

# POWER SYSTEM OPERATING INCIDENT REPORT – SHUT DOWN OF MT PIPER POWER STATION ON 8 NOVEMBER 2011

PREPARED BY: Electricity System Operations Planning and Performance

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Final

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### Purpose

This report has been prepared 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 following this event.

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## Abbreviations and Symbols

Abbreviation	Term
CVT	Capacitor voltage transformer
kV	Kilovolt
LOR1, LOR2	Lack of Reserve Levels 1 or 2
MP1, MP2	Generating units 1 or 2 at Mt Piper power station

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# 1 Introduction

On 8 November 2011, following a request from TransGrid received at 1024 hrs, generating units 1 and 2 at Mt Piper power station (MP1 and MP2) in New South Wales were shut down due to concerns over capacitor voltage transformers (CVTs) in the Mt Piper 330 kV switchyard. MP1 was shut down at 1155 hrs and MP2 was shutdown at 12:30 hrs. After TransGrid carried out repairs to the CVTs, AEMO gave clearance for MP1 and MP2 to return to service at 1851 hrs and 2000 hrs respectively.

This report has been prepared 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.

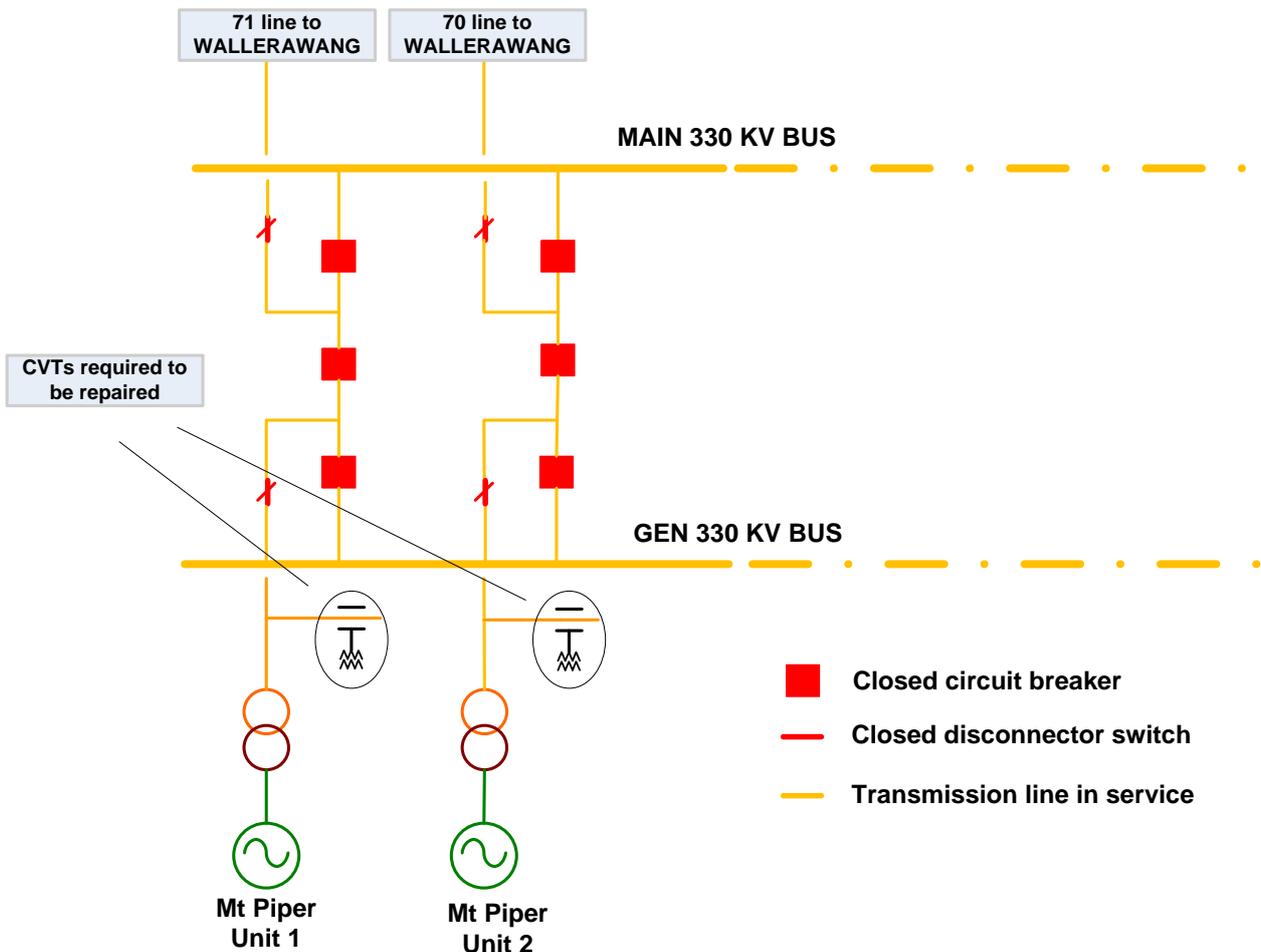
This report is largely based upon information provided by TransGrid, and TRUenergy. Data from AEMO's Energy Management System and Electricity Market Management System has also been used in analysing the incident.

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

# 2 Pre-Contingent System Conditions

The configuration of Mt Piper 330 kV power station switchyard 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



The 11 Dapto–Sydney South 330 kV transmission line was out of service for scheduled work to be completed on 17 November 2011. The transmission line outage resulted in the power transfer capability between the Victoria and New South Wales regions being reduced.

### 3 Summary of Events

At 1024 hrs, TransGrid advised AEMO that MP1 and MP2 were required out of service as soon as possible due to concerns with the serviceability of CVTs in the Mt Piper switchyard. At 1025 hrs, AEMO confirmed with Mt Piper and TRUenergy that TransGrid had advised there was an emergency situation requiring both units to be shut down. AEMO continued to liaise with TRUenergy to ensure the shutdown of MP1 and MP2 generating units, which occurred at 1155 hrs and 1230 hrs respectively.

TransGrid advised AEMO that, during an inspection of Mt Piper switchyard earlier in the day, oil leaks were observed on five of the six single phase CVTs in the MP1 and MP2 generating unit switch bays. The observed oil levels and the rate at which oil was leaking from each of these CVTs were such that there was a risk of failure. After making this assessment, TransGrid evacuated the switchyard as a safety precaution.

TransGrid took the following into account in making its assessment of the situation:

- Five of the six single phase CVTs in two switch bays had developed oil leaks. The oil levels were below the bottom of the CVT sight glasses. The quantity of oil remaining in each of the CVTs was difficult to assess. The condition of the five CVTs was such that there was the potential for an explosive failure of one or more CVTs, which could lead to an outage of part of the switchyard for a significant period of time.
- Due to the close proximity of the two switch bays, both bays had to be removed from service to allow repairs to be undertaken safely. There were no other safety concerns for the area surrounding the two switch bays.

### 4 Immediate Actions Taken

Mt Piper staff successfully shut down MP1 and MP2 generating units within the time frame specified by TransGrid. Following the shutdown of the units, TransGrid de-energised the switch bays with faulty CVTs. With the CVTs removed from service, AEMO did not reclassify any multiple contingencies as a credible contingency due to this incident.

AEMO invoked suitable constraint equations for the outages.

### 5 Follow-up Actions

The combination of the shutdown of both MP1 and MP2 generating units and the prior transmission line outage caused a reduction in supply in New South Wales and AEMO declared Lack of Reserve 1 (LOR1) condition in New South Wales from 1130 hrs to 1600 hrs. Refer market notice 36522.

AEMO recalled the transmission line at 1317 hrs. Based on its assessment of reserves, AEMO declared the Lack of Reserve 2 (LOR2) condition for New South Wales from 1500 hrs to 1630 hrs. Refer market notice 36524.

The transmission line was returned to service at 1522 hrs improving the supply situation in New South Wales. AEMO cancelled the LOR2 and LOR1 notices for New South Wales at 1542 hrs and 1607 hrs respectively. Refer market notices 36530 and 36532.

After the two switch bays were de-energised, TransGrid carried out repairs of the five CVT units. TransGrid identified the cause of oil leaks to be a blind rivet breaking through the magnetic unit tank. The rivet was used to attach a label to the unit twelve months prior to this event; however, oil leaks had not been observed during inspections since then. TransGrid advised that the onset of the leak may have been ambient temperature related.

TransGrid carried out CVT repairs on the day of the. AEMO, on advice from TransGrid, gave clearance for the MP1 and MP2 generating units to return to service at 1851 hrs and 2000 hrs respectively.

TransGrid has advised AEMO that no other CVTs in New South Wales that have the same problem.

TransGrid replaced the CVTs of MP2 switch bay during a scheduled MP2 outage in late November. The CVTs of MP1 switch bay will be replaced when MP1 is taken out of service for a scheduled outage.

## **6 Power System Security Assessment**

The power system frequency and voltages remained within the normal operating bands during the event and the power system remained in a secure operating state throughout the incident. There was no loss of load as a result of this incident.

The provision and response of facilities and services by TransGrid and TRUenergy were adequate to maintain the power system security during this power system incident.

## **7 Conclusions**

AEMO, TransGrid and TRUenergy maintained good operational communication and took appropriate action in managing this incident avoiding any implications on the power system security.

AEMO is satisfied that TransGrid has carried out the appropriate repairs to CVTs, subsequently replacing three CVTs to mitigate the risk of a similar incident occurring in the future.

AEMO correctly applied the criteria published in section 11 of its Power System Security Guidelines in assessing that the circumstances of this incident did not warrant reclassifying similar incidents as a credible contingency event.

## **8 Recommendations**

TransGrid will inform the status of replacing the CVTs of the MP1 switch bay to AEMO by the end of July 2012.