

THE DIAGNOSING AND CORRECTIVE ACTIONS TAKEN TO REDUCE THE EFFECTS OF STEAM WHIRL IN A GE D-11 STEAM TURBINE

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ABSTRACT

During commissioning testing, Dominion Energy's, Fairless Hills, power block 2, GE D-11 steam turbine showed signs of instability and tripped on two successive tests near 100% loading. The initial data reviews blamed an unstable bearing as being the problem. However, further review of the data strongly suggested that the problem was not that of an unstable bearing but that of steam whirl. Subsequent testing verified that the subsynchronous vibration was caused by steam whirl. During this testing, operating procedures were changed to permit the unit to operate at full load. A variation of these changes was incorporated into the control logic to permit reliable, near full load, operation until a permanent, hardware change could be engineered and installed. The hardware changes to control the problem were installed at a short unit outage.

This paper discusses the testing techniques and logic used to identify the presence of steam whirl in the GE D-11 steam turbine operating near 100% loading in a combined cycle application. This paper also discusses how operating procedures were modified to permit reliable operation of the unit until a permanent engineering fix could be designed. Finally the paper discussed the design changes made and their results on operation of the unit.

Keywords: Steam whirl, instability, Subsynchronous, vibration, D-11