THE NATIONAL GRID COMPANY plc

GRID CODE REVIEW PANEL

GRID CODE - OC5 CHANGES

1. Introduction

1.1. This paper reports on the progress made on the review of OC5. The review group was set up following the acceptance of paper GCRP 00/29 at the 23 November 2000 meeting of the Grid Code Review Panel. Nominations for inclusion in the review group were received from Innogy, PowerGen, British Energy and TXU.

1.2. With the bulk of the redrafting of the Grid Code to reflect the changes brought about by NETA completed, paper GCRP 00/29 proposed that the group would initially consider re-writing OC5 using the current principles incorporating a flowchart format and a rationalisation of common text. Once complete the group could consider further the other issues proposed in GCRP 99/27. The working group was asked to report back to the Grid Code Review Panel meeting in May 2001

2. Background

2.1. Grid Code section OC5 lays out the rules for the monitoring (and when necessary the testing) of Users equipment to ensure compliance with the selected parts of the Grid Code, Ancillary Service Agreements and dynamic parameters. Grid Code OC5 also lays down the framework for the handling and resolution of disputes as a result of the monitoring and testing process

2.2. The layout of Grid Code section OC5 is by way of each paragraph/service/parameter being monitored and tested. Since the process in each case is essentially the same this results in considerable duplication of wording which might be rationalised into common text.

2.3. The redrafting necessary for the introduction of NETA which was limited to straight substitution of the new terms has also resulted in text which is difficult to understand

3. Main Points of Proposed Rewording

3.1. The working group has examined the text of Grid Code section OC5 with the aim of simplifying the text without alteration of the underlying principles. Where the redrafting carried out for NETA has resulted in obscure wording, the working group has proposed clearer but equivalent text.

3.2. With two exceptions the revised layout for Grid Code section OC5 proposed by the working group rationalises all the procedures for monitoring, testing and disputes resolution into common text. A table has been introduced to set out the assessment criteria applicable to the individual plant performance being measured. The two exceptions referred to above are:-

a) the requirements for Black Start Testing, which is retained as a separate section (OC5.7), and

b) the deletion of OC5.4.2.5 as this level was considered inappropriate.

3.3. Attachment 1 to this paper illustrates which sections of text were identified as common, and indicates the proposed structure. Attachment 2 comprises the proposed new wording of OC5, with changes from the existing OC5 shown.

4. The Next Steps

4.1. The paper GCRP 99/27 proposed the following ideas to form the overall scope of the redrafting of OC5:

a) Rationalise common text for each of the test area requirements using flow chart principles incorporating changes necessary for NETA.

b) Include full references to Generator Connection Conditions for compliance and ongoing lifetime testing.

c) Add provisions for testing for Connection Conditions on User networks.

d) Add provisions for dual fuel operation.

e) Remove the Settlement System Administrator provisions.

f) Replace the disputes resolution procedure with a common resolution process based on a independent engineer.

4.2. Having completed the review of items (a) and (e) as agreed in the subsequent paper GCRP 00/29 the group is proposing to examine items (b) and (c). The latter will require the addition of a network operator representative to the working group.

5. Working Group Nominations

5.1. In order to ensure correct representation at the working group the Grid Code Review Panel is asked to nominate representatives from network operators to contribute to this review. With the aim of holding the first working group meeting in August 2001, nominations are requested by the end of June 2001.

6. **Recommendation**

6.1. The Grid Code Review Panel is requested to:

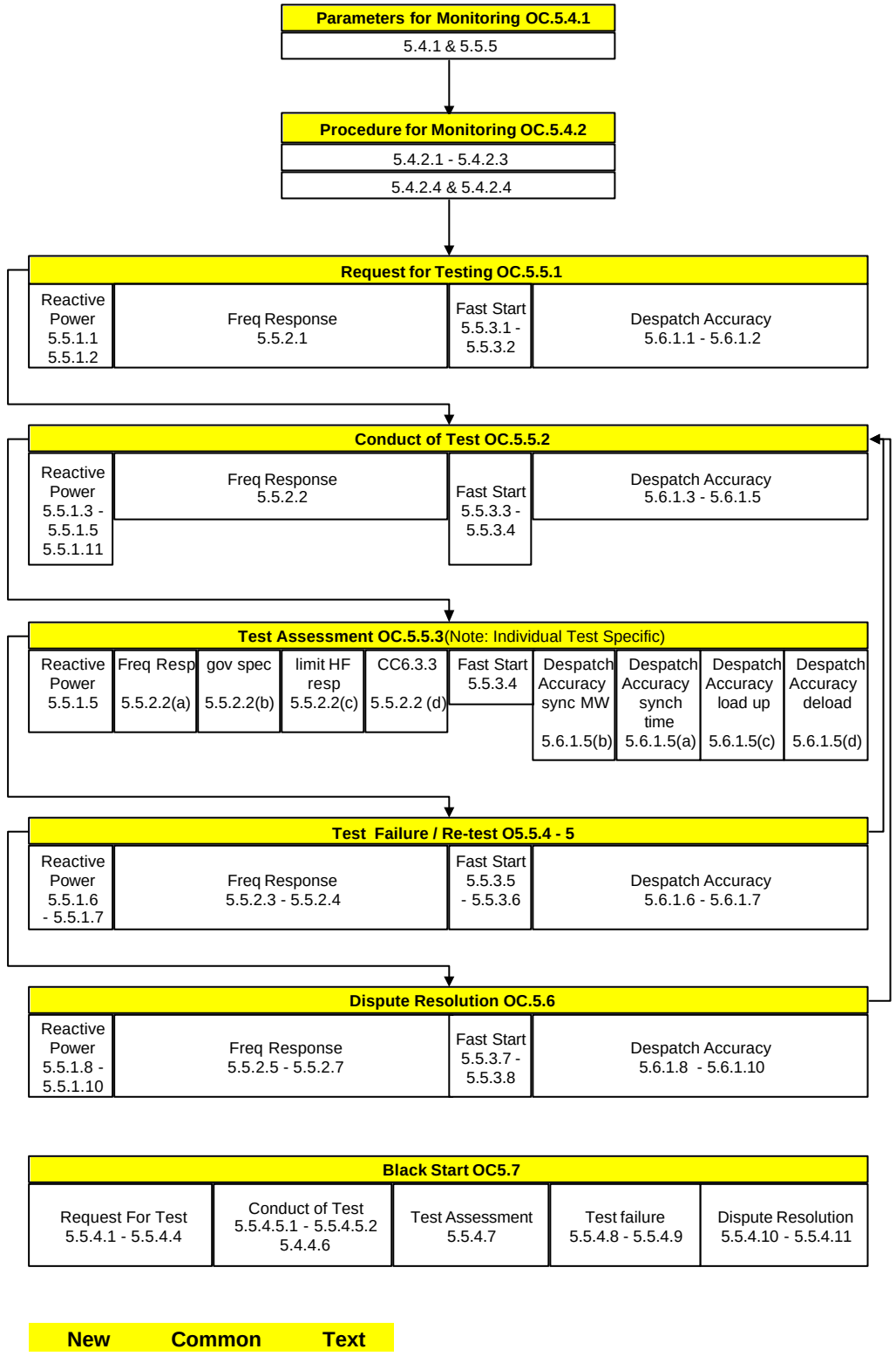
(i) consider the revised wording for Grid Code section OC5 attached to this paper and note that, subject to comments raised, this will form the basis of a consultation paper to be issued in the near future;

(ii) agree that the OC5 review group should now consider the inclusion of full references to Generator Connection Conditions for compliance and ongoing lifetime testing and add provisions for testing for Connection Conditions on User networks; and

(iii) request the nomination of additional representation from distribution network operators for the OC5 review group.

The National Grid Company plc
2nd May 2001

Diagram showing rationalisation of OC5 text to common wording



OPERATING CODE NO. 5

TESTING AND MONITORING

OC5.1 INTRODUCTION

Operating Code No. 5 ("**OC5**") specifies the procedures to be followed by **NGC** in carrying out:

(a) monitoring

(i) of **BM Units** against their expected input or output;

(ii) of compliance by **Users** with the **CC** and in the case of response to **Frequency**, **BC3**; and

(iii) of the provision by **Users** of **Ancillary Services** which they are required or have agreed to provide; and

(b) the following tests (which are subject to **System** conditions prevailing on the day):

(i) tests on **Gensets** to test that they have the capability to comply with the **CC** and, in the case of response to **Frequency**, **BC3** and to provide the **Ancillary Services** that they are either required or have agreed to provide;

(ii) tests on **BM Units**, to ensure that the **BM Units** are available in accordance with their submitted **Export and Import Limits, QPNs, Joint BM Unit Data** and **Dynamic Parameters**.

The **OC5** tests include the **Black Start Test** procedure.

OC5.2 OBJECTIVE

The objectives of **OC5** are to establish:

(a) that **Users** comply with the **CC**;

~~OC5.2.1 To establish whether **BM Units** and (in certain limited circumstances) **CCGT**~~

(b) whether **BM Units** operate in accordance with their expected input or output derived from their **Final Physical Notification Data** and agreed **Bid-Offer Acceptances** issued under **BC2**

~~and that **Users** comply with the **CC.**~~

~~The reference to certain limited circumstances is to the circumstances specified in this OC5 in which the output of **CCGT Units** may be verified, namely the monitoring of the provision of **Ancillary Services**~~

~~and the testing of **Reactive Power** and automatic **Frequency Sensitive Operation**.~~

~~OC5.2.2 To establish whether~~

(c) whether each **BM Unit** is available as declared in accordance with its submitted **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic ~~Parameters.~~Parameters**; and

~~OC5.2.3 To establish whether~~

(d) whether **Generators** and **Suppliers** can provide those **Ancillary Services** which they are either required or have agreed to provide.

In certain limited circumstances as specified in this **OC5** the output of **CCGT Units** may be verified, namely the monitoring of the provision of **Ancillary Services** and the testing of **Reactive Power** and automatic **Frequency Sensitive Operation**;

OC5.3 SCOPE

OC5 applies to **NGC** and to **Users** which in **OC5** means:

(a) **Generators**;

(b) **Network Operators;**

(c) **Non-Embedded Customers**; and

(d) **Suppliers.**

OC5.4 ~~PROCEDURE FOR~~ MONITORING

OC5.4.1 Parameters to be monitored

NGC will monitor the performance of

(a) **BM Units** against their expected input or output derived from their **Final Physical Notification Data** and agreed **Bid-Offer Acceptances** issued under **BC2**;

(b) compliance by **Users** with the **CC**; and

(c) the provision by **Users** of **Ancillary Services** which they are required or have agreed to provide.

OC5.4.2 Procedure for Monitoring

OC5.4.2.1 In the event that a **BM Unit** fails persistently, in **NGC's** reasonable view, to follow, in any material respect, ~~their~~ its expected input or output or a **User** fails persistently to comply with the **CC** and in the

case of response to **Frequency**, **BC3** or to provide the **Ancillary Services** it is required, or has agreed, to provide, **NGC** shall notify the relevant **User** giving details of the failure and of the monitoring that **NGC** has carried out.

OC5.4.2.2 The relevant **User** will, as soon as possible, provide **NGC** with an explanation of the reasons for the failure and details of the action that it proposes to take to:

(a) enable the **BM Unit** to meet its expected input or output or to provide the **Ancillary Services** it is required or has agreed to provide, within a reasonable period, or

(b) ~~details of the action it proposes to take~~in the case of a **Generating Unit** or **CCGT Module** to comply with the **CC** and in the case of response to **Frequency**, **BC3** or to provide the **Ancillary Services** it is required or has agreed to provide, within a reasonable period.

OC5.4.2.3 **NGC** and the **User** will then discuss the action the **User** proposes to take and will endeavour to reach agreement as to the parameters which are to be submitted for the **BM Unit** and the effective date(s) for the application of the agreed parameters.

OC5.4.2.4 In the event that agreement cannot be reached within 10 days of notification of the failure by **NGC** to the **User**, **NGC** or the **User** shall be entitled to require a test, as set out in OC5.5 and OC5.6, to be carried out.

~~OC5.4.2.5 For the purpose of monitoring expected input or output error, **NGC** will use a method which incorporates up to 100 sampling points, which are, so far as possible, equally spaced, per 30 minutes.~~

OC5.5 PROCEDURE FOR TESTING ~~THE ABILITY TO COMPLY WITH THE CC AND TO PROVIDE ANCILLARY SERVICES~~

OC5.5.1 ~~Reactive Power Tests~~Request For Testing

OC5.5.1.1 **NGC** may at any time (although it may not do so more than twice in any calendar year in respect of any particular ~~**Generating**~~**BM Unit** except to the extent that it can on reasonable grounds justify the necessity for further tests or unless the further test is a re-test) issue an instruction requiring a ~~**Generator**~~**User** to carry out a test, at a time no sooner than 48 hours from the time that the instruction was issued, on any one or more of the ~~**Generator's Generating Units**~~,**User's BM Units** to demonstrate that the relevant ~~**Generating**~~ **BM Unit**:

a) if active in the **Balancing Mechanism**, meets the ability to operate in accordance with its submitted **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** and achieve its expected input or output which has been monitored under OC5.4; and

in the case of a **BM Unit** comprising a **Generating Unit** or a **CCGT Module** meets,

b) the requirements for operation in **Frequency Sensitive Mode** and compliance with the requirements for operation in **Limited Frequency Sensitive Mode** in accordance with CC.6.3.3, BC3.5.2 and BC3.7.2; or

c) the terms of the applicable **Supplemental Agreement** agreed with the **Generator** to have a **Fast Start Capability**; or

d) the **Reactive Power** capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2. In the case of a test on a **Generating Unit** within a **CCGT Module** the instruction need not identify the particular **CCGT Unit** within the **CCGT Module** which is to be tested, but instead may specify that a test is to be carried out on one of the **CCGT Units** within the **CCGT Module**.

OC5.5.1.2 (a) The instruction referred to in OC5.5.1.1 may only be issued if the relevant ~~**Generator**~~**User** has submitted **Export and Import Limits** which notify that the ~~**Generating**~~relevant **BM Unit** is available in respect of the **Operational Day** current at the time at which the instruction is ~~issued, in which event the~~issued. The relevant ~~**Generator**~~**User** shall then be obliged to ~~declare that **Generating Unit** available with~~submit **Export and Import Limits** with a magnitude greater than zero for that **BM Unit** in respect of the time and the duration that the test is instructed to be carried out, unless that ~~**Generating**~~**BM Unit** would not then be available by reason of forced outage or **Planned Outage** expected prior to this instruction.

~~The **Export and Import Limits** in~~

(b) In the case of a **CCGT Module** the **Export and Import Limits** data must relate to ~~must include~~ the same **CCGT Units** which were included in~~the **Export and Import Limits** in~~ respect of the **Operational Day** current at the time at which the instruction is issued and must include, in relation to each of the **CCGT Units** within the **CCGT Module**, details of the various data~~in relation to each **CCGT Unit** in the form as~~ set out in BC1.A.1.3 and BC1.A.1.5, which ~~data~~ parameters **NGC** will utilise in instructing in accordance with this OC5 in issuing **Bid-Offer Acceptances**. The ~~data~~ parameters shall reasonably reflect the true operating characteristics of each **CCGT Unit**.

OC5.5.2 Conduct Of Test

OC5.5.2.1 The performance of the **BM Unit** will be recorded at **NGC Control Centres** with monitoring at site when necessary, from voltage and current signals provided by the **User** for each **BM Unit** under CC.6.6.1.

OC5.5.2.2 If monitoring at site is undertaken, the performance of the **BM Unit** will be recorded on a chart recorder (with measurements, in the case of a **Generating Unit**, taken on the **Generating Unit** Stator Terminals / on the **LV** side of the generator transformer) in the relevant **User's Control Room**, in the presence of a reasonable number of representatives appointed and authorised by **NGC**. If **NGC** or the **User** requests, monitoring at site will include measurement of governor and/or excitation system quantities.

~~OC5.5.1.3~~ OC5.5.2.3 The test will be initiated by the issue of ~~instructions in the form specified in~~instructions, which may be accompanied by a **Bid-Offer Acceptance**, under **BC2** (in accordance with the ~~**Generating Unit's** data submitted under **BC1** prevailing on the **Operational Day** current at the time at which the instruction is issued~~**Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** which have been submitted for the day on which the test was called, or in the case of a **CCGT Unit**, in accordance with the parameters submitted under OC5.5.1.2). The instructions in respect of a **CCGT Unit** within a **CCGT Module** will be in respect of the **CCGT Unit**, as provided in BC2.

~~OC5.5.1.4 The duration of the test will be for a period of up to 60 minutes during which period the **System** voltage at the **Grid Entry Point** for the relevant **Generating Unit** will be maintained by the **Generator** at the voltage specified pursuant to BC2.8 by adjustment of **Reactive Power** on the remaining **Generating Units**, if necessary.~~

~~OC5.5.1.5 The performance of the **Generating Unit** will be recorded on a chart recorder (with measurements taken on the **Generating Unit** Stator Terminals) in the relevant **Generator's Control Room**, in the presence of a reasonable number of representatives appointed and authorised by **NGC**, and the **Generating Unit** will pass the test if it is within ±5% of the capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2 (with due account being taken of any conditions on the **System** which may affect the results of the test). The relevant **Generator** must, if requested, demonstrate, to **NGC's** reasonable satisfaction, the reliability of the chart recorders, disclosing calibration records to the extent appropriate.~~

~~OC5.5.1.6 If the **Generating Unit** concerned fails to pass the test the **Generator** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within three **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **Generator** shall seek to resolve the dispute by discussion, and, if they fail to reach agreement, the **Generator** may by notice require **NGC** to carry out a re-test on 48 hours' notice which shall be carried out following the procedure set out in OC5.5.1.4 and OC5.5.1.5 and subject as provided in OC5.5.1.2, as if **NGC** had issued an instruction at the time of notice from the **Generator**.~~

~~OC5.5.1.7 If the **Generating Unit** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes**~~

Resolution Procedure for a ruling in relation to the dispute, which ruling shall be binding.

OC5.5.1.8 If following the procedure in OC5.5.1.6 and OC5.5.1.7 it is accepted that the **Generating Unit** has failed the test or re-test (as applicable), the **Generator** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **Generator** shall have brought the **Generating Unit** concerned to a condition where it complies with the **Reactive Power** capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2, and would pass the test. **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date or time (or any revised proposal), the **Generator** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.

OC5.5.1.9 If a **Generating Unit** fails the test, the **Generator** may amend the relevant registered parameters of that **Generating Unit** relating to **Reactive Power** capability, registered in the **Generator Performance Chart** for that **Generating Unit** under **OC2**, for the period until the **Generating Unit** can achieve the parameters previously registered, as demonstrated in a re-test.

OC5.5.1.10 Once the **Generator** has indicated to **NGC** the date and time that the **Generating Unit** can achieve the parameters previously registered, **NGC** shall either accept this information or require the **Generator** to demonstrate that the **Reactive Power** capability at the **Generating Unit** concerned has been restored so that it meets the **Reactive Power** capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2, by means of a repetition of the test referred to in OC5.5.1.1 by an instruction requiring the **Generator** on 48 hours notice to carry out such a test. The provisions of this OC5.5.1 will apply to such further test.

OC5.5.1.11 Testing of synchronous compensation will also be carried out under the procedure set out in this OC5.5.1.

OC5.5.2 **Frequency** Sensitive Testing

OC5.5.2.1 Testing of **Frequency** sensitive operation will be carried out as part of the routine monitoring under OC5.4 of **Gensets'** compliance with instructions for operation in **Frequency Sensitive Mode** and compliance with the requirements for operation in **Limited Frequency Sensitive Mode** in accordance with CC.6.3.3, BC3.5.2 and BC3.7.2 but **NGC** will notify a **Generator** that it proposes to carry out such a test at least 48 hours prior to the time of the proposed test, and **NGC** will only make such a notification if the relevant **Generator** has submitted **Export and Import Limits** which notify that the **Genset** is available in respect of the **Operational Day** current at the time at which the notification is issued. If **NGC** makes such a notification the relevant **Generator** shall then be obliged to declare that **Genset** available with **Export and Import Limits** with a magnitude greater than zero in respect of the time and for the duration that the test is

instructed to be carried out, unless that **Genset** would not then be available by reason of forced outage or **Planned Outage** expected prior to this instruction. The **Export and Import Limits** in the case of a **CCGT Module** must include the same **CCGT Units** which were included in the **Export and Import Limits** in respect of the **Operational Day** current at the time at which the instruction is issued.

OC5.5.2.2 The performance of the **Genset** will be recorded at **NGC Control Centres** with monitoring at site when necessary, from voltage and current signals provided by the **Generator** for each **Genset** under CC.6.6.1. If monitoring at site is undertaken, the performance of the **Genset,** as well as **System Frequency** will be recorded on a chart recorder (with measurements taken on the **LV** side of the generator transformer) in the relevant **Generator's** Control Room, in the presence of a reasonable number of representatives appointed and authorised by **NGC** and if **NGC** or the **Generator** requests, will include measurements of the Governor pilot oil/valve position. The **Genset** will pass the test if:

(a) where monitoring of the **Primary Response** and/or **Secondary Response** and/or **High Frequency Response** to **Frequency** change on the **Total System** has been carried out, the measured response in MW/Hz is within ±5% of the level of response specified in the **Ancillary Services Agreement** for that **Genset** ;

(b) where measurements of the Governor pilot oil/valve position have been requested, such measurements indicate that the Governor parameters are within the criteria set out in the appropriate governor standard (the version of which to apply being determined within CC.6.3.7);

(c) where monitoring of the **Limited High Frequency Response** to **Frequency** change on the **Total System** has been carried out, the measured response is within the requirements of BC3.7.2;

(d) where monitoring operation in accordance with CC.6.3.3 and BC3.5.1, for variations in **System Frequency** exceeding 0.1Hz within a period of less than 10 seconds, the **Active Power** output is within ±0.2% of the requirements of CC.6.3.3 when monitored at prevailing external air temperatures of up to 25°C

The relevant **Generator** must, if requested, demonstrate to **NGC's** reasonable satisfaction the reliability of the chart recorders, disclosing calibration records to the extent appropriate.

OC5.5.2.3 If the **Genset** concerned fails to pass the test the **Generator** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within three **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **Generator** shall seek to resolve the dispute by discussion, and, if they fail to reach agreement, the **Generator** may by notice require **NGC** to carry out a re-test by

monitoring at the next available opportunity, following the procedure set out in, and subject as provided in, OC5.5.2.1 and OC5.5.2.2.

OC5.5.2.4 If the **Genset** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

OC5.5.2.5 If following the procedure set out in OC5.5.2.3 and OC5.5.2.4 it is accepted that the **Genset** has failed the test or re-test (as applicable), the **Generator** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **Generator** shall have brought the **Genset** concerned to a condition where it complies with its **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** capability parameters submitted to **NGC** pursuant to OC4.5, which shall be in accordance with the criteria set out in CC.6.3.7, or with the requirements of BC3.7.2 for **Limited Frequency Sensitive Response**, as the case may be, and would pass the test. **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date or time (or any revised proposal), the **Generator** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.

OC5.5.2.6 If a **Genset** fails the test, the **Generator** may amend, with **NGC's** approval, the relevant registered parameters of that **Genset** relating to operation in **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** registered pursuant to OC4.5, for the period until the **Genset** can achieve the parameters previously registered, as demonstrated in a re-test.

OC5.5.2.7 Once the **Generator** has indicated to **NGC** the date and time that the **Genset** can achieve the parameters previously registered (or the requirements of BC3.7.2, as the case may be), **NGC** shall either accept this information or require the **Generator** to demonstrate that the **Frequency Sensitive Mode** capability or the capability to provide **Limited High Frequency Response,** as the case may be, at the **Genset** concerned has been restored so that it meets the **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** capability parameters submitted to **NGC** pursuant to OC4.5, which shall be in accordance with the criteria set out in CC.6.3.7, or meets the requirements of BC3.7.2 for **Limited High Frequency Response**, as the case may be, by means of a repetition of the monitoring referred to in OC5.5.2.1 at any time after the time and date approved under OC5.5.2.5. The provisions of this OC5.5.2 will apply to such further test.

OC5.5.3 **Fast Start Capability** Testing

OC5.5.3.1 **NGC** may at any time (although it may not do so more than twice in any calendar year in respect of any particular **Genset** except to the extent that it can on reasonable grounds justify the necessity for further tests or unless the further test is a re-test) issue an instruction requiring

a **Generator** at a time no sooner than 48 hours from the time that the instruction is issued, to **Synchronise** and **Load** up to its Maximum Export Limit any one or more of the **Gensets** the **Generator** has agreed is to have a **Fast Start Capability** under the terms of the applicable **Supplemental Agreement**.

OC5.5.3.2 The instruction referred to in OC5.5.3.1 may only be issued if the relevant **Generator** has submitted **Export and Import Limits** which notify that the **Genset** is available in respect of the **Operational Day** current at the time at which the instruction is issued, in which event the relevant **Generator** shall be obliged to declare that **Genset** available with **Export and Import Limits** with a magnitude of greater than zero in respect of the time that the test is instructed to be carried out, unless that **Genset** would not then be available by reason of forced outage or **Planned Outage** expected prior to this instruction. The **Export and Import Limits** in the case of a **CCGT Module** must include the same **CCGT Units** which were included in the **Export and Import Limits** in respect of the **Operational Day** current at the time at which the instruction is issued.

OC5.5.3.3 The test will be initiated by the issue of instructions in the form specified in **BC2** (in accordance with the **Genset's** data submitted under **BC1** prevailing on the **Operational Day** current at the time at which the instruction is issued).

OC5.5.3.4 The performance of the **Genset** will be recorded on a chart recorder in the relevant **Generator's** Control Room in the presence of a reasonable number of representatives appointed and authorised by **NGC** and the **Genset** will pass the test if it meets its **Fast Start Capability** requirements. The relevant **Generator** must, if requested, demonstrate to **NGC's** reasonable satisfaction, the reliability of the chart recorders, disclosing calibration records to the extent appropriate.

OC5.5.3.5 If the **Genset** concerned fails to pass the test the **Generator** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within three **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **Generator** shall seek to resolve the dispute by discussion, and if they fail to reach agreement, the **Generator** may by notice require **NGC** to carry out a re-test on 48 hours' notice which shall be carried out following the procedure set out in and subject as provided in OC5.5.3.1 to OC5.5.3.3 above.

OC5.5.3.6 If the **Genset** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

OC5.5.3.7 If following the procedure in OC5.5.3.5 and OC5.5.3.6 it is agreed that the **Genset** has failed the test or re-test (as applicable) the **Generator** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the

~~date and time by which the **Generator** shall have brought the **Genset** concerned to a condition where it meets its **Fast Start Capability** requirement set out in CC.6.3.14 and can provide that **Ancillary Service** and would pass the test. **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date or time (or any revised proposal), the **Generator** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.~~

~~OC5.5.3.8 Once the **Generator** has indicated to **NGC** the date and time that the **Genset** can achieve the **Fast Start Capability** requirements, **NGC** shall either accept this information or require the **Generator** to demonstrate that the **Fast Start Capability** at the **Genset** concerned has been restored so that it meets the **Fast Start Capability** requirements set out in CC.6.3.14, by means of a repetition of the test referred to in OC5.5.3.1 by an instruction requiring the **Generator** on 48 hours notice to carry out such a test. The provisions of this OC5.5.3 will apply to such test.~~

~~OC5.5.4 **Black Start Testing**~~

OC5.5.3 Test Assessment

The **BM Unit** will pass the test if the criteria below are met:

	Parameter to be Tested	Grid Code Reference	Pass Criteria
Reactive Capability	Reactive Capability	CC.6.3.2	**Generating Unit** will pass the test if it is within +5% of the capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2. The duration of the test will be for a period of up to 60 minutes during which period the **System** voltage at the **Grid Entry Point** for the relevant **Generating Unit** will be maintained by the **Generator** at the voltage specified pursuant to BC2.8 by adjustment of **Reactive Power** on the remaining **Generating Units**, if necessary.
Governor System	Primary, Secondary and High Frequency Response	ASA	The measured response in MW/Hz is within +5% of the level of response specified in the **Ancillary Services Agreement** for that **Genset.**
	Governor Compliance	CC.6.3.7	Measurements indicate that the Governor parameters are within the criteria set out in the appropriate governor standard (the version of which to apply being determined within CC.6.3.7).
	Limited High Frequency Response	BC3.7.2(b)	The measured response is within the requirements of BC3.7.2.
	Output at reduced System Frequency	CC.6.3.3 BC3.5.1	For variations in **System Frequency** exceeding 0.1Hz within a period of less than 10 seconds, the **Active Power** output is within ±0.2% of the requirements of CC.6.3.3 when monitored at prevailing external air temperatures of up to 25ºC.
	Fast Start	ASA	The **Fast Start Capability** requirements of the **Ancillary Services Agreement** for that **Genset** are met.
	Black Start	OC.5.7.1	The relevant **Generating Unit** is **Synchronised** to the **System** within two hours of the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** being required to start.

	Parameter to be Tested	Grid Code Reference	Pass Criteria
Dynamic Parameters	**Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters**	OC5	The **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** under test are within 2½% of the declared value being tested. The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the **Final Physical Notification Data** and **Bid-Offer Acceptances** issued under BC2 which are still in dispute following the procedure in OC5.4.2.
	Synchron -isation time	BC2.5.2.3	**Synchronisation** takes place within +5 minutes of the time it should have achieved **Synchronisation.** The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the **Final Physical Notification Data** and **Bid-Offer Acceptances** issued under BC2 which are still in dispute following the procedure in OC5.4.2.
	Run-up rates	OC5	Achieves the instructed output and, where applicable, the first and/or second intermediate breakpoints, each within +3 minutes of the time it should have reached such output and breakpoints from **Synchronisation** (or break point, as the case may be), calculated from the run-up rates in its **Dynamic Parameters.** The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the **Final Physical Notification Data** and **Bid-Offer Acceptances** issued under BC2 which are still in dispute following the procedure in OC5.4.2.
	Run-down rates	OC5	Achieves the instructed output within +5 minutes of the time, calculated from the run-down rates in its **Dynamic Parameters.** The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the **Final Physical Notification Data** and **Bid-Offer Acceptances** issued under BC2 which are still in dispute following the procedure in OC5.4.2.

Due account will be taken of any conditions on the **System** which may affect the results of the test. The relevant **User** must, if requested, demonstrate, to **NGC's** reasonable satisfaction, the reliability of the chart recorders, disclosing calibration records to the extent appropriate.

OC5.5.4 Test Failure/Re-test

If the **BM Unit** concerned fails to pass the test the **User** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **User** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **User** shall seek to resolve the dispute by discussion, and, if they fail to reach agreement, the **User** may by notice require **NGC** to carry out a re-test on 48 hours' notice which shall be carried out following the procedure set out in OC5.5.2 and OC5.5.3 and subject as provided in OC5.5.1.2, as if **NGC** had issued an instruction at the time of notice from the **User**.

OC5.5.5 Dispute following Re-test

If the **BM Unit** in **NGC's** view fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

OC5.6 DISPUTE RESOLUTION

OC5.6.1 If following the procedure set out in OC5.5 it is accepted that the **BM Unit** has failed the test or re-test (as applicable), the **User** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **User** shall have brought the **BM Unit** concerned to a condition where it complies with the relevant requirement. **NGC** will not unreasonably withhold or delay its approval of the **User's** proposed date and time submitted. Should **NGC** not approve the **User's** proposed date or time (or any revised proposal), the **User** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.

OC5.6.2 If a **BM Unit** fails the test, the **User** shall submit revised **Export and Import Limits, QPN, Joint BM Unit Data** and/or **Dynamic Parameters**, or in the case of a **BM Unit** comprising a **Generating Unit** or a **CCGT Module,** the **User** may amend, with **NGC**'s approval, the relevant registered parameters of that **Generating Unit** or **CCGT Module**, as the case may be, relating to the criteria, for the period of time until the **BM Unit** can achieve the parameters previously registered, as demonstrated in a re-test.

OC5.6.3 Once the **User** has indicated to **NGC** the date and time that the **BM Unit** can achieve the parameters previously registered or submitted, **NGC** shall either accept this information or require the **User** to demonstrate the restoration of the capability by means of a repetition of the test referred to in OC5.5.2 by an instruction requiring the **User** on 48 hours notice to carry out such a test. The provisions of this OC5.6 will apply to such further test.

OC5.7 BLACK START TESTING

OC.5.7.1 General

~~OC5.5.4.1~~(a) **NGC** may require a **Generator** with a **Black Start Station** to carry out a test (a "**Black Start Test**") on a **Genset** in a **Black Start Station** either while the **Black Start Station** remains connected to an external alternating current electrical supply (a "**BS Unit Test**") or while the **Black Start Station** is disconnected from all external alternating current electrical supplies (a "**BS Station Test**"), in order to demonstrate that a **Black Start Station** has a **Black Start Capability**.

~~OC5.5.4.2~~(b) Where **NGC** requires a **Generator** with a **Black Start Station** to carry out a **BS Unit Test**, **NGC** shall not require the **Black Start Test** to be carried out on more than one **Genset** at that **Black Start Station** at the same time, and would not, in the absence of exceptional circumstances, expect any of the other **Genset** at the **Black Start Station** to be directly affected by the **BS Unit Test**.

~~OC5.5.4.3~~(c) **NGC** may require a **Generator** with a **Black Start Station** to carry out a **BS Unit Test** at any time (but will not require a **BS Unit Test** to be carried out more than once in each calendar year in respect of any particular **Genset** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test, and will not require a **BS Station Test** to be carried out more than once in every two calendar years in respect of any particular **Genset** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test).

~~OC5.5.4.4 Notice of a **Black Start Test**~~

(d) When **NGC** wishes a **Generator** with a **Black Start Station** to carry out a **Black Start Test**, it shall notify the relevant **Generator** at least 7 days prior to the time of the **Black Start Test** with details of the proposed **Black Start Test**.

~~OC5.5.4.5~~OC.5.7.2 Procedure for a **Black Start Test**

The following procedure will, so far as practicable, be carried out in the following sequence for **Black Start Tests**:

~~OC5.5.4.5.1~~OC.5.7.2.1 BS Unit Tests

(a) The relevant **Generating Unit** shall be **Synchronised** and **Loaded**;

(b) All the **Auxiliary Gas Turbines** and/or **Auxiliary Diesel Engines** in the **Black Start Station** in which that **Generating Unit** is situated, shall be **Shutdown**.

(c) The **Generating Unit** shall be **De-Loaded** and **De-Synchronised** and all alternating current electrical supplies to its **Auxiliaries** shall be disconnected.

(d) The **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** to the relevant **Generating Unit** shall be started, and shall re-energise the **Unit Board** of the relevant **Generating Unit**.

(e) The **Auxiliaries** of the relevant **Generating Unit** shall be fed by the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)**, via the **Unit Board**, to enable the relevant **Generating Unit** to return to **Synchronous Speed**.

(f) The relevant **Generating Unit** shall be **Synchronised** to the **System** but not **Loaded**, unless the appropriate instruction has been given by **NGC** under **BC2**.

~~OC5.5.4.5.2~~OC.5.7.2.2 **BS Station Test**

(a) All **Generating Units** at the **Black Start Station**, other than the **Generating Unit** on which the **Black Start Test** is to be carried out, and all the **Auxiliary Gas Turbines** and/or **Auxiliary Diesel Engines** at the **Black Start Station**, shall be **Shutdown**.

(b) The relevant **Generating Unit** shall be **Synchronised** and **Loaded**.

(c) The relevant **Generating Unit** shall be **De-Loaded** and **De-Synchronised**.

(d) All external alternating current electrical supplies to the **Unit Board** of the relevant **Generating Unit**, and to the **Station Board** of the relevant **Black Start Station**, shall be disconnected.

(e) An **Auxiliary Gas Turbine** or **Auxiliary Diesel Engine** at the **Black Start Station** shall be started, and shall re-energise either directly, or via the **Station Board**, the **Unit Board** of the relevant **Generating Unit**.

(f) The provisions of ~~OC5.5.4.5.1~~OC.5.7.2.1 (e) and (f) shall thereafter be followed.

~~OC5.5.4.6~~OC.5.7.2.3 All **Black Start Tests** shall be carried out at the time specified by **NGC** in the notice given under ~~OC5.5.4.4~~OC5.7.1(d) and shall be undertaken in the presence of a reasonable number of representatives appointed and authorised by **NGC**, who shall be given access to all information relevant to the **Black Start Test**.

~~OC5.5.4.7~~OC.5.7.2.4 Failure of a **Black Start Test**

A **Black Start Station** shall fail a **Black Start Test** if the **Black Start Test** shows that it does not have a **Black Start Capability** (ie. if the relevant **Generating Unit** fails to be **Synchronised** to the **System** within two hours of the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** being required to start).

~~OC5.5.4.8~~OC.5.7.2.5 If a **Black Start Station** fails to pass a **Black Start Test** the **Generator** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **Generator** shall seek to resolve the dispute by discussion, and if they fail

to reach agreement, the **Generator** may require **NGC** to carry out a further **Black Start Test** on 48 hours notice which shall be carried out following the procedure set out in ~~OC5.5.4.5.1 or OC5.5.4.5.2~~OC.5.7.2.1 or OC.5.7.2.2 as the case may be, as if **NGC** had issued an instruction at the time of notice from the **Generator**.

~~OC5.5.4.9~~OC.5.7.2.6 If the **Black Start Station** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

~~OC5.5.4.10~~OC.5.7.2.7 If following the procedure in ~~OC5.5.4.8 and OC5.5.4.9~~OC.5.7.2.5 and OC.5.7.2.6 it is accepted that the **Black Start Station** has failed the **Black Start Test** (or a re-test carried out under ~~OC5.5.4.8),~~OC.5.7.2.5), within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, the relevant **Generator** shall submit to **NGC** in writing for approval, the date and time by which that **Generator** shall have brought that **Black Start Station** to a condition where it has a **Black Start Capability** and would pass the **Black Start Test**, and **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date and time (or any revised proposal) the **Generator** shall revise such proposal having regard to any comments **NGC** may have made and resubmit it for approval.

~~OC5.5.4.11~~OC.5.7.2.8 Once the **Generator** has indicated to **NGC** that the **Generating Station** has a **Black Start Capability**, **NGC** shall either accept this information or require the **Generator** to demonstrate that the relevant **Black Start Station** has its **Black Start Capability** restored, by means of a repetition of the **Black Start Test** referred to in ~~OC5.5.4.4~~OC5.7.1(d) following the same procedure as for the initial **Black Start Test**. The provisions of this ~~OC5.5.4~~OC.5.7.2 will apply to such test.

~~OC5.5.5 Other **Ancillary Services**~~

~~Instructions will not be issued for tests of other **Ancillary Services** but monitoring of performance in response to **System** derived inputs will be carried out in accordance with the procedures set out in OC5.4.~~

~~OC5.6 OPERATIONAL ACCURACY TESTING~~

~~OC5.6.1~~

~~OC5.6.1.1 **NGC** may at any time (although it may not do so more than twice in any calendar year in respect of any particular **BM Unit** except to the extent that it can on reasonable grounds justify the necessity for further tests or unless the further test is a re-test) issue an instruction requiring a **User** to carry out a test, at a time no sooner than 48 hours from the time that the instruction was issued, on any one or more of the **User's BM Units** that are active in the **Balancing Mechanism** to demonstrate that the relevant **BM Unit** meets the ability to operate in accordance with its submitted **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** and achieve its expected input or output which has been monitored under OC5.4.2.1.~~

~~OC5.6.1.2 The instruction referred to in OC5.6.1.1 may only be issued if the relevant **User** has submitted **Export and Import Limits** which notify that the **BM Unit** is available in respect of the **Operational Day** current at the time at which the~~

~~instruction is issued, in which event the relevant **User** shall then be obliged to submit **Export and Import Limits** with a magnitude greater than zero for that **BM Unit** in respect of the time and the duration that the test is instructed to be carried out, unless that **BM Unit** would not then be available by reason of forced outage or **Planned Outage** expected prior to this instruction. The **Export and Import Limits** in the case of a **CCGT Module** must include the same **CCGT Units** which were included in the **Export and Import Limits** in respect of the **Operational Day** current at the time at which the instruction is issued.~~

~~OC5.6.1.3 The test will be initiated by the issue of instructions, which may be accompanied by a **Bid-Offer Acceptance,** under **BC2** in accordance with the **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** which had been submitted for the day on which the test was called.~~

~~OC5.6.1.4 The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from their **Final Physical Notification Data** and **Bid-Offer Acceptances** issued under BC2 which are still in dispute following the procedure in OC5.4.2.~~

~~OC5.6.1.5 The performance of the **BM Unit** will be recorded on a chart recorder (with, in the case of a **Generator**, measurements taken on the **LV** side of the generator transformer in the relevant **Generator's** Control Room), in the presence of a reasonable number of representatives appointed and authorised by **NGC**, and the **BM Unit** will pass the test if the **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameter(s)** under test are within 2½% of the submitted value being tested unless the following **Dynamic Parameters** are being tested, in which case the **Genset** will pass the test if:~~

~~(a) in the case of achieving **Synchronisation**, **Synchronisation** is achieved within ±5 minutes of the time it should have achieved **Synchronisation**;~~

~~(b) in the case of meeting run-up rates, the **BM Unit** achieves the instructed output and, where applicable, the first and/or second intermediate breakpoints, each within ±3 minutes of the time it should have reached such output and breakpoints from **Synchronisation** (or break point, as the case may be), calculated from the run-up rates in its **Dynamic Parameters**.~~

~~(c) in the case of meeting run-down rates, if the **BM Unit** achieves the instructed output within ±5 minutes of the time calculated from the run-down rates in its **Dynamic Parameters**.~~

~~Due account will be taken of any conditions on the **System** which may affect the results of the test. The relevant **User** must, if requested, demonstrate, to **NGC's** reasonable satisfaction, the reliability of the chart recorders, disclosing calibration records to the extent appropriate.~~

~~OC5.6.1.6 If the **BM Unit** concerned fails to pass the test the **User** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **User** after due and careful enquiry. This must be provided within three **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **User** shall seek to resolve the dispute by discussion, and if they fail to reach agreement, the **User** may by notice require **NGC** to carry out a re-test on 48 hours' notice which shall be carried out~~

~~following the procedure set out in OC5.6.1.4 and OC5.6.1.5 as if **NGC** had issued an instruction at the time of notice from the **User**.~~

~~OC5.6.1.7 If the **BM Unit** concerned, in **NGC's** view fails to pass the re-test and a dispute arises on that, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.~~

~~OC5.6.1.8 If following the procedure in OC5.6.1.6 and OC5.6.1.7 it is accepted that the **BM Unit** has failed the test or re-test (as applicable), the **User** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **User** shall have brought the **BM Unit** concerned to a condition where it can achieve the relevant **Export and Import Limits, QPN, Joint BM Unit Data** and/or **Dynamic Parameters** and would pass the test. **NGC** will not unreasonably withhold or delay its approval of the **User's** proposed date and time submitted. Should **NGC** not approve the **User's** proposed date or time (or any revised proposal), the **User** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.~~