

OVERVIEW OF REGULATED HYDROELECTRIC FACILITIES

1.0 PURPOSE

This evidence describes the regulated hydroelectric facilities, and sets out an overview of the hydroelectric mandate, objectives, and organization and management framework. It also identifies the regulations, agreements and programs key to these facilities.

2.0 DESCRIPTION OF REGULATED HYDROELECTRIC FACILITIES

A total of fifty-four OPG hydroelectric generating stations will be subject to OEB regulation. These facilities consist of two segments: six stations in the Niagara Plant Group and R.H. Saunders facilities subject to OEB regulation since 2008, and forty-eight newly regulated hydroelectric facilities will come under OEB regulation.

In general, hydroelectric facilities include: generating equipment (turbines, generators, transformers, protections and controls, etc.), related civil works (powerhouses, dams, headworks, and spillways), and the facilities required to operate and maintain the generating stations (control rooms, work centres, and headquarters).

Chart 1 presents information about the Niagara Plant Group generating stations and the R.H. Saunders Generating Station. Chart 2 presents information about the newly regulated hydroelectric facilities.

Chart 1

Previously Regulated Hydroelectric Facilities General Information

Plant Group	Generating Station	Number of In-Service Units	Net In-Service Capacity (MW)	Original Unit In-Service Dates
Niagara PG	Sir Adam Beck I	8	427	1922 – 1930
	Sir Adam Beck II	16	1,499	1954 – 1958
	Sir Adam Beck PGS	6	174	1957 – 1958
	DeCew Falls I	4	23	1898
	DeCew Falls II	2	144	1948
Ottawa-St. Lawrence PG	R.H. Saunders	16	1,045	1958 – 1959

2.1 Niagara Plant Group

The Niagara Plant Group (“NPG”) includes the Sir Adam Beck facilities and the Decew facilities. A map showing these facilities is provided in Attachment 1.

The Sir Adam Beck facilities include Sir Adam Beck I Generating Station (“Sir Adam Beck I”), Sir Adam Beck II (“Sir Adam Beck II”), Pump Generating Station (“PGS”) and associated structures such as tunnels, the open cut canal and the International Niagara Control Works structure (also known as International Control Dam), as well as the PGS Reservoir. Water conveyance structures (i.e., tunnels and canals) divert water from the upper Niagara River to the Sir Adam Beck plants. Water is discharged from the plants into the lower Niagara River. Under a Memorandum of Understanding between OPG and the New York Power Authority (“NYPA”), OPG and NYPA equally share the costs associated with Joint Works at Niagara (including the International Control Dam).

The DeCew facilities include DeCew Falls I, DeCew Falls II and associated water conveyance structures such as Intakes 1 and 2, and the Waterworks canal. Water conveyance structures divert water from the Welland Ship Canal, through Lake Gibson and Lake Moodie, to the DeCew generating stations. Water discharged from the plants flows through the Twelve Mile Creek to Lake Ontario.

The Niagara Plant Group facilities (Sir Adam Beck and DeCew Falls) are controlled from a single control centre located at Sir Adam Beck I.

2.2 R.H. Saunders Generating Station

R.H. Saunders Generating Station ("R.H. Saunders") is a 16-unit hydroelectric station on the St. Lawrence River at Cornwall, Ontario. R.H. Saunders is connected to the 16-unit St. Lawrence - Franklin D. Roosevelt Generating Station, which is owned and operated by the New York Power Authority ("NYPA"). Together, the two stations span the entire St. Lawrence River. Associated structures include: the powerhouse, dams, headworks, dykes, bridges, and ice booms. Under a Memorandum of Understanding between OPG and NYPA, OPG and NYPA equally share the costs associated with Joint Works at the St. Lawrence facilities (including the Iroquois Control Dam and Long Sault Dam, headworks, dykes, and the Barnhart Island bridge). A map showing these facilities is provided in Attachment 2.

R.H. Saunders is part of the Ottawa St. Lawrence Plant Group, which includes nine other OPG hydroelectric facilities located on the Ottawa and Madawaska Rivers. R.H. Saunders is operated from a control centre within the station.

Chart 2
Newly Regulated Hydroelectric Facilities General Information

Plant Group	Generating Station	Number of In-Service Units	Net In-Service Capacity (MW)	Original Unit In-Service Dates
Ottawa-St. Lawrence Plant Group	Arnprior	2	82	1976-1977
	Barrett Chute	4	176	1942-1968
	Calabogie	2	5	1917
	Mountain Chute	2	170	1967
	Stewartville	5	182	1948-1969
	Chats Falls (OPG owns 4 of 8 units)	4	96	1931-1932
	Chenault	8	144	1950-1951
	Des Joachims	8	429	1950-1951
	Otto Holden	8	243	1952-1953
Central Hydro	Auburn	3	2	1911-1912

Plant Group	Big Chute	1	10	1909-1919 (rebuilt 1993)
	Big Eddy	2	8	1941
	Bingham Chute	2	1	1923-1924
	Coniston	3	5	1905-1915
	Crystal Falls	4	8	1921
	Elliot Chute	1	2	1929
	Eugenia Falls	3	6	1915-1920
	Frankford	4	3	1913
	Hagues Reach	3	4	1925
	Hanna Chute	1	1	1926
	High Falls	3	3	1920
	Lakefield	1	2	1928
	McVittie	2	3	1912
	Merrickville	2	2	1915-1919
	Meyersberg	3	5	1924
	Nipissing	2	2	1909
	Ragged Rapids	2	8	1938
	Ranney Falls	3	10	1922-1926
	Seymour	5	6	1909
	Sidney	4	4	1911
	Sills Island	2	2	1900
	South Falls	3	4	1916-1925
	Stinson	2	6	1925
	Trethewey Falls	1	1.7	1929
Northeast Plant Group	Abitibi Canyon	5	349	1933-1959
	Otter Rapids	4	182	1961-1963
	Lower Notch	2	274	1971
	Matabitchuan	4	10	1910
	Indian Chute	2	3	1923-1924
Northwest Plant Group	Aguasabon	2	51	1948
	Alexander	5	69	1930-1958
	Cameron Falls	7	92	1920-1958
	Caribou Falls	3	91	1958
	Kakabeka Falls	4	25	1906-1914
	Manitou Falls	5	73	1956-1958
	Pine Portage	4	142	1950-1954
	Silver Falls	1	48	1959
	Whitedog Falls	3	68	1958

1

2 2.3 Ottawa-St. Lawrence Plant Group

3 In addition to R. H. Saunders, the Ottawa-St. Lawrence Plant Group ("OSPG") includes four
4 generating stations on the Ottawa River (Otto Holden, Des Joachims, Chenaux, and Chats

1 Falls), and five generating stations on the Madawaska River (Mountain Chute, Barrett Chute,
2 Calabogie, Stewartville, and Arnprior).

3
4 The eight units and joint works (dams, sluices and bridges) associated with the Chats Falls
5 generating station on the Ottawa River are jointly owned with Hydro Quebec. Four
6 generating units are owned by OPG, and four are owned by Hydro Quebec. OPG operates
7 and maintains the entire station through an Operating Services agreement with Hydro
8 Quebec. Operating, maintenance and investment costs are shared in accordance with this
9 agreement. Costs associated with the Hydro Quebec portion of the facility are not included
10 in this application.

11
12 The OSPG office headquarters are located in Renfrew. The Ottawa River and Madawaska
13 River stations are maintained from six work centres, and they are remotely operated from a
14 control centre located at Chenaux GS. A map showing the locations of these facilities is
15 provided in Attachment 3.

16 17 **2.4 Central Hydro Plant Group**

18 The Central Hydro Plant Group ("CHPG") is comprised of twenty-five newly regulated
19 hydroelectric generating stations, and one unregulated generating station. The newly
20 regulated CHPG stations are located on ten river systems in the central part of the Province
21 (Beaver River, Mississippi River, Muskoka River, Otonabee River, Rideau River, Severn
22 River, South River, Sturgeon River, Trent River, and Wanapitei River).

23
24 The CHPG headquarters are located in North Bay. The CHPG generating stations are
25 maintained from four work centres, and they are remotely operated from a control centre
26 located at the North Bay headquarters. A map showing the locations of these facilities is
27 provided in Attachment 4.

28 29 **2.5 Northeast Plant Group**

30 The Northeast Plant Group ("NEPG") is comprised of five newly regulated hydroelectric
31 plants, and eight unregulated stations. The newly regulated NEPG facilities include: two

1 generating stations on the Abitibi River (Abitibi Canyon and Otter Rapids), two generating
2 stations on the Montreal River (Indian Chute and Lower Notch), and one generating station
3 on the Matabitchuan River (Matabitchuan).

4
5 The NEPG headquarters is located in Timmins. The newly regulated NEPG generating
6 stations are maintained from two work centres, and are remotely operated from a control
7 centre located in Timmins. A map showing the locations of these facilities is provided in
8 Attachment 5.

10 **2.6 Northwest Plant Group**

11 The Northwest Plant Group ("NWPG") is comprised of nine newly regulated plants, and two
12 unregulated stations. The newly regulated NWPG facilities include: one on the Aquasabon
13 River (Aguasabon), two on the English River (Manitou Falls and Caribou Falls), two on the
14 Kamanistikwia River (Silver Falls and Kakabeka Falls), three on the Nipigon River (Pine
15 Portage, Cameron Falls, and Alexander), and one on the Winnipeg River (Whitedog Falls).

16
17 The NWPG headquarters are located in Thunder Bay. The NWPG generating stations are
18 maintained from four work centres, and they are remotely operated from a control centre
19 located at the headquarters in Thunder Bay. A map showing the locations of the NWPG
20 facilities is provided in Attachment 6.

22 **3.0 HYDRO THERMAL OPERATIONS MANDATE AND OBJECTIVES**

23 The Hydro Thermal Operations Business Unit has the following objectives:

- 24 • Sustain and improve the existing hydroelectric and thermal assets for the long term.
- 25 • Operate and maintain hydroelectric facilities in an efficient and cost effective manner.
- 26 • Seek to expand, develop, and/or improve existing hydroelectric generation where
27 feasible.
- 28 • Maintain and improve reliability performance where practical and economic.
- 29 • Maintain the existing excellent employee safety record (top quartile performance).
- 30 • Strive for continuous improvement in the areas of environmental and dam and
31 waterways public safety performance.

- Build and improve relations with First Nations and Metis.

4.0 HYDRO THERMAL ORGANIZATION AND MANAGEMENT FRAMEWORK

4.1 OPG Business Transformation

As described in Ex. A4-1-1, OPG is undertaking a Business Transformation initiative in order to improve its cost structure, and to design a more efficient and effective organization. The Business Transformation initiative includes a total target OPG headcount reduction of 2,000, with an emphasis on reducing the size of the support functions.

As part of this initiative, the Hydroelectric and Thermal Business Units were merged into one business unit, and renamed the Hydro Thermal Operations Business Unit.

The newly merged Hydro Thermal Operations Business Unit consists of the following groups:

- Five hydroelectric plant groups (Niagara, Ottawa St/Lawrence, Northeast, Northwest and Central Hydro)
- Five thermal stations (Nanticoke, Lambton, Lennox, Atikokan and Thunder Bay)
- Hydro Thermal central support (Engineering and Technical Services, Dam Safety and Emergency Preparedness, Strategy and Business Support, Hydro Thermal Project Execution and the Senior Vice President's office)

The balance of the central support groups, that were previously part of the Hydroelectric Business Unit, such as Supply Chain, Environment, Water Resources, First Nations and Metis Relations, were moved under centre-led Corporate organizations as part of Business Transformation. Please refer to Ex. A4-1-1 for further details.

4.2 HTO Organization

All OPG hydroelectric plant groups, including the regulated facilities, report to the Senior Vice President ("SVP") Hydro Thermal Operations and form part of the Hydro Thermal Operations Business Unit ("HTO"). Each Thermal Plant or Hydroelectric plant group is managed by a plant manager, who is responsible for managing operational aspects of the facilities assigned to them.

The HTO central support groups perform a dual role. First, they provide oversight and due diligence support to the SVP - HTO by setting direction through high level programs and other requirements (e.g., HTO policies). Second, they provide the specialized support necessary for the plant and plant groups to make effective operational and business decisions and to achieve alignment with corporate and HTO policies and procedures.

Descriptions of the key functions and activities of the hydroelectric plant groups and the HTO central support groups are provided in Ex. F1-2-1.

5.0 KEY HYDROELECTRIC REGULATIONS, AGREEMENTS AND PROGRAMS

OPG's regulated hydroelectric facilities are subject to international treaties between Canada and the United States, federal and provincial legislation and regulatory requirements, as well as several contractual arrangements with third parties. Collectively these result in additional costs and program needs with respect to the operation and management of the regulated facilities.

This section provides an overview of:

- Regulations, treaties and agreements with regard to water rights for the regulated hydroelectric facilities.
- Agreements with other utilities/generators related to operational requirements/guidelines, joint works, water sharing, water diversions, and compensation settlements.
- Dam and public safety governance and programs.
- First Nations and Metis Relations.

A summary of the legislative and regulatory framework applicable to all OPG regulated facilities is provided at Ex. A1-6-1.

5.1 Water Rights

5.1.1 Regulation of Water Rights

Rights to and restrictions on the use of water are determined by international treaties between Canada and the United States, together with the application of interprovincial agreements, federal and provincial legislation, common law as it pertains to real property and riparian rights, as well as the terms and conditions of certain leases and permits with and from the Government of Canada and the Province of Ontario. Water management plans authorized by the Ontario Ministry of Natural Resources prescribe water elevation and flow limits for many of Ontario's major rivers.

5.1.2 International Boundary Rivers

Through a series of agreements between the Government of Canada and the Province of Ontario, OPG has been granted the right to exercise Canada's rights with respect to the construction, maintenance, and operation of hydroelectric generating facilities on the Niagara and St. Lawrence Rivers under the *Boundary Waters Treaty of 1909*, the *Niagara Diversion Treaty of 1950*, the *Niagara Development Act of 1951*, and the *International Rapids Power Development Agreement Act of 1952*.

The *Boundary Waters Treaty of 1909* governs all boundary waters between Canada and the United States. Water rights on both the Niagara and St. Lawrence Rivers are subject to this treaty. The Treaty created the International Joint Commission ("IJC") to help prevent and resolve disputes over the use of boundary waters between Canada and the United States. The IJC established the International Niagara Board of Control to oversee water level regulation on the Niagara River, and the International St. Lawrence River Board of Control to ensure Lake Ontario outflows meet IJC requirements, including dependable flow for hydropower and adequate depths for navigation on the St. Lawrence River.

The *Niagara Diversion Treaty of 1950* between Canada and the United States, among other things, determines the priority of use for the waters flowing out of Lake Erie (Niagara River and Welland Canal), sets minimum flow requirements over Niagara Falls, and provides for the allotment of the waters available for power generation. It also recognizes that certain

1 diversion waters are to be excluded from determination of the power generation water
2 allotment.

3
4 The International Niagara Committee ("INC") was created by the Governments of Canada
5 and the United States pursuant to the *Niagara Diversion Treaty of 1950* to determine and
6 report the amounts of water available for purposes of the Treaty, including water used for
7 power diversions at Niagara. The INC is independent of the IJC, but works in collaboration
8 with the IJC's International Niagara Board of Control.

9
10 The *Niagara Parks Act* (Ontario) provides the Niagara Parks Commission with the authority
11 to grant certain rights to use the waters of the Niagara River for purposes of power
12 generation. By agreement executed February 2005, the Niagara Parks Commission granted
13 OPG sole rights to take water from the Niagara and Welland Rivers for purposes of power
14 generation until December 31, 2056.

15
16 The DeCew Falls stations use water that is conveyed through the Welland Canal from Lake
17 Erie under an agreement between OPG and the St. Lawrence Seaway Management
18 Corporation that has been renewed through June 30, 2038.

19
20 **5.1.3 Interprovincial Rivers**

21 Four of OPG's newly regulated hydroelectric generating stations are located on the Ottawa
22 River which forms the provincial boundary between Ontario and Quebec. The *Ottawa River*
23 *Water Powers Act, 1943*, (concurrent legislation, Ontario and Quebec) authorized the water
24 power developments at OPG's Otto Holden GS, Des Joachims GS, and Chenaux GS sites
25 on the Ottawa River. The fourth station, Chats Falls GS, is owned jointly by OPG and Hydro
26 Quebec. The four generating stations are subject to water power lease agreements with the
27 Ontario Ministry of Natural Resources.

28
29 "An Agreement Respecting Ottawa River Basin Regulation" dated March 2, 1983, between
30 the Governments of Canada, Ontario, and Quebec, established the Ottawa River Regulation

1 Planning Board and Secretariat to oversee the integrated management of the waters within
2 the Ottawa River basin. OPG participates as a member of the Board.

3
4 One newly regulated hydroelectric station (Whitedog Falls GS) is located on the Winnipeg
5 River which flows from the Lake of the Woods in northwestern Ontario to Lake Winnipeg in
6 Manitoba. Another two newly regulated hydroelectric stations (Manitou Falls GS and Caribou
7 Falls GS) are located on the English River which is a major tributary to the Winnipeg River
8 just east of the Manitoba-Ontario provincial border. These three generating stations are
9 subject to water power lease agreements with the Ontario Ministry of Natural Resources.

10
11 Concurrent Federal and Provincial (Ontario and Manitoba) legislation, authorized regulation
12 of the waters of the Lake of the Woods, Lac Seul, the English and Winnipeg Rivers, control
13 of flows, and utilization of water diverted from the Lake St. Joseph. The Lake of the Woods
14 Control Board is the regulating authority for managing these waters.

15
16 5.1.4 Provincial Rivers

17 Forty-one of OPG's newly regulated hydroelectric generating stations are located on
18 seventeen interior Ontario rivers (see sections 2.3 to 2.6). Tenure at thirty-one of these sites
19 is authorized by water power lease agreements with the Ontario Ministry of Natural
20 Resources, or licence agreements with Parks Canada. The remaining ten of these sites are
21 owned by OPG.

22
23 In addition, OPG holds eight Crown Leases and twenty-seven Licences of Occupation,
24 issued by the Ontario Ministry of Natural Resources, that provide additional land tenure and
25 flooding rights for facilities associated with the newly regulated hydroelectric generating
26 stations.

27
28 Water management plans, authorized by the Ontario Ministry of Natural Resources, exist for
29 fourteen of the seventeen interior rivers and prescribe flow and water level elevation limits.
30 The other three rivers (Rideau, Trent, and Severn) fall under federal jurisdiction and are not
31 subject to Ontario Water Management Plans.

5.2 Agreements with Other Utilities

OPG also has agreements with the New York Power Authority, Hydro Quebec, Manitoba Hydro, and H2O Power LP to address issues such as operational requirements/guidelines, cost sharing and management of joint works, water utilization, and settlement of water/energy transactions.

5.3 Dam Safety and Waterways Public Safety

5.3.1 Dam Safety

There are 202 dams and special hydraulic structures associated with OPG's regulated hydroelectric stations. Of these, 25 dams are associated with OPG's stations in the Niagara Plant Group and two dams are associated with R.H. Saunders. A further 175 dams are associated with newly regulated stations in the Ottawa-St. Lawrence, Central Hydro, Northeast, and Northwest Plant Groups.

In Canada, dams come under the provincial jurisdiction, with the exception of dams situated in boundary waters, on canals (i.e., Trent-Severn Waterway and the Rideau Canal), and those owned by the Government of Canada. The majority of OPG's dams fall within the jurisdiction of the Province of Ontario, however the structures on the Ottawa River are also regulated by the Province of Quebec. OPG provides regular submissions to the Province of Quebec to demonstrate that these structures remain in compliance with the Act and Regulation.

The Province of Ontario currently governs dams under the *Lakes and Rivers Improvement Act* ("LRIA"), administered by the Ministry of Natural Resources ("MNR"). Sections 14 and 16 of the Act require MNR's approval for activities such as the construction, alteration, improvement, or repair of dams. In August 2011, the Province of Ontario issued new Technical Guidelines for Approval under the LRIA. These Guidelines are not formal regulations however they do form the standards to which dams in Ontario are expected to comply.

1 For dams located on the Trent Severn Waterway and the Rideau Canal system, OPG is
2 required to meet Parks Canada dam safety criteria, primarily as it applies to upgrading
3 structures.

4
5 While the regulatory regime in Ontario continues to develop, OPG has well-established
6 programs based on the Canadian Dam Association ("CDA") – Dam Safety Guidelines (2007)
7 and the CDA Guidelines for Public Safety Around Dams, as well as other industry guidelines
8 that are in many respects seen as a model for emerging standards and regulatory
9 requirements. OPG's Safe Operations Policy, approved by the OPG's Board of Directors,
10 and associated Dam Safety Program Management Document directs that dams be designed,
11 constructed, operated and maintained in a manner that meets all regulatory requirements or,
12 in the absence of regulations, the safety guidelines published by the CDA or other industry
13 best practice.

14
15 Pursuant to OPG's dam safety program, dam safety reviews are completed periodically for
16 all dams owned and operated by OPG. Costs associated with the recommended
17 maintenance and safety improvements have been incorporated into OPG's business plans.

18
19 5.3.2 Waterways Public Safety

20 Since 2002, OPG has developed a number of technical documents concerning public safety
21 around dams, as well as materials to educate the public and raise awareness of the hazards
22 associated with dams and hydroelectric facilities. Currently there are no regulations covering
23 public safety around dams. However, the Province of Ontario has issued a Best
24 Management Practice document in August 2011 to guide owners on improvements to safety
25 around dams. In addition the Canadian Dam Association issued Guidelines for Public Safety
26 Around Dams in October 2011.

27
28 In the absence of government regulations, OPG has developed a Waterways Public Safety
29 Program to guard the public from risks associated with its dams and hydroelectric stations.
30 The program includes: installation of physical control measures (e.g., booms, buoys, fencing,
31 signage, audible alerts), operating procedures, and employee training requirements. A major

1 element of the program is public education. For example, OPG has worked diligently to
2 establish a "Stay Clear - Stay Safe" message. OPG actively engages other agencies such as
3 the MNR, Ontario Provincial Police, St. John's Ambulance, Life Saving Society, the Ontario
4 Waterpower Association, and numerous other stakeholders in water safety education to
5 partner in delivering the message to the public.

6 7 **5.4 First Nations and Metis Relations**

8 Ontario Power Generation's hydroelectric assets are widely dispersed throughout Ontario.
9 Many of the stations and dams are in close proximity to various First Nation communities.
10 This proximity to dams and generating stations has had direct and indirect effects on the
11 communities during initial construction and from on-going operations.

12
13 OPG has engaged in a past grievance settlement program since 1992 to address some of
14 these effects on First Nation Communities. The program attempts to address legal and
15 fairness issues with First Nation communities affected by generation stations owned and
16 operated by OPG. The program is voluntary and non adversarial. The successful outcome is
17 a negotiated settlement acceptable to both parties. Within OPG, executive approval is
18 required to enter into a settlement agreement. The program is backed by the OPG Board
19 level Policy on First Nations and Metis Relations.

20
21 To date, OPG (and formerly Ontario Hydro) have completed settlements with 19 First Nation
22 communities.

23

LIST OF ATTACHMENTS

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- Attachment 1: Niagara Plant Group - Overview
- Attachment 2: St. Lawrence River – Overview
- Attachment 3: Ottawa - St. Lawrence Plant Group – Overview
- Attachment 4: Central Hydro Plant Group – Overview
- Attachment 5: Northeast Plant Group – Overview
- Attachment 6: Northwest Plant Group – Overview