

Lesson Learned

Substation DC Voltage Alarm Set Points

Primary Interest Groups

Balancing Authorities
Distribution Providers
Generator Operators
Reliability Coordinators
Transmission Operators

Problem Statement

The low setting of a DC voltage alarm set point did not allow the system operator and field personnel adequate time to respond and address a battery charger failure before substation relay protection system capability was lost and reliability to the bulk power system (BPS) was compromised.

Details

The system operator received a low-voltage alarm at 109 volts DC from a 230/69kV substation and dispatched field personnel to investigate the alarm. When field personnel arrived they determined the battery charger was not producing proper voltage. Before proper action could be taken the DC voltage continued to decay and fell below the 85 volt DC operating threshold and all protective relays began to alarm and shutdown. Additionally, control circuits became non-functional and SCADA measurements and status information became erroneous. At this point it was decided the substation and surrounding BPS was at risk if a fault occurred in the unprotected relay protection system zones; so orders were given to shed load and remove the substation from service.

Corrective Actions

The entity set all DC bus voltage relays to alarm at 125 volts for an under-voltage condition and two volts above battery charger equalization for a high-voltage condition.

Lesson Learned

Entities should review and verify substation DC low-voltage alarm set points are set high enough to allow system operators and field personnel to adequately respond to substation battery and battery charger problems before DC voltage degrades to critical levels.

For more information please contact:

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