

# LOSS OF SWANBANK B1 AND B2 GENERATING UNITS ON 15 JUNE 2010

PREPARED BY: Electricity System Operations Planning and Performance

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Final

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## 1 Introduction

On 15 June 2010, at 01:15 hours, the No. 1 and the No. 2 generating units at Swanbank power station in Queensland region tripped. The units were generating approximately 50 MW each at the time. The No. 3 and No.4 generating units were not in service at the time of the incident.

This report has been prepared under clause 4.8.15 of the Rules 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.

Information supplied by CS Energy and Powerlink has been used to prepare this report. Data from AEMO's Energy Management and Market Systems has also been used in analysing the event.

All references to time in this report refer to Market Time (Australian Eastern Standard Time).

## 2 Background Information

In September 2009, a failure occurred in the Swanbank B station Plant Automation, Control and Monitoring System (PACMS) system. The reliability of the station protection system was compromised as a consequence of this failure. To mitigate this issue, many of the hardwired critical functions between the power station node controllers were rearranged into a failsafe configuration in order to trip the in service units upon the loss of a critical controller or communications. Additional hardwired signals were installed where required. These modifications were applied to all controllers on all 4 units under the Swanbank B PACMS change process.

### 3 Summary of Events

Figure 1 below shows the configuration at Swanbank B. Note that CB 8032 and CB 5032 are open under normal conditions.

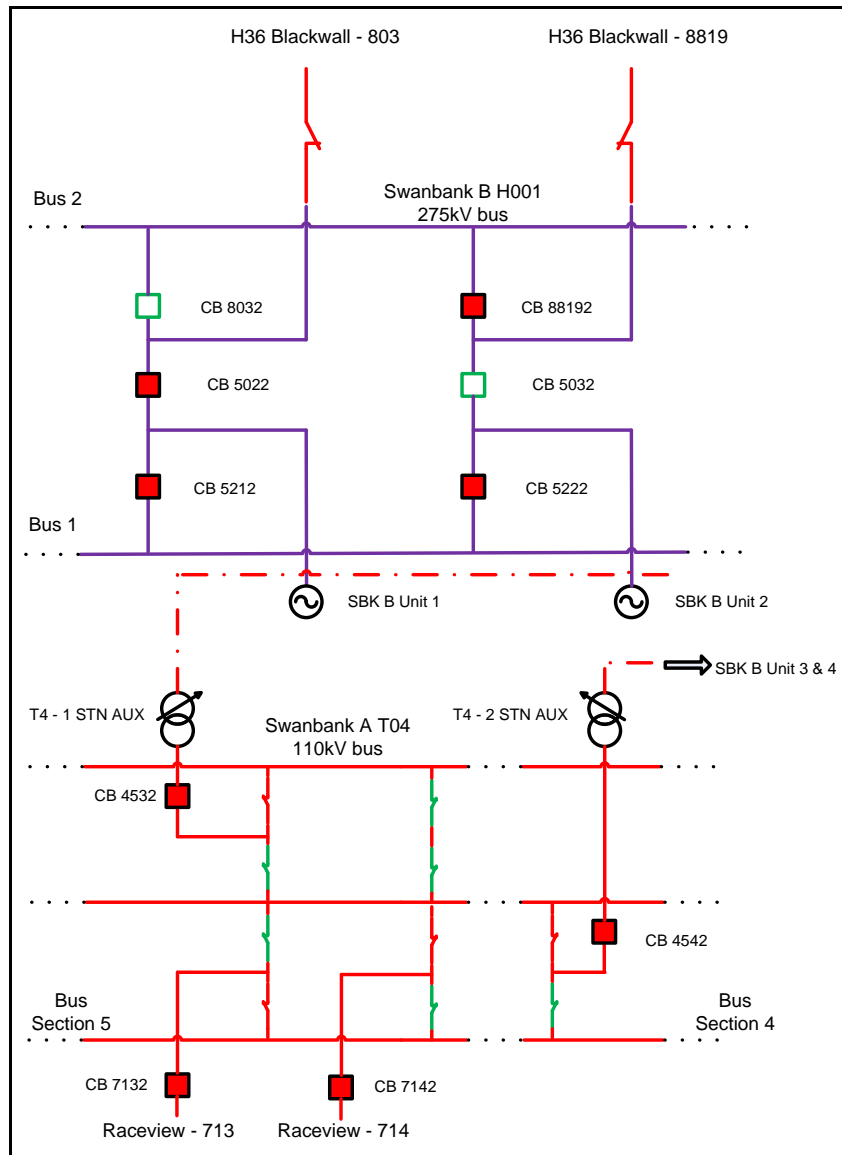


Figure 1 Swanbank system configuration before events occurred (only relevant sections of the bus are shown)

At approximately 01:15 on 15 June 2010, there was a fault on the 33kV equipment at the Raceview substation owned by Energex. The high fault current (~20000A) caused a secondary fault where the 33kV phases engaged with the earth conductor. The disturbance caused by the fault on the 33kV system was not detected by AEMO, CS Energy or Powerlink systems. Energex reported that the protection systems operated on the 33kV system as expected.

The consequence of the disturbance at Raceview was a minor voltage dip at the Swanbank A T04 110kV busbar. The Swanbank B station auxiliary supply is fed from the Swanbank A T04 110kV switchyard. The voltage dip that occurred as a result of the disturbance at Raceview substation was sufficient to trigger operation of under-voltage relays of the auxiliary supply switchboard at Swanbank B power station.

Due to the voltage dip, the controller of the fabric filter shutdown briefly. Unlike other controllers in the power station, the fabric filter controller is not connected to the uninterruptible power supply (UPS) because it is located in a remote switchroom far from the main station. Due to the modifications done to the PACMS system in September 2009, the temporary shutdown of the

fabric filter controller caused a Master Fuel Trip (MFT) signal to be triggered for the in service generating units. Unit 1 tripped when Swanbank B CB 5212 (Unit 1, No.1 bus cb) and CB 5022 (feeder 803, unit 1 centre cb) opened via trip signals following the initiation of MFT signals. The 275 kV Blackwall - Swanbank 803 line was offloaded as a consequence. At the same time, CB 5222 (Unit 2) also opened, tripping the No.2 generating unit.

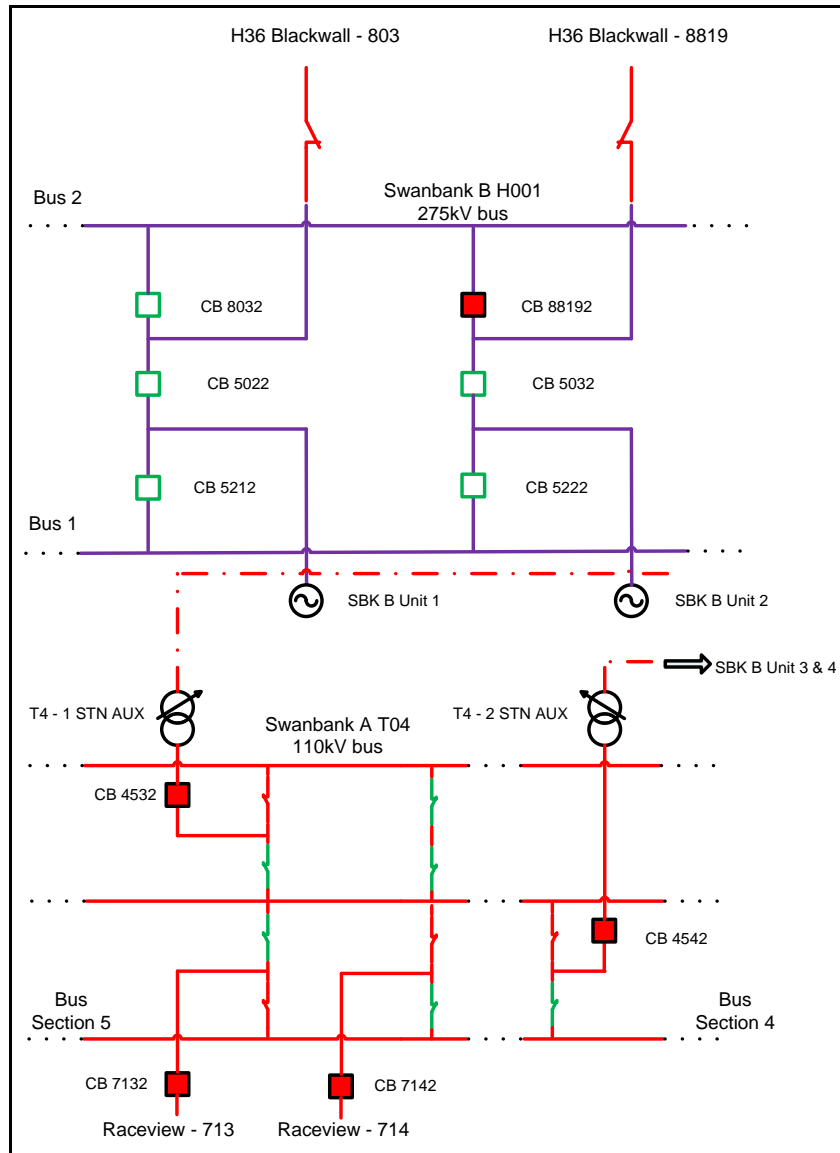


Figure 2 Configuration following the isolation of Unit 1 & 2

The Blackwall – Swanbank 803 line was placed back on load at 01:19 hours by closing CB 8032. Swanbank B units 1 and 2 were synchronised and returned to service at 04:07 and 06:47 hours respectively.

#### 4 Power System Security Assessment

Approximately 100 MW of generation was interrupted following the tripping of the two generating units. No voltage or frequency violations were reported during the event. AEMO’s real time contingency analysis system reported no violations during this event.

## 5 Follow Up Actions

CS Energy has undertaken the following actions:

- Reported to AEMO on 21 June 2010, that the Swanbank B Power Station may not be complying with Section 3.3 – *Response to Voltage Disturbances* of its Agreed Performance Standards.
- Modified the control system logic to include a 2 second timer before tripping the generating unit on a trip signal receive signal from the non UPS controller so that if the controller was to shutdown due to a voltage dip, the tripping of the generating unit would not occur unless the voltage dip was greater than 1 second. This modification was completed on 22 June 2010.
- Is purchasing UPSs for the controllers that are not currently supplied from UPS supplies. Once these UPSs are installed, all controllers should be operating on UPSs. The UPS units are expected to be installed and in service by 31 October 2010.

## 6 Conclusion

At approximately 01:15 hours on 15 June 2010, generating units 1 & 2 at the Swanbank B power station tripped. Approximately 100 MW of generation was interrupted as a consequence. No power system security violations resulted from this incident.

Investigations determined that a fault that occurred at Energex Raceview distribution substation caused a voltage dip on the Swanbank A T04 110kV bus. The resulting operation of under-voltage relays of auxiliary supply systems caused a critical controller to temporarily shut down leading to trip of No.1 and No.2 generating units.

CS Energy has reported that the Swanbank B Power Station may not be complying with its Agreed Performance Standards due to the inability of its generating units to remain in service during voltage disturbances.

The control system logic has been modified to ensure that the Swanbank B generating units remain in service during minor voltage disturbances in auxiliary supply systems as a temporary measure.

CS Energy is in the process of purchasing UPS units for all controllers that are not currently supplied from UPS supplies.

## 7 Recommendations

1. AEMO will liaise with CS Energy on the reported non-compliance of Swanbank B generating units to resolve the non-compliance in accordance with the current procedures.
2. CS Energy will inform the progress of installing new UPSs for the required controllers by the end of October 2010.