Non-Standard Gas Entry Conditions Assessment Report – Connection 3

What the analysis includes:

Assessment of the expected Oxygen content on the Network after the connection, and where any oxygen element is expected to reach in the NTS from the connection, and at what percentage, on a typical worst case demand level.

Limitations:

- Does not assess all potential network circumstances, such as maintenance, or different supply patterns. For example, with maintenance, pipeline isolation, valve operations, and compressor configurations in the local area may lead to NGT exit points receiving concentrated biomethane; therefore, planned maintenance should be carefully assessed. Given the wide range of possible maintenance scenarios, NGT will make every effort to minimize impacts through specialized maintenance regimes. However, if sufficient blending cannot be maintained, NGT may require customers to reduce or temporarily suspend flow to ensure compliance with gas quality standards across the network.
- Is not a forward-looking statistical view i.e. how often gas will get to a location in the future given future predicted supply/demands.
- Cannot guarantee that any situation analysed will always be the case, and that unforeseen or unassessed scenarios may produce different results.

Site reference: Connection 3

Assumptions:

Assumed flow from site: Oxygen level from site:	0.036 mcm\d 0.2% mol
Potential sites impacted:	Nearest downstream sites, Little Barford PS (38 km), Millbrook PS (52km), Hardwick GDN, Whitwell GDN (82km) and Royston GDN (84km)
Sensitive site assumptions:	Nearest Power station, Little Barford ~38km. Nearest Storage site, Humbly Grove ~ 223km
Blending assumption:	Existing NTS forecast supplies, north to south

Analysis:

Assessment Demand Range: ~ 139 mcm\d

Sites assessed: System wide, with focus on the Southwest and Southeast.

Summary of analysis:

In total 16 days of scenario run on a ~139 mcm\d demand (Day 365 Average), the lowest demand day of the year (Summer Day, expected to be the worst case). This was chosen as it would demonstrate the greatest impact to the network.

Results:

The assessment includes the currently connected Biomethane sites, as follows.

Glentham: flowing at maximum as per Network Entry Agreement, with 0.2% of O2

Murrow: flowing at maximum as per Network Entry Agreement, with 0.2% of O2

The impact on Oxygen content on sensitive sites is as follows.

Power stations:

Offtake	Region	Mol.% (Max)	PPM
Spalding 1 and 2	East Midlands	0.00147	14.7
Sutton Bridge	East Midlands	0.00147	14.7
Marchwood	Southwest	0.00088	8.8
Didcot B	Southwest	0.00085	8.5
Langage	Southwest	0.00073	7.3
PalmPaper	East Midlands	0.00058	5.8
KingsLynn	East Midlands	0.00058	5.8
Epping Green	Southeast	0.00051	5.1
Rocksavage	Northwest	0.00042	4.2
Seabank B	Southwest	0.00041	4.1
Seabank	Southwest	0.00041	4.1
Staythorpe	East Midlands	0.00039	3.9
Corby	Northwest	0.00037	3.7
WestBurton	Northeast	0.00015	1.5
Cottam	Northeast	0.00015	1.5
Saltend	Northeast	0.00012	1.2
Coryton	Southeast	0.00011	1.1
Winnington	Northwest	0	0
Sellafield	Scotland and The North	0	0
Damhead Creek	Southeast	0	0
Isle Of Grain	Southeast	0	0
Pembroke	South Wales	0	0
Gt Yarmouth	East Midlands	0	0
Carrington	Northwest	0	0
Keadby 2	Northeast	0	0
Killingholme	Northeast	0	0

Storage sites:

Offtake Name	Region	Mol.% (Max)	PPM
Humbly Grove	Southwest	0.00083	8.3
Hilltop	Northwest	0.00037	3.7
Holford	Northwest	0.00036	3.6
Stublach	Northwest	0.00003	0.3
Hornsea	Northeast	0	0
Aldbrough	Northeast	0	0
Beltoft	Northeast	0	0

Interconnector:

Offtake	Region	Mol.% (Max)	PPM
Bacton BBL Interconnctor Export	East Midlands	0.00054	5.4
Bacton IUK Interconnector Export	East Midlands	0	

Distribution Network (DN) Offtakes:

Offtake	Region	Mol.% (Max)	PPM
Kirkstead	East Midlands	0.00142	14.2
SuttonBridge	East Midlands	0.00142	14.2
Brisley	East Midlands	0.00086	8.6
Hardwick	Southwest	0.00085	8.5
BraishfieldB	Southwest	0.00082	8.2
Ilchester	Southwest	0.00074	7.4
Coffinswell	Southwest	0.0007	7
KennSouth	Southwest	0.0007	7
Aylesbeare	Southwest	0.00069	6.9
PetersGrnNT	Southeast	0.00068	6.8
WestWinch	East Midlands	0.00054	5.4
Royston	Southeast	0.00049	4.9
Whitwe	Southeast	0.00049	4.9
PeterborEye	East Midlands	0.0004	4
Blaby	Northwest	0.0004	4
Rugby	South Wales	0.0004	4
MktHarborogh	Northwest	0.0004	4
Maelor	Northwest	0.00039	3.9
Drointon	Northwest	0.00039	3.9
MickleTrafford	Northwest	0.00039	3.9
AudleyNW	Northwest	0.00039	3.9
Malpas	Northwest	0.00039	3.9
Aspley	Northwest	0.00039	3.9
Fiddington	South Wales	0.00038	3.8
Evesham	South Wales	0.00038	3.8
Seabank	Southwest	0.00037	3.7
Cirencester	Southwest	0.00037	3.7
Gilwern	South Wales	0.00036	3.6
RossSW	South Wales	0.00036	3.6
RossWM	South Wales	0.00036	3.6
SilkWilloughby	East Midlands	0.00036	3.6
Dowlais	South Wales	0.00018	1.8
Farningham	Southeast	0.0001	1

The range of penetration into the Network from Connection 3 is as below, with the %X2Y number representing the percentage of gas at that site that has come from Connection 3:

The Worst case %: = 0.24% composition of the gas from Connection 3 at Hardwick DN Offtake.

The Table below shows % of gas at Exit points that has come from Connection 3 (filtered to > 0.07%).

Offtake	**%X2Y**	**Type**	**Region**
Hardwick	0.24428	GDN	Southwest
Humbly Grove	0.24284	ST	Southwest
Marchwood	0.24185	PS	Southwest
Braishfield B	0.23754	GDN	Southwest
DidcotB	0.23466	PS	Southwest
Peters GreenNT	0.19351	GDN	Southeast
Ilchester	0.19215	GDN	Southwest
Kenn South	0.17891	GDN	Southwest
Coffinswell	0.17876	GDN	Southwest
Langage	0.17856	PS	Southwest
Aylesbeare	0.17401	GDN	Southwest
Epping Green	0.14369	PS	Southeast
Royston	0.14362	GDN	Southeast
Whitwell	0.14343	GDN	Southeast
Spalding 1and 2	0.08532	PS	East Midlands
Sutton Bridge	0.08532	GDN	East Midlands
Sutton Bridge	0.08455	PS	East Midlands
Kirkstead	0.08446	GDN	East Midlands

Conclusion: This is acceptable.

Reasoning: The analysis showed that if a 0.2mol% specification for oxygen is agreed with Connection 3, no storage site is expected to receive gas with O2 concentration greater than 0.00083mol%, no power station O2 concentration greater than 0.00142mol%, and no interconnector O2 concentration greater than 0.00054mol%, which is well within GSMR and operational guidelines.