AGI asset in each LDZ is taken from the Distribution Networks AGI asset recording system at the end of the leakage year, i.e. 31 March. The number of gas holders is adjusted, via liaison with the relevant operational personnel, to reflect the number of holders actually containing gas.	Responsible Department – Network Integrity AGI Asset Recording System - SAP Operations Personnel

5.2 AGI Working Losses

5.2.1 AGI Working Losses Fixed Elements and Assumptions

Element/ Assumption	Value(s)/Comments	Source(s)
Working Losses	The total national AGI Working Losses was estimated in the 2002/03 AGI leakage test programme. This value was apportioned across the LDZs in proportion to the number of assets that routinely vent (Holders, LTS Offtakes and NTS Offtakes) in each LDZ. These values were effectively fixed at the time of Network Sales in 2005 and are in line with our baseline submissions.	2002/03 AGI Leakage Tests

LDZ	Working Losses m^3/annum
Northern	744,542
North East	648,151

6. LEAKAGE AS A RESULT OF INTERFERENCE DAMAGE

Leakage as a result of Interference Damage is calculated in three parts:

I. Gas releases in excess of 500kg,

II. Damage to Services, and

III. Damage to Mains

6.1 Gas releases in excess of 500kg

6.1.1 >500kg Events Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Number of Incidents	Number of incidents within the leakage period, i.e. 1 April to 31 March. The number of incidents where the total gas emissions have not been estimated is multiplied by 500kg. Added to this is the gas emissions associated with incidents where they have been estimated. The leakage associated with this is converted to cubic metres using the specified Gas Density for the LDZ.	Responsible Department – HS&E Incident Recording System - 'INJINC' (Injuries and Incidents).

6.2 Damage to Services

6.2.1 Damage to Services Fixed Elements and Assumptions

Element/ Assumption	Value(s)/Comments	Source(s)
Leakage Rates	Severed Services - 17m3/hr Punctured Services – 5.66m3/hr	Historic
Response Times	2 Hours	Historic
Assumed Severed: Punctured split	50%:50%	Historic
Leakage Calculation	Number of Incidents x Leakage Rate x Response Time	

6.2.2 Damage to Services Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Number of Incidents	Total number of service damage incidents within the leakage period, i.e. 1 April to 31 March	Responsible Department – Records & HS&E Recording System – SAP

6.3 Damage to Mains

6.3.1 Damage to Mains Fixed Elements and Assumptions

Element/ Assumption	Value(s)/Comments	Source(s)
Leakage Rates	LP Incidents - 42.45m3/hr Punctured Services – 283m3/hr	Historic
Response Times	3.92 Hours	Historic
Assumed LP: MP split	95%:5%	Historic
Leakage Calculation	Number of Incidents x Leakage Rate x Response Time	

6.3.2 Damage to Mains Variable Elements and Assumptions

Element/ Assumption	Value(s)/Comments	DN Specific Information
Number of Incidents	Total number of mains damage incidents within the leakage period, i.e. 1 April to 31 March. The number of incidents in the >500kg category is subtracted from the total number of mains damage incidents before they are split into LP and MP incidents	Responsible Department – HS&E Recording System – SAP

7. FORECASTED CALORIFIC VALUE ASSUMPTIONS

<table>
<tr><th>Element/ Assumption</th><th>Value(s)/Comments</th><th>DN Specific Information</th></tr>
<tr><td>Forecasted Calorific Value assumptions</td><td>For the purpose of measuring Performance against the Leakage Incentive Baselines, the ‘Baseline Target CV’s’ are annually updated with Forecasted LDZ Calorific Values.
<table>
<tr><th></th><th colspan="5">Calorific Values (MJ/m3)</th></tr>
<tr><th>LDZ</th><th>2008/09</th><th>2009/10</th><th>2010/11</th><th>2011/12</th><th>2012/13</th></tr>
<tr><td>North</td><td>40.28</td><td>40.30</td><td>40.40</td><td>40.38</td><td>40.22</td></tr>
<tr><td>North East</td><td>40.20</td><td>40.22</td><td>40.29</td><td>40.27</td><td>40.11</td></tr>
</table></td><td>Forecasted LDZ Calorific Values, sourced from the National Grid 2006 (Demand Statements).</td></tr>
</table>

APPENDIX A – DOCUMENTATION REFERENCES

Ref1.	R6303	-	Report on the 2002/3 National Leakage Test Programme
Ref2.	IGE Communication 1244	-	Vapour phase glycol treatment of leaking lead/yarn joints in gas mains
Ref3.	R6413	-	Above-Ground Installation Shrinkage - Final Report

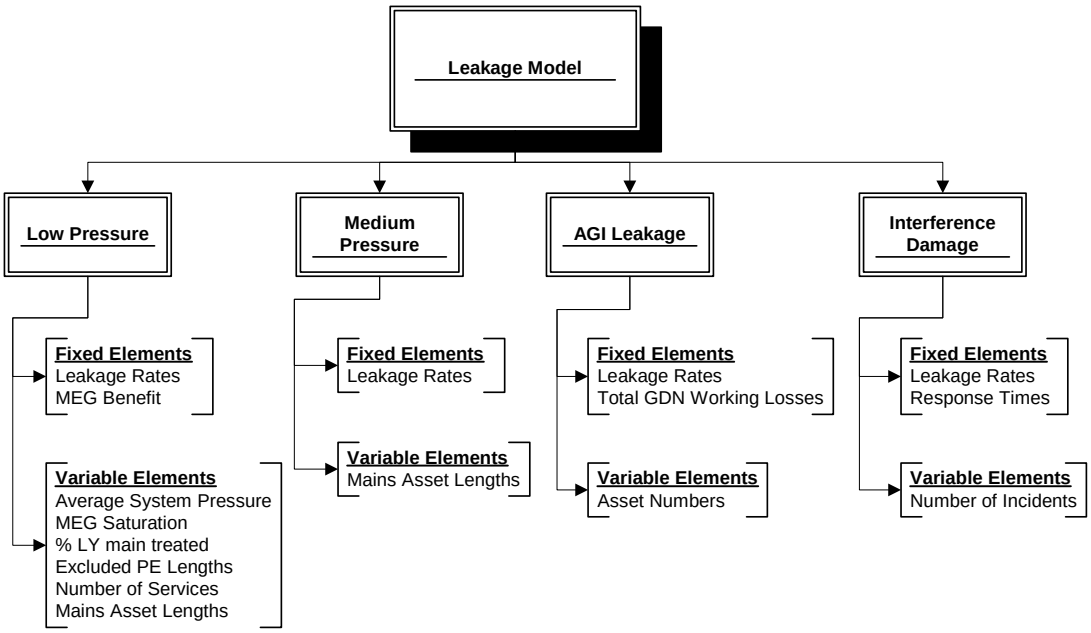
Report Number: 9099 - GL Independent Review of Service Leakage Estimation Methodology

Assessment of Service Leakage Estin

APPENDIX B - GLOSSARY OF TERMS

Distribution Network	-	One or more LDZs
Reporting Network	-	A subsection of an LDZ for which low pressure leakage is calculated individually. The sum of the leakage in the reporting networks is the total low pressure leakage for the LDZ
MEG	-	Mono Ethylene Glycol. A substance that is introduced into the gas network to cause the yarn in lead-yarn jointed mains to swell
SAP	-	NGNs' mains and services asset repository
MAP's / GIS	-	NGNs' graphical mains recording system
SYNERGEE	-	Graphical Based Network Analysis system – Uses MAP's/GIS as it source for mains data
DDS	-	Demand Derivation System – Uses Sites and Meters data as its primary source for consumer details and interfaces with Synergee
SAP	-	NGNs' Plant data repository
INJINC (Injuries and Incidents).	-	NGNs' incident reporting system

APPENDIX C – HIGH-LEVEL DIAGRAM OF LEAKAGE MODEL



APPENDIX D – 'BASELINE NO. METALLIC $'

SHOWS THE NUMBER OF METALLIC SERVICES ASSUMED IN SETTING THE BASELINES, SEE EMBEDDED SPREADSHEET & WORKSHEET 'BASELINE NO. METALLIC $'.

Baseline No. Metallic.xls

APPENDIX E - LDZ LEAKAGE QUANTITY FOR FORMULA YEAR 2008/09

Purpose of Proposal

The purpose of this section is to present NGN's actual LDZ Leakage Quantities for the North East and Northern LDZ for the Formula Year 2008/09 as required under Special Condition E9 paragraph 5 of our Gas Transporter's Licence.

Special Condition E9 paragraph 5; states that Northern Gas Networks has an obligation to submit a report setting out the actual leakage volume reported by the Leakage Model for each LDZ which it operates for the preceding year together with any new information obtained by the licensee regarding leakage rates.

Summary

The LDZ Leakage Quantity, set out within Appendix E, reflects the losses associated with leakage, in the operation of the system. Details of how these Quantities have been determined are provided in this appendix. This report has been prepared in accordance with the new UNC arrangements implemented from December 29th 2008 as a consequence of Mod 0225.

Fugitive emissions of gas have been calculated on an LDZ basis using actual mains population as at 12th May 2009.

Leakage

For the purpose of analysis, leakage may be conveniently split into the following three categories:

- distribution Mains (including service pipes);
- above Ground Installations (AGIs); and
- other losses.

Distribution mains and services leakage is a feature of normal system operation.

AGI leakage also includes the routine venting of control equipment.

Other losses include gas lost as a result of interference damage and broken mains. These losses are not continuous; they are caused by specific events.

Distribution Mains (and Services) Leakage

The leakage of gas from the Distribution Mains system (which includes service pipe leakage) is calculated by combining the results of the 2002/03 National Leakage Testing programme with the following network specific information:

- actual mains population up to 12th May 2009
- the annual average system pressure in each network; and
- the measured concentration of Monoethylene Glycol (MEG) joint treatment chemical in the gas.

Leakage is calculated by multiplying the annual average mains pressure in each network by the Main and Service Pipe Leakage Factors determined by the 2002/03 National Leakage Test programme and the relative lengths of mains / numbers of services in each network. Where applicable (i.e. cast iron mains only) the Pipe Leakage factors are adjusted to take into account the measured concentration of MEG.

The table below shows the Low Pressure leakage on an LDZ basis.

LDZ	Low Pressure Leakage	
	Tonnes	GWh
North East	14,697	225
Northern	11,301	173
Total	25,999	398

The table below shows the Medium Pressure leakage on an LDZ basis.

LDZ	Medium Pressure Leakage	
	Tonnes	GWh
North East	1,121	17
Northern	695	11
Total	1,816	28

AGI Leakage

The figures for leakage from Above Ground Installations have been taken from the findings of the Transco 2003 Above Ground Installation Leakage Test programme.

Information relating to the programme has already been shared with Users and Ofgem; consequently, it is not proposed to include significant detail in this paper.

The table below shows AGI leakage and routine venting associated with these sites on an LDZ basis.

LDZ	AGI Emissions	
	Tonnes	GWh
North East	1,693	31
Northern	2,043	26
Total	3,736	57

Other Losses

Gas may be lost from LDZ equipment as a result of specific events, namely broken mains, interference damage to plant, in addition to ongoing leakage. These losses are known collectively as other losses.

Statistics in respect of the number of broken mains and damages are used in conjunction with calculations of the amount of gas lost through each type of incident to derive the total amount of gas lost as a result of these events.

The table below shows the amount of gas lost as a result of 'Other Losses' by LDZ.

Other Losses	Tonnes	GWh
North East	143	2.19
Northern	240	3.68
Total	383	5.87

Total Leakage

The table below shows the total amount of leakage for formula year 2008/09 expressed in tonnes and GWh.

LDZ	Total Leakage	
	Tonnes	GWh
North East	17,654	270
Northern	14,279	219
Total	31,934	498

APPENDIX F – PROCEDURE TO ENSURE ACCURACY OF DATA INPUT INTO THE LEAKAGE MODEL V1.3

- Where possible all data extraction and compilation processes have been automated to reduce the risk of error arising from manual processes.

- NGN has a Regulatory Compliance Policy which outlines the requirements for all Regulatory Reports which includes the requirement to have appropriate data checks at every stage of the process up to submission of the report.

- All data which is input to the Leakage Model is provided by United Utilities Operations Limited ("UUOL") and they are required to undertake appropriate checking of the data before this is submitted to NGN for input into the Leakage Model. A Reporting Declaration form is signed by each UUOL data provider to confirm that appropriate data checks have been performed.

- NGN then undertake a sense check of the data provided by UUOL to ensure it is complete and in the format required for input to the model. An analysis is also undertaken against prior year data and any unusual variances are investigated and queried.

- The data is input to the Leakage Model using cut and paste functions from the original UUOL source data where appropriate to reduce the risk of errors in manual data input.

- The data is input to the Leakage Model by one NGN official and another NGN official is responsible for checking the data input to the model against the source data provided by UUOL. This process is evidenced in a worksheet which has been added to the Leakage Model to record the source data file names, the date of input and initials of the person who input the data and the date of checking and the initials of the officials who checked the data.

- An internal audit was performed of the Leakage Model in 2008 by NGN's Internal Audit provider at that time (KPMG) to provide assurance over the processes and controls operated over the Leakage Model which included sample checking some of the data input to the model back to source UUOL records. The audit identified some weaknesses in the data extraction and compilation processes and improvements have been made to the overall control framework above. The audit also identified some minor variances in the data input to the model but this did not affect the overall calculations undertaken by the model.

- A further internal audit is currently being undertaken by NGN's new in-house Internal Audit function which has also included sample checking of data input to the model. Whilst the audit is not yet complete, no significant variances in data input have been identified to date and any minor variances have been corrected before any reporting has been produced from the model.

This procedure was drawn up and signed off as acceptable by NGNs' audit department.

PROC_ REPORT_LDZ SHRINK_LEAKAGE_V(

APPENDIX G – PROCEDURES FOR PROPOSING MODIFICATIONS TO THE LEAKAGE MODEL

NGN has assessed the leakage model in accordance with Special Condition E9 Paragraph 7 to 13 of the Gas Transporter Licence. In particular, NGN in conjunction with the other GDNs have reviewed the leakage model and discussed how to ensure that the model continues to achieve the accurate calculation and reporting of gas leakage. GDNs identified AGI working losses and low pressure service leakage as two areas that should be considered for modification and accordingly consulted the industry. Following an independent expert's report (see appendix A), GDNs recommended a change to the calculation of low pressure service leakage to ensure that these are correctly accounted for by the leakage model. This change was approved by Ofgem and has been implemented.