

1 Q. Please describe whether Hydro's maintenance and testing of transformers employs
2 techniques capable of identifying bushing conditions or defects. If the answer is yes,
3 describe the techniques and describe and quantify the likelihood that any such
4 conditions or defects would have been identified had maintenance on T1
5 transformer been conducted prior to the transformer failure and had such
6 conditions or defects existed at that time.

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9 A. Hydro's maintenance program for power transformers employs techniques to help
10 identify bushing conditions or defects. The planned maintenance consists of:

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12 1. A visual inspection at an interval of 120 days to assess such things as
13 porcelain condition, oil level, and the overall visual condition of unit. The
14 bushings on Sunnyside Transformer T1 were last visually inspected on
15 October 26, 2013 with no bushing concerns noted.

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17 2. Power factor testing (which is a specific high-voltage Doble Power Factor
18 electrical test) completed every six years as a part of the transformer
19 maintenance. The power factor test is completed to assess the overall
20 integrity of the bushing, including its internal components. Test results
21 are reviewed immediately by the Protection and Control Technician
22 conducting the test. If the results indicate a questionable condition,
23 consultations occur with the Protection and Control Supervisor and/or
24 Asset Specialist to ensure the appropriate action is taken prior to the
25 transformer being put back in service. In addition, following the test, the
26 results are further reviewed by Hydro's Asset Specialist to determine
27 whether further work is required.

1 The last power factor (Doble) test was conducted on August 16, 2007,
2 and the results were deemed acceptable with no follow up work
3 identified. Following the T1 fire, it was decided to send the previous
4 power factor test results on file for the transformer (including the results
5 from 2007) to Doble Engineering for an expert review. It is important to
6 note that for this review, Doble was not made aware that the
7 transformer had failed. Doble Engineering confirmed there did not
8 appear to be a concern with the bushings based upon their review.

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10 With the maintenance information Hydro had, there was nothing directing Hydro to
11 treat T1 transformer maintenance as a top priority. As a result, by choosing to
12 defer the maintenance, Hydro was carrying out priority work as indicated by its
13 ongoing asset management program. Further, it is Hydro's experience with
14 preventative maintenance that bushing defects were identified in only 2% of
15 transformers during all maintenance carried out since 2000 (see also Hydro's
16 response to PR-PUB-NLH-073). As such, it is uncertain whether the maintenance
17 would have identified a defect in the bushing.