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Gas Transmission – The Development and Maintenance of a Methodology for Network Output Measures

A Report prepared for the Office of Gas and Electricity Markets
Special Condition C13: Network Output Measures

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nationalgrid

GAS TRANSMISSION – THE DEVELOPMENT AND MAINTENANCE OF A METHODOLOGY FOR NETWORK OUTPUT MEASURES

Document Revision History

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1.0	January 2008	First Draft
2.0	February 2008	Includes comments from Tony Stonehewer and modifications to Secondary Asset List
3.0.	March 2008	Inclusion of draft reports
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About this Document

This document describes the methodology developed by National Grid in response to the Office of Gas and Electricity Markets (Ofgem) licence condition (C13: Network Output Measures).The purpose of this licence condition is to ensure the development and maintenance of an appropriate methodology to enable the evaluation of network output measures for the gas national transmission pipeline system.

The requirement is for a methodology which, year-on-year, provides appropriate assessment of Network Output Measures covering Network Asset Condition, Network Risk, Network Performance and Network Capability.

This document describes the process used by National Grid to develop the methodology measures in accordance with the Special Licence Condition C13 See Appendix 1. This process will be used to produce the first Network Output Measure report.

The document is presented by National Grid in accordance with Special Condition C13 of National Grid's Gas Transporter Licence in respect of the NTS ("the Licence"). National Grid believes the content is consistent with its duties under the Gas Act and is consistent with the Standard Conditions, Standard Special Conditions and Special Conditions of the Licence.

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CONTENTS

ABOUT THIS DOCUMENT .....

1. 0 PURPOSE AND SCOPE .....

2.0 PRINCIPLES & METHODOLOGY.....

3.0 NETWORK ASSET CONDITION REPORT METHODOLOGY.....

4.0 NETWORK RISK REPORT METHODOLGY .....

5.0 NETWORK PERFORMANCE REPORT METHODOLOGY.....

6.0 NETWORK CAPABILITY AND UTILISATION METHODOLOGY .....

7.0 CONCLUSIONS .....

APPENDIX 1 : SPECIAL LICENCE CONDITION 13

APPENDIX 2 : LIST OF SECONDARY ASSETS

APPENDIX 3 : NATIONAL TRANSMISSION SYSTEM MEASURES INCLUDED IN THE HSE REPORT "MAJOR HAZARDS SAFETY PERFORMANCE INDICATORS IN THE UK ONSHORE GAS AND PIPELINE INDUSTRY"

APPENDIX 4 : EXAMPLE NETWORK CONDITION REPORT

APPENDIX 5 : EXAMPLE NETWORK RISK REPORT

APPENDIX 6 : EXAMPLE NETWORK PERFORMANCE REPORT

APPENDIX 7: ANNUAL PRICE CONTROL REVIEW REPORT WITH CAPABILITY AND UTILISATION INFORMATION

1. 0 Purpose and Scope

1. In accordance with Special Condition C13: Network Output Measures this statement describes the process to develop and report on network output measures for Network Asset Condition, Network Risk, Network Performance and Network Capability and Utilisation for the gas National Transmission pipeline system.

2. This statement documents the process National Grid proposes to use to report on the Network Output measures in accordance with the following requirements as detailed in SC 13 Part B

(a) Network Asset Condition…the current condition of the assets which collectively form the pipe-line system to which this licence relates (including condition of the principal components of those assets) (collectively "network assets"), the reliability of the network assets and the predicted rate of deterioration in the condition of the network assets which is relevant to making assessment of the present and future ability of network assets to perform their function

(b) Network Risk…the overall level of risk to the reliability of pipeline system to which this the licence relates as a result of network asset condition and the interdependence between network assets

(c)Network Performance …those aspects of the technical performance of the pipe-line system which have a direct impact on the reliability and cost of services provided by the licensee as part of its transmission business

(d) Network Capability …the level of capability and the utilisation of the pipe-line system to which the license relates at entry and exit points and other network capability and utilisation factors

1.1 Definitions

Pipe-line System to which the license relates - Gas National Transmission System

Principal Assets – Entry Points, Pipelines, Compressors, Multi-junctions, Exit Points

Entry Points –allow gas to enter the network such that gas volumes and gas quality can be measured and controlled as dictated by operational requirements.

Pipelines – carry gas from one facility to another, in a safe and reliable manner, from the entry points to the delivery points at the end of the transmission system.

Multi-junctions –join pipelines with branched connections and are used to split flow of gas through transmission system and provide multiple routes for gas delivery.

Compressor Sites – raise gas pressure in the pipeline system such that required flows and system pressures can be achieved

Exit Points – connection to the Distribution Networks or Industrial/ Power Station customers to the Gas Transmission networks - monitor the pressure and measure the gas flowing from the National Transmission Systems.

Secondary Assets Groups – are assets which support the principal asset to ensure they can still perform their function. There are 47 secondary asset groups ranging from a Compressor Control System to a Major River Crossing.

Unplanned Event – An event could not be planned into the normal maintenance or operation of the gas network an unforeseeable event.

2.0 Principles and Methodology

3. The principles we have used to develop this Network Output Measures report is to avoid duplicating any existing risk and performance reports which are currently produced and reported to any government agency including OFGEM, HSE, SEPA and EA. We have considered each licence condition in detail and the requirements to consider;-

   - Performance in relation to the development, maintenance and operation of an efficient economical pipeline system
   - Assessment of historical and forecast network expenditure on the pipeline system
   - Comparison analysis over time
   - Provide information in a transparent manner to interested parties
   - Assessment of the customer satisfaction derived from the services provided

4. The network output measures proposed and the methodology for producing them are considered to be the most efficient and effective way by which we can measure the performance of the Gas National Transmission System.

5. In accordance with the Licence requirements we consulted interested parties on the proposed methodology at a workshop on the 3rd of April 2008. There were no comments from the stakeholders on the proposals presented in this paper.

6. The Gas National Transmission System (NTS) plays a key part in the energy supply to the UK, any failure to supply can have a major effect on the electricity network as well as industrial and domestic gas users.

7. Any failure within the NTS which affects domestic gas users will cause major disruption to the life of the community and industries affected. Unlike a failure on the electricity system, where supplies can be restored without the involvement of the user, a gas supply failure would require each consumer to be visited individually to ensure all appliances have been turned off and are safe before supply could be restored. Each visit would take approximately 30 minutes. Restoration of supplies to a town or city could therefore take several weeks.

8. In addition to the supply restoration challenges, the transportation of high pressure has significant public safety challenges. The catastrophic failure of any primary asset can have a significant effect on the local population and environment, with possible explosion or large release of natural gas.

9. For these reasons the gas National Transmission System is designed to be very reliable and is operated and maintained to avoid where possible the failure of a primary asset. The deterioration of the primary assets therefore can not be tolerated. The assets are designed and operated to recognised industry and international standards.

10. To ensure the condition of the primary asset National Grid the effetiveness and reliability of secondary asset needs to be maintained. For example there is a risk of external corrosion to any underground pipe which is protected by a Cathodic Protection (CP) system which include;- groundbeds, transformers, test posts, coupons etc. Cathodic Protection systems have therefore been identified as a Secondary Asset Group requiring monitoring as part of the Network Output Measures.

11. Secondary Asset Groups have been defined for each of the five primary assets and the full listing and details of whether they apply to a Primary Asset is contained in Appendix 2

12. The report on asset condition will provide an assessment of the secondary asset group current condition with a prediction of future condition which gives an indication of future investment required. The information will not detail the specific work required and it can only be used to provide an indication of the number of secondary asset groupings which will require investment over and above normal maintenance and inspection requirements. Detailed assessment of the secondary asset is required before an investment decision can be made to either fully replace the asset, partial replace, re-life or partial re-life the asset. It is not efficient to carry out this assessment until shortly before the work is required.

13. As a Gas Transporter, National Grid is required to produce a Safety Case which is accepted and subjected to routine inspection by the Health and Safety Executive. In addition to the Gas Safety (Management) Regulation requirements, National Grid has to apply for permits from the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA) under the Integrated Pollution Prevention Regulations to operate gas driven compressors; these permits cover the maintenance operation and replacement of the assets.

14. National Grid provides the HSE, SEPA and EA with a risk assessment in accordance with the Gas Safety (Management) Regulations, Control of Major Accident Hazard (COMAH) Regulations, Pipeline Safety Regulations and Integrated Pollution Prevention Control regulations. Where an assessment is required for an individual site or point specific location then the risk assessment can be provided as quantitative analysis. The complex nature of networks means any risk assessments which are required for a network are produced using a qualitative risk analysis approach.

15. The network risk methodology is based on the management of four key risks associated with the operation of a gas transmission system.

- **Security of Supply (Reliability**) – the risk of not meeting the Licence obligation for a 1 in 20 winter demand.

- **Public Safety** - the risk to the safety of the general public as a result of asset failure.

- **Environment** - the risk to the environment from releases and emission from assets in particular the emissions to atmosphere from gas powered compressors

- **Finance** – the risk associated with not being able to accurately measure the energy transported.

16. The information provided will give an indication of the current risk based on the performance and availability of the secondary asset groups to protect and control the risks associated with the primary assets and the network. It will provide an indication of the overall network risk associated with the asset condition and performance.

17. The network performance and individual asset performance is already reported on an annual basis to the HSE, EA and SEPA.

18. National Grid provides performance information for the NTS to the HSE who collate information provided by a number of pipeline operators and Gas Transporters and publish them on the HSE web site as “Major Hazards Safety Performance Indicators in the UK Onshore Gas and Pipeline Industry”. The information is used by the HSE to monitor the performance of the network and associated risks to the general public from gas supply and transportation. Details of the measures that apply to NTS can be found in Appendix 3.

19. The gas powered compressor sites fall under the Pollution Prevention Regulation, for which regular performance data is required to be submitted to the environmental relevant regulator EA or SEPA. Each year the environmental regulators require National Grid to produce a Network Review Report detailing emission to air from each compressor site and predicting future usage of the compressor sites. This data is then used to justify future environmental improvements and predict the environmental impact of each site. The data is provided for each Compressor Site as the actual hours run per compressor unit for the year as well as the average number of hours in the last four years and the predicted number of running hours for the next four years.

20. As these reports are already available then it is not proposed to duplicate any of these measures in the Network Output Measures report on performance. The measures which will be included are those which assess the performance of the network and its affect on the entry and exit points from the network. These are the measures which are of most interest to the stakeholders who use the network.

21. The Capability and Utilisation of the network is already reported in considerable detail in the Annual Transmission Price Control Review Reporting Pack A review of this information did not identify any gaps in the measures already reports. There may however be opportunities to rationalise the information in the future to make it easier to use.

3.0 Network Asset Condition Report Methodology

22. The Network Asset Condition report will take the form of individual Principal Asset Condition Reports containing an assessment of Secondary Asset Group Condition and a prediction of when work will be required to restore the asset to the appropriate level of performance or availability. An example of this is shown in Appendix 4.

23. The Secondary Asset Group Condition report will provide an assessment of the number of years before an asset group requires intervention work over and above the normal maintenance activity expected on the asset. The assets will be grouped into the following categories.

- Work may be required within 2 years of current year
- Work may will be required within 5 years but not within 2 years of current year
- Work may be required within 10 years but not within 5 years of current year
- Work may not be required within the next 10 years of current year

24. The assessment of asset condition and time period before the asset group requires replacement work will be made using the following information;

Age of the Secondary Asset Group which will be derived from date of construction or the amount of duty the asset has been subjected to (e.g. running hours / or number of operations).

Expected Life Range of Secondary Asset Group will be derived by using one or more of the following data sources;

Benchmarking against industry data
Design Life
Fault Data
Historical Asset Replacement
Operational Test Data
Visual Inspection

25. The Age and the Expected Life Range of a Secondary Asset Group will be reviewed annual to take account of variation in duty and performance data.

26. In addition to these factors additional drivers which affect the decision on when to replace secondary assets also need to be considered including; equipment obsolescence and revised legislative requirements or standards.

27. In some cases the secondary equipment group may no longer be supported by the manufacturer in these cases it may be necessary to replace all or some of the assets to ensure the asset group can be maintained or repaired in the event of a failure.

28. There are other cases where changes in legislation or improvement in international standards means a secondary asset no longer meets the performance criteria. For example it may be necessary to replace a gas generator which emits high levels of Nitrous Oxide with a modern drive, in order to meet the Pollution Prevention Control Regulations, even though its availability and mean time between failure rate is good. These additional drivers will be included in the expected life assessment.

4.0 Network Risk Report Methodology

29. The Network Risk Report will be presented in the form of individual Principal Asset Risk Reports containing an assessment of the risk derived from the current condition and performance of the secondary asset groups which protect and manage the primary assets. An example of the report format is contained in Appendix 5.

30. The risks considered are those which have a material effect on the network and its stakeholders i.e. the people who use the network and those in close proximity to the network. The risks have be categorised into four themes;

- **Security of Supply (Reliability**) – the risk of loss of supply and/or not meeting the License obligation for a 1 in 20 winter demand.

- **Public Safety** - the risk to the safety of the general public as a result of asset failure.

- **Environment** - the risk to the environment from releases and emission from assets in particular the emissions to atmosphere from gas powered compressors

- **Finance** – the risk associated with not being able to accurately measure the energy transported.

31. Each secondary asset group is controlling or managing one or more of these risks which protect the primary asset. The performance of the secondary assets in managing these risks has been assessed in the following manner.

32. The risk levels have been defined by reviewing the code of practice or industry standards which the secondary asset group have to meet. The performance / availability level of the secondary asset group has then been categorised in the following risk levels;-

- **Acceptable** – Secondary Asset Group performance or availability meets or exceeds the Code of Practice or Industry Standard.

- **Cautionary** – Secondary Asset Group performance or availability does not meet Code of Practice or Industry Standard however it is within 20% of the target.

- **Unacceptable** –Secondary Asset Group performance or availability does not meet Code of Practice or Industry Standard and it is over 20% from the target.

33. For example – Remote Operable Valves are required to conform with IEC 61508 "International Standard for electrical, electronic and programmable electronic safety related systems" which requires Safety Integrity Levels (SIL) to be set and maintained for protective systems.

Remote Operable Valves SIL 1 = 0.1 reliability (e.g. failure rate not greater than 1 in 10 operations)

The risk level for Remote Operable Valve secondary asset group is therefore;-

- **Acceptable** – Failure rate of less than or equal to 1 in 10 (or 0.1)

- **Cautionary** – Failure rate greater than 1 in 10 (or 0.1) and less than 1 in 8 (or 0.125)

- **Unacceptable** – Failure rate greater than 1 in 8 (or 0.125)

34. Each year the risk level for every secondary asset group will be assessed using performance, inspection and maintenance information collated during the year.

35. The overall Network Risk is the collation of the individual secondary asset group risks for each primary asset.

5.0 Network Performance Report Methodology

36. The performance of the network can be summarised as the number of unplanned events that qffect the normal operation of the network and may affect the flow / pressure of gas into the network from an entry point or the flow or pressure of gas leaving the network at an exit point. There are a number of performance reports already in the public domain in addition to these the overall network performance will be reported on the basis of pipeline, entry point and exit point performance an example of the report format is contained in Appendix 6.

37. The following network performance measures will be reported on an annual basis ;

- Number of unplanned events where the operating pressure of a pipeline has been reduced to carry out a repair or investigate the condition of the pipeline.

- Number of unplanned events where the flow into the network from an Entry Point has been restricted because of an asset fault or failure.

- Number of unplanned events where the flow from the network at an Exit Point has been restricted because of an asset fault or failure.

38. Definitions

- **Unplanned Event** – an event which has not been prearranged as part of a routine maintenance or inspection activity.

- **Pressure Restriction** – a requirement to reduce pressure in a pipeline below the normal Maximum Operating Pressure of a pipeline as defined by IGE/TD1.

- **Entry Point Asset Flow Restriction** – where the Delivery Facility Operator has been issued with a Transmission Flow Advice (TFA) note requesting them to reduce flows other than for gas quality reasons.

- **Exit Point Flow Restriction** – where the Consumer or Distribution Network has been requested to reduce flows by National Grid Gas Network Control Centre.

6.0 Network Capability and Utilisation Report Methodology

39. The existing Annual Price Control Review Report Pack already contains a significant amount of data on the current and future network capability and utilisation, including actual and forecasts of demands for both entry and Distribution Network exit points.

40. The Network Capability and Utilisation report will therefore take the form of the following tables detailed below are reported in the Annual Price Control Review Reporting Pack (see Appendix 7 for details of information reported) ;-

5.1 System characteristics
5.2 Activity indicators
5.3 Transmission system utilisation and performance
5.4 System demand and capability
5.5 Utilisation of compressor capacity
5.6 Environmental Monitoring
5.9 Asset data
5.11 Forecast scenarios

7.0 Conclusion

41. This report describes a set of methodologies which have been developed and proposed by National Grid to meet the requirements of The Office of Gas and Electricity Markets (Ofgem) Special Licence Condition C13: Network Output Measures on UK gas transmission systems.

42. The methodologies will enable an annual report to be provided giving appropriate assessment of the Network Output Measures for Network Asset Condition, Network Risk, Network Performance and Network Capability.

43. It is anticipated that, once the methodologies have been agreed with Ofgem, the monitoring of the Network Output Measures will begin 1 April 2009 and the first annual report will be submitted to Ofgem by 31 July 2010.

Appendix 1

Special Condition C13: Network Output Measures

Part A: Purpose

2 The purpose of this condition is to ensure the development and maintenance of an appropriate methodology to enable the evaluation of network output measures (as defined in paragraph 2) for the pipe-line system to which this licence relates.

Part B: Development of the Network Output Measures Methodology

3 The licensee shall, in consultation with interested parties, before 31 May 2008, or such later date as the Authority may direct, submit a methodology (the "network output measures methodology") for approval by the Authority in accordance with paragraphs 7, 8 and 9. The network output measures methodology shall be designed to enable the evaluation of:

3.1. the current condition of the assets which collectively form the pipe-line system to which this licence relates (including the condition of the principal components of those assets) (collectively, "network assets"), the reliability of network assets, and the predicted rate of deterioration in the condition of network assets which is relevant to making assessment of the present and future ability of network assets to perform their function ("network asset condition");

3.2. the overall level of risk to the reliability of the pipe-line system to which this licence relates as a result of network asset condition and the interdependence between network assets ("network risk");

3.3. those aspects of the technical performance of the pipe-line system to which this licence relates which have a direct impact on the reliability and cost of services provided by the licensee as part of its transportation business ("network performance"); and

3.4. the level of capability and utilisation of the pipe-line system to which this licence relates at entry and exit points and other network capability and utilisation factors ("network capability");

collectively the "network output measures".

4 The licensee shall set out in its proposed network output measures methodology the categories of data to be used and the methodology to be applied to such data to derive network output measures.

5 The network output measures shall be designed to facilitate:

5.5. the monitoring of the licensee's performance in relation to the development, maintenance and operation of an efficient, co-ordinated and economical pipe-line system for the conveyance of gas;

5.6. the assessment of historical and forecast network expenditure on the pipe-line system to which this licence relates;

5.7. the comparative analysis over time between:

5.7.1. geographic areas of, and network assets within the pipe-line system to which this licence relates;
5.7.2. pipe-line systems for the conveyance of gas within Great Britain; and
5.7.3. pipe-line systems for the conveyance of gas in Great Britain and in other countries.

5.8. the communication of relevant information regarding the pipe-line system to which this licence relates between the licensee, the Authority and interested parties in a transparent manner; and

5.9. the assessment of customer satisfaction derived from the services provided by the licensee as part of its transportation business;

collectively the "Network Output Measures objectives".

6 Save where the Authority otherwise consents, when submitting its network output measures methodology proposal for approval by the Authority in accordance with paragraph 2, the licensee shall also provide the Authority with:

6.10. analysis and reports relevant to the development of the network output measures methodology, including supporting data and models to indicate how the proposed methodology facilitates the Network Output Measures objectives;

6.11. a description of the data and treatment applied to that data used in the network output measures methodology; and

6.12. historical data which was used in the network output measures methodology. Historical data should, where reasonably practicable, be provided for a period of at least ten years preceding the year in which the proposal is submitted.

7 The Authority shall review the proposed network output measures methodology submitted to it under paragraph 2 and shall consult with the licensee and where appropriate other interested parties.

8 If the Authority is satisfied that the network output measures methodology proposed by the licensee in accordance with paragraph 2 facilitates the Network Output Measures objectives, the Authority shall approve the proposed network output measures methodology.

9 If the Authority is satisfied that the network output measures methodology proposed by the licensee in accordance with paragraph 2 would, if amended, facilitate the Network Output Measures objectives, the Authority may approve such proposed network output measures methodology with such amendments as the Authority shall direct.

10 If the Authority is not satisfied that the network output measures methodology proposed by the licensee in accordance with paragraph 2 facilitates the Network Output Measures objectives, or if the Authority is not satisfied that the proposed methodology would facilitate the Network Output Measures objectives if amended, the Authority shall issue a notice of disapproval of such proposed network output measures methodology. The

Authority shall, in such a notice, provide reasons for such disapproval. The Authority shall also, after consulting with the licensee and other interested parties, direct the areas in which the licensee shall make improvements to the network output measures methodology that it has proposed, and the date by which the licensee shall propose to the Authority such an improved network output measures methodology.

Part C: Implementation of the Network Output Measures Methodology

11 Where the network output measures methodology has been approved by the Authority under paragraph 7 or 8, and which may be modified from time to time in accordance with Part D of this Condition, the licensee shall:

11.13. from 1 April 2009, or such later date as the Authority may direct, record the data required for the application of the network output measures methodology together with the network output measures derived pursuant to it;

11.14. in respect of the formula year commencing on 1 April 2009 (or such later date as the Authority may direct) and each subsequent formula year, submit a report on the network output measures to the Authority by 31 July (or such later date as the Authority may direct) in the year immediately following the end of the formula year to which the network output measures relate. The Authority will propose any corresponding specific reporting arrangements applicable to the network output measures in accordance with Standard Special Condition A40 (Price Control Review Information).

12 Where the network output measures methodology has been approved by the Authority under paragraph 8 the licensee shall also provide the Authority, as soon as is reasonably practicable, with the relevant data as specified under paragraph 5(c) reflecting the amendments to the proposed network output measures methodology as directed by the Authority.

Part D: Modification to the Network Output Measures Methodology

13 The licensee shall at all times keep the approved network output measures methodology under review to ensure that it facilitates the Network Output Measures objectives.

14 The licensee shall, subject to paragraphs 14, 15 and 16, make such modifications to the approved network output measures methodology as may be required to better facilitate the Network Output Measures objectives.

15 Except with the consent of the Authority, before making a modification to the network output measures methodology the licensee shall:

15.15. consult interested parties and allow them a period of not less than 28 days within which to make written representations;

15.16. furnish the Authority with a report setting out:

(i) the proposed modification to the approved network output measures methodology;
(ii) the representations (if any) made to the licensee and not withdrawn;
(iii) any changes to the modification proposed to the approved network output measures methodology proposed as a consequence of such representations;
(iv) how the proposed modification better facilitates the Network Output Measures objectives;
(v) the data used to develop the modification to the network output measures methodology. Historical data should, where reasonably practicable, be provided for a period of at least ten years preceding the year in which the modification was proposed;
(vi) a timetable for implementation of the modification, provided that no such modification may be implemented earlier than the date on which the period referred to in paragraph 15 expires; and

(c) where the Authority has given a direction that sub-paragraphs 14(a) and/or 14(b) shall not apply, comply with such other requirements that the Authority may specify in the direction in respect of proposals to modify the network output measures methodology.

16 Where the licensee has complied with the requirements of paragraph 14, it shall, unless the Authority has within 28 days of the report being furnished to it given a direction that the modification may not be made, implement the modification to the network output measures methodology. The Authority shall propose any corresponding changes to the specific reporting arrangements in accordance with Standard Special Condition A40 (Price Control Review Information).

17 The Authority may review the network output measures methodology (in consultation with the licensee and/or interested parties) and revisions to the network output measures methodology may be directed by the Authority in a manner specified in the directions and the licensee shall forthwith comply with any such directions. The Authority shall propose any corresponding changes to the specific reporting arrangements in accordance with Standard Special Condition A40 (Price Control Review Information).

Appendix 2: Secondary Asset Groups Listing

	Primary Assets				
Secondary Asset Groups	**Entry Point**	**Pipeline**	**MultiJunction**	**Compressor**	**Exit Point**
Civil assets - drainage	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Civil assets - access	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Civil assets - buildings/enclosures	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Civil assets - pipe supports	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fuel tanks & bunds	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Electrical - including standby generators	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Electrical - safe shutdown (UPS etc)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Filter / Scrubbers	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fire and gas detection	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Fire Protection	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Major River Xing's	**N/A**	**Yes**	**N/A**	**N/A**	**N/A**
Network Control and Instrumentation (telemetry, pressure, flow and temperature)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Pig Trap	**Yes**	**Yes**	**Yes**	**N/A**	**Yes**
Below Ground Pipe Coating	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Locally Actuated Valves	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Process valves (remotely operated valves)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Acoustic cladding	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Civil Assets - ducting	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Cathodic Protection	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Impact protection (N2 Sleeves)	**N/A**	**Yes**	**N/A**	**N/A**	**N/A**
Markers	**N/A**	**Yes**	**N/A**	**N/A**	**N/A**
Above Ground Pipe Coating	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Security	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
After coolers	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Air intake	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Exhausts	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Boundary Controllers	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Cab ventilation	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Compressor	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Flow or pressure regulator including measurement	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Gas analyser	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Gas Generator	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Fiscal metering	**Yes**	**N/A**	**N/A**	**N/A**	**Yes**
Fuel gas metering	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Odorisation Plant	**N/A**	**N/A**	**N/A**	**N/A**	**Yes**
Power turbine	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Preheaters	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Station process control system	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Unit control system	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Recycle line & valve	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Starter motor	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Vent system	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Electrical variable speed drive	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Non return valve	**N/A**	**N/A**	**N/A**	**Yes**	**N/A**
Slam shut system	**Yes**	**N/A**	**Yes**	**Yes**	**Yes**
Safety valves (remotely operated valves)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Civil assets - bridges	**N/A**	**Yes**	**N/A**	**N/A**	**N/A**

Yes – Secondary Asset Group applies to Primary Asset
N/A – Secondary Asset Group not part of Primary Asset

Appendix 3: National Transmission System Measures included in the HSE Report "Major Hazards Safety Performance Indicators in the UK Onshore Gas and Pipeline Industry"

- Pipeline Fault Data – NTS data is provided as part of the United Kingdom Onshore Pipeline Association (UKOPA)

- Gas Quality Excursions – provides data on the number of Terminal Flow Advice notices issued as a result of gas quality excursions at the entry points.

- Maximum Operating Pressure (MOP) Excursions – Number of occasions MOP exceeded in accordance with Institution of Gas Engineers and Managers (IGEM) document on Recommendations on Transmission and Distribution Practice for Steel Pipeline for High Pressure Gas Transmission TD/1 Edition 4.

- Distribution Entry Point Pressure – Number of occasions the inlet pressure to a Distribution Network Offtake falls below 38Barg.

Appendix 4 – Example - Network Asset Condition Report

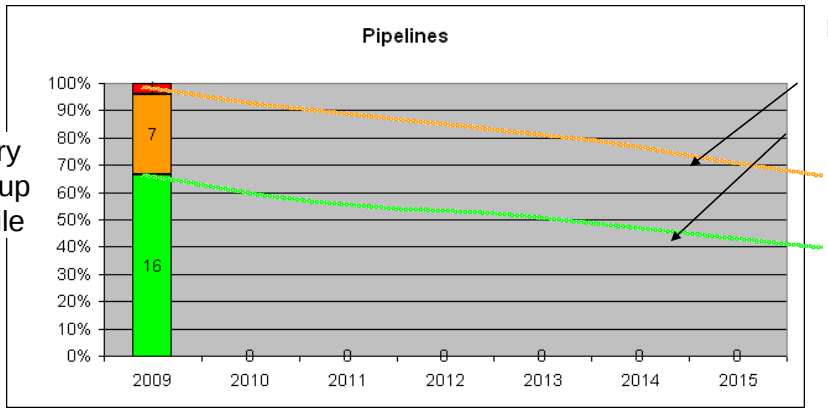
	Primary Asset -Entry Point					
Secondary Asset Groups	**Unit**	**No of Asset groups where work may be required within 2 Years**	**No of Asset groups where work may be required within 5 ears but not less than 2 years**	**No of Asset groups where work may be required within 10 years but not less than 5 years**	**No of Asset groups where work may be required within not less than 10 years**	**Total No of Assets Groups**
Above Ground Pipe Coating	**Site**					
Acoustic cladding	**Site**					
Below Ground Pipe Coating	**Site**					
Cathodic Protection	**System**					
Civil assets - access	**Site**					
Civil assets - buildings/enclosures	**Site**					
Civil assets - drainage	**Site**					
Civil Assets - ducting	**Site**					
Civil assets - pipe supports	**Site**					
Electrical - including standby generators	**Site**					
Electrical - safe shutdown (UPS etc)	**Site**					
Filter / Scrubbers	**Site**					
Fire and gas detection	**Site**					
Fire Protection	**Site**					
Fiscal metering	**Streams**					
Flow or pressure regulator including measurement	**Streams**					
Fuel tanks & bunds	**Units**					
Gas analyser	**Units**					
Locally Actuated Valves	**Units**					
Network Control and Instrumentation (telemetry, pressure, flow and temperature)	**Sites**					
Pig Trap	**Units**					
Preheaters	**Units**					
Process valves (remotely operated valves)	**Units**					
Safety valves (remotely operated valves)	**Units**					
Security	**Site**					
Slam shut system	**Units**					
Station process control system	**Site**					
Vent system	**Unit**					

Appendix 5 - Example Network Risk Report

Example - Network Risk Report

Gas NTS Network Risk Profile for Pipelines

Secondary asset Group Risk Profile



Projected risk if secondary asset group condition not addressed

nationalgrid

Appendix 6 – Example Network Performance Report

Network Performance Report	Previous Years Performance			Current Year	Details
	2006/7	2007/8	2008/9	2009/10	Site / Pipeline Affected
Number of unplanned events where the operating pressure of a pipeline has been reduced to carry out a repair or investigate the condition of the pipeline.	1	0	0	1	
Number of unplanned events where the flow into the network from an Entry Point has been restricted because of an asset fault or failure.	0	0	0	1	
Number of unplanned events where the flow from the network at an Exit Point has been restricted because of an asset fault or failure.	0	0	0	0	

Appendix 7 Annual Price Control Review Report with Capability and Utilisation information

5.1 System characteristics	As at end of reporting year				Additions during year	Removals during year
		Sub-total by pressure tier				
Pipelines	**Total**	**'X' bar**	**'Y' bar**	**'Z' bar**		
1200mm diameter (km)						
1050mm diameter (km)						
900mm diameter (km)						
750mm diameter (km)						
600mm diameter (km)						
<=450mm diameter (km)						
Totals						
Compressors						
Gas turbine (#)						
Electric drive (#)						
Gas turbine total capacity (MW)						
Electric drive total capacity (MW)						
Offtakes (#)						
Others						
Block valve sites (#)						
Pig trap sites (#)						
Multijunctions (#)						

5.2 Activity indicators	Total for reporting year	Monthly Breakdown	
		April	May
Actual flows at system entry points (GWh) Entry Points			
Total Entry Flows			
Actual NTS Demand (GWh) **by LDZ**			
Total LDZ Demand			
Interconnector Export			
Total Exports via Interconnectors			
NTS Direct Connect Industrials (by LDZ)			
Total NTS Direct Connect Industrials			
Power Stations **Storage** **Shrinkage**			

5.3 Transmission system utilisation & performance	Total for reporting year	Monthly breakdown	
		April	May
NTS Demand			
Highest daily total demand (GWh/day)			
Highest daily total entry (GWh/day)			
1 in 20 peak day demand by LDZ (GWh/day)			
Total energy transmitted to offtake points (GWh)			
Units of transmission shrinkage (GWh)			
System performance			
Number of Transmission system incidents (#)			
Compressor availability (% of total)			
Compressor MTBF (mean time between failures)			

5.4 System demand and capability	As at end of reporting year	Monthly breakdown	
		April	May
Firm entry capacities booked (GWh/day)			
Entry Points			
Gas entry capacity baselines (GWh/day)			
Entry Points			
Highest actual entry flows - Peak day (GWh/day)		April	May
Entry Points			

5.5 Utilisation of compressor capacity		Total for reporting year	Monthly breakdown		
			April	May	June
Compressor Site	Unit A Unit B Unit C				

Appendix 7 : Annual Price Control Review Report with Capability and Utilisation information

5.6 Environmental Monitoring

C02 emitted by gas powered compressors	**For reporting**
Compressor emissions by site, annually	kg of CO2 per GWh
Compressor Site & Unit ..	
NTS Total	

NOX emitted by gas powered compressors	**For reporting**
Compressor emissions by site, annually	kg of NOX per GWh
Compressor Site & Unit ..	
NTS Total	

Methane emitted from plant	**For reporting**
Total for NTS	kg of methane per GWh
Emissions from pipeline network Emissions from associated equipment	
NTS Total	

Appendix 7 : Annual Price Control Review Report with Capability and Utilisation information

	5.9 ASSET DATA									
	AGE PROFILE		PIPELINES				COMPRESSORS			OFF'S
LIST OF ASSETS	Date Constructed	Design life (years)	Pipeline diameter (mm)	Pipeline length (km)	Design Pressure rating (bar)	Pipeline Feeder number	Compressor unit power rating (MW)	Compressor unit power source	Compressor station total power (MW)	Offtake capacity (scmh)
Pipelines										
Pipeline Name										
Sub total										
Compressors										
Compressor Site & Unit										
Sub total										
Offtakes										
Offtake Name										
Sub total										
Other (e.g. Multijunctions)										
Sub total										
TOTAL										

5.11 Forecast Scenarios

System Entry Points	Minimum Case					Maximum Case					Base Case Scenario			
	Forecast deliverability (GWh/day)					Forecast deliverability (GWh/day)					Forecast deliverability (GWh/day)			
	y+1	y+2	y+3	y+4	y+5	y+1	y+2	y+3	y+4	y+5	y+1	y+2	y+3	y+4
	2007/08	2008/09	2009/10	2010/11	2011/12	2007/08	2008/09	2009/10	2010/11	2011/12	2007/08	2008/09	2009/10	2010/11
Entry points														
Total														

LDZ and NTS Demands	Maximum Peak Day DN forecast				
	Forecast (GWh/day)				
	y+1	y+2	y+3	y+4	y+5
	2007/08	2008/09	2009/10	2010/11	2011/12
LDZ					
LDZ Total					
NTS					
Total					