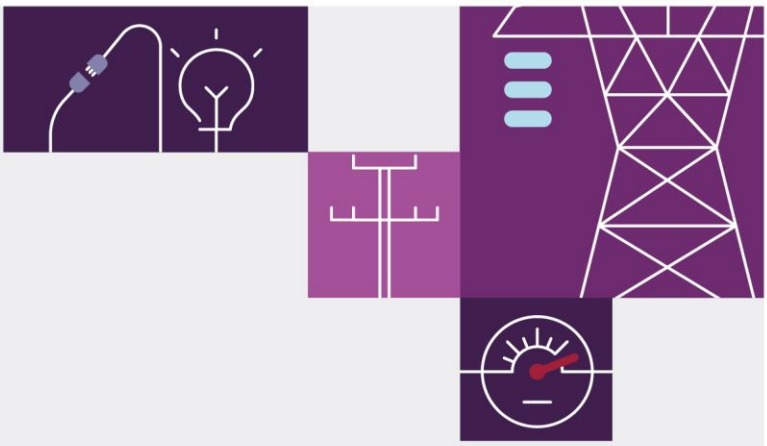
Trip of Heywood – Alcoa Portland No. 2 500 kV line at Alcoa Portland end only

April 2022

Reviewable Operating Incident Report under the National Electricity Rules



Important notice

Purpose

AEMO has prepared this report in accordance with clause 4.8.15(c) of the National Electricity Rules, using information available as at the date of publication, unless otherwise specified.

Disclaimer

AEMO has made every reasonable effort to ensure the quality of the information in this report but cannot guarantee its accuracy or completeness. Any views expressed in this report may be based on information given to AEMO by other persons.

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Contact

If you have any questions or comments in relation to this report, please contact AEMO at system.incident@aemo.com.au.

The National Electricity Market (NEM) operates on Australian Eastern Standard Time (AEST). All times in this report are in AEST.

Abbreviations

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
APD	Alcoa Portland
HYTS	Heywood Terminal Station
kV	Kilovolt
NEM	National Electricity Market
NER	National Electricity Rules
TNSP	Transmission Network Service Provider

Incident review

This reviewable operating incident[1] report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It has been prepared using information provided by AusNet[2] and from AEMO systems.

Table 1 Summary of event – Trip of Heywood – Alcoa Portland No. 2 500 kV line at Alcoa Portland end only

	Details
Reviewable operating incident type	• Non-credible contingency event impacting critical transmission elements.
Incident details	This report relates to a reviewable operating incident[3] that occurred on 21 December 2021 in Victoria. The incident involved the trip of the Heywood (HYTS) to Alcoa Portland (APD) No. 2 500 kilovolt (kV) line at the APD end only.
Incident classification	Protection/Control System – protection system maloperation
Generation impact	Nil
Customer load impact	Nil
Incident key events	1. At 0722 hrs on 21 December 2021, Circuit Breaker (CB) 5100 tripped at APD 500 kV substation, disconnecting the HYTS – APD 500 kV No. 2 line at the APD end only (see Figure 1). 2. At 0755 hrs on 21 December 2021, CB5100 at APD 500 kV substation was returned to service.
Incident cause	Post incident investigation by AusNet has confirmed: • The tele-protection equipment at HYTS registered an unexpected blue phase remote trip signal on one of the two available protection schemes, which initiated a trip of CB5100 at APD 500 kV substation. • The Y protection relay associated with CB5100 at APD 500 kV substation indicated it had received a “Y remote trip receive” signal. • The tele-protection equipment at HYTS had registered a toggling blue phase remote trip signal during this incident. This signal toggled for approx. 20 seconds. The tele-protection equipment logs recorded that this signal had been received and AusNet have confirmed this initiated the trip of CB5100. • Despite relays at APD substation identifying and responding to this toggling remote trip signal, the corresponding relay event logs did not show this signal being sent from the Y protection relay. • Testing of the Test-Isolate Switch (TIS) installed on each phase between the relay and the tele-protection device has not uncovered any defects.
Power system response (facilities and services)	There were no other material impacts on the broader power system, load, or generation.
Rectification	The root cause of the incident is not yet known. However, AusNet has taken the following actions to identify and rectify the issue: • Insulation testing of all associated cabling, which returned no defective results. • The TIS and Y protection relay at HYTS have been replaced. • The Y protection relay has been sent to the vendor for further analysis. The initial investigation from the vendor has not identified any defects. • The relay has now been sent to the manufacturer and testing of the relay is ongoing at the time of writing this report.

[1] Reviewable operating incidents are defined by NER clause 4.8.15(a) and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

[2] Participant is a Transmission Network Service Provider (TNSP) for Heywood and Alcoa Portland Substation.

[3] See NER clause 4.8.15(a)(1)(i), as the event relates to a non-credible contingency event; and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

	Details
Power system security	The power system remained in a secure operating state throughout this incident and the Frequency Operating Standard[4] was met for this incident.
Reclassification	AEMO assessed whether to reclassify this incident as a credible contingency event[5]. The cause of this non credible contingency was not known to AEMO at the time of the event. As such, AEMO considered the opening of HYTS – APD No. 2 500 kV line at APD end only was reasonably possible to reoccur and correctly reclassified it as a credible contingency event on 21 December 2021.
Market information	AEMO issued Market Notice 93318 at 0804 hrs on 21 December 2021 – Advice of non-credible contingency event and to advise that this incident had been reclassified as a credible contingency until further notice (this market notice was issued in accordance with NER requirements).
Conclusions	AEMO has concluded that: 1. The trip of HYTS – APD No. 2 500 kV line at the APD 500 kV substation end only was caused by a toggling blue phase remote trip signal which caused CB5100 to trip. 2. Testing of the relay which operated during this incident is still ongoing to identify the root cause of the incident. 3. AusNet has completed insulation testing of all associated cabling and has replaced the affected TIS and Y protection relay at APD substation. 4. AEMO correctly identified the need to reclassify this incident as a credible contingency, as the cause of the incident was not currently known. Since AusNet has not yet determined the cause of the incident, the reclassification remains in place. 5. The power system remained in a secure operating state and Frequency Operating Standard was met during the incident.
Recommendations	1. AusNet to confirm the root cause of this incident with the manufacturer and take appropriate action. 2. AusNet to share root cause of the incident with AEMO as well as the Power System Security Working Group (if appropriate).

[4] Frequency Operating Standard, effective 1 January 2020, available at https://www.aemc.gov.au/media/87484.

[5] AEMO is required to assess whether or not to reclassify a non-credible contingency event as a credible contingency event – NER clause 4.2.3A(c) – and to report how the reclassification criteria were applied – NER clause 4.8.15(ca).

Figure 1 Incident diagram – post-incident diagram (all elements shown were in service prior to the incident)