
Trip of Springvale No.2 220 kV Bus

October 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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Abbreviations

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
HTS	Heatherton
hrs	Hours
kV	Kilovolt
MW	Megawatts
NEM	National Electricity Market
NER	National Electricity Rules
ROTS	Rowville Terminal Station
SVTS	Springvale Terminal Station
TNSP	Transmission Network Service Provider

Incident review

This reviewable operating incident¹ 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 Services (AusNet)² and from AEMO systems.

Table 1 Summary of event – Trip of Springvale No.2 220 kilovolt (kV) bus

	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 22 May 2021 in Victoria. This incident involved the trip of the Springvale No.2 220 kV bus while the B2 220/66 kV transformer was out of service for planned maintenance.
Incident classification	Faulty equipment – oil gauge.
Generation impact	There was no loss of generation as a result of this incident.
Customer load impact	No customer load was tripped or automatically shed in response to this incident.
Pre-incident conditions	Prior to this incident, the Springvale B2 220/66 kV transformer was out of service and isolated for the planned replacement of the 66 kV feeder circuit breaker. The remotely operated isolator that connects the transformer to the Springvale No.2 220 kV bus was open, and the 66 kV bus was isolated. The Springvale No.2 220 kV bus and the Rowville (ROTS) – Springvale (SVTS) No.2 220 kV line were both in service.
Incident key events	<ol style="list-style-type: none"> At 0728 hrs on 22 May 2021: <ul style="list-style-type: none"> The Springvale No.2 220 kV bus tripped. Given the substation arrangement, this off-loaded the ROTs – SVTS No.2 220 kV line and the SVTS – Heatherton (HTS) No.2 220 kV line at Springvale. AusNet advised that there was no load lost. At 0747 hrs, AEMO consulted with AusNet to investigate if the ROTs-SVTS No.2 220 kV line SVTS No.1 bus circuit breaker would be closed to re-energise it at the SVTS side. At 0804 hrs, the ROTs-SVTS No.2 220 kV line SVTS No.1 bus circuit breaker was closed at SVTS. At 0858 hrs, AusNet advised AEMO that it had identified the cause of the bus trip as the gas protection of the SVTS B2 transformer that was out of service. AusNet advised that the gas protection had been isolated and the event was unlikely to occur again under the current circumstances. At 0902 hrs, the Springvale No.2 220 kV bus was returned to service. Following the bus being returned to service, the ROTs – SVTS No.2 220 kV line SVTS No.1 bus circuit breaker was opened to restore the normal configuration at SVTS. At 1738 hrs on 23/5/2021, the SVTS B2 transformer was returned to service using the planned switching following its oil level being topped up and the gas protection being reinstated.

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 AusNet is a Transmission Network Service Provider (TNSP) for 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
Incident cause	<p>Post incident investigation has confirmed:</p> <ul style="list-style-type: none"> At 0728 hrs on 22 May 2021, the gas protection (Buchholz) of the SVTS B2 transformer resulted in the tripping of the SVTS No.2 220 kV bus. The transformer gas protection was triggered due to a transformer low oil condition. The low oil condition was a result of the transformer oil cooling down following being taken out of service. The ambient temperature at the time was 4° Celsius. <p>Due to the transformer protection not being isolated when the transformer was taken out of service, the low oil condition resulted in a protection operation being triggered by the Buchholz relay. This protection operated as designed to trip the SVTS No.2 220 kV bus, as the B2 transformer does not have a 220 kV circuit breaker.</p>
Power system response (facilities and services)	<p>Transformer low oil condition:</p> <ul style="list-style-type: none"> The transformer gas alarm was triggered by a transformer low oil condition, which occurred as the transformer cooled down after being taken out of service. During the routine inspection, the low oil level of the transformer was overlooked due to the conservator oil gauge being jammed and showing an incorrect reading. <p>Protection operation:</p> <ul style="list-style-type: none"> The B2 transformer Buchholz relay protection operated as designed/intended had the transformer been in service at the time of the low oil condition. The protection does not receive the status of the B2 transformer 220 kV isolator, and the protection was not isolated when the transformer was taken out of service for the replacement of the 66 kV feeder circuit breaker. This is in line with AusNet's procedure when no maintenance work is planned on the transformer when it is out of service. Therefore, the protection still operated despite the transformer being out of service at the time of the low oil condition.
Rectification	<p>In response to this incident, the oil level of the SVTS B2 transformer was topped up on 23 May 2021 before it was returned to service. As the oil level was topped up, the conservator gauge unjammed to give the correct reading – no further action was required.</p> <p>AusNet has advised that it intends to arrange a meeting to discuss the incident with staff who undertake station inspections, and to provide training on how to better recognise faulty oil gauges. This should help ensure such issues are reported and followed up, reducing the risk of a transformer low oil level condition being overlooked.</p> <p>The SVTS B2 transformer has since been decommissioned as part of the planned SVTS station upgrade.</p>
Power system security	<p>The power system remained in a secure operating state throughout this incident and the Frequency Operating Standards⁴ was met for this incident.</p>
Reclassification	<p>AEMO assessed whether to reclassify this incident as a credible contingency event⁵.</p> <p>At 0858 hrs on 22 May 2021, AusNet advised AEMO that it had identified the cause of the bus trip as the SVTS B2 transformer gas protection. AusNet advised that the gas protection had been isolated and the event was unlikely to reoccur.</p> <p>On 23 May 2021, while the transformer remained out of service, the faulty conservator oil gauge and low oil condition was identified. AusNet advised AEMO that the transformer's oil level was topped up and the conservator gauge was corrected before it was put back into service.</p> <p>Based on this advice, AEMO determined the incident was unlikely to reoccur and therefore correctly determined that reclassification as a credible contingency event was not required.</p>
Market information	<p>For this incident, AEMO issued the following market notices (all market notices for this incident were issued in accordance with NER requirements):</p> <ul style="list-style-type: none"> AEMO issued Market Notice 85785 at 0743 hrs on 22 May 2021 to advise of the non-credible contingency event. AEMO issued Market Notice 85791 at 0910 hrs on 22 May 2021, to advise that at 0902 hrs, the Springvale No.2 220 kV bus was returned to service and AEMO would not reclassify the event as a credible contingency event.

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).

	Details
Conclusions	<p>AEMO has concluded that:</p> <ol style="list-style-type: none"> 1. The Springvale No.2 220 kV bus trip was caused by the gas alarm of the Springvale B2 transformer. Transformer protection was not isolated when taken out of service for planned maintenance, which is as per AusNet's standard procedure. 2. The gas alarm was triggered due to the transformer oil cooling down after being taken out of service. This cooling coupled with a low starting level caused the transformer oil level to drop sufficiently for protection to operate. 3. The low oil level of the transformer was not identified while the transformer was in service due to the conservator oil gauge being jammed and giving an incorrect reading.
Recommendations	<p>AusNet plans to review routine inspection procedures and associated training to ensure faulty conservator oil gauges are identified and reported to reduce the risk of transformer low oil level conditions being overlooked.</p>