

Lesson Learned

BESS Output Oscillation Due to OEM Software Update

Primary Interest Groups

Reliability Coordinators (RC)
Balancing Authorities (BA)
Transmission Operators (TOP)
Generator Owners (GO)
Generator Operators (GOP)

Problem Statement

A battery energy storage system (BESS) was subject to an original equipment manufacturer (OEM) software modification to the energy station controllers (ESC) to implement a new control feature. This modification was intended to be run in a test environment but was accidentally implemented on site, which resulted in a divide by zero calculation for a MW setpoint, leading to an infinite gain and driving the plant to oscillate between its limits.

Details

Via supervisory control and data acquisition (SCADA), the BA and TOP observed the BESS output oscillating between +/- 150 MW starting at 6:19 a.m. for approximately 11 minutes (see **Figure 1**). The TOP issued an operating instruction for the BESS, directing it to come off-line within 10 minutes due to oscillations and cycling outside of market dispatch. The site operator informed the system operator that the resource would be coming off-line shortly but failed to do so in a timely manner. The system operator directed the BESS operator to cease operations for a second time 9 minutes later. The BESS operator complied and was off-line at 6:30 a.m., approximately 11 minutes after the initial operating instruction was issued. At 06:30 a.m., the resource was removed from the grid until the root cause could be determined and future occurrences prevented.

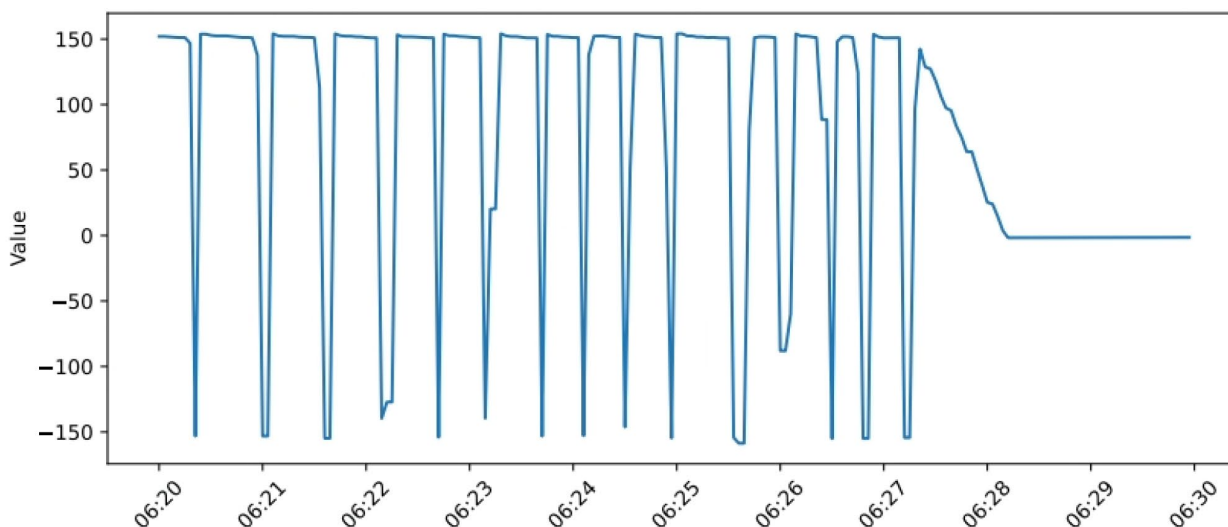


Figure 1: Oscillations from BESS Facility

Corrective Actions

- The external virtual private network (VPN) connection to the controls vendor was disabled until additional processes are added to ensure that test environment changes are not inadvertently applied.
- The BESS operator reinstalled the prior-version software and performed system testing to validate proper performance.
- The BESS operator implemented preliminary changes in its existing SCADA platform to detect and alarm oscillatory behavior.
- Transmission operation staff were provided lessons learned training on the event with an emphasis on how to identify oscillatory behavior.
- BESS process and procedure improvements were made to tighten software change control including migration of changes to the operation environment are ongoing.
- The BESS completed SCADA upgrades to remove division by zero calculations, enhance data granularity, and add oscillatory behavior alarming.
- The BESS provided lesson learned and three-part communication refresher training to site operators to ensure timely adherence to operating instructions.

Lesson Learned

- Ensure thorough testing of software in a safe (sandbox) environment prior to implementing in the field.
 - Error trapping routines should catch all divide-by-zero cases.
 - Operator and field sensor inputs should be limited by the software to avoid approaching such cases as well.
- System operating instructions need to be carried out within the specified time frame to protect system reliability.

NERC's lessons learned seek to provide industry with technical and understandable information that helps it maintain the reliability of the BPS. NERC asks entities that have taken action on this lesson learned to respond to the short survey provided in the link below.

Click here for: [Lesson Learned Survey](#)

Lesson Learned #: LL20260918
 Date Published: September 18, 2026
 Category: Communications

For more Information please contact:

[NERC – Lessons Learned](#) (via email)

This document is designed to convey lessons learned from NERC's various activities. It is not intended to establish new requirements under NERC's Reliability Standards or to modify the requirements in any existing Reliability Standards. Compliance will continue to be determined based on language in the NERC Reliability Standards as they may be amended from time to time. Implementation of this lesson learned is not a substitute for compliance with requirements in NERC's Reliability Standards.