Trip of Vales Point Unit 5 and Unit 6 on 7 June 2020

December 2021

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.

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CONTACT

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

Abbreviations

Abbreviation	Term
AC	Alternating current
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
AUFLS2	Automatic under-frequency load shedding scheme
DC	Direct current
FCAS	Frequency control ancillary service/s
Hz	Hertz
MW	Megawatts
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 Delta Electricity, Snowy Hydro, Alcoa Portland, and TasNetworks and from AEMO systems[2].

Table 1 Summary of event

	Details
Reviewable operating incident type	• Non-credible contingency event impacting critical transmission elements, or transmission in multiple regions. • Operation of under frequency or over frequency protection and control scheme(s).
Incident details	This report relates to a reviewable operating incident[3] that occurred on 7 June 2020 in New South Wales. The incident involved the trip of Vales Point Units 5 and Unit 6 each from around 600 megawatts (MW) for a total loss of generation of 1,247 MW.
Incident classification	Internal to power station
Generation impact	1,247 MW
Customer load impact	26 MW
Incident key events	1. At around 1333 hrs on 7 June 2020: – Vales Point Unit 6 tripped while generating 607 MW. – Vales Point Unit 5 also tripped 20 seconds later while generating 640 MW. – Jindabyne Pump No. 1 tripped 33 MW to provide frequency control ancillary services (FCAS). – Alcoa Portland (APD) Potlines reduced 106 MW load to provide FCAS. – Nyrstar load reduced 26 MW to provide automatic under-frequency load shedding scheme (AUFLS2) service. 2. Station service transformer No. 4 at Vales Point Power Station tripped at 1631 hrs on 7 June 2020. 3. Vales Point Unit 5 returned to service at around 1145 hrs on 11 June 2020. 4. Vales Point Unit 6 returned to service at around 1628 hrs on 12 June 2020.
Incident cause	Delta Electricity's post incident investigation has confirmed the following. 1. The cause of the incident was a faulty Vales Point unit 6, 415 volt (V) motor over temperature protection (located in the motor) that resulted in 415 V alternating current (AC) being unexpectedly applied onto 110 V direct current (DC) control and protection circuits used throughout the power station. The applied AC electricity erroneously signalled electrical fault conditions on the Unit 6 main protection scheme which correctly tripped Unit 6. The 110V DC control circuits were connected between Unit 6 and Unit 5 at the time of this event. This is not the normal operation mode and has since been corrected. Application of AC supply onto DC systems also caused interruption to Unit 5 auxiliary supplies to trip, resulting in the later trip of Unit 5 due to loss of auxiliaries. The trip of Unit 6 cleared electrical supplies to the faulty motor, removing the AC from the DC supplies.

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

[2] Delta Electricity owns and operates Vales Point Power Station; Snowy Hydro owns and operates Jindabyne Pump; TasNetworks is the transmission network service provider in Tasmania and Nyrstar (zinc smelter in Hobart) is one of its major industrial customers, Alcoa Portland (aluminium smelter) is a major industrial consumer in Victoria.

[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
	2. Prior to Cause 1 being identified, the station service transformer tripped during efforts to return Unit 6 to service. The station service transformer tripped when Unit 6, 415 V auxiliary power supplies were re-established, and the faulty motor was re-energised. The reconfigured power supplies (post Unit 5 and Unit 6 trip) and the impressed AC voltage caused a spurious trip on the station transformer No. 4.
Power system response (facilities and services)	• Snowy Hydro informed AEMO that the Jindabyne pump at the time of this incident was enabled for contingency raise FCAS with trip setting set at 49.75 hertz (Hz). Snowy Hydro confirmed that the pump tripped as expected to provide the FCAS services due to the low frequency. • TasNetworks informed AEMO that Nyrstar load was providing raise 6-second FCAS via AUFLS2 and operated in response to the mainland event. TasNetworks confirmed that AUFLS2 operated as per design. • APD Potlines reduced 106 MW load to provide contingency raise FCAS per design.
Rectification	• When located, the faulty Vales Point Unit 6 motor was isolated from service and has since been replaced. • The 110 V DC ring main control circuits between the units have been separated.
Power system security	The power system remained in a secure operating state throughout this incident and requirements of the Frequency Operating Standard[4] were met. During this event, the frequency reduced to 49.58 Hz and remained outside the normal operating frequency band for around 280 seconds[5]. Frequency remained within the operational tolerance band throughout the incident.
Reclassification	AEMO assessed whether to reclassify this incident as a credible contingency event[6]. AEMO was later advised by Delta Electricity that the cause of the incident had been identified and the failed equipment had been isolated. Delta Electricity advised that a reoccurrence of the trip was not reasonably possible. As such, AEMO responded correctly and did not classify this non-credible contingency as a credible contingency event.
Market information	For this incident, AEMO issued the following market notices (all market notices for this incident were issued in accordance with NER requirements): • At 1448 hrs on 7 June 2020, AEMO issued market notice 75880 to advise of the non-credible contingency event. • At 1723 hrs on 10 June 2020, AEMO issued market notice 75941 to advise that the cause of this non-credible contingency event had been identified, and that AEMO was satisfied that another occurrence of this event was unlikely under the current circumstances and would not reclassify this event as a credible contingency event.

[4] See https://www.aemc.gov.au/australias-energy-market/market-legislation/electricity-guidelines-and-standards/frequency-0

[5] See https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/ancillary_services/frequency-and-time-error-reports/quarterly-reports/2020/frequency-and-time-error-monitoring-2nd-quarter-2020.pdf?la=en

[6] 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).