

POWER SYSTEM OPERATING INCIDENT REPORT: TRIP OF SHEFFIELD-PALOONA AND SHEFFIELD-BURNIE NO.2 110KV TRANSMISSION LINES ON 21 MARCH 2013

PREPARED BY: Systems Capability

DATE: 12 June 2013

FINAL

Disclaimer

Purpose

This report has been prepared by the Australian Energy Market Operator Limited (**AEMO**) for the sole purpose of meeting obligations in accordance with clause 4.8.15 (c) of the National Electricity Rules (NER).

No reliance or warranty

This report contains data provided by third parties and might contain conclusions or forecasts and the like that rely on that data. This data might not be free from errors or omissions. While AEMO has used due care and skill, AEMO does not warrant or represent that the data, conclusions, forecasts or other information in this report are accurate, reliable, complete or current or that they are suitable for particular purposes. You should verify and check the accuracy, completeness, reliability and suitability of this report for any use to which you intend to put it, and seek independent expert advice before using it, or any information contained in it.

Limitation of liability

To the extent permitted by law, AEMO and its advisers, consultants and other contributors to this report (or their respective associated companies, businesses, partners, directors, officers or employees) shall not be liable for any errors, omissions, defects or misrepresentations in the information contained in this report, or for any loss or damage suffered by persons who use or rely on such information (including by reason of negligence, negligent misstatement or otherwise). If any law prohibits the exclusion of such liability, AEMO's liability is limited, at AEMO's option, to the re-supply of the information, provided that this limitation is permitted by law and is fair and reasonable.

© 2013 Australian Energy Market Operator Ltd. All rights reserved

Abbreviations and Symbols

Abbreviation	Term
CB	Circuit Breaker
EMMS	Electricity Market Management System
EMS	Energy Management System
ENVI & LN	Environment and Lightning
kV	Kilovolt
NEM	National Electricity Market
ms	Milliseconds
TT	Loss of multiple transmission elements

Contents

Disclaimer	2
Abbreviations and Symbols	3
Incident summary	5
1 Introduction	6
2 Pre-Contingent System Conditions	6
3 Summary of Events.....	7
4 Immediate Actions Taken.....	10
5 Follow-up Actions.....	10
6 Power System Security Assessment.....	10
7 Conclusions.....	10
8 Recommendations	10

Incident summary

Date and time of incident	21 March 2013 at 1905 hrs
Region of incident	Tasmania
Affected regions	Tasmania
Event type	Loss of multiple transmission elements (TT)
Primary cause	Environment and Lightning (ENVI & LN)
Impact	Nil
Associated reports	Nil

1 Introduction

At 1905 hrs on 21 March 2013, the Sheffield – Paloona 110 kV and Sheffield – Burnie No.2 110kV transmission lines simultaneously tripped and then auto-reclosed. No load or generation was interrupted as a result of this incident. Lightning was determined as the likely cause of this incident.

This report has been prepared under clause 4.8.15 (c) of the National Electricity Rules (NER) to assess the adequacy of the provision and response of facilities and services and the appropriateness of actions taken to restore or maintain power system security.

This report is largely based upon information provided by Transend. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMMS) has also been used in analysing the incident.

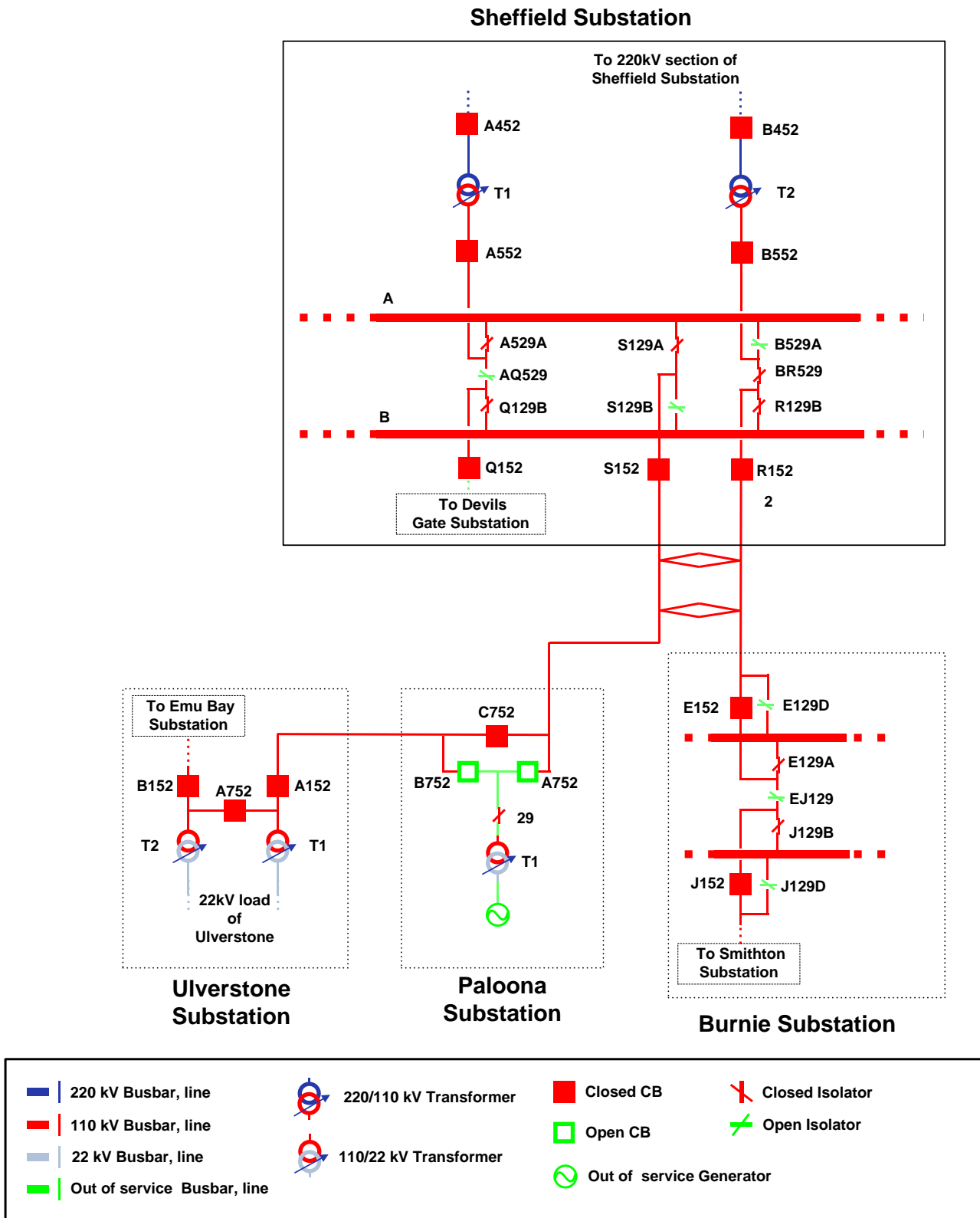
All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

2 Pre-Contingent System Conditions

Prior to the incident, there were reports of lightning in the vicinity. Paloona power station was not operating during this system incident.

The status of the power system prior to the incident is shown in Figure 1. For clarity only equipment relevant to this incident has been included in the diagram.

Figure 1 - Status of the power system prior to the incident



3 Summary of Events

At 1905 hrs on 21 March 2013, both the Sheffield – Palooa 110 kV and Sheffield – Burnie No.2 110kV transmission lines tripped and then auto-reclosed successfully. There was no load or generation interrupted as a result of this incident.

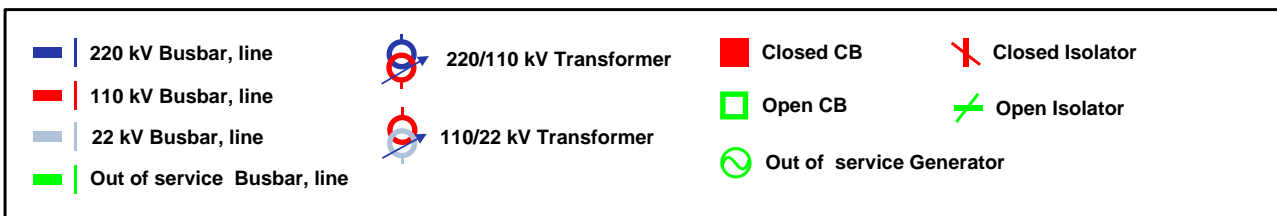
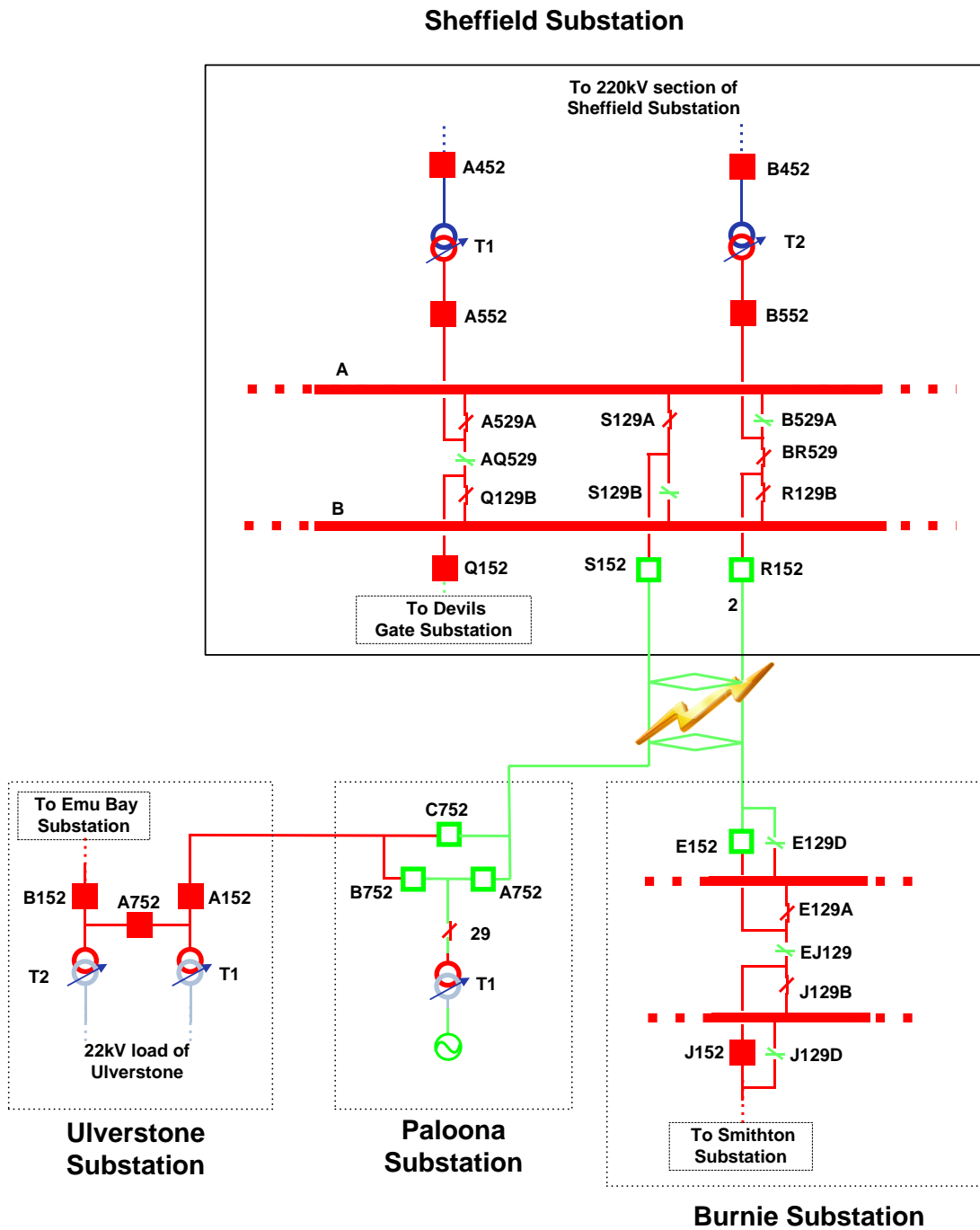
The key events that took place during the incident are summarised in Table 1 below.

Table 1: Summary of events

Time	Events
21-Mar-13, 19:05:13	A 3 phase fault was detected on Sheffield – Burnie No.2 110kV line, Circuit Breaker (CB) R152 and CB E152 operated isolating both ends of Sheffield – Burnie No.2 110kV line.
21-Mar-13, 19:05:13	A phase to phase fault was detected on Sheffield – Paloona 110kV line, Circuit Breaker (CB) S152 and CB C752 operated isolating both ends of Sheffield – Paloona 110kV line.
21-Mar-13, 19:06	Faults on both lines were cleared within 100ms and circuit breakers on both lines auto-reclosed successfully.
22-Mar-13, 02:31	Market Notice No.41992 issued informing of this non-credible contingency event.
22-Mar-13, 02:36	Market Notice No.41993 issued informing of the reclassification of this event.
22-Mar-13, 15:27	Transend confirmed that the trip of the Sheffield – Burnie No.2 110kV and Sheffield – Paloona 110kV transmission lines was caused by lightning.
22-Mar-13, 15:33	Market Notice No.41996 issued informing of the cancellation of the reclassification of the event.

The status of the power system during the incident is shown in Figures 2 below.

Figure 2- Status of the power system during the contingency¹



¹ After the trip of both lines but prior to the auto-reclose actions.

4 Immediate Actions Taken

At 1905 hrs on 21 March 2013 faults were detected on both the Sheffield-Paloona 110kV and Sheffield-Burnie No.2 110kV transmission lines. The distance protection relay operated clearing faults on both lines within 100ms. Auto-reclose then operated successfully on both lines to restore them to service within two seconds. There was no load interruption or equipment damage as a consequence of this event.

At 0231 hrs on 22 March 2013, AEMO issued Market Notice No.41992 advising the occurrence of this non-credible contingency event. The market notice was delayed due to the need to maintain power system security after several non-credible contingencies occurred in close succession in Tasmania that evening.

At 0236 hrs on the same day, Market Notice No.41993 was issued advising the reclassification of this incident as a credible contingency.

5 Follow-up Actions

At 1527 hrs on 22 March 2013, Transend confirmed that the simultaneous trip of the Sheffield – Paloona 110kV and the Sheffield–Burnie No.2 110kV transmission lines was caused by lightning. Transend also confirmed that the protection systems operated correctly clearing the faults and returning both lines back to service.

At 1533 hrs on 22 March 2013, AEMO issued Market Notice No. 41996 informing the market on the cancellation of reclassification for the loss of both the Sheffield – Paloona 110kV and the Sheffield – Burnie No.2 110kV transmission lines as a credible contingency. This was performed following the advice from Transend that the likely cause was lightning and that lightning was no longer detected in the vicinity of the lines.

6 Power System Security Assessment

The power system voltages and frequencies remained within the normal operating bands and the power system remained in a secure operating state throughout the incident.

7 Conclusions

At 1905 hrs on 21 March 2013 the Sheffield – Paloona 110kV and Sheffield – Burnie No.2 110kV transmission lines tripped and auto-reclosed successfully. The trips were determined to be caused by lightning strikes. The protection system operated correctly clearing the faults and returning both transmission lines back to service by 1906 hrs. There was no load loss or equipment damage as a result of this incident.

AEMO correctly applied the criteria published in Section 13 of its Power System Security Guidelines in assessing that the circumstances of this incident did warrant the reclassification of the incident as a credible contingency event. There was some delay in notifying the market of the incident however this delay did not affect power system security.

8 Recommendations

There are no recommendations arising from this incident.