1.0 PURPOSE
This evidence provides the production forecasts for the regulated hydroelectric facilities and a description of the methodology used to derive the forecasts. It also presents an overview of outage planning for the regulated hydroelectric facilities.

2.0 REGULATED HYDROELECTRIC PRODUCTION FORECAST
The regulated hydroelectric production for the years 2007 - 2012 is presented in Ex. E1-T1-S1 Table 1. OPG is seeking approval of a test period production forecast of 38.4 TWh (19.4 TWh in 2011, and 19.0 TWh in 2012) for the regulated hydroelectric facilities.

2.1 Forecast Methodology
The regulated hydroelectric production forecast is impacted by water availability. OPG seeks to optimize the use of available water while meeting safety, legal, environmental, and operational requirements. The availability of water is affected by meteorological conditions, particularly precipitation and evaporation. The forecast methodology accounts for operational strategies that attempt to maximize use of available water and minimize spill (unutilized water flow).

Computer models are used to derive flow and production forecasts for the regulated hydroelectric facilities. Forecast monthly water flows, generating unit efficiency ratings, and planned outage information are used to convert forecast water availability into forecast energy production.

With the exception of the change highlighted in section 2.5, the regulated hydroelectric production forecast methodology is essentially the same as the methodology that was approved by the OEB in EB-2007-0905.
2.2 Niagara River Flow and Production Forecast

Forecast water levels and outflows for Lake Huron, Lake St. Clair, and Lake Erie are derived by OPG using the Hydrological Response Model for the Great Lakes, developed by the Great Lakes Environmental Research Laboratory.

Input parameters to this model include:

- “Starting” elevations for Lakes Huron, St. Clair, and Erie based on current month end elevation estimates.
- Default median values for hydrological parameters based on historic data, antecedent conditions, and forecast data from Environment Canada and the U.S. National Oceanic and Atmospheric Administration (“NOAA”). These parameters include basin precipitation, runoff, and lake evaporation for Lakes Michigan, Huron, St. Clair, and Erie flows for the St. Mary’s River (Lake Superior outflow), Chicago Diversion, and Welland Canal, and factors to account for the impact of ice retardation on the flow in the St. Clair, Detroit, and Niagara Rivers.

The model produces monthly average water level and outflow forecasts for Lakes Huron, St. Clair, and Erie. The Lake Erie water level and outflow forecast produced by the model is compared with the six-month advance forecast produced by Environment Canada as a consistency check.

Minor adjustments are applied to the forecast monthly Lake Erie outflows, as produced by the Great Lakes Hydrological Response Model, to determine the Grass Island Pool inflow forecast. The Grass Island Pool is the section of the Niagara River immediately above Niagara Falls. Water used by OPG for power production at Niagara is diverted from the river in this area. These adjustments account for seasonal variations in local inflow, and flow reductions due to ice or weed retardation effects. The OPG Grass Island Pool inflow forecast is compared with one produced by the New York Power Authority (“NYPA”) as a consistency check. Because of the increasing uncertainty associated with predicting natural systems over time, forecasts for periods beyond two years assume that water availability trends back towards historic monthly medians. This assumption reflects historical trends.
In addition to the forecast monthly Grass Island Pool inflows, flows diverted to the DeCew Falls stations, seasonal restrictions for the Beck waterways, the NYPA’s diversion and discharge capacities, and unit availability information for the Sir Adam Beck plants (Sir Adam Beck I, Sir Adam Beck II, and Sir Adam Beck Pump Generating Station), are used in the forecasting of the energy production for the Sir Adam Beck plants in the Niagara Utilization Model – Monthly. Other factors that may be adjusted in the Niagara forecasting application, if necessary, include Lake Ontario water levels, Grass Island Pool leakage level, pump generating station operating patterns, and the Sir Adam Beck 25 cycle system load (to April 2009 only). These adjustments are applied based on regularly updated historical records, and are used to improve forecast accuracy.

The Niagara energy forecasting model uses generating unit efficiency ratings to calculate monthly energy production for the Sir Adam Beck units based on the forecast flow and unit outage information. Based on an assessment of historical performance, the calculated production forecast values are modified to account for losses attributed primarily to automatic generation control, condense-mode operations, and surplus baseload generation.

Potential water transactions with NYPA are also computed in the forecasting application, with adjustments applied based on assessment of historical performance with respect to transactions (see Ex. G1-T1-S1 for a discussion of water transactions). However, the energy associated with potential water transactions is excluded from the production totals presented in the table accompanying this exhibit (Ex. E1-T1-S1 Table 1) because:

- there is no obligation for NYPA to accept water transactions, and
- energy produced by NYPA is delivered to the New York market, not the Ontario market.

Under an agreement between OPG and FortisOntario Inc., energy was returned to FortisOntario (formerly Canadian Niagara Power) as compensation for the utilization of the FortisOntario Niagara water entitlement at the Sir Adam Beck stations. The returned energy attributed to FortisOntario is equivalent to over 650 GWh annually, and was included as part of the total Niagara energy forecast. It is itemized separately in the tables within this exhibit.
This agreement terminated on April 30, 2009 consistent with the expiry of the FortisOntario water lease, after which OPG assumed the water entitlement.

2.3 DeCew Falls Diversion Flow and Production Forecast
The DeCew Falls stations use water diverted from Lake Erie through the Welland Canal to produce electricity. Forecasts of diversion through the Welland Canal are prepared based on actual historical diversion flows, forecast Lake Erie water levels, outages planned for the DeCew plants, scheduled rowing regatta events (OPG adjusts its water use to provide appropriate conditions for major events), and St. Lawrence Seaway Management Corporation navigation needs and plans for canal maintenance.

Energy production forecasts for DeCew Falls I and II are made using a spreadsheet application known as Rivmonth. It uses forecast monthly DeCew Falls diversion flow, DeCew Falls unit availability information based on planned outages, and generating unit efficiency ratings to calculate the combined monthly energy production for the DeCew Falls stations.

2.4 St. Lawrence River Flow and Saunders Production Forecast
Lake Ontario and the St. Lawrence River outflows and levels are regulated by the International St. Lawrence River Board of Control. The International St. Lawrence River Board of Control has established plans to provide for artificial control of the outflows and levels of Lake Ontario to satisfy the various interests that were identified at the time of the plans’ development. Each of these plans involves a model that determines the regulated Lake Ontario outflow and level. The International St. Lawrence River Board of Control currently has the authority to deviate from the approved plan under specific conditions.

The initial plan for the regulation of the levels and outflows of Lake Ontario (Plan 1958-A) was implemented in April 1960. Following further studies and several years of operating experience, a second plan, “Regulation Plan 1958-D”, was implemented in 1963 and continues in use today. This plan has been reviewed by the International Joint Commission (“IJC”) in recent years and the IJC has “concluded that regulation should be based on a revised set of goals and criteria aimed at more natural flows while respecting other interests”
(reference IJC website, [www.ijc.org](http://www.ijc.org)) Consultations between the Commission and the Canadian and United States governments are ongoing.

Forecast monthly flow and Lake Ontario levels derived from the Regulation Plan 1958-D model are compared with values produced by each of Environment Canada (Great Lakes – St. Lawrence Regulation Office) and NYPA, as a consistency check. When knowledge of International St. Lawrence River Board of Control plans and strategies that will result in deviations from plan is available, adjustments are applied to reflect this information. Forecast monthly flow and level values are input to the Rivmonth energy production spreadsheet application for up to the first six months of the forecast period. Thereafter, the forecast monthly flows are estimated to be consistent with flow trends predicted by the Niagara River forecast. The R.H. Saunders generating unit efficiency ratings and planned major outages are also incorporated in the Rivmonth application.

### 2.5 Forecast Surplus Baseload Generation Adjustment

Surplus baseload generation (“SBG”) is a condition that occurs when electricity production from baseload facilities is greater than Ontario demand. During 2009, SBG was more prevalent in Ontario than it has been for many years. Increased SBG was due to reduced electricity demand resulting from depressed economic conditions and relatively moderate temperatures, as well as an increase in available electricity supply. Typically, production at Niagara is reduced during periods of SBG when water available for generation at the Beck plants may be rejected and spilled over the Falls because the generation is not required. As indicated in section 2.2, the forecast production values for Niagara are modified to account for reduced production attributable to system operational conditions, including condense-mode operations, the provision of automatic generation control and operating reserve, etc., based on an assessment of historical performance (i.e., representative of typical or normal system conditions). However, this model adjustment did not adequately account for the decreased production attributable to SBG experienced in 2009.

Significant SBG is forecast to continue through the test period based on Ontario electricity demand and generation supply forecasts. Consequently, an additional forecast SBG
adjustment has been integrated into the regulated hydroelectric production forecast totals for 2010, 2011, and 2012, and itemized separately in line 21 of Ex. E1-T1-S2 Table 1. The specific SBG adjustments included in the forecast are: 0.2 TWh in 2010, 0.5 TWh in 2011, and 0.8 TWh in 2012.

3.0 OUTAGE PLANNING

Outage planning for OPG’s hydroelectric generating stations is based on a streamlined reliability centered maintenance philosophy as described in Ex. A1-T4-S2.

Outages are generally planned to conduct:

- Major overhaul, rehabilitation or upgrade work
- Preventative maintenance
- Condition based maintenance
- Inspection and testing

The normal cyclical patterns of river flow within a year are considered when scheduling outages in order to minimize the spilling of water.

At the Niagara Plant Group, a consistent base maintenance program (utilizing streamlined reliability centred maintenance principles) is used except for major overhauls or upgrades. At Sir Adam Beck I, eight of the ten generating units (all at 60 cycle) are currently available for service. The two remaining units (25 cycle) were deregistered at the end of April 2009. OPG plans to undertake major rehabilitation on three of the Sir Adam Beck I units during the current business plan period. This will impact unit availability. The six pump/generating units at Sir Adam Beck Pump Generating Station were rehabilitated within the past 12 years, which has improved unit reliability. However, to maintain a reasonable level of reliability, more frequent corrective maintenance is required on these reversible pump generators than on conventional units. This is because of the complexity of the reversible pump generators compared to conventional hydroelectric turbine/generators and the increased wear and tear associated with the frequent stops and starts required for storage and peaking. Extended
outages are planned for four of the reversible pump generators over the next five years as further described in Ex. F1-T3-S3.

DeCew Falls I was removed from service in December 2008 for penstock replacement and the four units are expected to return to service between July 2010 and April 2011

The outage plan for R.H. Saunders is fairly consistent from year to year. Maintenance outages are scheduled on four units each year, thereby completing inspections and maintenance on each of the 16 units over a four year period. Outages requiring more than two units to be out-of-service simultaneously (e.g., transformer bank outages and black start tests), are typically of short duration (less than three days) and normally scheduled during the fall when St. Lawrence river flows are typically at their lowest. In general, outages do not significantly impact production at R.H. Saunders.