

1 **Q. Re: Unit 1 and Unit 2 Generator Stator Rewind (Tab 2)**

2 Please provide the justification for proceeding with this project at this time given
3 AMEC's "Recommended Actions" found at page 8-6 of the Holyrood Thermal
4 Generating Station Condition Assessment & Life Extension Study.

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7 **A.** It is unclear which recommendation is referred to in the above question. For
8 completeness, the following table shows all the issues and recommended actions
9 found at page 8-6 of the Holyrood Thermal Generating Station Condition
10 Assessment and Life Extension Study.

TABLE-1 RECOMMENDED ACTIONS - 6840 #1 GENERATOR STATOR

Issues	Recommended Actions
<p>1. There is oil leaking into the stator, reducing the effectiveness of the winding support. Oil and grease has been found on the end-windings at each past inspection, and on other similar GE generators. A leak in the horizontal joint of the seal assembly was found at the last outage and a temporary repair was made – is it still effective 7 years later?</p>	<p>1. Keep the differential seal oil/hydrogen differential pressure constant and between 27 – 40 kPa (4 and 6 psi).</p> <p>2. Check the oil level in the de-training tank is not high, and the flow in the seal oil drain lines is not excessive or foaming, which increases the risk of oil backing up and leaking into the generator</p> <p>3. Monitor the partial discharge activity every 3 months for signs of increased partial discharge activity. If the end-winding partial discharge activity exceeds 30 mV on any of the phases, plan an early intervention for repair of the stator end-winding looseness.</p> <p>4. Check the hydrogen consumption and seal oil consumption for leakage.</p>
<p>2. The stator core appears to be in satisfactory condition, but the GE El-Cid test report is incomplete. (It is important to confirm the condition of the core is sound, before ordering a replacement stator winding for installation in 2012, see next item).</p>	<p>1. Plan for an El-cid test and a high flux test of the stator core, during the next major inspection. Check the stepped end packets, and record the highest defect values in each slot.</p> <p>2. Repeat the measurements in the highest three slots and note the positions, for boroscope inspection. Take infra-red photos of the core and note the hot spots (areas greater than 3 °C above the surrounding areas).</p>
<p>3. The GE tests showed the right phase of the stator winding was in very weak condition in 2003. A</p>	<p>1. At the next major inspection, repeat the 10 KV Megger test, and the DC hipot test at 34 KV. (Check whether the poor insulation</p>

Issues	Recommended Actions
<p>rewind was recommended. An update on the winding condition should be obtained at the 2012 inspection (preferably from a second source). The tests should only be done on the winding after it has been carefully cleaned and re-tightened, and is known to be clean and dry.</p>	<p>condition was due to the high moisture or to the insulation deteriorating during the re-wedging – this is useful information for Unit 3).</p> <ol style="list-style-type: none"> 2. Also test the bushings and the PT's, and carry out ratio tests on the CT's. 3. Decide whether the windings will last until 2015, or whether they should be replaced during the 2012 outage. 4. Draft a specification now, for the manufacture, test and installation of a replacement winding, together with new RTD's, and bushing and terminal plate flange seals. Also include options for new bushings and CT's, in case they are necessary. This will reduce the outage time, if a winding failure should occur during the next two years. 5. At the next major inspection, have the OEM (or potential rewind Contractors) take the stator slot and winding dimensions. 6. Consider taking advance delivery of the winding and store it at the plant until needed (make sure the new winding will fit either Unit1 or Unit 2, or identify why this is not possible).

1 With respect to issue 1 in the above table, all recommended actions are being
2 addressed through operational procedures. With respect to issue 2, this testing
3 work will be completed on Unit 1 during the 2012 major overhaul. With respect to
4 issue 3, details on recommended actions are as follows:

- 5 1. These tests will be performed on Unit 1 as recommended during its steam
6 turbine and generator overhaul major outage, scheduled for 2012. The testing
7 will be conducted to confirm the anticipated continued degradation of the
8 stator winding condition.
- 9 2. Although outside the scope of the stator rewind project, this testing will be
10 conducted on Unit 1 during the scheduled 2012 major outage as well.
- 11 3. The testing on Unit 1 stator in 2012 will provide up to date data to allow for a
12 further estimation of the remaining life of the stator windings. Given that the
13 delivery time, once ordered, on a stator winding is approximately 18 months
14 (and given the criticality of all three Holyrood units producing during the winter
15 for the Island Interconnected System) the earliest that a stator rewind for Unit 1

1 could proceed on a planned basis is spring of 2014. If it is determined that the
2 condition of the Unit 1 stator windings are such that it must be done as soon as
3 possible then Unit 1 will likely be moved to 2014, instead of Unit 2 as presently
4 planned.

5 4. Budgetary estimates of the cost of stator winding rewinds were obtained in
6 order to prepare this budget proposal. Once sanctioned a detailed specification
7 will be prepared in 2012.

8 5. These measurements will be taken at the next major outage for both units.

9 6. This option was considered, and dismissed. The present project schedule has
10 the Unit 2 stator rewind taking place at the same time as the scheduled major
11 outage to the Unit in 2014. This synergy allows for savings of approximately
12 \$500,000 to be realized (given that the unit will already be significantly
13 disassembled, contract work crews already mobilized, etc.). Even with a winding
14 on hand, should a failure occur, the unit down time would be considerable
15 (mobilization of work crews, sourcing of other components and tools, etc.).

16 These factors, combined with the criticality of the Holyrood units to the Island
17 Interconnected System in winter and the potential for catastrophic damage to
18 generator stator and other unit components should an in-service failure occur,
19 make the planned rewind the more desirable option. The final point is that,
20 given a winter 2012 stator winding order (and the 18 month delivery time), the
21 requirement of Holyrood units to be in service during winter months and the
22 outage time required to install and commission the new windings, the earliest
23 that rewind work could begin at this point would be spring of 2014.