

POWER SYSTEM OPERATING INCIDENT REPORT – TRIP OF CALVALE NO.2 275KV BUSBAR AND CALVALE TO TARONG 8811 275KV LINE IN QUEENSLAND ON 10 OCTOBER 2012

PREPARED BY: Operations Planning

DATE: 28 November 2012

FINAL

Disclaimer

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Abbreviations and Symbols

Abbreviation	Term
CB	Circuit Breaker
CT	Current Transformer
EMMS	Electricity Market Management System
EMS	Energy Management System
kV	Kilovolt
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine
NOS	Network Outage Schedule

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Incident summary

Date and time of incident	10 October 2012 at 1935 hrs
Region of incident	Queensland
Affected regions	Queensland
Event type	BB – Busbar trip
Primary cause	TE – Transmission equipment failure
Impact	NIL
Associated reports	NIL

1 Introduction

At 1935 hrs on 10 October 2012, the Calvale No.2 275kV busbar and the Calvale (H24) to Tarong (H18) 8811 275kV line tripped due to protection operation in response to a high voltage fault internal to the 'A' phase of a current transformer (CT) associated with 275kV circuit breaker (CB) 88112 at Calvale substation.

There was no generation or customer load interruption as a result of the incident. The Calvale No.2 275kV busbar was returned to service at 2333hrs on 10 October 2012 and the Calvale to Tarong 8811 275kV line was returned to service on 11 October 2012 at 1730 hrs.

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.

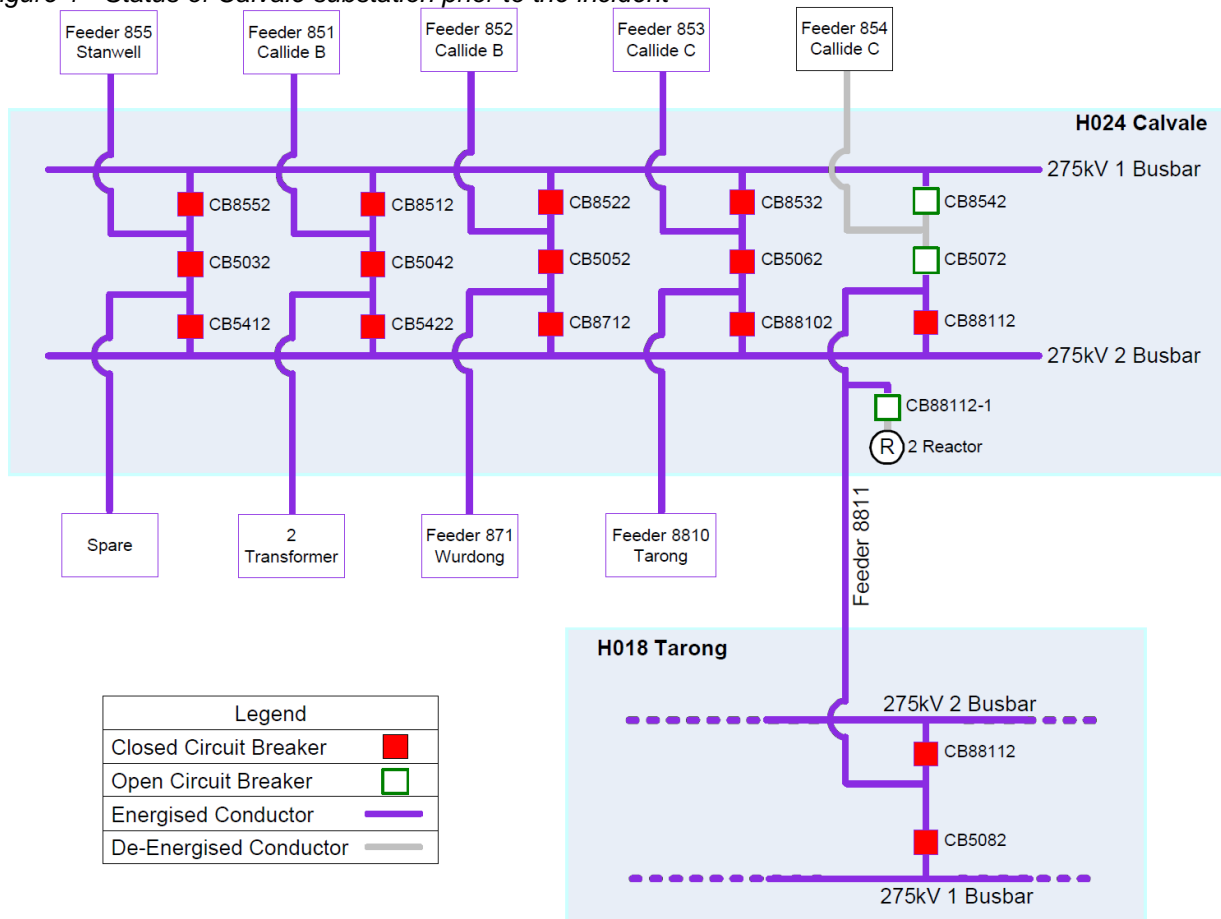
This report is largely based upon information provided by Powerlink. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMMS) has also been used in analysing the incident. All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

2 Pre-Contingent System Conditions

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.

At the time of the incident, the Calvale – Callide C Power Station 854 275kV line was out of service, with CB 8542 and CB 5072 open at Calvale as shown below. This was due to CS Energy planned works.

Figure 1 - Status of Calvale substation prior to the incident



3 Summary of Events

Time	Events
10/10/2012 19:35hrs	Calvale (H24) No 2 275kV busbar and the Calvale – Tarong (H18) 8811 275 kV line tripped.
10/10/2012 20:23hrs	AEMO issued Market Notice No.39986, advising the market of a non-credible contingency.
10/10/2012 22:26hrs	275kV CT's associated with 275kV CB 88112 isolated.
10/10/2012 23:33hrs	Calvale No 2 275kV busbar returned to service.
11/10/2012 17:30hrs	Calvale – Tarong 8811 275kV line returned to service.
18/10/2012 14:12hrs	275kV CB 88112 returned to service with faulty CT replaced.

At 1935 hrs on 10 October 2012, the Calvale No.2 275kV busbar and Calvale to Tarong 8811 275kV line simultaneously tripped due to protection operation. The protection system operated due to the occurrence of a high voltage fault internal to the 'A' phase of a 275kV CT associated with CB 88112 at Calvale substation.

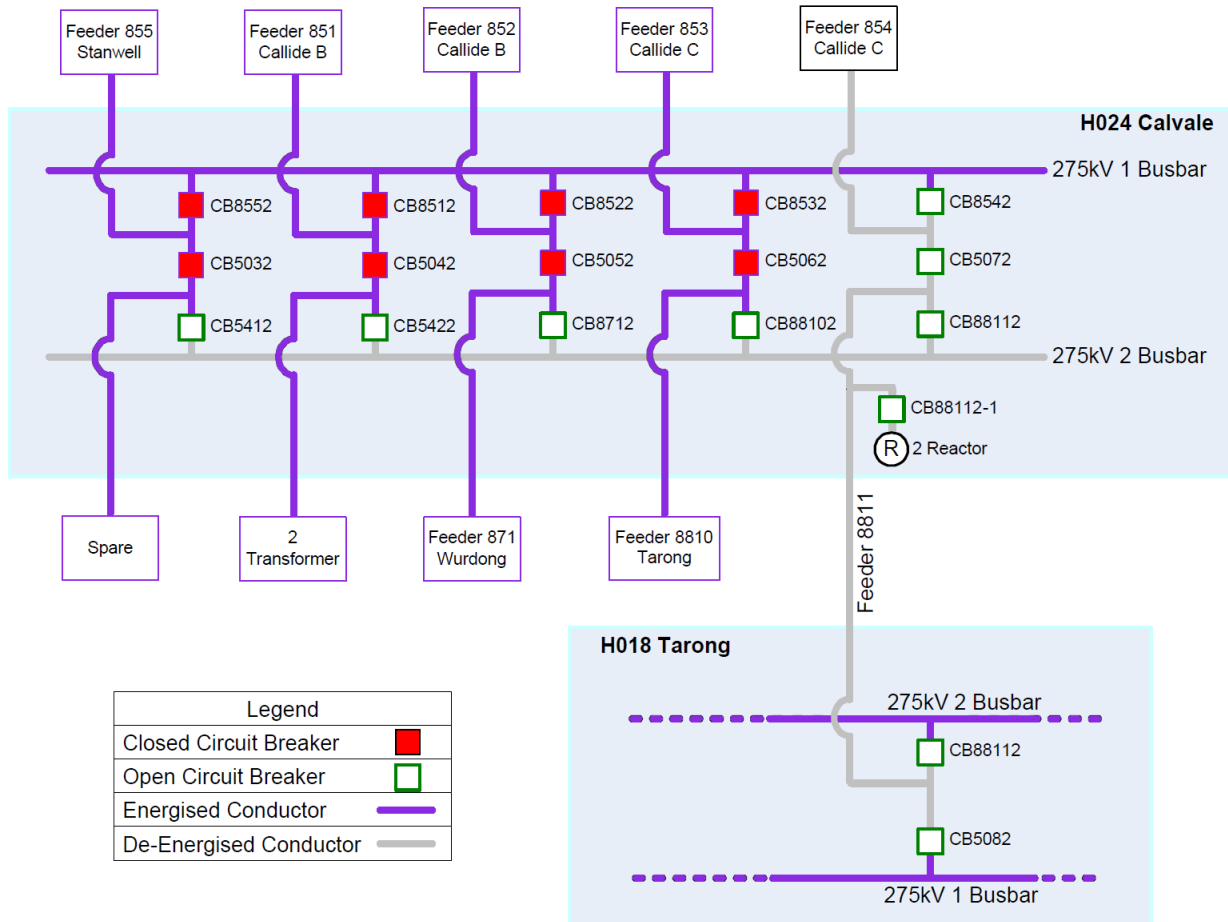
The following 275kV CBs tripped due to operation of Calvale No.2 275kV busbar and Calvale – Tarong 8811 275kV line protection systems:

- 88112 CB at Calvale.
- 88102 CB at Calvale.
- 8712 CB at Calvale.
- 5422 CB at Calvale.
- 5412 CB at Calvale.
- 88112 CB at Tarong.
- 5082 CB at Tarong.

The operation of these CBs successfully cleared the high voltage fault from the power system.

The status of the power system immediately after the incident is shown in Figure 2.

Figure 2 – Status of Calvale substation immediately after the incident



4 Immediate Actions Taken

Constraint set Q-CLTR_8810 was invoked from 1945hrs 10 October 2012.

At 2023 hrs 10 October 2012, AEMO issued the Electricity Market Notice No.39986 advising the occurrence of this non-credible contingency event. AEMO used information provided by Powerlink and operating procedure SO_OP 3715 Power System Security Guidelines¹ and determined that the simultaneous trip of the No.2 275kV busbar at Calvale and Calvale to Tarong 8811 275kV line does not need to be reclassified as a credible contingency event.

At 2246 hrs on 10 October 2012, the 275kV CT's associated with 275kV CB 88112 at Calvale were isolated from the power system.

5 Follow-up Actions

Powerlink's initial assessment of the cause of the incident determined that the protection systems operated correctly due to the existence of a high voltage fault internal to the 'A' phase of a 275kV CT associated with 275kV CB 88112 at Calvale substation. The CT associated with CB 88112 supplies current signals to protection systems applicable to the No.2 275kV busbar and 8811

¹ Clause 4.2.3B of the NER requires that AEMO establish criteria to use when considering whether a non-credible contingency event is reasonably possible. This is published in AEMO operating procedure SO_OP3715 Power System Security Guidelines, which is available at: <http://www.aemo.com.au/electricityops/3715.html>

275kV line at Calvale. The high voltage fault occurred at a location internal to the CT that is within the zone protected by the No.2 275kV busbar and 8811 275kV line protection systems.

At 2335hrs on 10 October 2012, all the CBs (except for the Tarong 8811 275kV line CB) were closed onto the No.2 275kV busbar at Calvale after the failed 275kV CT was isolated from the power system.

At 1730 hrs on 11 October 2012, the Calvale to Tarong 8811 275kV line was returned to service via No.1 275kV busbar at Calvale.

At 1412hrs on 18 October 2012, 275kV CB 88112 at Calvale was returned to service after the failed 275kV CT was replaced.

Powerlink has initiated further investigation into the cause of the high voltage fault.

6 Power System Security Assessment

The high voltage faults were cleared from the power system within the requirements as specified in the National Electricity Rules (NER).

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.

There was no loss of load or generation resulting from the incident.

7 Conclusions

At 1935 hrs on 10 October 2012, the Calvale No.2 275kV busbar and the Calvale to Tarong 8811 275kV line tripped due to the operation of protection systems as a result of a high voltage fault internal to a CT associated with 275kV CB 88112 at Calvale substation.

AEMO correctly assessed and applied the criteria published under clause 4.2.3B of the National Electricity Rules in the context of the non-credible contingency event under investigation.

AEMO is satisfied with the appropriateness of actions taken by Powerlink.

8 Recommendations

Powerlink will advise AEMO of the outcome of the investigation into the cause of the high voltage fault by the end of March 2013.