

Quality of Service Incentive Scheme – Exceptional Events

Appointed Examiner's Report	
Reporting year	2011/12
DNO	Western Power Distribution – East Midlands Licensed Area
Cause	Catastrophic failure of 33kV Switchgear
Date of event	12 October 2011

Submitted to:

Ofgem and
Western Power Distribution

Submitted by:

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Glossary

AE	Appointed Examiner
BPI	British Power International
BSP	Bulk Supply Point
CB	Circuit-breaker
CEGB	Central Electricity Generating Board
CI	Customer Interruptions per 100 connected customers
CML	Customer Minutes Lost per connected customer
DNO	Distribution Network Operator
EHV	Extra High Voltage – all voltages above 20kV up to but excluding 132kV
ENWL	Electricity North West Limited
HV	High Voltage – all voltages above 1kV up to and including 20kV
IDMT	Inverse Definite Minimum Time
QoS	Quality of Service
RIG	Regulatory Instructions and Guidance
SCADA	System Control and Data Acquisition
SI	Short Interruption
SLD	Single Line Diagram
SoF	Statement of Facts
ToR	Terms of Reference
WPD	Western Power Distribution

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 Western Power Distribution (WPD) under the “one-off” exceptional event mechanism that catastrophic failure of WPD’s 33kV switchgear at 12:54 on Wednesday, 12 October 2011 resulted in the loss of supplies from its Winster Bulk Supply Point (BSP) adversely affected the reported performance for its East Midlands distribution licensed area for the reporting year 2011/12.

The Appointed Examiner (AE) has visited WPD 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 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 WPD’s performance in mitigating the impact of the event upon its customers.

The AE concludes that all programmed maintenance was up-to-date at WPD’s Winster BSP and that WPD had no reason to believe that there was any latent defect within the 33kV indoor switchgear at its Winster BSP.

Notwithstanding WPD’s personnel being unable to gain access to the damaged switchgear, initially because of the fire, but immediately thereafter due to the unsafe nature of the switchhouse, the AE concludes that WPD’s control engineers and field personnel reacted well, restoring supplies by alternative means as swiftly as possible.

Given the nature of the incident and the remote locations of many of the affected customers, the AE also concludes that WPD’s personnel are to be commended for restoring supplies to 99.99% of the affected customers within 24 hours, with all supplies being restored by 17:00 on Thursday, 13 October 2011.

The AE notes the number of mobile generators that WPD sourced and deployed to restore some supplies, particularly as the loadings on its alternative infeeds came close to their maxima.

The AE also notes WPD’s early realisation of the scale of the incident and arranging for a Silver Command to be established with the emergency services, for directly supporting its most vulnerable customers, for contacting the local aid and voluntary organisations and for keeping the media constantly advised of the situation.

The AE commends WPD for its ‘lateral thinking’ in carrying out the cross-jointing on its 33kV system so as to restore the 33kV infeeds to its affected Primary Substations as expeditiously as possible in order to optimise the security of supply available at that time.

The AE also commends WPD for installing the container-type 33kV switchboard at Winster BSP and for its consultative approach towards the local National Park Authorities in gaining their approval to the permanence of this arrangement.

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

The AE therefore recommends that an adjustment to WPD East Midland'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:

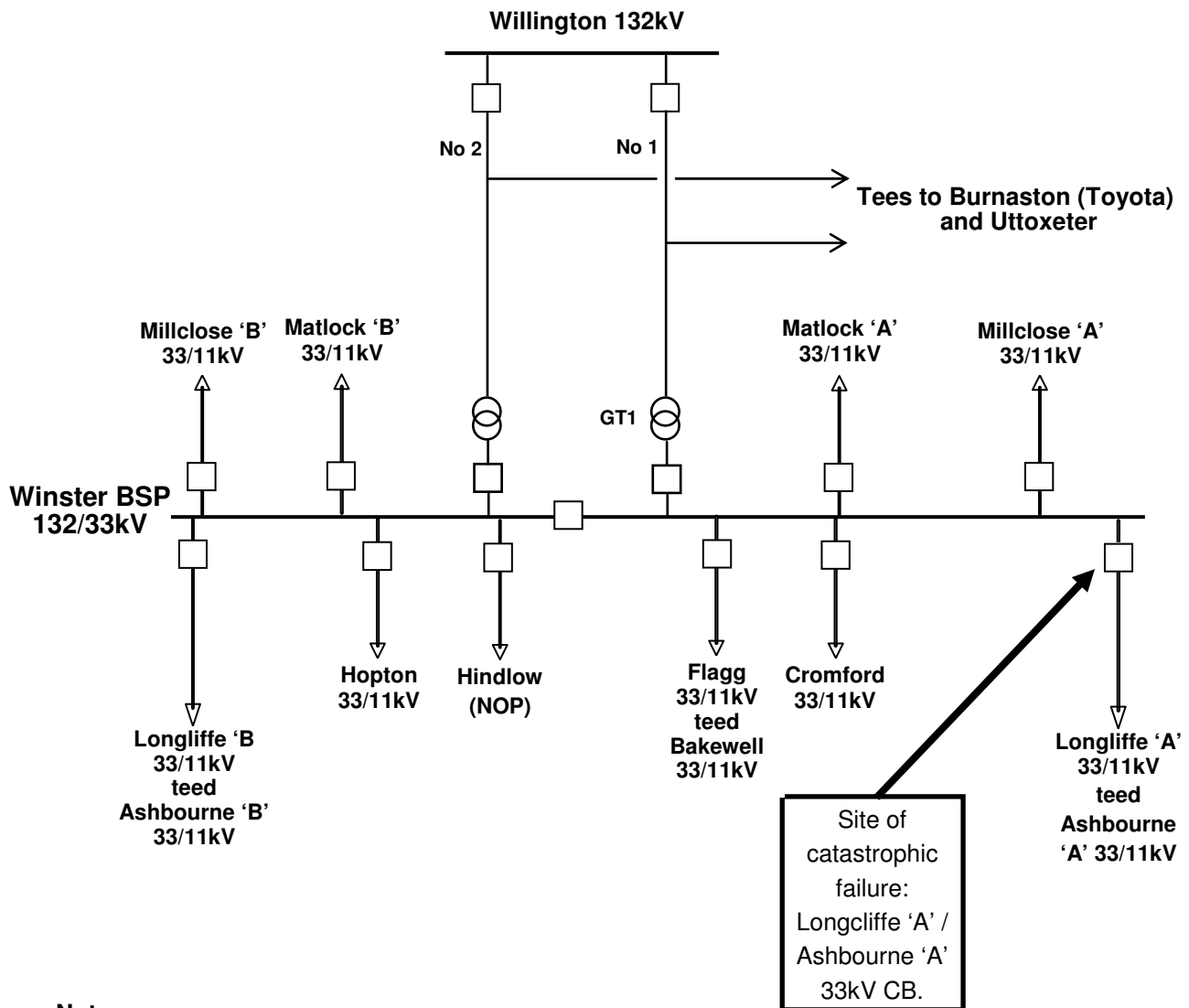
	Audited number	Number above the threshold	Recommended adjustment
CI	1.07	0.07	0.07
CML	3.67	2.87	2.87

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 WPD has furnished photographic evidence to support its claim that the 33kV switchgear at WPD's 132/33kV Winstar BSP suffered a catastrophic failure.
- 1.3 The ensuing explosion irreparably damaged the 33kV switchboard and the 33kV switchhouse, resulting in the loss of all 33kV infeeds to eight of WPD's 33/11kV Primary Substations.
- 1.4 WPD's protection operated to clear the incident from its distribution network.
- 1.5 Rapidly assessing the scale of the incident, WPD's control engineers began to restore supplies within ten minutes via tele-controlled switching as field personnel made their way to the area.
- 1.6 Further supplies were restored by a combination of tele-controlled and manual switching, including LV back-feeding, until the loadings on WPD's distribution network were such that mobile generation was deployed to restore the majority of the remaining customers.
- 1.7 WPD was prevented from accessing the damaged switchgear by the fire brigade and by the unsafe structure of the damaged switchhouse.
- 1.8 WPD's Buxton Substation is supplied at 33kV from the Electricity North West Limited's (ENWL) distribution network. Following a request from WPD, ENWL made additional capacity available via the Buxton 33kV system which enabled WPD to restore the 33kV infeed to its Bakewell Primary Substation via the alternative infeed from Buxton.
- 1.9 WPD's personnel worked 'around the clock' to carry out cross-jointing on its 33kV network to restore 33kV infeeds to its other affected Primary Substations.
- 1.10 Following WPD's request, the emergency services and other utilities established a "Silver Command". WPD was also pro-active in providing direct support to its customers and in working with the various local aid and voluntary organisations.
- 1.11 WPD ensured that its most vulnerable customers were particularly looked after and safeguarded as well as establishing a special media line to ensure that customers were kept up-to-date with the situation.
- 1.12 As a result of the incident, 28,166 of WPD's customers' supplies were interrupted.
- 1.13 28,162 of these customer supplies were restored within twenty-four hours. Following agreement, the remaining 4 customers were off supply for a further 4 hours until WPD's distribution network was further stabilised.
- 1.14 A simplified view of the section of WPD's 132/33kV network affected by this event is shown in Figure 1.

Figure 1 – Simplified Network Diagram of WPD's 132/33kV distribution network affected by the incident



Note:

1. Supplies to WPD's customers fed from Hindlow 33/11kV Primary Substation were not interrupted by this incident as the 33kV feeder from Winster is normally open at Hindlow.
2. The SLD is for illustration purposes only - the physical disposition of the circuit-breakers is not necessarily that which obtained on site

Exceptionality requirements

Does the event qualify for exclusion?

- 1.15 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.
- 1.16 The AE therefore considers that, subject to satisfying the requirements of Appendix 4 to CRC 8, the event qualifies for possible exclusion under the "one-off" exceptional events process.

Exceptionality test results

1.17 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	0	0
EHV	1	1
HV	0	0
LV	0	0
Total	1	1

1.18 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	1.0	1.07	1.07	Pass	0.07
CML exceptionality	0.8	3.67	3.67	Pass	2.87

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' Exceptional Events Claims for 2011/12

WPD's views of its performance

- 1.19 WPD's distribution system in the north of Derbyshire is largely supplied from its Winster 132/33kV BSP.
- 1.20 Winster BSP was commissioned in the 1950s by the then Central Electricity Generating Board (CEGB) and comprised two 132/33kV transformers feeding an indoor Metropolitan Vickers metal-clad switchboard.
- 1.21 The 33kV bus section circuit-breaker runs in the 'normally closed' position.
- 1.22 At 12:54 on Wednesday 12 October 2011, a catastrophic failure of the Longcliffe 'A' 33kV oil circuit-breaker at Winster BSP resulted in an explosion which irreparably damaged the 33kV switchgear and the 33kV switchhouse resulting in the loss of 33kV infeeds to eight of WPD's 33/11kV Primary Substations.
- 1.23 Initial supplies were restored through a combination of automatic and tele-controlled switching.
- 1.24 WPD considers that its duty control engineers reacted well in assessing the alarms generated by the event and beginning to restore supplies via tele-controlled switching in ten minutes.
- 1.25 Other supplies were restored through a combination of manual switching, mobile generators (both LV and HV) and LV backfeeds.
- 1.26 Cross-jointing of the 33kV network was carried out to restore 33kV infeeds to the affected area, thus improving the security of customers' supplies.

WPD's answers to questions on its performance

- 1.27 Within the last three years, the AE has reviewed the former Central Networks' and WPD's design standards, construction methods and maintenance procedures during previous visits to audit exceptional event claims and found them fit for purpose.
- 1.28 The AE is pleased to note that, in the six and a half months between WPD purchasing Central Networks and the occurrence of this incident, WPD had standardised its emergency procedures and that these were fully understood throughout the enlarged organisation at the time of the incident.
- 1.29 The AE confirms that WPD's emergency procedures provide for the type of event being examined here.
- 1.30 To aid understanding of the background to WPD's SoF, the AE prepared a list of initial questions regarding this incident. These questions were used as the basis for the examination of WPD's claim.
- 1.31 The initial questions were discussed during the AE's visits to WPD's Tipton Control Centre on 13 February 2012, when the records of WPD's SCADA system, the incident report and other information were made available.

1.32 WPD 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 WPD's answers being printed in normal font.

Q1. What emergency plans and procedures were in place at the time of the incident at Winster 132 / 33kV BSP?

A1. WPD's emergency procedures as outlined at previous audits.

WPD's structure introduced on October 1 2011 allowing new emergency procedures to be implemented – this was the first exceptional event run under WPD processes and procedures in the East Midlands licensed area.

The WPD South West and South Wales Control Room Manager was responsible for the control room aspects of the incident management. The North Midlands Network Services Manager was responsible for overall control of the incident "buddied" with the South Wales Network Services Manager.

All three were based in WPD's East Midlands control room at Pegasus for the duration of the incident.

Q2 Did that version of the emergency plans and procedures provide for dealing with this type of incident?

A2. Yes – P2/6 review completed on acquisition.

Emergency switching plans and strategic spares reviewed.

Additional generation was already on order but was not delivered in time for the incident under review at Winster BSP.

WPD is a member of the national Energy Emergency Executive Committee (E3C group) which enabled high level contact to be made at an early stage with ENWL and agreed increased 33kV capacity to WPDs' Buxton Substation.

Q3. If the emergency plans and procedures had changed in the period between WPD taking ownership of the erstwhile Central Networks and the incident at Winster 132 / 33kV BSP how widely known were the new plans and procedures amongst the staff of the former Central Networks at the time of the incident?

A3. WPD had put a new organisational structure in place on 01 October 2011 and the incident was run in accordance with WPD processes and procedures. This followed extensive training which particularly focussed on acting with a sense of urgency in restoration strategies.

Q4. At the time of submitting its Statement of Fact (SoF), WPD was still investigating the exact cause of the incident, what has WPD determined since regarding this aspect of its claim?

A4 WPD's confidential internal report was made available to the AE during the audit visit. The root cause of the incident was considered to be the failure of the blue phase circuit-breaking contact within the blue phase interruption chamber of the Longcliffe 'A' teed Ashbourne 'A' 33kV circuit-breaker during an operation to clear a fault on the outgoing feeder.

The arcing within the interruption chamber led to a flashover between the blue phase contacts and the switchgear metalwork, the ensuing pressure build-up resulting in an explosion, the catastrophic failure of the circuit-breaker and the devastation of the 33kV switchhouse.

Q5 What type of switchgear was installed at Winstar BSP at the time of the incident?

A5 Winstar BSP is a 132/33kV transformer station supplied via two 132/33kV grid transformers. At the time of the incident these fed onto a Metropolitan Vickers SB12 33kV metal-clad indoor switchboard.

Q6. When were the 33kV busbars and switchgear commissioned at WPD's Winstar BSP?

A6. Winstar was commissioned in its pre-incident form by the then Central Electricity Generating Board (CEGB) in the mid-1950s.

Q7. What is WPD's and the former Central Networks' operational experience of this type of switchgear?

A7. This was the only switchgear of this type in service. Prior to the incident, it had a good service history with no known defects.

Q8. WPD's SoF suggests that the switchgear affected by this incident is situated indoors. If this is the case, what fixed fire-fighting installations and / or fire segregation measures were deployed at Winstar BSP?

A8. Winstar BSP was equipped with a multi-zone CO₂ system protecting the three fire-segregated sections of the 33kV switchroom, together with the fire segregated ground floor busbar rooms and the cable riser rooms.

Q9. What was the erstwhile Central Networks' policy for the installation of fixed fire-fighting equipment and other measures for switchgear of this type situated indoors? Were these measures deployed at Winstar BSP?

A9. When Winstar BSP was designed, it was in line with the policy for indoor 33kV oil-filled circuit-breakers for both CO₂ and segregating fire walls. Present day policy is that each site is assessed individually to determine if fixed fire protection systems are required, based on type of switchgear, network risk, personnel safety risk and risk to adjoining properties.

Q10. WPD's SoF mentions that access was prohibited to its Winstar BSP during the event by the emergency services. How has any associated clock-stopping period been incorporated within WPD's claimed figure for the CML attributed to this incident as provided for under paragraph 3.70 of the NADPR RIGS version 2?

A10. WPD has not included any clock-stopping in the incident report due to delays accessing the switch room on the basis that, although the fire brigade and the buildings inspector prevented access to the building and surrounding site WPD restored large numbers of customers via alternative supplies.

Q11. At WPD's Winstar BSP, what protection schemes were installed on:

a. the 33kV busbars?

b. the 33kV sides of the three 132 / 33kV transformers?

c. the 33kV bus section circuit-breaker? And

d. the circuit-breakers controlling the 132kV sides of the 132 / 33kV transformers?

- A11(a). Clearance of busbar faults is by the operation of Inverse Definitive Minimum Time (IDMT) protection on the incoming Grid Transformers and 33kV bus-section CB. Busbar earth-faults are cleared by operation of the 33kV Bus Section IDMT earth-fault protection, followed by the IDMT Standby Earth Fault Stage 1 protection on the LV side of the relevant Grid Transformer. Busbar phase-faults are cleared by operation of the 33kV Bus section IDMT overcurrent protection, followed by the HV overcurrent protection Stage 1 on the relevant Grid Transformer.
- A11(b). The 132/33kV Grid Transformers are equipped with an Alstom type MCGG82 relay which is arranged to provide a two-stage HV overcurrent protection scheme. The first stage trips the transformer 33kV circuit-breaker and the second stage operates the transformer 132kV fault throwing switch if fault current is still flowing 400ms after the first stage has operated.
- The 132/33kV Grid Transformers are also equipped with two Alstom type MCGG22 relays which are arranged to provide a two-stage LV earth-fault protection scheme. The first stage (Standby Earth Fault Stage 1) trips the transformer 33kV circuit-breaker and the second stage (Standby Earth Fault Stage 2) operates the transformer 132kV fault throwing switch.
- A11(c). The 33kV Bus Section CB is equipped with a Reyrolle Argus type DCD414B protection relay, which is set to provide IDMT overcurrent and earth-fault protection
- A11(d). The Winsters-Burnaston-Utttoxeter 1 & 2 132kV feeder CBs at Willington are equipped with Reyrolle type THR3PE12 distance protection relays, Alstom type MCGG62 overcurrent protection relays and AEI type VAR82 auto-reclose relays. The distance protection relays have three zones set to provide instantaneous (INST) and definite-time (DT) phase and earth-fault protection, the overcurrent relays are set to provide IDMT overcurrent and earth-fault protection, and the auto-reclose is a single-shot scheme.

[AE's note: The AE is satisfied that the protection schemes installed on the affected section of WPD's network are appropriate].

Q12. What settings are applied to the above 33 kV protection schemes?

- A12. A full set of protection settings was made available to the AE during the audit visit.
- [AE's note: The AE is satisfied that the settings applied to the protection schemes installed on the affected section of WPD's network are appropriate].*

Q13. What protection operated when supply was lost?

- A13. At Winsters 132/33kV BSP:
The Longcliffe 'A' and Ashbourne 'A' 33kV CB opened at the very start of the incident; and
33kV CB Grid T1 opened shortly after fault inception.
- At Longcliffe 33/11kV Primary Substation:
Transformer 'A' 11kV CB tripped on directional overcurrent protection.
- At Ashbourne 33/11kV Substation:
Transformer 'A' 11kV CB tripped; and
Transformer 'B' 11kV CB tripped.
- At Burnaston 132/11kV Primary Substation:
11kV CB Grid 3 tripped on directional overcurrent protection.
- At Utttoxeter 132/33kV Primary Substation:
33kV CB Grid 2 tripped on directional overcurrent protection.
- At Willington 132kV Grid Substation
The Winsters-Burnaston-Utttoxeter n°2 132kV CB tripped on main protection; automatically reclosed onto the fault and tripped again on main protection.

Q14. What learning points has WPD incorporated into its procedures as a result of this incident?

A14. WPD considers that its emergency plans and procedures worked well in restoring supplies to the affected customers without undue delay.

WPD continually reviews its contingency plans in order to improve its performance. Specific learning points from this incident include:

- The availability of an increased number of mobile generators within the former Central Networks' geographic area; and
- The purchase of additional strategic spares:
 - a mobile 33kV switchboard, for which tenders have just been received; and
 - two mobile 33kV ring main units which have already been purchased and which are stored at WPD's Huthwaite depot.

Q15. What further learning points should be considered as a result of the application of the current one-off Exceptional Event Claims process?

A15. Audit within a three month period; and

Review of clock-stopping in the RIGs for RIIO ED1

1.33 WPD also provided further information both during and subsequent to the audit visit. This includes:

- photographs of the irreparably damaged switchhouse at its Winster BSP;
- photographs of the catastrophically failed 33kV circuit-breaker at its Winster BSP;
- sight of the up-to-date maintenance programme for Winster BSP;
- a copy of WPD's SCADA alarms received during this incident;
- a copy of the switching log from WPD's SCADA system;
- a representation of the incident on WPD's SCADA system;
- sight of WPD's protection schemes and associated relay settings for the affected parts of its distribution system;
- a simplified single line diagram (SLD) of the relevant sections of WPD's 33 kV network showing all the Primary Substations affected by the loss of supply during this incident; and
- a copy of WPD's incident report from which it calculated the CI and CML attributed to the event.

2. Audit part 2

WPD's performance in preventing the event

- 2.1 In viewing WPD's performance in preventing this event, the AE has considered what more WPD could have reasonably done to ensure that its 33kV switchgear at Winster BSP was free from latent defects and therefore fit for purpose.
- 2.2 The AE has discussed WPD's policy on its preventative measures and studied WPD's records to ascertain if they were applied.
- 2.3 Photograph 1 shows the extensive damage to the 33kV switchhouse, making the building unsafe for access. **[AE's note: WPD subsequently employed a specialist demolition contractor to safely remove the remains of the switchhouse].**
- 2.4 Photograph 2 shows the 33kV circuit-breaker that catastrophically failed. The force of the explosion can be gauged from the fact that the bolts securing the substantial metal door to the front of the circuit-breaker were sheared off and the whole door blasted off its hinges. The damage to the access door can be seen in the lower image of photograph 2. **[AE's note: the number of securing bolts that were sheared off during the incident can be judged from the undamaged circuit-breaker beyond that which failed].**
- 2.5 Photograph 3 shows the damaged interruption chamber of the failed circuit-breaker.
- 2.6 Photograph 4 shows the arc damage within the interruption chamber of the failed circuit-breaker.
- 2.7 WPD's measurement systems clearly show the tripping of 132kV and 33kV circuit-breakers at 12:54 on 12 October 2011.
- 2.8 WPD's measurement systems also confirm the restoration of supplies from 13:04 on 12 October 2011 until 17:00 on 13 October 2011.
- 2.9 An examination of WPD's measurement systems confirms that WPD's control engineers acted quickly to assess the alarms generated by the incident and to restore supplies as speedily as possible.
- 2.10 WPD's inspection and preventative maintenance programme is up-to-date
- 2.11 The AE therefore concludes that WPD had done all it could reasonably have been expected to do in considering that there were no latent defects within its 33kV switchgear at its Winster BSP.

WPD's performance in mitigating the effects of the event

- 2.12 WPD's internal investigation concludes that the root cause of the incident is most likely to have been within the blue phase interrupter of the Longcliffe 'A' teed Ashbourne 'A' 33kV circuit-breaker. The failure of the circuit-breaker to fully clear a feeder fault led to the catastrophic failure of the circuit-breaker itself.
- 2.13 The AE is pleased to note that WPD has used the learning from the restoration of this incident to purchase temporary 33kV ring main units that could be deployed in the event of a similar incident in the future.
- 2.14 The AE is also pleased to note that WPD has specified a type of mobile 33kV switchboard for emergency use and has gone out to tender for the production of the equipment.
- 2.15 The actions of WPD's standby personnel, its control engineers and the additional switching staff resulted in the restoration of customers' supplies as swiftly as possible.
- 2.16 The damage to WPD's 33kV switchgear and 33kV switchhouse is consistent with the catastrophic failure of the Longcliffe 'A' teed Ashbourne 'A' 33kV oil-filled circuit-breaker.
- 2.17 The AE has discussed the running arrangements of WPD's 33kV distribution network connected to its Winster BSP and concludes that WPD's protection systems worked correctly to detect the initial fault and also to clear the escalated incident from WPD's distribution system once the Longcliffe 'A' teed Ashbourne 'A' 33kV circuit-breaker failed to clear the initial fault.
- 2.18 The AE commends WPD's control engineers for analysing the situation and restoring supplies as rapidly as possible, thereby minimising the duration of the interruption.
- 2.19 The AE commends WPD for contacting ENWL to obtain increased 33kV capacity to WPD's Buxton substation so as to assist with the restoration of WPD's customer supplies. **[AE's note: The assistance given to WPD by ENWL is particularly significant as this enabled WPD to restore the 33kV infeed to its Bakewell Primary Substation, thereby restoring supplies and restoring system security to that area of Derbyshire].**

Recommended performance adjustment(s)

2.20 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	0.07	0.07
CML	2.87	2.87

Detailed justification

- 2.21 In reaching a judgement on a recommendation, the AE has firstly considered whether or not WPD could have reasonably taken any different course of action that would have prevented the catastrophic failure of its 33kV switchgear at Winster BSP.
- 2.22 In viewing WPD's performance in preventing this event, the AE has taken into account his personal knowledge of distribution switchgear and that of his colleagues who have considerable operational experience of incidents due to many causes.
- 2.23 The AE considers that the preventative maintenance measures employed by WPD on its 33kV indoor switchgear at Winster BSP are in accordance with the current industry standard and, as far as is reasonably practicable, prevent incidents of this nature occurring.
- 2.24 In considering WPD's restoration strategy, the AE is conscious that WPD's duty control engineers acted with commendable skill and speed in analysing the SCADA alarms and indications generated by this incident.
- 2.25 The AE is satisfied that WPD's inspection and maintenance programmes are up-to-date for its Winster BSP and that WPD had no reason to believe its 33kV switchgear contained any latent defect.
- 2.26 The AE is satisfied that WPD's distribution network at Winster BSP complies with the requirements of Security of Supply Standard P2/6.
- 2.27 The AE has discussed WPD's learning from this incident, including the already delivered 33kV mobile ring main units and the tendered-for mobile 33kV switchboard.
- 2.28 The AE is satisfied that WPD has met the criteria for preventative and mitigating actions set out in Appendix 4 to paragraph 8.58 of Special Licence Condition CRC 8.
- 2.29 The AE therefore concludes that WPD's claim is justified and recommends to Ofgem that the amounts of CI and CML above the threshold values should be excluded from the performance of its East Midlands licensed area 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	WPD East Midlands
Date of event	12 October 2012
Cause	Catastrophic failure of 33kV switchgear
Notification to Ofgem	12 October 2011
SoF received	18 October 2011
SoF information	<ul style="list-style-type: none"> At Winster BSP the catastrophic failure of the Longcliffe 'A' teed Ashbourne 'A' 33kV circuit-breaker resulted in an explosion which irreparably damaged the 33kV switchhouse and resulted in the loss of all 33kV outfeeds from Winster BSP to eight of WPD's 33/11kV Primary Substations; The cause was found to be the internal failure of the blue phase interrupter in the Longcliffe 'A' teed Ashbourne 'A' 33kV CB; WPD's control engineers restored many supplies by tele-controlled switching; WPD's photographs show the irreparably damaged circuit-breaker and the shattered 33kV switchhouse. 33kV cross-jointing carried out to get 33kV back to WPD's Primary Substations; Mobile generators used (LV and HV) to restore some supplies; ENWL increased the 33kV capacity through Buxton – enabled WPD to restore 33kV to Bakewell Primary; and A containerised 33kV switchboard installed at Winster BSP.
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 WPD's response, is contained in paragraph 1.32 of the report.
Location of audit visit	WPD's Tipton Control Centre
Date of audit visit	13 February 2012
Visiting Auditor	Geoff Stott (BPI)
WPD's Representatives	Jim Driscoll, Mike Dunne, Richard Skyte and Alison Sleightholm
Information provided during and subsequent to the audit visit	<p>Comprehensive documentation / information including:</p> <ul style="list-style-type: none"> a discussion of the protection arrangements for the affected sections of WPD's distribution system; sight of the settings applied to the above protection schemes; sight of the inspection and maintenance programme – all up-to-date at Winster BSP; copies of the relevant 132kV and 33kV SLDs; a copy of WPD's SCADA events log that shows the 23 pages of alarms generated by the event;

	<ul style="list-style-type: none"> • a discussion regarding the control engineers' switching schedules covering the event; • the switching log shows the loss of supplies from Winstar BSP commenced when the Longcliffe 'A' feed Ashbourne 'A' and the incoming Grid transformer GT1 33kV CBs tripped at 12:54 on 12 October 2011; • further indications from Winstar BSP were lost as the explosion had damaged the SCADA remote terminal unit; • the normal network running arrangements were demonstrated; • a reconstruction of the 87 restoration stages associated with the incident; • the methods of restoration used to restore the supplies to the affected customers was also demonstrated; • a copy of WPD's 'PCNaFIRS' incident report that shows: <ul style="list-style-type: none"> ◦ the number of customers affected by the incident to be 28,166; and ◦ the customer minutes lost to be 9,638,544; • the AE confirms that these figures agree with those quoted in WPD's SoF; • using WPD East Midlands' total connected customers at 30 September 2011 of 2,623,103 the number of customers affected equates to a CI of 1.07. $[28,166 \times 100 / 2,623,103]$; • similarly, the customer minutes lost for this event equate to a CML of 3.67. $[9,638,544 / 2,623,103]$; • discussion regarding WPD's cross-jointing to restore 33kV infeeds to its affected Primary Substations; • discussion regarding the deployment of the container-type 33kV switchboard; • discussion regarding the purchase of additional mobile generators for the Midlands licensed areas; • discussion regarding the design and purchase of a purpose-built temporary, mobile 33kV switchboard; and • discussion regarding WPD's purchase of two 33kV ring-main units for use in any future emergency. <p>WPD's photographs of the incident.</p> <p>Confirmed P2/6 compliant.</p> <p>The list of initial questions was discussed.</p> <p>WPD 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>
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Table A-2: Impact on CI and CML

	CI		CML	
	Claimed	Audited	Claimed	Audited
132kV	0	0	0	0
EHV	1.07	1.07	3.67	3.67
HV	0	0	0	0
LV	0	0	0	0
Total	1.07	1.07	3.67	3.67
WPD East Midlands' Threshold (total)	1.0		0.8	
Part 1 Exceptionality Test	Pass		Pass	
Part 1 Precondition of eligibility (meets App 3 to paragraph 8.57 of CRC 8)	Pass			

WPD'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 the regulatory reporting year 2011/12.

Appendix B Photographs



Photograph 1 – The damage to the 33kV switchhouse



Photograph 2 – The damage to the Longcliffe 'A' teed Ashbourne 'A' 33kV circuit-breaker and the access door that was blasted off



Photograph 3 – View of the damaged interruption chambers



Photograph 4 – The arc damage within the interruption chamber