POWER SYSTEM OPERATING INCIDENT REPORT – ISLANDING OF POINT HENRY POTLINES ON 12 DECEMBER 2011

PREPARED BY: Electricity System Operations Planning and Performance

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FINAL

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Abbreviations and Symbols

Abbreviation	Term
CB	Circuit Breaker
kV	Kilovolt
MW	Megawatt
APS	Anglesea Power Station
GTS	Geelong Terminal Station
PTH	Point Henry Terminal Station

1 Introduction

At 1217 hrs on 12 December 2011, No.1 and No.2 Geelong (GTS) – Point Henry (PTH) 220 kV lines and 220 kV PTH – Anglesea line in Victoria tripped. Alcoa Australia Limited (Alcoa) was testing the under-frequency load shedding relays at Point Henry smelter when the incident took place. This resulted in the loss of 330 MW of load at PTH and the loss of 157 MW of generation at Anglesea Power Station (APS). The load was restored between 1341 hrs and 1348 hrs and APS generating unit was returned to service at 2313 hrs on the same day.

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 SP AusNet, Vicpower Trading and Alcoa of Australia Limited. Data from AEMO's Energy Management System and Electricity Market Management System has also been used in analysing the incident.

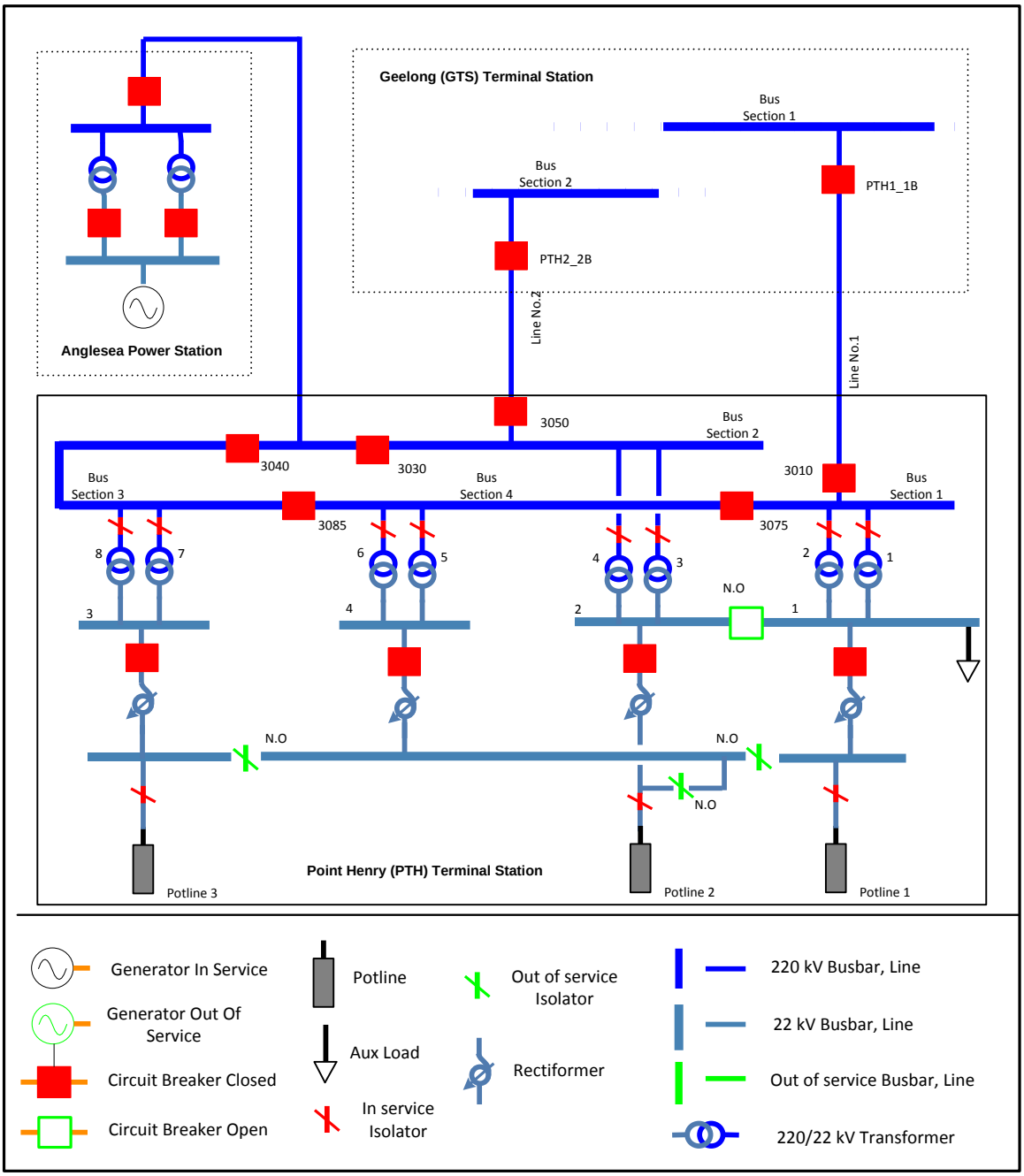
All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

2 Pre-Contingent System Conditions

The PTH smelter consists of three Aluminium potlines. Each of the potlines is connected to an under-frequency load shedding scheme using four under-frequency relays with different trip settings for the three potlines.

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: System status of PTH, APS and GTS terminal stations



Prior to the incident both No.1 and No.2 GTS – PTH 220kV lines and the PTH – APS 220 kV line were in service. The three potlines were consuming approximately 330 MW. APS was generating approximately 157 MW.

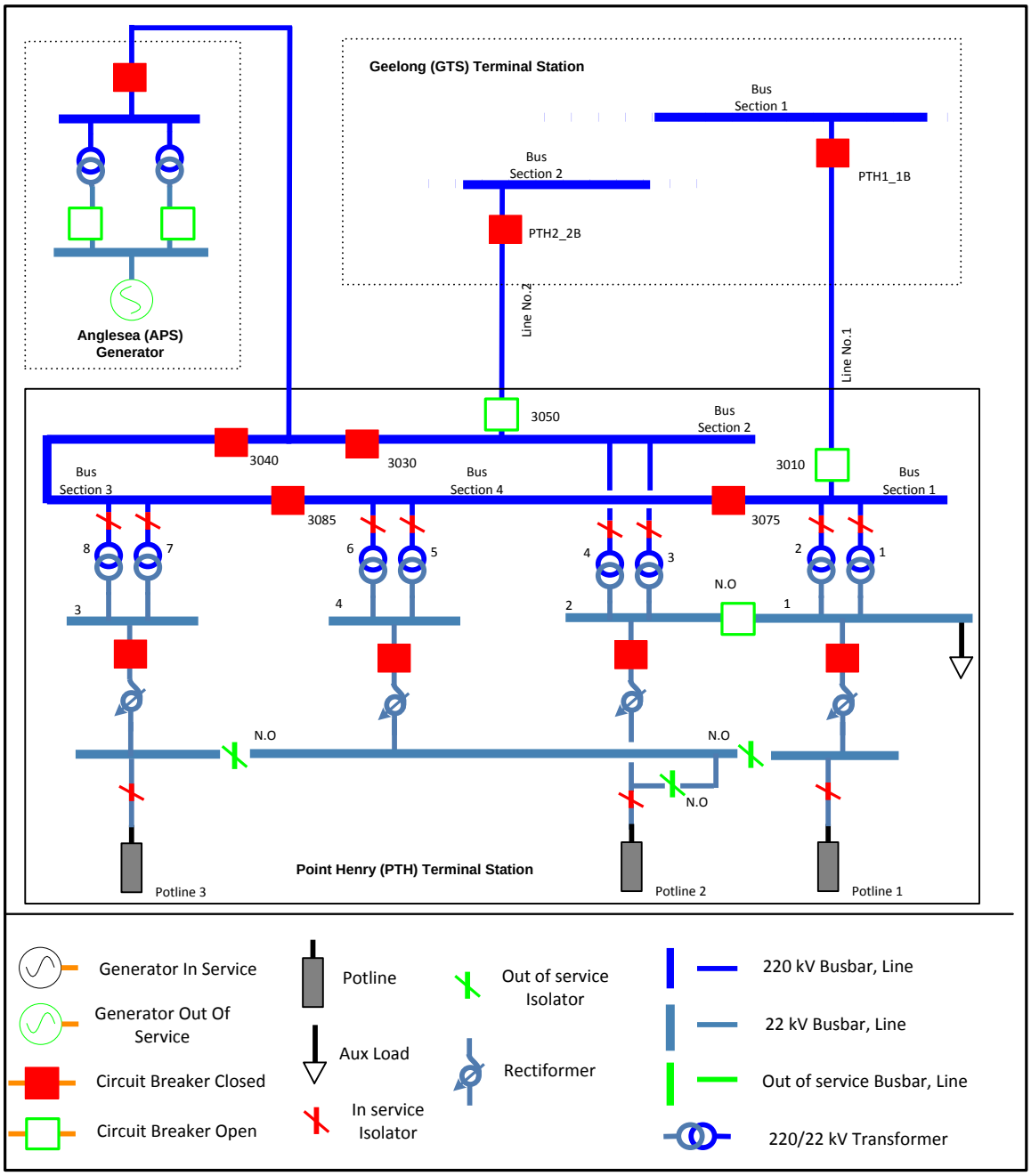
3 Summary of Events

On 12 December 2011 an Alcoa contractor was testing PTH under-frequency load shedding scheme when the incident took place. Protection relays No.1, No.2 and No.4 trip 22 kV CBs and relay No.3 triggers a logic sequence which islands PTH and APS or trips the potline loads.

Before the test, it was assumed that all trip links of the protection relays were isolated. The tests conducted on the first two relays were successful. At 1217 hrs, when the Alcoa contractor

performed work on the third relay, CB 3010 and CB 3050 tripped due to the activation of relay No.3 protection logic. This resulted in the unloading of both No.1 and No.2 GTS - PTH 220 kV lines. The loss of both lines left approximately 330 MW of total potline load connected to APS generating 157 MW. APS tripped on low frequency, offloading the APS – PTH 220 kV line.

Figure 2: Status of power system immediately after the incident



4 Immediate Actions Taken

Alcoa ceased testing the under-frequency load shedding relays and commenced investigating the cause of the incident.

AEMO issued market notice 36967 at 1247 hrs to advise the occurrence of this incident.

At 1229 hrs both No.1 and No.2 GTS – PTH lines were returned to service. At 1228 hrs AEMO invoked the constraint set V_APPT to reflect the outage of the APS – PTH line. The APS – PTH

line was returned to service and AEMO revoked the constraint set V_APPT at 1232 hrs. Restoration of Point Henry potlines commenced at 1241 hrs and all potlines were restored by 1348 hrs. APS was returned to service at 2313 hrs.

In accordance with its operating procedure SO_OP 3715 Power System Security Guidelines[1], AEMO determined that it was not appropriate to declare the islanding of PTH and APS as a credible contingency, because Alcoa had ceased testing of the under-frequency load shedding relays. AEMO issued market notice 36968 at 1305 hrs to advise this decision to market participants.

5 Follow-up Actions

Alcoa identified that the drawing used by the staff testing under-frequency relays did not include a relevant cross reference; hence the required trip link was not opened prior to testing the third relay, causing the islanding of PTH and APS consistent with the design of the islanding scheme. Alcoa corrected the drawing immediately and revised the test procedure to include the additional isolation and other precautions to be undertaken.

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.

The provision and response of facilities and services of Alcoa and SP AusNet were adequate to maintain power system security.

7 Conclusions

An inadequate cross reference in a drawing used by Alcoa led to the inadvertent operation of the PTH and APS islanding scheme when Alcoa was testing one of its under-frequency load shedding relays.

AEMO is satisfied that Alcoa has carried out the appropriate work to mitigate the risk of a similar incident occurring in the future.

AEMO correctly applied the criteria published in section 12 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

There are no recommendations arising from this incident.

[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_OP 3715 Power System Security Guidelines, which is available at: http://www.aemo.com.au/electricityops/3715.html