













UNC Modification		At what stage is this document in the process?
<h1>UNC 0607:</h1> <h2>Amendment to Gas Quality NTS Entry Specification at the St Fergus NSMP System Entry Point</h2>		<div>01 Modification</div> <div>02 Workgroup Report</div> <div>03 Draft Modification Report</div> <div>04 Final Modification Report</div>
<p>Purpose of Modification:</p> <p>This enabling modification will facilitate a change to the current contractual Carbon Dioxide limit at the St Fergus NSMP System Entry Point, through modification of a Network Entry Provision contained within the Network Entry Agreement (NEA) between National Grid Gas plc. and North Sea Midstream Partners Limited (NSMP) in respect of the St Fergus NSMP Sub Terminal.</p>		
	<p>The Proposer recommends that this modification should be:</p> <ul style="list-style-type: none"> • subject to self-governance • assessed by a Workgroup <p>This modification will be presented by the Proposer to the Panel on 15 December 2016. The Panel will consider the Proposer's recommendation and determine the appropriate route.</p>	
	<p>High Impact:</p> <p>None</p>	
	<p>Medium Impact:</p> <p>None</p>	
	<p>Low Impact:</p> <p>Transporters, Shippers and Consumers</p>	

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1 Summary

What

This is an enabling modification that seeks to facilitate an increase in the carbon dioxide limit with the Network Entry Agreement at the North Sea Midstream Partners (NSMP) sub-terminal at St. Fergus between National Grid Gas plc and NSMP Ltd. It is proposed to increase the limit from 4mol% to 5.5mol% subject to a cap on aggregate CO₂ and N₂ at 7mol% until the end of Gas Year 2023/24 with any continued relaxation in specification beyond that date subject to an objective test of continued requirement. It is also proposed to make provision in the NSMP St Fergus NEA to allow National Grid to reduce the CO₂ limit at the NSMP St Fergus Entry Point to a level between 4.0mol% and 5.5mol% within the period of time for which this Modification applies in the event that another UNC Modification(s) to increase the CO₂ limit is approved in respect of another System Entry Point and which National Grid NTS would otherwise be unable to accommodate without incurring material cost.

Why

The Rhum gas field can be up to 6.5mol% CO₂, the effects of which are mitigated via blending with low CO₂ gas from Norway to St Fergus via the Vesterled Pipeline. This is not sustainable due to the prohibitive cost of procuring this service from Norwegian shippers, potentially leading to the early cessation of production from Rhum and Bruce fields.

The alternative processing and treatment solutions to remove the excess carbon dioxide have been considered upstream of the NTS (both offshore and onshore at the NSMP sub-terminal), however these would require significant investment and time to implement. Rhum would become cash negative and cease production before any project became operational.

How

In accordance with the UNC Transportation Principal Document Section I 2.2.3 (a), the Proposer is seeking to amend the NEA described above via this enabling modification. On satisfactory completion of the UNC process the parties to the NEA will be able to seek Authority consent to amend the agreement.

2 Governance

Justification for Self-Governance

Self-Governance is proposed because the higher CO₂ gas is unlikely to have a material effect on the following self-governance criteria:

- (aa) existing or future gas consumers as the dilution from low CO₂ (<2mol%) gas from the SEGAL sub-terminal and SAGE sub-terminal (<4mol%) and low (1.5 – 4 mol%) CO₂ gas from Norway via Vesterled means that the gas export into the NTS will remain below 4mol% under most operating scenarios; and
- (bb) competition in the shipping, transportation or supply of gas conveyed through pipes or any commercial activities connected with the shipping, transportation or supply of gas conveyed through pipes. By ensuring continued supplies of UK gas into the system security of supply will be enhanced, competition will be maintained and flow of gas into the NTS will be maintained; and

- (cc) *the operation of one or more pipe-line system* as continued flow of Bruce and Rhum gas (up to 5% of UK domestic gas supply) will maintain flow rates in the NTS and extend system life ensuring security of supply and the opportunity to develop additional flows into the system in the future; and
- (dd) *matters relating to sustainable development, safety or security of supply, or the management of market or network emergencies.* The modification will maintain security of supply by ensuring that fields do not prematurely cease production and more indigenous gas will flow into the market giving greater coverage for market or network emergencies.

Requested Next Steps

Panel is asked to:

- Determine whether this modification is subject to self-governance; and
- Refer this proposal to a Workgroup for assessment.

The preliminary views indicate there will be no impact on existing or future gas consumers as the dilution from low CO₂ from the SEGAL and SAGE sub-terminals and low CO₂ gas from Norway via Vesterled means that the gas export into the NTS will remain below 4mol% under most operating scenarios. Indeed, security of supply will be enhanced and recovery of oil and gas from the UKCS will be maximised. The Panel's engagement is sought to assess the impact of the requested change, in order to confirm that a higher CO₂ limit at St Fergus NSMP sub-terminal would be beneficial for the GB gas market.

3 Why Change?

With the increasing maturity of UKCS as a gas production area, all producers are being asked by the OGA to focus on maximising economic recovery (MER) from existing fields.

The current CO₂ limit at the St Fergus NSMP sub-terminal is 4.0mol%. The commingled stream that arrives at the terminal via the FUKA pipeline system is derived from a number of Northern North Sea and West of Shetland fields including the BP operated Rhum field. The CO₂ content of the Rhum gas is between 6.2% - 6.5mol% and the Rhum field currently relies on blending with other fields in order to meet Gas Entry Conditions. As this gas is blended with other Shippers' gas within the FUKA pipeline (including the low CO₂ gas from the Laggan/Tormore fields) by the time it enters the NTS the CO₂ content is below 4.0mol%.

On occasions when the Laggan/Tormore fields trip and temporarily cease to export low CO₂ gas into the FUKA pipeline high CO₂ content gas from the Rhum field can remain in the pipeline. Restarting gas export from the Laggan/Tormore fields then leads to a short duration increase in the CO₂ content of gas arriving at the St Fergus NSMP sub-terminal above 4.0mol% as the increasing pipeline pressure from the Laggan/Tormore restart pushes the high CO₂ Rhum gas along the pipeline and into the sub-terminal. In order to mitigate this intermittent risk of exceeding the 4.0mol% when Laggan Tormore restarts, a guaranteed daily flow of additional low CO₂ blend gas is procured from Norway to the St Fergus NSMP sub-terminal via a commercial arrangement. This gas is transported daily to the St Fergus NSMP sub-terminal via the Norwegian Vesterled pipeline. The commercial mechanism with the Norwegian shippers is costly and Rhum cannot endure having to continually purchase blend gas to cover the brief periods when additional blending gas may be required.

In addition, gas with low CO₂ content is exported into the NTS from the two other sub-terminals (SAGE and SEGAL) which are adjacent to the NSMP sub-terminal. Gas from these terminals allows "fortuitous" blending of gas within the manifold area of the NTS prior to gas entering the five NTS export pipelines

from the St Fergus sub-terminals thereby reducing the combined CO₂ content of the export gas before the gas reaches consumers.

For Information; NSMP gas including Rhum is GS(M)R compliant with or without Laggan Tormore flows from the Shetland Gas Plant. Bruce/Rhum gas on its own is GS(M)R compliant. If Rhum gas flows at normal export rates and is commingled with all FUKA sources excluding Laggan/Tormore, the composition of the combined export gas is ~4.5mol% CO₂. With Laggan/Tormore fields flowing and Rhum at peak rates, the CO₂ content of the commingled gas in the FUKA pipeline is <2.7mol%.

Rhum has been delivering natural gas into the NTS as part of a commingled stream since 2005. St Fergus NSMP sub-terminal delivery to the NTS has not exceeded 4.0mol%. Rhum production flows of c.4.5 mcmd is, on average, about 15% of the total flow through FUKA and Rhum and Bruce combined account for approximately 5% of the UK National Supply.

Historically Rhum was able to export gas into the FUKA system above 3.8mol% CO₂ without increasing the CO₂ content of sub-terminal NTS delivery gas above 4.0mol% by blending the gas with low CO₂ gas from the Bruce/Keith fields (now almost depleted) and from the Alwyn area field (rates now much lower and not far from 4.0mol% CO₂ content. The suspension of Rhum production in 2010 to comply with EU sanctions against Iran (Rhum is jointly owned by the Iranian Oil Company) has created a disparity in the relative remaining gas volumes and production rates of Rhum gas relative to the Bruce/Keith and Alwyn fields resulting in the requirement for additional firm delivery to the NSMP sub-terminal of low CO₂ volumes of Norwegian blend gas.

The import of firm volumes of low CO₂ Norwegian gas was imported via the Vesterled pipeline (from Heimdal in the Norwegian sector to the NSMP terminal) to offset the decline in blending sources within the FUKA pipeline and ensure the CO₂ content in the export gas from the sub-terminal into the NTS remained below 4.0mol% commenced in 2015. This activity was viewed as a short-term measure until the Laggan/Tormore fields and the associated Shetland Gas Plant started up (February 2016). While Laggan/Tormore gas provides low CO₂ gas directly into the FUKA system, modelling of pipeline flow behaviour and the subsequent observation of actual pipeline flows, has led to a requirement for an increase in the volume of firm Norwegian gas which has to be delivered on a daily basis. This is because when there is an unplanned trip/outage of the Laggan/Tormore fields, gas from the Rhum field that is already in the FUKA pipeline causes an increase in the CO₂ content of FUKA pipeline gas. On restart and ramp-up of Laggan/Tormore production the “slug” of high CO₂ content gas already in the FUKA pipeline is accelerated into the St Fergus terminal causing a pulse of higher CO₂ gas which requires the firm delivery of Norwegian gas to blend down to <4.0mol% prior to entry into the NTS.

Once delivered into the FUKA system the Rhum gas delivery rate at the terminal is largely determined by the flow rates into the FUKA system from the Alwyn area (up to 6 mcm/d) and from the Laggan/Tormore fields (currently up to 14 mcm/d) in addition to the Bruce and Rhum flow rates. Hence a slug of up to 10 mcm of Rhum composition gas (between 3.8-6.5mol% CO₂) could in principle arrive at the NSMP sub-terminal at rates of 20 up to mcm/d. As an unplanned outage of the Laggan/Tormore fields cannot be predicted, the St Fergus terminal operator has requested a constant volume of Norwegian gas at sufficient quantity to constantly cover the risk of a Laggan/Tormore restart generating a pulse of higher CO₂ gas causing a breach of the CO₂ specification in the NEA (4 mol%). A constant flow of Norwegian gas is required to guarantee meeting the NEA specification limit of 4.0mol% CO₂ as it would take too long for a reactive increase in Norwegian gas flow to reach the terminal. The cost of continuous provision of this gas at the flow rates required to cover Laggan Tormore field re-starts is prohibitive.

The provision of processing and treatment solutions to remove the excess CO₂ upstream of the NTS (both offshore and onshore at the NSMP sub-terminal) have been considered however, these would

require significant investment and substantial time (3+ years) to implement. The Rhum field will become sub-economic and cease production before such a project became operational. While, the planned life of the Rhum field is until at least 2023, longevity is limited by the economic life of the host platform at the Bruce field. There is insufficient production from the Bruce field to cover the operating costs for the Bruce platform which is reliant on a throughput related cost share arrangement with the Rhum field to cover such costs. If Rhum field cannot flow at sufficiently high rates (either due to the cost of providing Norwegian blend gas or due to curtailment to meet current CO₂ specifications) there will be insufficient flow to cover Bruce platform costs and the Bruce, Rhum and Keith fields will cease production.

To assess the feasibility of gas with a higher CO₂ content exiting the NSMP sub-terminal, BP has engaged with National Grid NTS to understand whether a higher limit would be compatible with network safety and operational efficiency. The preliminary results of National Grid NTS and BP work have so far identified no material increase in risks associated with 5.5mol% CO₂ content. In addition, as gas at other St Fergus System Entry Points has a CO₂ content significantly lower than 4.0mol%, modelling demonstrates that gas with higher CO₂ content at the NSMP System Entry Point could be blended with gas from the adjacent sub-terminals without impacting the system or consumers. It should also be noted that CO₂ is not a defined parameter in the Gas Safety (Management) Regulations 1996, and no amendment of GS(M)R is required.

What the effects are should the change not be made

The significant cost of securing additional firm blend gas from Norway will lead to the early Cessation of Production from the Rhum and associated Bruce and Keith fields. This problem could be addressed by treating the gas for removal of CO₂ at the wellhead or at the terminal, but the investment to bring the quality in line with current specification would be significant, take many years to complete and would make these fields uneconomic.

This modification seeks to establish a change to the existing NEA parameters as a more efficient and economic approach to facilitate delivery of potential new supplies to the System, subject to ensuring no adverse impact on consumers or on the operation of the pipeline system. Therefore, in light of the preliminary views achieved so far, the Panel's engagement is sought to assess the impact of the requested change, in order to confirm that a higher CO₂ limit at St Fergus NSMP sub-terminal would be beneficial for the GB gas market.

If the change isn't made then the resulting impacts will most likely be;

- Early abandonment of Rhum, Bruce and Keith, loss of 600 jobs and U.K. tax revenues.
- Stranded reserves (~50% reserves) that would otherwise be economic to produce.

4 Code Specific Matters

Reference Documents

None

Knowledge/Skills

No additional skills or knowledge is required to assess this modification

5 Solution

This modification seeks to amend a Network Entry Provision within the existing St Fergus NSMP System NEA. This amendment would increase the CO₂ upper limit for gas delivered from the St Fergus NSMP Sub-Terminal System Entry Point into the National Transmission System to 5.5mol% from the current limit of 4.0mol% subject to a cap on aggregate CO₂ and N₂ at 7mol% until the end of Gas Year 2023/24 with any continued relaxation in specification beyond that date subject to an objective test of continued requirement. It is also proposed to make provision in the NSMP St Fergus NEA to allow National Grid to reduce the CO₂ limit at the NSMP St Fergus Entry Point to a level between 4.0mol% and 5.5mol% within the period of time for which this Modification applies in the event that another UNC Modification(s) to increase the CO₂ limit is approved in respect of another System Entry Point and which National Grid NTS would otherwise be unable to accommodate without incurring material cost.

6 Impacts & Other Considerations

Does this modification impact a Significant Code Review (SCR) or other significant industry change projects, if so, how?

No impact identified.

Consumer Impacts

No impact/positive impact. Consumers can currently receive gas at 4mol% from both the SAGE and St Fergus NSMP sub-terminals. In the event of a CO₂ excursion by a sub-terminal, fortuitous commingling within the manifold area of the National Grid terminal can prevent the gas entering the five NTS export pipelines from the St Fergus sub-terminals from exceeding 4mol%, although this is not routinely utilised by NSMP. BP's analysis to support this Modification showed that such commingling could be expected to maintain gas entering the NTS at St Fergus at below 4mol%.

For Information; NSMP gas including Rhum is GS(M)R compliant with or without Laggan Tormore flows from the Shetland Gas Plant. Rhum gas on its own is GS(M)R compliant.

If Rhum gas flows at normal export rates and is commingled with all FUKA sources excluding Laggan/Tormore, the composition of the combined export gas is ~4.5mol% CO₂. With Laggan/Tormore fields flowing and Rhum at peak rates, the CO₂ content of the commingled gas in the FUKA pipeline is <2.7mol%.

Implementing the change will remove the significant cost of securing additional firm blend gas from Norway and remove the probability of early Cessation of Production from the Rhum and associated Bruce and Keith fields. This will have a positive impact on the security of supply for the UK as a whole. Recovery of oil and gas from the specific fields will be maintained, while the continued flow of gas into the pipeline systems ensure a more efficient and economic operation of the pipeline system and the increased utilization of the existing infrastructure capacity will extend the useful life of existing assets and enable further new developments to access the pipeline infrastructure in the future.

Cross Code Impacts

None identified.

EU Code Impacts

None identified.

Central Systems Impacts

None.

User Pays

User Pays	
Classification of the modification as User Pays, or not, and the justification for such classification.	No User Pays service would be created or amended by implementation of this modification and it is not, therefore, classified as a User Pays Modification.
Identification of Users of the service, the proposed split of the recovery between Gas Transporters and Users for User Pays costs and the justification for such view.	None
Proposed charge(s) for application of User Pays charges to Shippers.	None
Proposed charge for inclusion in the Agency Charging Statement (ACS) – to be completed upon receipt of a cost estimate from Xoserve.	None

7 Relevant Objectives

Impact of the modification on the Relevant Objectives:	
Relevant Objective	Identified impact
a) Efficient and economic operation of the pipe-line system.	Positive
b) Coordinated, efficient and economic operation of (i) the combined pipe-line system, and/ or (ii) the pipe-line system of one or more other relevant gas transporters.	None
c) Efficient discharge of the licensee's obligations.	None
d) Securing of effective competition: (i) between relevant shippers; (ii) between relevant suppliers; and/or (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant	Positive

shippers.	
e) Provision of reasonable economic incentives for relevant suppliers to secure that the domestic customer supply security standards... are satisfied as respects the availability of gas to their domestic customers.	None
f) Promotion of efficiency in the implementation and administration of the Code.	None
g) Compliance with the Regulation and any relevant legally binding decisions of the European Commission and/or the Agency for the Co-operation of Energy Regulators.	None

This modification to change the CO₂ limit at the NSMP Sub Terminal has been preceded by discussion between National Grid NTS and BP, aimed at assessing the feasibility of such change. Some of the following considerations therefore reflect both the results of National Grid NTS analysis and BP's own assessment of changes.

Positive impacts have been identified on the objectives of *a) efficient and economic operation of the pipeline system and on d) competition among shippers.*

The combined flows of Bruce and Rhum fields contribute around 5% of UK domestic gas supply into the NTS. These flows help towards a more efficient and economic operation of the pipeline system thanks to an increased utilisation of the existing infrastructure capacity and extending the useful life of existing assets. In addition, extending the production life of the Bruce and Rhum assets allows a wider range of gas into the network and mitigates instances of interruption in production flows, due to seasonal maintenance programs which affect the overall supply of gas to the UK market.

Competition between shippers should be improved through maximization of available production by avoiding early cessation of production, maintaining diversity and reducing reliance on imported gas. In addition, the presence of domestic supplies could contribute to efficient price formation and help sustain NBP as a liquid hub.

8 Implementation

No implementation date is proposed.

As self-governance procedures are proposed, implementation could be sixteen business days after a Modification Panel decision to implement, subject to no Appeal being raised.

9 Legal Text

As this is an enabling modification, no UNC legal text is required.

For completeness, the following legal text is suggested to modify Network Entry Provisions contained within the NEA.

"2.3 Gas tendered for delivery by System Users to the System at the System Entry Point shall not contain any solid, liquid or gaseous material which would interfere with the integrity or operation of the System or any pipeline connected to such System or any appliance which a consumer might reasonably be

expected to have connected to the System. In addition, all gas delivered to the System at the System Entry Point shall be in accordance with the following values:

*(k) Carbon Dioxide not more than 5.5mol% (or such other limit as may be agreed) during the Modification Period and not more than 4.0mol% at all other times**

(o) The aggregate content of CO₂ and N₂ in delivery gas shall not exceed 7mol% during the Modification Period”

*This would be appropriately qualified in the NEA amendment to enable a reduction in the CO₂ limit to between 4.0mol% and 5.5mol% to be applied within the Modification Period with the objective of sharing flexibility available in a non-discriminatory manner if another UNC Modification(s) to increase the CO₂ limit at another System Entry Point(s) were to be approved and which National Grid would otherwise be unable to accommodate at no material cost.

It is also envisaged that at the end of each Gas Year from 2023 NSMP will be required to demonstrate to National Grid NTS that commingled gas with CO₂ concentrations in excess of 4mol% has been received at the St Fergus plant through the FUKA pipeline during that year and if this cannot be demonstrated the Modification Period will end at 1st October of the following Gas Year.

National Grid NTS would be obliged to notify all Users of the start and end dates of the Modification Period and any reduction in the CO₂ limit that may be applied within the Modification Period pursuant to UNC TPD Section I2.2.6.

10 Recommendations

Proposer's Recommendation to Panel

Panel is asked to:

- Determine whether this modification is subject to self-governance; and
- Refer this proposal to a Workgroup for assessment.

Appendix A

The Rhum field is an oil and gas field located in the Northern North Sea and is operated by BP and jointly owned by the Iranian Oil Company. The field has no stand-alone facilities and production is from two sub-sea wells tied-back via a sea bed flowline to the adjacent Bruce field production platform.

The FUKA pipeline system and NSMP sub-terminal at St Fergus transports and processes gas from a number of Northern North Sea and West of Shetland fields including the Rhum field and the recently developed Laggan and Tormore fields (operated by Total).

The NSMP Sub-terminal NEA specification limit is 4.0mol% CO₂ as is the SAGE NEA specification. The SEGAL Sub-terminal NEA specification limit is 1.6mol% CO₂.

Figure 1 provides a schematic of the layout of the terminals and fields. Figure 2 shows the physical location of the SAGE, SEGAL and St Fergus NSMP sub-terminals.

Figure 1. Simplified schematic of Sub terminals entry into NTS

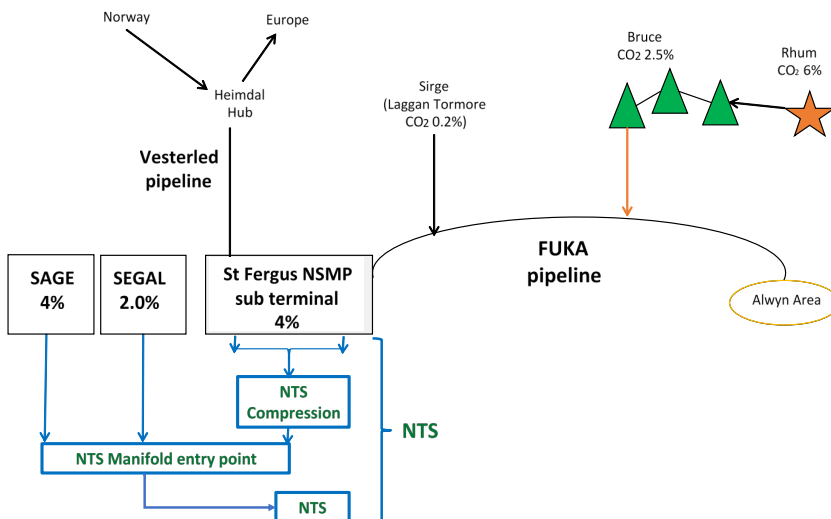


Figure 2. Physical location of the SAGE, SEGAL and St Fergus NSMP sub-terminals

