

POWER SYSTEM INCIDENT REPORT

TRIP OF NO.1 220KV BUSBAR AT SOUTH MORANG TERMINAL STATION ON 12TH DECEMBER 2009

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FINAL

1. INTRODUCTION

At 23:51 hrs on the 12th December 2009, the No.1 220 kV busbar at South Morang Terminal Station (SMTS) in Victoria Region tripped. This resulted in the tripping of H1 & H2 330/220kV transformers and B1 220/66kV transformer at SMTS, as well as off-loading the No.1 South Morang to Thomastown 220 kV line at SMTS. The power system remained in a secure operating state during this incident and there was no load interruption.

Investigation by SP AusNet, the Transmission Network Service Provider indicated that the incident was a result of an internal flash over of the H2 transformer 220kV No.1 bus circuit breaker (CB). After isolating the failed CB, the affected transmission equipment was returned to service by 06:40 hrs on 13th December.

This report has been prepared under clause 4.8.15 of the National Electricity 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 for this report has been provided by SP AusNet. Additional information has been obtained from AEMO's Energy Management System and Market Management System.

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

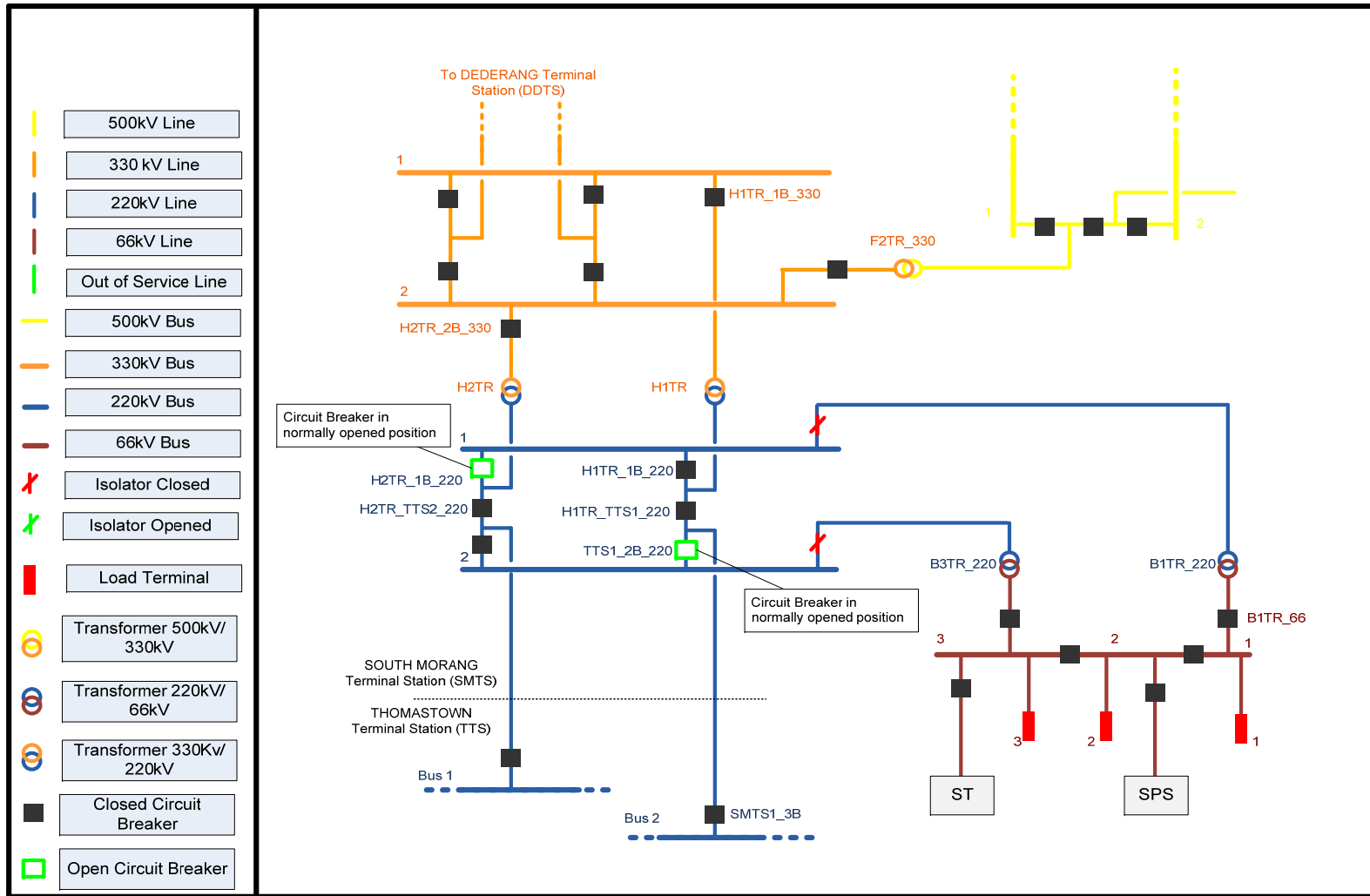
2. SUMMARY OF EVENTS

At approximately 23:51 hrs on 12th December 2009, an internal flash over occurred in the H2 transformer 220kV No.1 bus CB. Normally this CB is operated open. As a result of the failure, the No 1 220 kV busbar opened automatically and the H1, H2 and B1 transformers at SMTS were de-energised. This also caused off-loading of the Thomastown No1 220 kV line at SMTS. Figure 1 below illustrates the status of SMTS before the incident and figure 2 outlines the status after the incident.

Market Notices 29342 and 29343 were issued at 00:07 hrs and at 00:15 hrs on 13th December 2009 respectively, informing market participants of the unplanned outage and invocation of the Constraint set V-SMTXH1_R to manage the post contingency power system security.

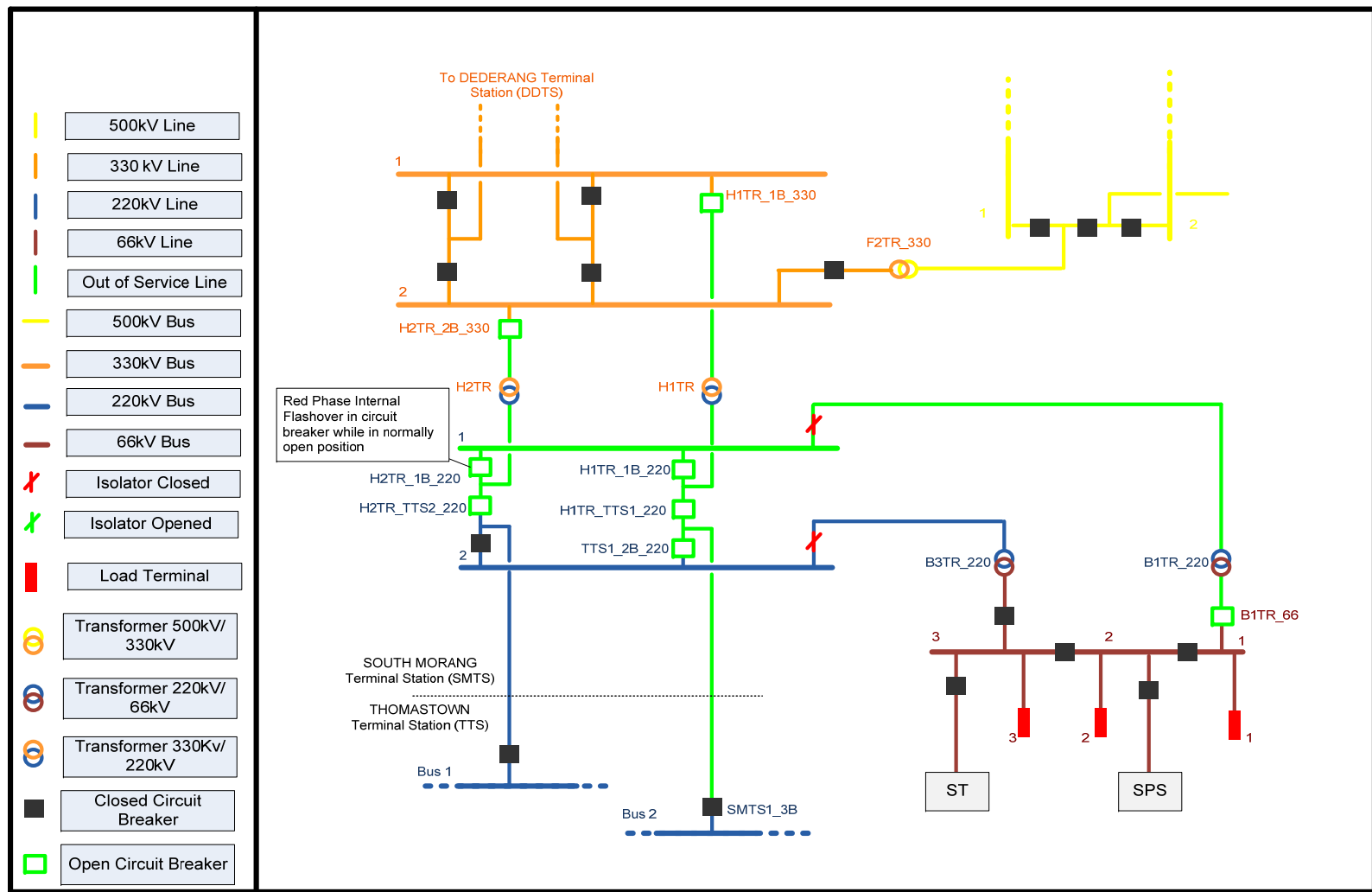
H1 and H2 transformers were progressively restored at approximately 03:43 hrs and 04:03 hrs, while B1 transformer was returned to service by approximately 06:40 hrs on 13th December 2009.

FIGURE 1: STATUS OF SMTS PRIOR TO THE OCCURANCE OF THE INCIDENT



Power System Incident Report – Trip of No.1 220kV Busbar at South Morang Terminal Station on 12th December 2009

FIGURE 2: STATUS OF SMTS AFTER THE OCCURANCE OF THE INCIDENT



Power System Incident Report – Trip of No.1 220kV Busbar at South Morang Terminal Station on 12th December 2009

3. ANALYSIS OF EVENTS

The H2 transformer 220kV No.1 bus CB at SMTS is normally operated open. At approximately 23:51hrs on 12th December 2009, an internal flash over of the red phase of this CB occurred. The X protection of the H2 transformer operated tripping the H2 330/220KV transformer. The protection design at SMTS is such that the B1 220/66 kV transformer zone differential protection is extended to cover the No.1 220kV busbar. Similarly the B3 transformer zone differential protection is extended to cover the No.2 220kV busbar. (Note that B1 and B3 transformers do not have 220kV CBs.) Hence the B1 220/66KV transformer also tripped when the internal flash over was experienced on the H2 transformer 220kV No.1 bus CB.

Investigation by SP AusNet found that the correct settings had not been implemented on X protection of the H1 transformer; as a result the X protection of H1 transformer also operated tripping the transformer during this incident. New settings for the X protection relay were issued and applied immediately following the incident.

The power system remained in a secure operating state following these events.

Market Notices 29342 and 29343 were issued on 13th December 2009 at 00:07 hrs and 00:15 hrs respectively. This was to inform market participants of the unplanned outage and also the invocation of constraint set V-SMTXH1_R from 00:05hrs to manage post contingent conditions. Further to this, Market Notice 29344 was issued at 02:44hrs advising participants that a discretionary constraint set had been invoked to maintain the power system in a secure operating state and to manage local contingency analysis violations in the Victoria region. This constraint set (I-VN_0650) limited the inter-regional transfer from Victoria to NSW to no more than 650 MW.

H1 and H2 transformers were progressively restored at approximately 03:43 hrs and 04:03 hrs on 13th December 2009, while B1 transformer was returned to service at approximately 06:40 hrs 13th December 2009.

Investigations by SP AusNet found that the circuit breaker flashed over from the corona shield on the interrupter to the tank. There were no switching operations or CB operations taking place at the time and the CB did not suffer from any mechanism or mechanical defects. SP AusNet replaced the faulted CB, with the replacement CB being switched into service on 15th January 2009. The failed CB has been sent to the manufacturer for investigation.

4. FOLLOW UP ACTIONS

NIL.

Power System Incident Report – Trip of No.1 220kV Busbar at South Morang Terminal Station on 12th December 2009

5. POWER SYSTEM SECURITY

There were no power system security issues during this event.

6. CONCLUSIONS

An internal single phase flash over in H2 transformer 220kV No.1 bus CB at South Morang Terminal Station resulted in the tripping of the No.1 220 kV busbar and de-energisation of the H1, H2 and B1 transformers.

The protection systems correctly operated and de-energised the H2 330/220KV transformer, the No1 220kV busbar and the B1 220/66kV transformer. The H1 330/220 kV transformer tripped incorrectly due to an incorrect protection relay setting, and this has since been rectified. The initiating cause of the trips has been rectified by CB replacement. Following the initial contingency, the power system remained in a secure operating state.

7. RECOMMENDATION

NIL.