From: Bonner, John
Sent: Monday, July 18, 2005 6:26 PM
To: Bijoor, Gurunath; McCaffrey, Thomas S.; Andreozzi, Vincent
Cc: Penny, Robert; Bonner, John; Morris, David
Subject: IPEC Transformer Review

This email provides a brief summary of my evaluation of the IPEC main transformers with respect to other ENN fleet transformers.

The IPEC Unit 2 GE transformers are original units, which were manufactured in 1972. There are two operating issues, which impact the reliability of the IPEC Unit 2 main transformers.

1. The power uprate requires that the transformers operate up to 108.1% above their 55°C rating during period when high MVAr output is required. Operating above the 55°C rating and into the 65°C rating result in accelerated thermal aging of the transformer insulation.

2. The main generator terminal voltage of both IPEC units 2 and 3 are 22kV. IPEC Unit 2 maintains the generator terminal voltage between 20.8kV and 22.6kV. The IPEC main transformers have a low voltage rating of 20.3kV. Therefore the main transformers are being subjected to over-excitation voltage above 105% design limits, as high as 111% of rated. This over-excitation operation can result in breakdown of the transformer insulation on an extended period. (I will be contacting ConEd and NYPA system planning this week (7-18-05) to try to determine why these generator - transformer voltage arrangement was chosen.)

   The transformer low side voltage rating needed to be addressed before proceeding with the fabrication of the replacement IPEC Unit 2 main transformers.

The DGA test results show some minor thermal heating issue, which have stabilized since the cooling system has been place in manual run.

Main Transformer 22 has significance N_2 leak, which cannot be repaired without a unit shutdown.

The units were evaluated by ABB as part of the power uprate project in 2002. This evaluation made a number of recommendations. One of the recommendations made by the ABB report was to install additional cooling. This recommendation was not implemented based a decision purchase and replacement units.

Based on a review of condition of all the ENN Fleet main transformers it is my conclusion that the IPEC Unit 2 main transformers are at the highest risk with the Fitzpatrick units next. IPEC Unit 3 has the similar operating issues as Unit 2 but due to the unit's MVAr capability generator terminal voltage and total MVA less. The limit on the total MVA output and does not require a high a generator terminal voltage.

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A more detailed review of the condition of the fleet main transformer is being developed and will be issued by the end of July 2005.

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