

DETAILS OF OM&A PROJECTS – REGULATED HYDROELECTRIC

1.0 PURPOSE

The purpose of this evidence is to identify OM&A projects and provide available business case summaries for Tier 1 OM&A projects at OPG's regulated hydroelectric facilities.

2.0 OVERVIEW

OM&A projects are categorized as either Tier 1, Tier 2 or Tier 3. More specifically:

- Tier 1 OM&A projects have a total cost of \$20M or greater that have budgeted expenditures during the test period. Business case summaries are provided, if available, for Tier 1 OM&A projects.
- Tier 2 projects have a total cost of \$5M to \$20M.
- Tier 3 projects have a total cost of less than \$5M.

3.0 OM&A PROJECT DESCRIPTIONS

3.1 Tier 1 OM&A Projects

Tier 1 OM&A projects are those with total costs greater than or equal to \$20M. There are three Tier 1 OM&A projects at OPG's regulated hydroelectric facilities that have planned expenditures during the test period – one at Niagara Plant Group and two at Ottawa St. Lawrence Plant Group (Ex. F1-3-3, Table 1). The costs of all regulated hydroelectric Tier 1 OM&A projects totals \$77.8M - \$21.3M at Niagara Plant Group and \$56.5M at Ottawa St. Lawrence Plant Group (Ex. F1-3-3, Table 1). A detailed description of the projects follows.

3.1.1 Niagara Plant Group: Sir Adam Beck, Pump Generating Station - Units 1 to 5 Overhauls (SABP0036)

OPG intends to overhaul Units 1 to 5 at the Beck Pump Generating Station ("PGS"). The project cost was estimated at \$21.3M for business planning purposes with a scheduled start in 2013. Subsequent to the approval of the current Business Plan, a decision was made to execute a partial release on the overhaul program for the first unit (i.e., PG3) to minimize

1 schedule and estimate uncertainty associated with releasing a five unit overhaul program. A
2 Business Case Summary was prepared for the PG3 overhaul and released under a different
3 project number (SABP0053) (See Attachment 1). The Business Case included a capital
4 acquisition of a spare set of turbine blades to ensure that replacement blades would be
5 available for the unit overhaul program.

6
7 A unit overhaul program at the PGS was last completed in the mid to late 1990s. There was
8 an expectation, at that time, that after completing these overhauls the runner life of these
9 units would be 25 to 30 years. This period is consistent with the life expectancies of the
10 Francis type runners at OPG's other generating stations and was consistent with the
11 previous unit's service life at the PGS. However, since the unit overhauls were completed,
12 the number of reversing operations and/or loading changes that the PGS units have
13 experienced has increased significantly. The number of cycles is expected to further increase
14 in response to changes in the Ontario generation mix and electricity system operation.

15
16 Additionally, in 2008, the seals on the PG6 runner failed after approximately ten years of
17 service necessitating an emergency unit overhaul. Based on a careful inspection of the
18 condition of the PG6 runner internal mechanisms, OPG has concluded that 15 years is a
19 more reasonable service life expectation, given the complicated nature of the runner and the
20 increased operations described above. Inspection of the runner blades also indicated that
21 there is significant blade deformation. Correcting the blade deformation of the remaining
22 units may increase unit efficiency and energy production.

23
24 Unit overhauls will begin with units PG3 and PG5. These units were overhauled at the start
25 of the last overhaul program in the 1990's and currently have the greatest risk of failure. The
26 results from the inspection of runner internal mechanisms during these overhauls will be
27 used to confirm the 15-year life expectancy of these runners and to justify the overhauls on
28 units PG1, PG2 and PG4. The first unit overhaul (PG3) is planned for 2014 and the second
29 unit overhaul (PG5) is planned for 2015.

1 This project has been deferred by two years since it was identified in EB-2010-0008. This
2 deferral is primarily due to the identification of the project for the capital replacement of the
3 turbine runner blades at Sir Adam Beck PGS. Additional time was required to investigate the
4 runner replacement which included detailed analysis of the existing runner blades and design
5 optimization to ensure that runner blades are replaced with the most efficient blades
6 practical.

7
8 3.1.2 Ottawa St. Lawrence Plant Group - Otto Holden Generating Station - Units 1 to 8
9 Overhauls (OTTO0036)

10 Since the early 1970's, Otto Holden GS has experienced structural and operation problems
11 as a result of concrete growth associated with alkali-aggregate reactivity. Some of these
12 problems include the reduction in runner clearances, misalignment of the turbine/generator
13 assembly, and the seizing of the guide vanes in their bushings. A concrete growth mitigation
14 project was executed between 1998 and 2008 and the concrete growth rate in the station is
15 being tracked and critical clearances are being measured regularly. Unit overhauls are
16 necessary to re-establish functional features and dimensional tolerances to ensure proper
17 performance. In addition, future plans for mitigating the impact of concrete growth on unit
18 performance will also be determined.

19
20 The recommended alternative is to execute one unit overhaul per year beginning in 2015.
21 This project will reverse any current operating issues with the units, as well as mitigate the
22 future risks to unit performance and reliability resulting from continued concrete growth. The
23 Otto Holden GS Mechanical and Electrical Overhauls project is not released and therefore
24 does not have a Business Case Summary.

25
26 3.1.3 Ottawa St. Lawrence Plant Group Chats Falls Generating Station Main Dam
27 Restoration. (CHAF0035)

28 The Main Dam at Chats Falls GS was constructed in 1930 -1931 and is 5.24 km in length.
29 The dam is divided into 13 sections or divisions for construction and identification purposes.
30 These structures are currently experiencing significant deterioration leading to operational
31 problems and potential structural and stability issues. Structural and weathering related

deterioration has been observed and monitored since the 1940s. External engineering services were retained to carry out assessment inspections which also revealed the presence of alkali-aggregate reactivity which has contributed to the deterioration as well.

The project consists of the complete rehabilitation of all dam sections including all four stop log sluiceways and replacement of handrails. This work will mitigate operational risks associated with the deteriorating concrete, extend the service life of the structures, and reduce leakage and further concrete deterioration. This project was released in 2012 for a net cost of \$20M (See Attachment 1). Hydro Quebec and Ontario Power Generation are sharing the gross \$40M cost equally.

3.2 Tier 2 OM&A Projects

Tier 2 OM&A projects are those with total costs between \$5M and \$20M. There are sixteen Tier 2 OM&A projects at OPG's regulated hydroelectric facilities that have planned expenditures during the test period – one at Niagara Plant Group, three at R.H. Saunders GS, ten at Ottawa St. Lawrence Plant Group and two at Northeast Plant Group (Ex. F1-3-3, Table 2). The costs of all regulated hydroelectric Tier 2 OM&A projects totals \$144.3M - \$17.6M at Niagara Plant Group, \$31.4M at R.H. Saunders GS, \$83.7M at Ottawa St. Lawrence Plant Group and \$11.6M at Northeast Plant Group (Ex. F1-3-3, Table 2).

3.3 Tier 3 OM&A Projects

Tier 3 OM&A projects are those with total costs less than \$5M. There are 106 Tier 3 OM&A projects at OPG's regulated hydroelectric facilities that have planned expenditures during the test period – 23 at Niagara Plant Group, 13 at R.H. Saunders GS, 24 at Ottawa St. Lawrence Plant Group, 18 at Central Hydro Plant Group, 3 at Northeast Plant Group and 25 at Northwest Plant Group (Ex. F1-3-3, Table 3). The costs of all regulated hydroelectric Tier 3 OM&A projects totals \$95.7M – \$20.9M at Niagara Plant Group, \$15.0M at R.H. Saunders GS, \$26.8M at Ottawa St. Lawrence Plant Group, \$16.1M at Central Hydro Plant Group, \$3.1M at Northeast Plant Group and \$13.8M at Northwest Plant Group (Ex. F1-3-3, Table 3).

1 **LIST OF ATTACHMENTS**

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3 Attachment 1: Business Case Summaries

ATTACHMENT 1
Business Case Summaries

Provided below is a list of projects with total project cost of \$20M or greater, and their associated business case summaries. Paper copies of the business case summaries are provided in a separate binder (EB-2013-0321 Volume 4).

Tab	Business Case Summaries	Project No.
1	Chats Falls GS - Main Dam Concrete Restoration	CHAF0035
2	Sir Adam Beck Pump GS – Unit Overhauls	SABP0053 (formerly SABP0036)