

Document Title: EA007 – Observed Oscillations with New Wind Gen near Steel Mill

Category: Event Analysis

Time Horizon: Operations Assessment

Party Involved: Nebraska Public Power District (NPPD)

Event Date: April 2019

Event Description: An oscillation was observed in the frequency and voltage data from a single PMU in an area with several PMUs. The map below (see Figure 1) shows the relative location of three PMUs on the NPPD system. A significant customer (steel mill) is physically located somewhere near the end of the word “Antelope” on the map. Some wind farms were recently added in the same area with a point of interconnect at the Antelope location.

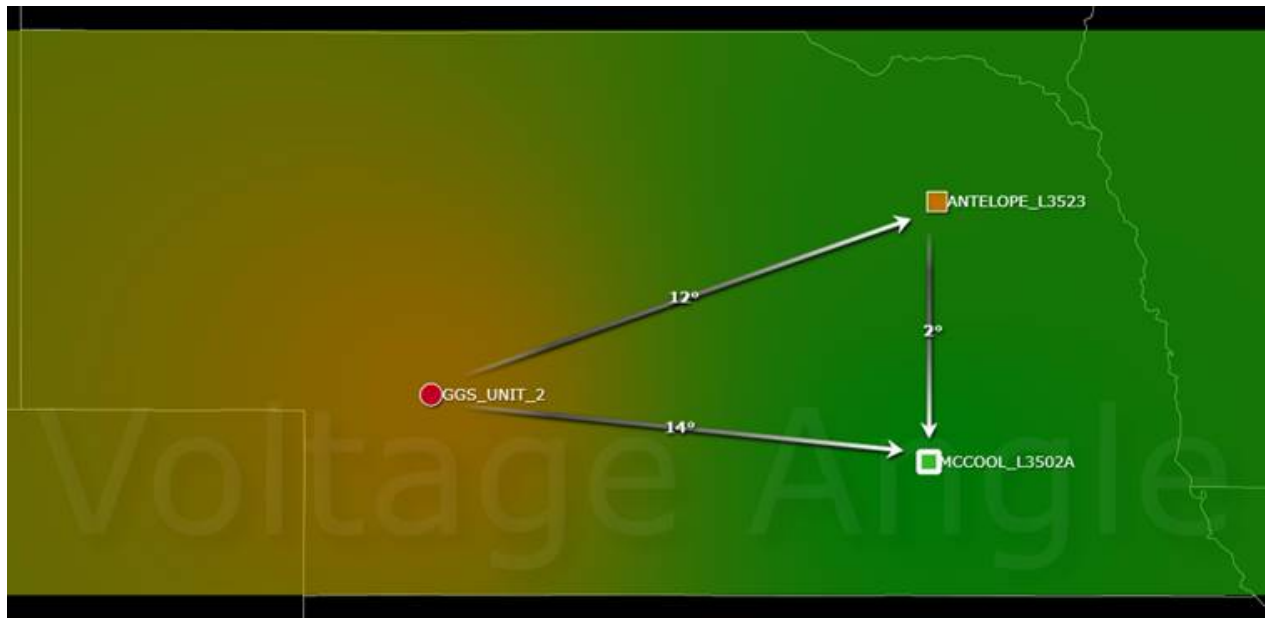


Figure 1 –Relative location of the monitoring PMUs

The oscillations/fluctuations (see Figure 2 on following page) were observed in the data and NPPD engineering staff felt there was either an interaction between the voltage sags caused by the steel mill melts and the inverters at the wind farms or the data was affected solely by the impacts of the steel mill melt process on the system.

After further analysis, it was determined that the observed fluctuations were not related to an interaction between the steel mill and the wind turbines as it is observed independent of when the wind generation is offline or online.

NPPD staff believe the odd data signature is related to the phase angle changing quickly during steel melts which is causing the frequency changes/spikes observed by their equipment. When the melts are happening, the load can change by as much as 110 MW.

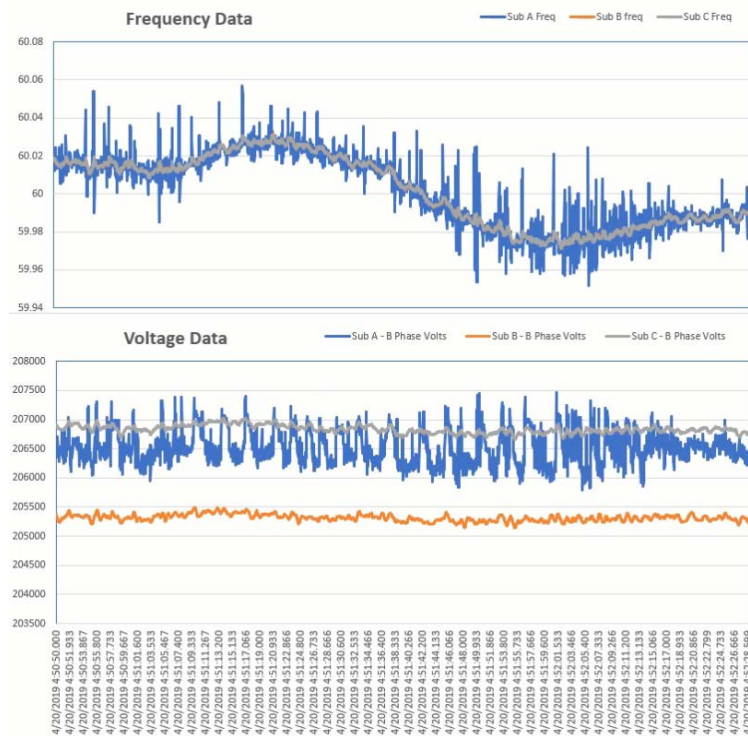


Figure 2 – System Frequency and phase B voltage data from area PMUs

Operational Value

This example illustrates how synchrophasor data can provide enhanced situational awareness to Operations on the dynamic nature of the electric transmission system. By being able to identify dynamic system events not visible in SCADA data further analysis of the behavior can be performed to determine causes and potential corrective actions.

Background

The mission of the North American Synchrophasor Initiative (NASPI) Control Room Solutions Task Team (CRSTT) is to work collectively with other NASPI task teams to advance the use of real-time synchrophasor applications for improving control room operations and grid reliability. This team utilizes its experience and regional diversity to provide advice, direction, support and guidance to NASPI stakeholders and other organizations involved in the development and implementation of real-time synchrophasor applications.

This is one of a series of operational use case documents being developed by CRSTT members to describe the various manners in which grid operators and electric utilities are using synchrophasor data to provide value in the Operations Horizon. Existing versions of these papers, along with other CRSTT work products can be found on the CRSTT page of the NASPI website (<https://www.naspi.org/crstt>).