Power System Operating Incident Report – Trip of Robertstown-Tungkillo 275 kV Line at Tungkillo End on 19 November 2013

PREPARED BY: AEMO Systems Capability

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STATUS: FINAL

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Version Release History

VERSION	DATE	BY	CHANGES	CHECKED BY	AUTHORISED BY
1	21 Jan 2014	S Darnell	FINAL	P Biddle	P Biddle

Incident Classifications

Time and date and of incident	0936 hrs Tuesday 19 November 2013
Region of incident	SA
Affected regions	SA
Event type	TG – Loss of transmission element
Primary cause	PTN & CTR – Protection and Control
Impact	Nil
Associated reports	Nil

Abbreviations

Abbreviation	Term
AEMO	Australian Energy Market Operator
EMMS	Electricity Market Management System
EMS	Energy Management System
kV	Kilovolt
MW	Megawatt

1 Introduction

This report reviews a power system operating incident that occurred on Tuesday 19 November 2013 in the South Australia region at ElectraNet's Tungkillo substation. AEMO is required to review this incident as it is classified as a non-credible contingency that satisfies the requirements of a reviewable operating incident under the National Electricity Rules[1] (NER).

The purpose of this incident review is to assess power system security over the course of the incident. The NER requires AEMO 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[2].

This report is based upon information provided by ElectraNet[3]. 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 The Incident

On Tuesday 19 November 2013 at 0936 hrs the Robertstown – Tungkillo 275 kV transmission line opened at the Tungkillo Substation end (only). The transmission line remained energised from the Robertson end. The line was manually reclosed and returned to service two minutes later at 0938 hrs. No load of generation was lost as a result of this incident.

The determinant for investigating this incident is that the Robertstown-Tungkillo 275 kV transmission line opened at one end. Generally transmission lines open at both ends under fault conditions. This is an expected outcome known in power system security terms as a credible contingency. The opening of a transmission line at one end is an unexpected event and is identified in power system security terms as a non credible contingency.

3 Participant Investigation

ElectraNet investigated the incident and found that a defective protection relay at Tungkillo substation caused the transmission line to open at one end. The relay was associated with the Y protection on the Robertstown-Tungkillo 275 kV transmission line. The relay was replaced on 25 November 2013.

4 System Diagrams

The status of the power system prior to the incident is shown in Figure 1 and after the incident in Figure 2. For clarity only equipment relevant to this incident has been included in the diagrams. The diagram shows the Robertson – Tungkillo 275 kV transmission line in service in Figure 1, and open at the Tungkillo end in Figure 2.

[1] NER v60 Clause 4.8.15(a)(1)(i) and AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents
[2] NER v60 Clause 4.8.15 (b)
[3] ElectraNet is the Transmission Network Service Provider in South Australia

Figure 1 - Status of the power system prior to the incident

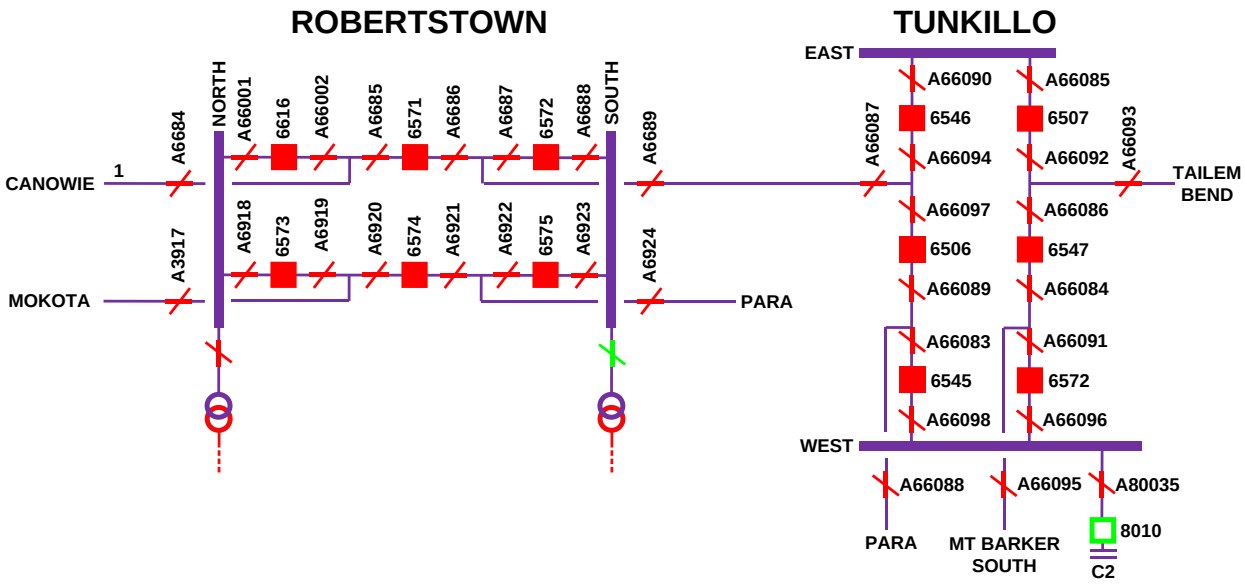
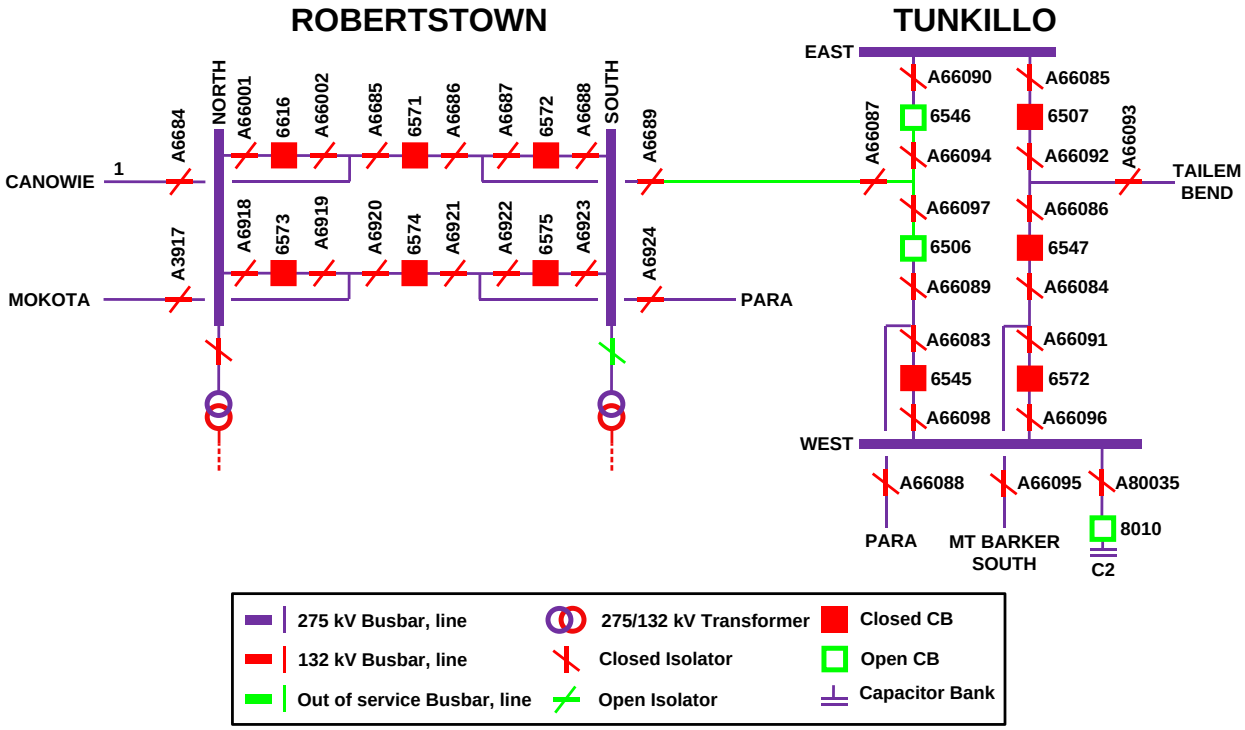


Figure 2 - Status of the power system immediately after the incident



5 Incident Event Log

The sequence of events comprising the incident are itemised in Table 1.

Table 1 – Event Log

Time and Date	Event
0936 hrs 19 Nov 2013	Robertstown – Tungkillo 275 kV transmission line opened at the Tungkillo end
0938 hrs 19 Nov 2013	Robertstown – Tungkillo 275 kV transmission line manually closed
1620 hrs 20 Nov 2013	Market Notice 43901 issued: notification of a non-credible contingency event
1620 hrs 20 Nov 2013	Market Notice 43902 issued: AEMO reclassifies the event as a credible contingency because the cause of the event has not been identified
25 Nov 2013	ElectraNet replaced the defective protection relay at Tungkillo substation
2231 hrs 25 Nov 2013	Market Notice 44003 issued: cancelation of credible contingency reclassification because the cause of the event has been identified and AEMO is satisfied that the event is unlikely to reoccur

6 Immediate Actions

This section assesses actions taken as the immediate response to the incident.

ElectraNet manually reclosed Tungkillo end of the Robertstown – Tungkillo 275 kV transmission line at 0938 hrs on 19 Oct 2013.

AEMO and ElectraNet did not need to take further action as the power system had been restored to the pre-incident state.

7 Follow-up Actions

This section assesses follow-up actions taken to resolve the incident.

AEMO issued Market Notice 43901 at 1620 hrs on 20 November 2013 to notify the market of a non-credible contingency event. This was approximately 31 hours after the event and not within two hours of the event in which AEMO is required to notify the market of a non-credible contingency event[4].

AEMO then assessed whether or not to reclassify the event as a credible contingency[5]. For this incident AEMO correctly reclassified the event as a credible contingency because the cause of the event had not been identified. AEMO issued Market Notice 43902 at 1620 hrs on 20 November 2013 to notify the market of this assessment.

ElectaNet replaced the defective protection relay on 25 November 2013.

AEMO then issued Market Notice 44003 at 2231 hrs on 25 November 2013 to notify the market that the cause of the event had been identified and rectified, and that the incident was unlikely to reoccur.

[4] AEMO, *Power System Security Guidelines,* v56 Section 10.3

[5] For a non credible contingency AEMO is required to assess whether or not to reclassify a non credible contingency event as a credible contingency (NER v60 Clause 4.2.3A (c)) and to report how re-classification criteria were applied NER v60 Clause 4.8.15 (ca). AEMO has to determine if the condition that caused the non-credible contingency event has been resolved.

8 Power System Security

This section assesses how AEMO managed power system security over the course of the incident[6].

Over the course of this incident power system security was maintained. The power system was correctly restored to the pre-incident state with two minutes, and power system frequency and voltages remained within operating limits.

9 Conclusions

1. The trip of the Robertstown – Tungkillo 275 kV transmission line at the Tungkillo Substation end was caused by defective protection relay at Tungkillo substation. The defective replay was subsequently replaced.
2. AEMO failed to notify the market of a non-credible contingency within the appropriate timeframe. Market Notice 43901 was issued 31 hours after the event and should have been issued within two hours of the event.
3. Power system security was maintained over the course of the incident.

10 Recommendations

There are no recommendations arising from this incident.

[6] AEMO is responsible for power system security in the NEM and is required to operate the power system in a secure operating state (NER Clause 4.2.4 (a)). AEMO must thereby ensure that the power system is maintained in, or returned to, a secure operating state following a contingency event.