



Power system in South Australia not in a secure operating state on 14 May 2019

January 2020

Reviewable Operating Incident Report under the
National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	14 May 2019, 1159 hrs to 1339 hrs
Region of incident	South Australia
Affected regions	South Australia
Event type	Power system not secure
Generation impact	No generating unit was disconnected or had its output limited because of this incident
Customer load impact	No customer load was disconnected because of this incident
Associated reports	Nil

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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1. Overview

This report relates to a reviewable operating incident¹ that occurred on 14 May 2019 in South Australia where the power system was not in a secure operating state for more than 30 minutes.

No generation or customer load was lost because of this incident.

As this was a reviewable operating incident, AEMO is required 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 security².

AEMO has concluded that:

1. The power system in South Australia was not in a secure operating state for 100 minutes due to generation from the Tailem Bend solar farm not being constrained by AEMO during planned outages of transmission equipment.
2. The requirement to constrain generation from the Tailem Bend solar farm was not identified due to a process issue associated with AEMO's Energy Management System (EMS).
3. The process issue has been corrected and AEMO has updated its procedures to prevent a reoccurrence.

This report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It is based on information from AEMO's Energy and Market Management Systems.

National Electricity Market time (Australian Eastern Standard Time [AEST]) is used in this report. At the time of this incident, local time in South Australia was AEST minus 30 minutes.

2. The incident

2.1 Pre-incident conditions

Prior to and during this incident, the 275 kV and 132 kV East Busbars and the 275/132 kV transformer at the Tailem Bend substation were out of service for planned work by ElectraNet.

2.2 The incident

On 14 May 2019 between approximately 1159 hours and 1339 hours, the power system in South Australia was not in a secure operating state, as post-contingent voltages on the 132 kV network around the Tailem Bend and Keith substations were below the required limits.

During this period, an outage of the Mobilong – Tailem Bend line³ would have resulted in voltage levels as low as 105 kV at the Tailem Bend and Keith substations, where the allowable post-contingent voltage limit is 119 kV. For various times during this period, AEMO's Contingency Analysis (CA) application could not solve for

¹ See NER clause 4.8.15 and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents. The incident was classified as a non-credible contingency event (see NER 4.2.3(e)).

² See NER clause 4.8.15(b).

³ Due to the outage of the 275/132 kV transformer at Tailem Bend, the subsequent outage of the Mobilong – Tailem Bend 132 kV line results in increased power flow on the Keith – Tailem Bend 132 kV line.

the outage of the Mobilong – Tailem Bend 132 kV line, indicating potential for voltage collapse in the Tailem Bend/Keith area if the contingency had occurred.

AEMO has two control centres with each having its own separate EMS and associated CA tools. One system is based in Brisbane and the other in Sydney⁴. These EMS are normally identical, with the relevant CA tools producing similar results. In accordance with normal AEMO practice, one of the control centres will monitor CA violations in South Australia via its EMS. The other control room does not normally monitor South Australia unless there are exceptional circumstances⁵.

At around 1320 hrs on 14 May 2019, staff monitoring SA observed that the EMS in the other control centre was showing potential voltage violations for the loss of the Mobilong – Tailem Bend 132 kV line in South Australia, and that these violations had been occurring since 1159 hrs. Appendix A1 shows these CA results. These violations were not showing on the EMS being used by staff monitoring SA.

AEMO determined the potential violations related to generation at the Tailem Bend solar farm coupled with the outage of the 275/132 kV transformer at Tailem Bend. The Tailem Bend solar farm was constrained down⁶ to a maximum output of 80 MW from 1340 hrs on 14 May, and all violations ceased.

AEMO reviewed the EMS applications to determine why the violations were identified on one EMS but not the other, and determined the issue related to the modelling of the Tailem Bend solar farm. Although the solar farm was correctly modelled in both EMS, its status had been manually set to be out of service on the EMS being used to monitor SA at the time. As such, the CA tools on this EMS assumed there was no generation from the Tailem Bend solar farm. The modelling issue was corrected at 1345 hrs on 14 May 2019.

Normally, when new equipment is to be commissioned on the power system, AEMO will update the EMS models in advance of the commissioning date, and then the equipment is manually set to be out of service in the models until commissioning commences. Once commissioning commences, the EMS must be configured so that it treats the equipment as in service. In this instance, only one of the EMS was updated. AEMO has updated its procedures to ensure this action is taken on both EMS in the future.

This potential impact of the generation at the Tailem Bend solar farm during the outage of the Tailem Bend busbar and transformer was not identified during the outage assessment process.

⁴ The control rooms are operated as co-primary and staff at either site can access either EMS if required.

⁵ Similar arrangements are in place for the other NEM regions with each region being monitored by one of the control centres only. Monitoring can be swapped between control centres if necessary.

⁶ Constraint set #TBSF1_E invoked.

3. Conclusions

AEMO has assessed this incident in accordance with clause 4.8.15(b) of the NER. In particular, AEMO has assessed the adequacy of the provision and response of facilities or services, and the appropriateness of actions taken to restore or maintain power system security.

AEMO has concluded that:

1. The power system in South Australia was not in a secure operating state for 100 minutes due to generation from the Tailem Bend solar farm not being constrained by AEMO during planned outages of transmission equipment.
2. The requirement to constrain generation from the Tailem Bend solar farm was not identified due to a process issue associated with AEMO's Energy Management System (EMS).
3. The process issue has been corrected and AEMO has updated its procedures to prevent a reoccurrence..

A1. Contingency Analysis violations

Contingency Analysis run time	Post-contingent voltage Tailern Bend (kV)	Post-contingent voltage limit (kV)	Violation (kV)
11:59 hrs	116	119	3
12:01	118	119	1
12:04	117	119	2
12:09	118	119	1
12:14	115	119	4
12:19	110	119	9
12:22	109	119	10
12:25	108	119	11
12:30	Unsolved	119	
12:33	108	119	11
12:35	Unsolved	119	
12:40	Unsolved	119	
12:43	108	119	11
12:46	Unsolved	119	
12:51	Unsolved	119	
12:54	Unsolved	119	
12:56	Unsolved	119	
13:02	Unsolved	119	
13:05	Unsolved	119	
13:07	106	119	13
13:12	Unsolved	119	
13:15	Unsolved	119	
13:17	105	119	14
13:23	Unsolved	119	
13:26	Unsolved	119	

Contingency Analysis run time	Post-contingent voltage Taillem Bend (kV)	Post-contingent voltage limit (kV)	Violation (kV)
13:29	Unsolved	119	
13:34	Unsolved	119	
13:37	Unsolved	119	
13:39	107	119	12