

Quality of Service Incentive Scheme – Exceptional Events

Appointed Examiner's Report	
Reporting year	2011/12
DNO	Northern Powergrid – Yorkshire Licensed Area
Cause	Failure of jumper connection to 132kV cable sealing end
Date of event	09 August 2011

Submitted to:

Ofgem and
Northern Powergrid

Submitted by:

British Power International

British Power International
The Octagon
Middleborough
Colchester CO1 1TG
United Kingdom

March 2012

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of British Power International. British Power International accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm his agreement to indemnify British Power International for all loss or damage resulting therefrom. British Power International accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned. Please note that the information or data, prepared by parties, other than British Power International which has been reviewed in the preparation of this document has not been independently checked or verified for accuracy by British Power International.

Document Status

Title: Exceptional Events Report – Northern Powergrid (Yorkshire) – failure of jumper connection to 132kV sealing end – 09 August 2011


Reference: EE 2011/12 – NPG(Y)

Issue: Final Version 1.0

Date: 25 March 2012

Electronic Doc Ref: M:\BPIUSER\Projects\Current\UK Ofgem - EE one-offs for 2011/12/NPG(Y)/Reports

Authorisation

Name	Position	Signed	Date
Geoff Stott	Project Manager		25 March 2012

History

Issue	Date	Originator	Checker	Description
1.0	25 March 2012	Geoff Stott	Ron Webb	Final version incorporating comments
0.1	23 February 2012	Geoff Stott	Evelyne Lefevre-Farcy	Draft for circulation to Ofgem and Northern Powergrid
0.0	20 February 2012	Geoff Stott	Ron Webb	Document created from template

List of Contents

Sections and Appendices

Glossary.....	4
Summary	5
1. Audit part 1	6
Summary of main facts	6
Exceptionality requirements	7
Does the event qualify for exclusion?.....	7
Exceptionality test results.....	8
Northern Powergrid's views of its performance	9
Northern Powergrid's answers to questions on its performance.....	10
2. Audit part 2.....	13
Northern Powergrid's performance in preventing the event.....	13
Northern Powergrid's performance in mitigating the effects of the event.....	14
Recommended performance adjustment(s)	15
Detailed justification	15
Appendix A Record of Audit part 1	17
Appendix B Photographs	20

Tables

Table 1-1: Number of incidents attributed to the event.....	8
Table 1-2: Summary of exceptionality test results	8
Table 2-1: Audit part 2 recommended adjustment(s)	15

Figures

Figure 1 – Simplified Network Diagram of Northern Powergrid's 132/33kV distribution network affected by the incident	7
--	---

Photographs

Photograph 1 – The failed jumper in situ at tower PHO1	20
Photograph 2 – The failed jumper connection in relation to the crimped lug	20
Photograph 3 – The jumpers of the other two phases on the n°2 circuit at tower PHO1	21

Glossary

AE	Appointed Examiner
BPI	British Power International
CB	Circuit-breaker
CI	Customer Interruptions per 100 connected customers
CML	Customer Minutes Lost per connected customer
DAR	Delayed Auto-reclose
DNO	Distribution Network Operator
EHV	Extra High Voltage – all voltages above 20kV up to but excluding 132kV
HV	High Voltage – all voltages above 1kV up to and including 20kV
NPG	Northern Powergrid
QoS	Quality of Service
RIGs	Regulatory Instructions and Guidance
SCADA	System Control and Data Acquisition
SLD	Single Line Diagram
SoF	Statement of Facts
ToR	Terms of Reference

Notes:

Within this document:

1. The term “higher voltage” is used to indicate all voltages greater than 1kV.
2. The calculations of CI and CML within this document are adapted from the annual calculations contained in the RIGs to reflect the CI and CML generated by the actual incidents being audited. They are as follows:

CI: the number of interruptions to supply – the number of customers interrupted per 100 connected customers generated by the incidents being audited. It is calculated as:

$$CI = \frac{\text{The sum of the number of customers interrupted for incidents being audited} * 100}{\text{The total number of connected customers}}$$

CML: the duration of interruptions to supply – the number of customers interrupted per connected customer generated by the incidents being audited. It is calculated as:

$$CML = \frac{\text{The sum of the customer minutes lost for all restoration stages for incidents being audited}}{\text{The total number of connected customers}}$$

In both the formulae above, the total number of connected customers is as declared as at 30 September during the relevant reporting year. Any claims that occur and are audited prior to 30 September in the reporting year during which they occur will be audited using the total number of customers declared at 30 September in the previous reporting year.

Summary

Ofgem has appointed British Power International (the Appointed Examiner) to audit the submission made by Northern Powergrid under the “one-off” exceptional event mechanism that the failure of a jumper connection to a 132kV cable sealing end on terminal tower PHO1 of the Bradford West to Holmfield n°2 132kV circuit on Tuesday, 09 August 2011 materially and adversely affected reported performance for its Yorkshire distribution licensed area for the reporting year 2011/12.

The Appointed Examiner (AE) has visited Northern Powergrid to audit the claim against part 1 of the “one-off” exceptional event process and finds that it passes the exceptionality threshold in terms of both CI and CML.

The AE concludes that the event falls within the category of an “other event” as defined in paragraph 8.57 of Special Licence Condition CRC 8, including meeting the exceptionality requirements set out in Appendix 3 thereof.

The AE therefore proceeded to part 2 of the “one-off” exceptional event process, assessing Northern Powergrid’s performance in mitigating the impact of the event upon its customers.

The AE also concludes that Northern Powergrid restored its customers’ supplies without delay, including the speedy return to service of the Bradford West to Holmfield n°1 132kV circuit to enable the final restoration of supplies.

The AE further concludes that Northern Powergrid had met the criteria of Appendix 4 to paragraph 8.58 of Special Licence Condition CRC 8 and that the incident is therefore deemed to be eligible for adjustment in the DNO’s reported performance.

The AE therefore recommends that an adjustment to Northern Powergrid’s 2011/12 reported distribution system performance is made, in line with the part 1 audited CI and CML figures as shown in the following table:

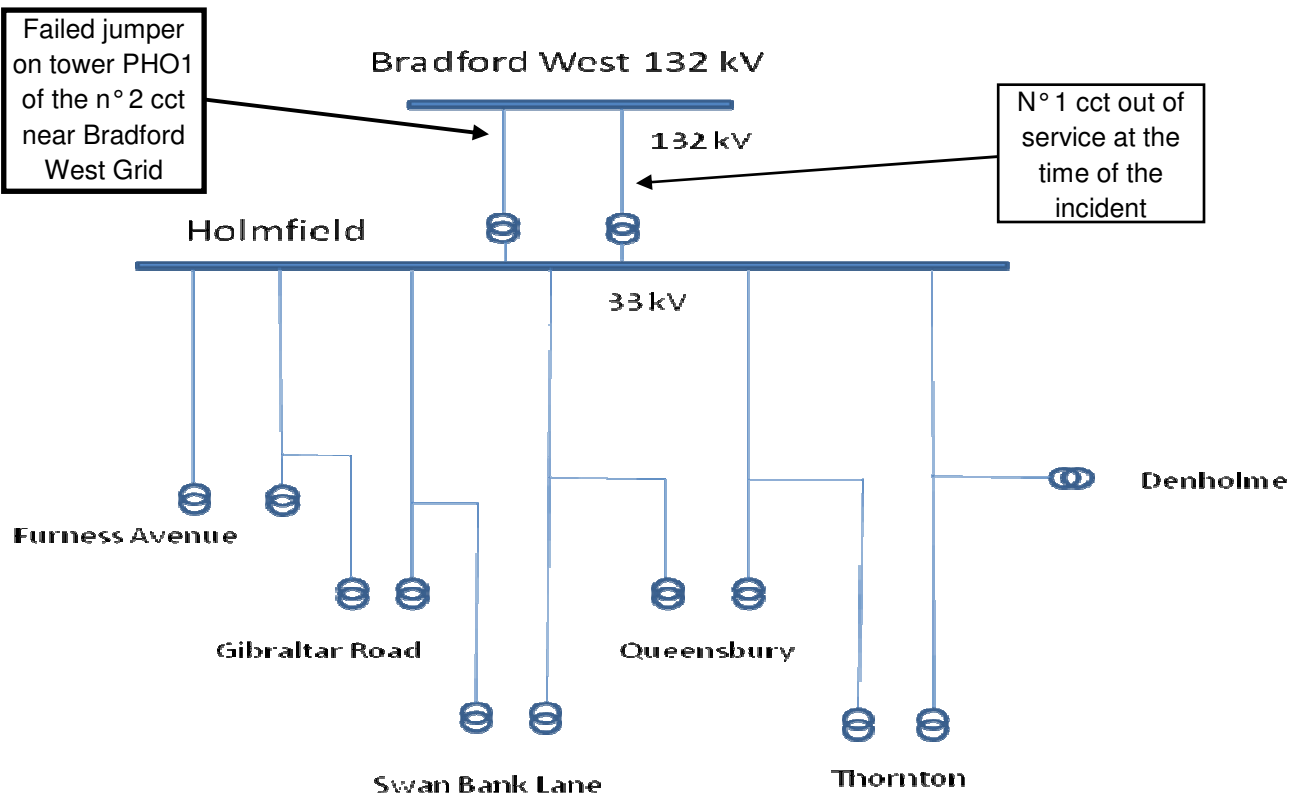
	Audited number	Number above the threshold	Recommended adjustment
CI	2.51	1.41	1.41
CML	1.55	0.65	0.65

1. Audit part 1

Summary of main facts

- 1.1 The AE's headline information log for this event is set out in Table A-1 at Appendix A. In addition, the following paragraphs summarise the main facts of the event.
- 1.2 Northern Powergrid has furnished evidence to support its claim that the failure of a jumper connection to a cable sealing end at tower PHO1 of the Bradford West to Holmfield n°2 132kV circuit resulted in the loss of all supplies from its Holmfield Grid Substation at 12:53 on Tuesday, 09 August 2011.
- 1.3 Northern Powergrid's Bradford West to Holmfield n°1 132kV circuit had been switched out on 18 July 2011 and was undergoing essential refurbishment and maintenance work.
- 1.4 Supplies to the customers fed from six of Northern Powergrid's Primary Substations were interrupted.
- 1.5 Prior to commencing supply restoration by tele-controlled switching, Northern Powergrid's control engineer contacted the engineer responsible for the work on the n°1 circuit to ensure that there were no safety issues to be considered.
- 1.6 The work on the n°1 circuit was stopped and the circuit returned to service at 15:53 on 09 August 2011.
- 1.7 56,710 of Northern Powergrid's customers' supplies were interrupted for periods of between ten minutes and just over three hours.
- 1.8 A simplified view of the section of Northern Powergrid's 132/33kV network affected by this event is shown in Figure 1.

Figure 1 – Simplified Network Diagram of Northern Powergrid’s 132/33kV distribution network affected by the incident



Notes:

1. Apart from the outage of the Bradford West to Holmfield n°1 132kV circuit, Northern Powergrid's distribution system affected by this incident was running normally at the time of the incident.
2. Initial supplies were restored via tele-controlled switching using Northern Powergrid's pre-prepared contingency plans.
3. Final supplies were restored after bringing the Bradford West to Holmfield n°1 132kV circuit back into service.
4. For clarity, only the salient items of switchgear are shown.

Exceptionality requirements

Does the event qualify for exclusion?

- 1.9 The AE considers that the event falls within the category of an “other event” as defined in paragraph 8.57 of Special Licence Condition CRC 8, and meets the exceptionality requirements set out in Appendix 3 thereof.
- 1.10 The AE therefore considers that, subject to meeting the requirements of Appendix 4 to CRC 8, the event qualifies for possible exclusion under the “one-off” exceptional events process.

Exceptionality test results

1.11 The number of incidents attributed to the event is shown in Table 1-1.

Table 1-1: Number of incidents attributed to the event

Number of incidents attributed to the event	Claimed number	Audited number
132kV	1	1
EHV	0	0
HV	0	0
LV	0	0
Total	1	1

1.12 The results calculated by the AE to test this claim against Ofgem's exceptionality criteria are shown in Appendix A. A summary of the results is shown in Table 1-2.

Table 1-2: Summary of exceptionality test results

Test	Threshold	Claimed number	Audited number	Pass / Fail	Amount above threshold
CI exceptionality	1.1	2.52	2.51	Pass	1.41
CML exceptionality	0.9	1.55	1.55	Pass	0.65

Notes:

1. Ofgem's CI and CML exceptionality criteria are set out in the AE's ToR¹.
2. The audited CI and CML used in the exceptionality test have been determined from the number of incidents attributed to the event.
3. Where the event passes either or both the exceptionality thresholds, the amount(s) above threshold is/are carried forward into the Audit part 2 assessment of DNO performance.
4. In accordance with guidance from Ofgem, the AE's calculations use the threshold values contained in the current Distribution Price Control and the number of customers connected to the DNO's network relevant to the date on which the incident occurred.

¹ Audits of Electricity Distribution Network Operators' One-off Exceptional Events Claims for 2011/12

Northern Powergrid's views of its performance

- 1.13 Northern Powergrid has a robust, commercially confidential risk assessment policy that details the various checks that must be carried out during the process of requesting a system outage at or above Extra High Voltage (EHV). *[AE's note: The AE has seen Northern Powergrid's risk assessment policy. Northern Powergrid does not wish the inherent security arrangements of its policy to become public knowledge – hence the commercially confidential classification].*
- 1.14 Prior to the outage of the Bradford West to Holmfield n°1 132kV circuit, Northern Powergrid is satisfied that its policy was fully applied and that, apart from known mechanical problems with the tower fittings, its personnel had no reason to suspect the electrical load-carrying capability of the Bradford West to Holmfield n°2 132kV circuit.
- 1.15 The outage on the n°1 circuit commenced as scheduled on Monday 18 July 2011. As part of Northern Powergrid's contingency plans, the n°1 circuit was available for restoration within a set timescale of 12 hours during the working week and 18 hours outside of this.
- 1.16 In addition, Northern Powergrid's contingency programme included re-arrangements of its 11kV network to enable some supplies to be restored via tele-controlled switching.
- 1.17 The Bradford West to Holmfield 132kV double circuit tower line was installed in 1959 and was part of Northern Powergrid's extensive programme of refurbishment to bring its assets of this age to the beginning of a new life cycle.
- 1.18 Prior to programming the outage on the circuits, Northern Powergrid had carried out comprehensive survey work which included commissioning a specialist examination of the line conductors, the results of which determined that the conductors were still fit for purpose and a recommendation that a re-test be undertaken in 10 years' time.
- 1.19 In accordance with good engineering practice, several items of equipment were scheduled for essential refurbishment during the outage on the n°1 circuit.
- 1.20 Approximately three weeks after the outage began on the n°1 circuit, the n°2 circuit failed.
- 1.21 In accordance with Northern Powergrid's policy, before attempting to re-energise the circuit, Northern Powergrid's control engineer contacted the engineer in charge of the work on the n°1 circuit. Having determined that there were no safety issues associated with the outage on the n°1 circuit, Northern Powergrid's control engineer re-energised the n°2 circuit via tele-control. The circuit stayed in for several minutes but then tripped again.
- 1.22 In parallel with the above, Northern Powergrid's control personnel had begun supply restoration via the already available tele-controlled alternative 11kV circuits. This was halted when the n°2 circuit appeared to be holding in after being re-energised.

- 1.23 Following the second trip on the n°2 circuit, supply restoration at 11kV was recommenced and the engineer in charge of the work on the n°1 circuit was requested to make safe and to cancel all safety documentation to enable the circuit to be brought back into service.
- 1.24 The n°1 circuit was brought back into service in just less than three hours, thus facilitating the final restoration of the interrupted supplies.
- 1.25 Northern Powergrid considers that the protection applied to its Bradford West to Holmfield n°2 132kV circuit operated correctly to clear the fault from its system.
- 1.26 Northern Powergrid considers that its duty control engineers reacted well in assessing the alarms generated by the event, contacting the engineer in charge of the work on the n°1 circuit, trying the n°2 circuit back and beginning to restore supplies in ten minutes, completing the task once the n°1 circuit had been returned to service.
- 1.27 Northern Powergrid considers that its engineering team did well in returning the n°1 circuit to service within three hours, given the terrain over which it runs and the extensive work being carried out.

Northern Powergrid's answers to questions on its performance

- 1.28 Within the last four years, the AE has reviewed Northern Powergrid's design standards, construction methods and maintenance procedures during previous visits to audit exceptional event claims and found them fit for purpose.
- 1.29 Northern Powergrid's SoF indicates that, prior to the outage on the n°1 circuit, comprehensive examination and survey work had been carried out so that, once finished, the refurbished tower line would be brought back to the beginning of a new life cycle.
- 1.30 The AE confirms that Northern Powergrid's emergency procedures provide for the type of event being examined here.
- 1.31 To aid understanding of the background to Northern Powergrid's SoF, the AE prepared a list of initial questions regarding this incident. These questions were used as the basis for the examination of Northern Powergrid's claim.
- 1.32 The initial questions were discussed during the AE's visit to Northern Powergrid's Leeds Control Centre on 14 February 2012 when the records of Northern Powergrid's SCADA system, the incident report and other information were made available.
- 1.33 Given the information and photographic evidence provided by Northern Powergrid and the AE's personal knowledge of installations of this type, it was considered to be unnecessary to visit tower PHO1.
- 1.34 Northern Powergrid has provided answers to the AE's initial list of questions. For ease of reference, the AE's questions are printed in bold font with Northern Powergrid's answers being printed in normal font.

Q1. What changes, if any, has Northern Powergrid (NPG) made to its emergency plans and procedures since the incident affecting the Doncaster Central area occurred on 24 June 2011?

A1. No material change has been made to the plans. Main changes fall around trigger levels and MIMP structure.

Q2 What, if any, auto-reclose schemes are installed on the Bradford West to Holmfield 132kV feeders?

A2. Main Protection – Impedance Distance, Auto-reclose 12 seconds dead time.

Q3. What protection schemes are installed on the Bradford West to Holmfield 132kV feeders?

A3. Back up protection compensated overcurrent and earth fault. *[AE's note: The AE is satisfied that the protection schemes installed on the affected section of Northern Powergrid's network are appropriate].*

Q4. NPG's SoF indicates that the Bradford West to Holmfield 132kV double-circuit tower line was in need of considerable refurbishment.

What were the deciding factors in working on the number 1 circuit first?

A4. As exemplified in NPG's SoF, the results of NPG's surveys showed that the phase conductors were fit for continued service and that it was the mechanical components and some of the smaller cross-section tower steelwork that needed replacing.

There was no reason to suspect the electrical integrity of either circuit, the choice of which circuit to work on first was simply numeric.

Q5. When did the outage on the Bradford West to Holmfield number 1 132kV circuit begin?

A5. Monday 18 July 2011 as programmed.

Q6. NPG's SoF contains considerable evidence of inspection work having been carried out on the Bradford West to Holmfield 132kV double circuit tower line. At what frequencies are NPG's 132kV lines normally inspected by helicopter and by ground patrol?

A6. Helicopter 2 years, thermal 4 years, ground patrol 10 years and high resolution helicopter 10 years.

Q7. In examining this claim, the Appointed Examiner will need to further understand the nature of NPG's Bradford repairs engineer being at the site of the failure two days before it occurred and any further observations that person may have relevant to NPG's claim?

A7. The Bradford repairs engineer will be present during the audit visit to explain this item in Northern Powergrid's SoF.

[AE's notes:

1. The Bradford repairs engineer was carrying out induction / familiarisation training for newly appointed personnel at Northern Powergrid's Leeds control centre. Part of this included a visit to the Bradford West 132kV Grid Substation and the nearby terminal tower PHO1 of the Bradford West to Holmfield double circuit 132kV tower line. Nothing untoward was observed on the n°2 circuit including the jumper connections to the 132kV cable sealing ends.

2. On the day of the incident, the daughter of a Northern Power cable jointer was walking in the fields near to Bradford West Grid Substation. She observed the flashover at tower PHO1 and immediately telephoned her father, who, in turn, contacted the Bradford repairs engineer to report the site of the failure].

Q8. What learning points has Northern Powergrid incorporated into its procedures as a result of this incident?

A8. Northern Powergrid's review of the incident confirmed that the company's procedures cater for incidents such as this.

Northern Powergrid's review concluded that its comprehensive pre-outage preparations and checks were properly carried out prior to the outage on the Bradford West to Holmfield n°1 132kV circuit.

Q9. What further learning points should be considered as a result of the application of the revised Exceptional Event Claims process?

A9. None

1.35 Northern Powergrid also provided further information during the audit visit. This includes:

- discussion regarding the review that Northern Powergrid carried out after this incident to ensure that its policies and procedures are appropriate and were correctly invoked prior to this incident occurring;
- a discussion regarding the relative reliabilities of Northern Powergrid's circuits at the higher voltage levels;
- a discussion regarding the protection schemes on the Bradford West to Holmfield 132kV double circuit tower line;
- the details of Northern Powergrid's SCADA alarms received during this incident as included in its SCADA log;
- a copy of Northern Powergrid's incident report;
- a copy of the pre-outage request and risk assessment for the n°1 circuit;
- a representation of the incident on Northern Powergrid's SCADA system;
- sight of the commercially confidential report from the specialist examination of the conductors of the Bradford West to Holmfield 132kV double circuit tower line; and
- a simplified single line diagram (SLD) of the affected sections of Northern Powergrid's 132kV and 33kV networks showing the six Primary Substations affected by the loss of the 132kV infeeds to Holmfield 132/33kV grid substation.

2. Audit part 2

Northern Powergrid's performance in preventing the event

- 2.1 In viewing Northern Powergrid's performance in preventing this event, the AE has considered what more Northern Powergrid could have reasonably done to ensure that the 132kV jumper connections at tower PHO1 of its Bradford West to Holmfield n°2 132kV circuit were free from any defect prior to the outage on the Bradford West to Holmfield n°1 132kV circuit.
- 2.2 The AE has discussed the fault history of both these circuits with Northern Powergrid and is satisfied that Northern Powergrid's database shows no previous incidents of any kind.
- 2.3 In accordance with Northern Powergrid's pre-outage checks, the control room switching log clearly states the requirement to carry out a full patrol of the n°2 circuit prior to the outage commencing on the n°1 circuit. This text insert was placed in the switching log on 29 March 2011 by Northern Powergrid's 132kV outage planning engineer.
- 2.4 Northern Powergrid's claim includes the associated documentation from the engineer in charge of the outage confirming that all the requisite pre-outage checks had been carried out.
- 2.5 Photograph 1, copied from Northern Powergrid's SoF, shows the failed jumper in situ at tower PHO1. *[AE's note: Discussions with Northern Powergrid's Bradford repairs engineer confirm that the jumper failed at a point where the conductor enters the crimped lug, making visible detection of any weakness virtually impossible].*
- 2.6 Photograph 2, taken after the failed components had been removed, shows the failed jumper connection in relation to the crimped lug.
- 2.7 Photograph 3 shows the jumper connections to the 132kV cable sealing ends of the other two phases on the n°2 circuit at tower PHO1.
- 2.8 Northern Powergrid's measurement systems confirm the tripping of circuit-breakers to clear the incident from Northern Powergrid's system at 12:53 on 09 August 2011 as reported in Northern Powergrid's SoF.
- 2.9 Northern Powergrid's measurement systems also confirm the restoration of supplies to its customers in stages between 13:03 and 15:56. Consultations with the local wind farm resulted in it being re-connected at 16:08.
- 2.10 An examination of Northern Powergrid's confidential documentation shows that its outage planning / risk assessment policy is robust and that it was rigorously applied during the planning of the outage of the Bradford West to Holmfield n°1 132kV circuit.

- 2.11 Northern Powergrid's documentation also shows that, apart from known mechanical refurbishment on the tower line, there was no reason to believe that there were any latent defects within the electrical conductors of the n°2 circuit.
- 2.12 The AE concludes that Northern Powergrid had done all it could reasonably have been expected to do in considering that the Bradford West to Holmfield n°2 132kV circuit could not be relied upon during the necessary outage of the n°1 circuit.

Northern Powergrid's performance in mitigating the effects of the event

- 2.13 Northern Powergrid's incident report shows the cause of the incident to be "dropper adrift – Andy Lister sourcing materials". **[AE's note: 'Andy Lister' is the engineer in charge of the work on the n°1 circuit who had confirmed that the pre-outage checks had been carried out on the n°2 circuit].**
- 2.14 Northern Powergrid's comprehensive surveys and analysis of the Bradford West to Holmfield double circuit 132kV tower line had revealed no known weaknesses in the electrical integrity of either circuit, the refurbishment being to replace mechanical fixtures and fittings, carry out tower painting and complete remedial civil work on some tower foundations.
- 2.15 The AE has discussed the running arrangements and protection schemes associated with the affected section of Northern Powergrid's 132/33kV distribution network with Northern Powergrid's engineering personnel.
- 2.16 The examination of the protection arrangements at Bradford West and Holmfield Grid Substations shows that Northern Powergrid's protection schemes operated correctly to clear the fault from its network.
- 2.17 The AE concludes that Northern Powergrid did all it could to restore supplies as expeditiously as possible, thereby minimising the duration of the interruption.
- 2.18 The AE commends Northern Powergrid's control engineers in analysing the situation, contacting the engineer responsible for the work on the n°1 circuit and restoring all supplies as quickly as possible.
- 2.19 The AE also commends Northern Powergrid's personnel for restoring the n°1 circuit to service within three hours of the incident.
- 2.20 The AE is pleased to note that Northern Powergrid has reviewed this incident and concluded that its pre-outage procedures are robust and that they were invoked prior to the outage on the Bradford West to Holmfield n°1 132kV circuit.
- 2.21 The AE commends the actions of the daughter of a Northern Powergrid's cable jointer who recognised the symptoms of a power incident and immediately alerted the company of her sighting. **[AE's note: whilst it might not seem directly germane to the audit of this incident, the report of this sighting greatly speeded up the restoration process and demonstrates Northern Powergrid's "extended family" which is only made possible via the dedication of its employees. The young lady is to be congratulated and commended on her public spiritedness and swift action].**

Recommended performance adjustment(s)

2.22 The AE's recommendations to Ofgem are shown in Table 2-1.

Table 2-1: Audit part 2 recommended adjustment(s)

	Amount above threshold	Audit part 2 recommendation
CI	1.41	1.41
CML	0.65	0.65

Detailed justification

- 2.23 In reaching a judgement on a recommendation, the AE has firstly considered whether or not Northern Powergrid could have reasonably taken any different course of action that would have prevented the incident on its Bradford West to Holmfield n°2 132kV circuit.
- 2.24 In viewing Northern Powergrid's performance in preventing this event, the AE has taken into account the lack of any previous incidents on the affected circuit and the rigorous application of Northern Powergrid's comprehensive and robust risk assessment / pre-outage planning policy associated with the work on the n°1 circuit.
- 2.25 The AE has also taken into account Northern Powergrid's reliability statistics for its higher voltage circuits that show the 132kV circuits to be more reliable per kilometre than the HV / EHV voltage levels. The AE is therefore satisfied that the circuit configuration adopted during the outage of the n°1 circuit was the most reliable option and therefore afforded the most system security to Northern Powergrid's customers.
- 2.26 The AE has also discussed this incident with his colleagues who have considerable operational experience of incidents with many differing causes; they agree with the visiting auditor's conclusions and recommendations.
- 2.27 The AE considers that the presence of Northern Powergrid's very experienced Bradford repairs engineer at tower PHO1 a few days prior to the incident vindicate its belief that there were no latent / obvious defects within the electrical connections of the n°2 circuit.
- 2.28 In considering Northern Powergrid's restoration strategy, the AE is conscious that Northern Powergrid's duty control engineers acted with commendable skill and speed in analysing the SCADA alarms and indications for this incident, contacting the engineer responsible for the work on the n°1 circuit and trying the faulted circuit back as part of the restoration strategy.

- 2.29 Similarly, Northern Powergrid's operational personnel are to be commended for the speed in which the n°1 circuit was brought back into service within three hours of the incident occurring.
- 2.30 The AE is satisfied that the affected sections of Northern Powergrid's distribution network comply with the requirements of Security of Supply Standard P2/6.
- 2.31 The AE has discussed Northern Powergrid's review of this incident and is pleased to note that Northern Power's robust pre-outage procedures were fully invoked prior to the outage on the n°1 circuit.
- 2.32 The AE is satisfied that Northern Powergrid has met the criteria for preventative and mitigating actions set out in Appendix 4 to paragraph 8.58 of Special Licence Condition CRC8.
- 2.33 The AE therefore concludes that Northern Powergrid's claim is justified and recommends to Ofgem that the amount of CI and CML above the threshold values should be excluded from Northern Powergrid's performance for regulatory reporting year 2011/12.

Appendix A Record of Audit part 1

Table A-1: Appointed Examiner's Information Log

“One-Off” Exceptional Event	Reporting Year 2010/11
Licensed Area	Northern Powergrid (Y)
Date of event	09 August 2011
Cause	Failure of jumper connection to 132kV cable sealing end
Notification to Ofgem	16 August 2011
SoF received	13 September 2011
SoF information	<ul style="list-style-type: none"> supplies from Holmfield 132/33kV Grid Substation were interrupted at 12:53 on Tuesday 09 August 2011 when the Holmfield 132kV CB tripped at Bradford West Grid Substation; Northern Powergrid's duty control engineers: <ul style="list-style-type: none"> contacted the engineer in charge of the maintenance work on the n°1 circuit; restored first supplies via tele-control at 13:03; tried the n°2 circuit back at 13:14 – it held in before tripping again at 13:18; called for the restoration of the n°1 cct. <i>[AE's note: it was re-energised at 15:43 and loaded at 15:52];</i> restored final supplies via tele-control at 15:56; and liaised with the local wind farm, agreeing to its re-connection at 16:08.
Additional pre-visit information provided	Based on the SoF the AE drew up a list of initial questions. These were discussed during the audit visit. This initial list of questions, together with Northern Powergrid's response, is contained in paragraph 1.34 of the report.
Location of audit visit	Northern Powergrid's Leeds Control Centre
Date of audit visit	14 February 2012
Visiting Auditor	Geoff Stott (BPI)
Northern Powergrid's Representatives	Neil Dunn-Birch, Tony Ingham, Jeremy Meara, Jim Morrell, and Ian Punshon
Information provided during and subsequent to the audit visit	<p>Comprehensive documentation / information including:</p> <ul style="list-style-type: none"> the protection arrangements for the Bradford West to Holmfield 132kV dual circuit tower line; copies of the relevant 132kV and 33kV SLDs; sight of the most recent foot patrol report for Bradford West to Holmfield 132kV dual circuit tower line; sight of the most recent high-resolution helicopter patrol Bradford West to Holmfield 132kV dual circuit tower line; sight of the specialist reports into the condition of the conductors of the Bradford West to Holmfield 132kV dual circuit tower line showing that the conductors are sound and recommending a re-test in ten years;

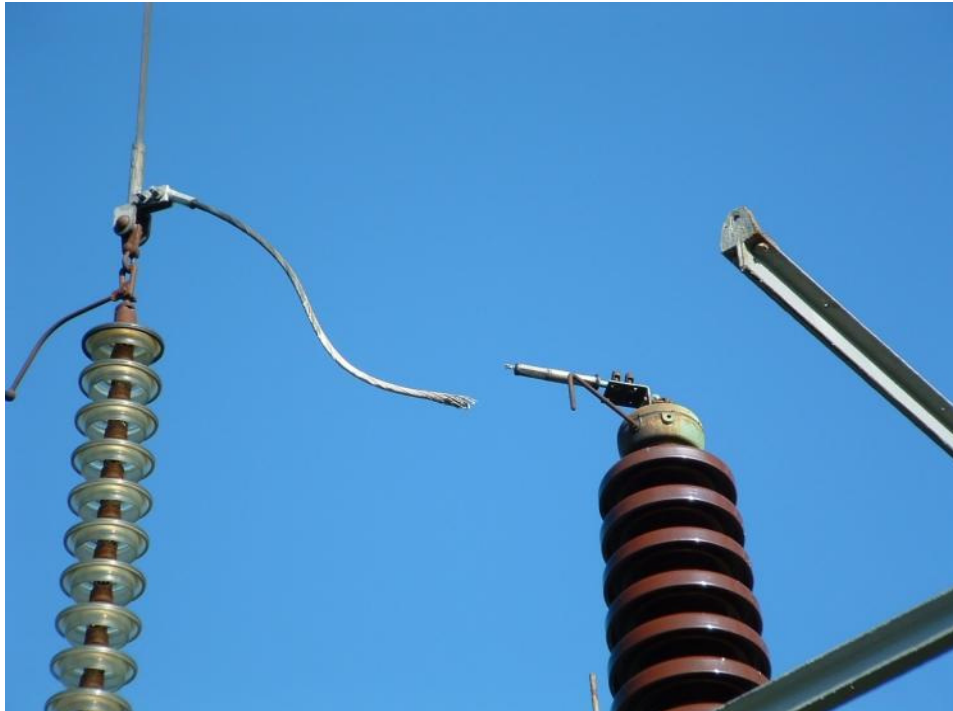
<p>Information provided during and subsequent to the audit visit (Continued)</p>	<ul style="list-style-type: none"> • the SCADA switching log showing the loss of supplies from Holmfield 132/33kV substation at 12:53 on 09 August 2011; • the normal network running arrangements were demonstrated; • a copy of Northern Powergrid's 'IRIS' incident report that shows: <ul style="list-style-type: none"> ◦ the number of customers affected by the incident to be 56,710; and ◦ the customer minutes lost to be 3,496,912.2. • the AE confirms that these figures agree with those quoted in Northern Powergrid's SoF; • using Northern Powergrid's total connected customers at 30 September 2010 of 2,258,404 the number of customers affected equates to a CI of 2.51. $[56710 \times 100 / 2258404]$; • similarly, the customer minutes lost for this event equate to a CML of 1.55. $[3,496,912.2 / 2258404]$; • a summary of the on-going review of Northern Powergrid's various policy documents; • a copy of the outage request for the number 1 circuit, including the responsible engineer's check list; • a copy of Northern Powergrid's post-incident internal report; • a geographic diagram showing the location of tower PHO1 at the Bradford West end of the circuit route; and • sight of the investigatory report into the condition of the 132kV conductors. <p>Northern Powergrid's photographs show the failed jumper connection at tower PHO1 and its point of failure of the jumper at its entry to the crimped terminal lug.</p> <p>Discussed the protection that operated – 1 phase adrift caused unbalance seen by back up earth fault protection - confirmed protection consistent with the fault.</p> <p>Discussed Northern Powergrid's risk assessment / outage planning / request policy – documents show the outage request on the n°1 circuit was fully compliant.</p> <p>Statistical reliability 132kV vis-à-vis 11kV and contingencies put in place as part of the outage on the n°1 circuit.</p> <p>Very reliable - no previous fault history for the n°2 circuit.</p> <p>Confirmed P2/6 compliant.</p> <p>The list of initial questions was discussed.</p> <p>Northern Powergrid provided answers to the initial questions plus additional information both during and subsequent to the audit visit.</p> <p>Ok regarding compliance with Appendix 4 of Paragraph 8.58 of CRC 8.</p> <p>[AE's note: Following a report from the daughter of a Northern Powergrid cable jointer the failure of the jumper connection at tower PHO1 was confirmed far more quickly than it might otherwise have been found].</p>
---	---

Table A-2: Impact on CI and CML

	CI		CML	
	Claimed	Audited	Claimed	Audited
132kV	2.52	2.51	1.55	1.55
EHV	0	0	0	0
HV	0	0	0	0
LV	0	0	0	0
Total	2.52	2.51	1.55	1.55
Northern Powergrid(Y) Threshold (total)	1.1		0.9	
Part 1 Exceptionality Test	Pass		Pass	
Part 1 Precondition of eligibility (meets App 3 to paragraph 8.57 of CRC 8)	Pass			

Northern Powergrid's measurement systems are subject to QoS audits for accuracy of reporting and it is not within the AE's ToR to repeat that work as part of the examination of exceptional event claims, although any consequential adjustments to reporting accuracy will be reflected in Ofgem's final adjudication of reported performance for regulatory reporting year 2011/12.

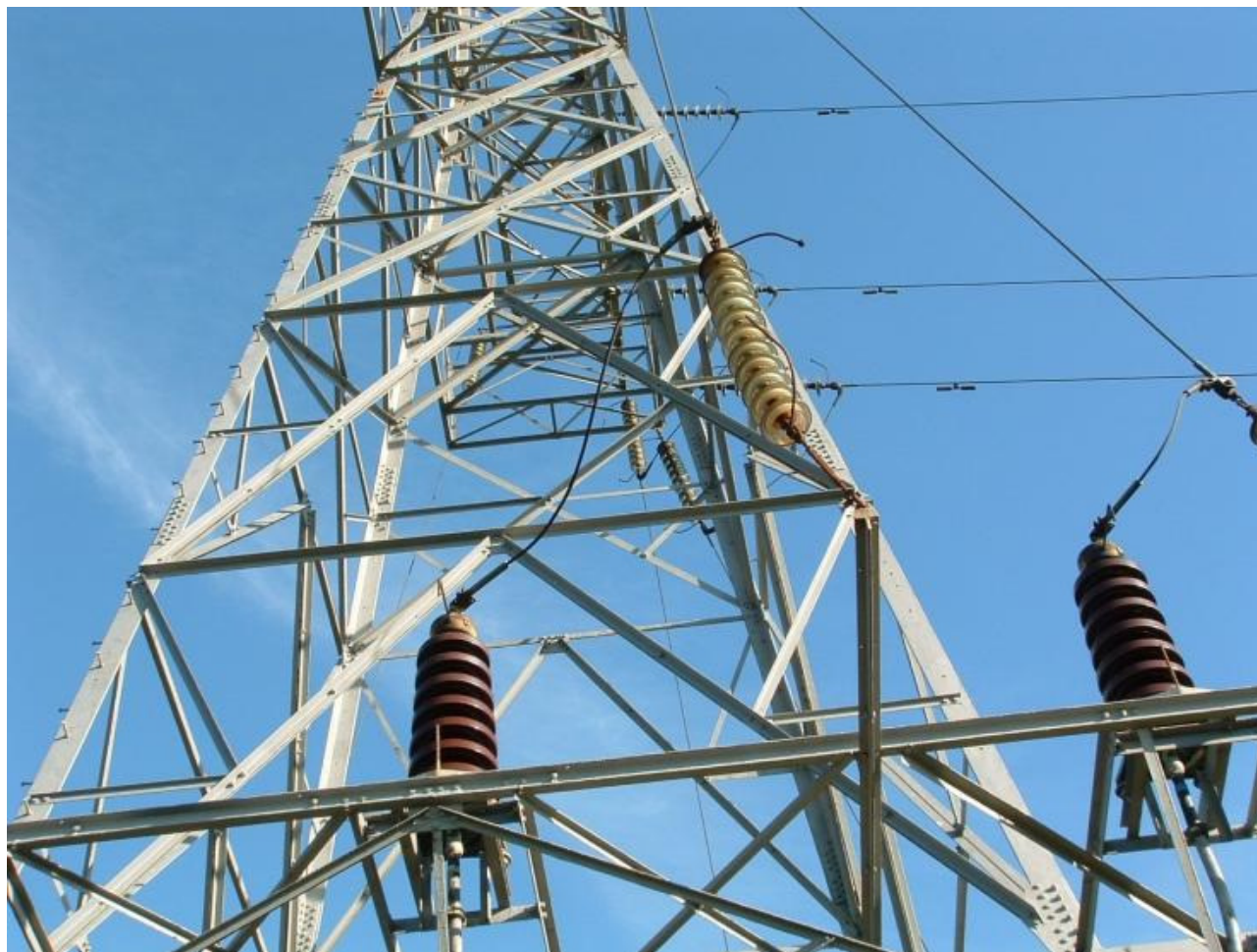
Appendix B Photographs



Photograph 1 – The failed jumper in situ at tower PHO1



Photograph 2 The failed jumper connection in relation to the crimped lug



Photograph 3 –The jumpers of the other two phases on the n°2 circuit at tower PHO1