NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING – BACKGROUND INFORMATION

1.0 PURPOSE

This evidence provides background information regarding OPG's nuclear waste management and decommissioning activities and the financial management of the nuclear waste management and decommissioning liabilities.

2.0 OVERVIEW

The following specific aspects of nuclear waste management and decommissioning are discussed in this exhibit:

- A summary of the process by which nuclear waste is generated at OPG's generating stations, the different nuclear waste types and OPG's general approach to nuclear waste management. OPG's decommissioning responsibilities and role in the management of nuclear wastes at Pickering A and B Generating Stations ("Pickering"), Darlington Generating Station ("Darlington") and the Bruce Generating Station ("Bruce"), operated by Bruce Power L.P. are also summarized (section 2.0).
- The regulatory framework that applies to the financial management of nuclear waste management and decommissioning (section 3.0).
- A description of OPG's financial reference plan for nuclear waste management and decommissioning activities which provides the basis for determining OPG's nuclear liabilities and the current estimated values of these liabilities (section 4.0).

These items provide the necessary context for the subsequent explanation of the recovery of costs associated with the OPG's liabilities for decommissioning its nuclear stations (including Bruce) and nuclear used fuel and low and intermediate level waste management (collectively, the "nuclear liabilities") through the revenue requirement as described in Ex. C2-T1-S2.

2.0 NUCLEAR WASTE GENERATION AND DECOMMISSIONING

2.1 Nuclear Waste Types

In CANDU reactors, when a fuel bundle no longer contains enough fissionable uranium to heat water efficiently, it becomes used fuel and must be replaced.

Used fuel removed from OPG-owned reactors is radioactive and considered to be high level radioactive waste. Materials that have come into close contact with the reactors but which are less radioactive than used fuel, such as reactor components, ion exchange resins, filters used to keep reactor water systems clean and other structural material and reactor equipment, including pressure tubes, are considered to be intermediate level radioactive waste. A third category, low level radioactive waste, consists of materials that are used in connection with station operations such as tools, mop heads, and protective clothing. These items are less radioactive than intermediate level radioactive waste and can generally be handled without radiation shielding.

OPG is responsible for the ongoing, long-term management of all levels of radioactive wastes, including those from the Bruce facilities. As such, references in this exhibit to the nuclear facilities, includes all nuclear facilities owned by OPG (i.e., Pickering, Darlington, and Bruce).

2.2 Management of High Level Radioactive Wastes

Used fuel bundles are temporarily stored in water-filled pools at the nuclear generating stations for a “cooling-off” period of at least ten years, during which time their radioactivity and heat is substantially reduced. After a sufficient “cooling off” period, used fuel can be transferred from the wet bays to above-ground concrete canisters that are stored at each nuclear station site. This is referred to as dry storage.

In June 2007, Natural Resources Canada announced that the Government of Canada accepted a recommendation by the Nuclear Waste Management Organization (“NWMO”) in response to the Nuclear Fuel Waste Act (“NFWA”) for the safe, long-term management of

used nuclear fuel. Additional details on the requirements of the NFWA and the work of the NWMO are discussed in section 3.4 of this exhibit.

2.3 Management of Low and Intermediate Level Radioactive Wastes

OPG's low level radioactive waste and intermediate level radioactive waste, collectively ("L&ILW"), is stored primarily at OPG's Western Waste Management Facility. This facility, situated at the Bruce nuclear site, is owned and operated by OPG and operates under licenses issued by the Canadian Nuclear Safety Commission ("CNSC") that are distinct from OPG's and Bruce Power's nuclear generator licenses that are issued by the CNSC.

An agreement has been reached with the Municipality of Kincardine and four surrounding municipalities for OPG to develop a deep geologic repository facility for the long-term placement of L&ILW adjacent to the Western Waste Management Facility. OPG has initiated a federal environmental assessment process in respect of this proposed facility. OPG's plan is for L&ILW to continue to be stored at the current facility while the deep geologic repository facility is planned and developed. The in-service date of the deep geologic repository facility is estimated to be 2018.

2.4 Decommissioning Overview

OPG will also manage radioactive wastes associated with the decommissioning of its nuclear generating stations, including Bruce A and Bruce B Generating Stations, after the end of their useful lives. When a nuclear facility is shut down permanently, the facility is initially placed in safe-store condition to protect the health and safety of workers, the public and the environment. Decommissioning involves activities undertaken to safely eliminate the radiological, chemical, and industrial hazards from the facility in order to release the site for other uses based on approved site release criteria.

OPG's current plans for decommissioning the nuclear generating stations are to remove fuel and heavy water from the reactors and place the station into a safe-store state. Safe-store activities have begun at Pickering A Units 2 and 3. The facility is then stored and monitored for 30 years to allow the residual radioactivity to decay. This will be followed by station

dismantling and site restoration over a ten-year period. Used fuel will continue to be stored on site until the long-term management strategy for used fuel is implemented as documented in section 3.2.

As noted earlier, OPG also owns and operates radioactive waste management facilities on the Bruce site and used fuel storage facilities at the Pickering, Darlington and Bruce sites. OPG will decommission these waste facilities when they are permanently shut down. Decommissioning of OPG's radioactive waste management facilities will entail the removal, re-packaging (if required) and transporting of the waste to a long-term facility, dismantling of the facilities and site restoration.

The existing station decommissioning estimates were prepared by a U.S.-based consultant, TLG Services ("TLG"), who prepares a large number of station decommissioning estimates for U.S. utilities and has developed a database on decommissioning costs based on actual experience. TLG has done estimates for 93 of 104 operating U.S. power reactors at 62 sites and for 18 of the 22 permanently shut down U.S. power reactors at 17 sites. They worked with Pickering station staff to update decommissioning estimates for Pickering A with the latest available data based on the work to place Pickering A Units 2 and 3 in safe-store following the decision to not return these units to service.

3.0 REGULATORY FRAMEWORK

3.1 Ontario Nuclear Funds Agreement ("ONFA")

On April 1, 1999, the obligation for nuclear waste management and decommissioning was transferred from the former Ontario Hydro to OPG. The responsibility for funding these liabilities is described in the ONFA Agreement between the Province of Ontario and OPG. A copy of ONFA is available on OPG's website at:
http://www.opg.com/pdf/Nuclear%20Reports%20and%20Publications/Ontario%20Nuclear%20Funds%20Agreement.pdf

ONFA provides for the establishment of a reference plan for nuclear waste management and for decommissioning of stations and other facilities. The reference plan, approved by the

Province, includes cost estimates at a reasonable level of detail as well as assumptions on economics, waste program timing and planned operating lives for stations.

The key provisions of the ONFA are:

- For OPG to establish two segregated funds, including the used fuel fund (to fund future costs of nuclear used fuel waste management) and the decommissioning fund (to fund the future cost of nuclear fixed asset removal and L&ILW management). The used fuel fund includes a trust fund as required by the NFWA and discussed in section 3.4 below.
- For the Ontario Electricity Financial Corporation ("OEFC") to be responsible for funding approximately $2,378M (present value as at April 1, 1999). This amount, representing the nuclear liabilities that Ontario Hydro had accumulated, was included in the decommissioning fund at the time that the agreement became effective.
- For the Province to limit OPG's financial exposure in relation to the cost of used fuel management as explained below.
- For the Province to support financial guarantees to the CNSC for OPG's nuclear waste management and decommissioning liabilities by providing a provincial guarantee as a supplement to accumulated ONFA funds in return for an annual guarantee fee equal to 0.5 per cent of the amount guaranteed, which is reflected in OPG's OM&A costs as explained below.

OPG's contributions to the used fuel fund and the decommissioning fund are determined based on the ONFA Reference Plan cost estimates. These estimates are prepared with the assistance of external consultants and are based on external practices and benchmarks. The ONFA Agreement specifies the timing, circumstances, contents, and approvals required for changes to the Reference Plan. The ONFA Reference Plan must be updated every five years or whenever there is a significant change as determined through the ONFA Agreement. The most recent update to the Reference Plan was submitted by OPG to the Province in November 2006. The Reference Plan was approved by the Province in December 2006 after a detailed review of the submission with the aid of external consultants. OPG's nuclear liabilities are discussed in greater detail in section 4.0 of this exhibit.

A new ONFA Reference Plan is expected to be completed in 2011 to be applicable to the 2012 - 2016 period. Any change resulting from the new ONFA Reference Plan for the 5-year period 2012 - 2016 will be reflected in the Nuclear Liability Deferral Account described in Ex H1-T1-S1 section 6.2.

As part of the ONFA Reference Plan update in 2006, updated nuclear funds contribution profiles were submitted to the Province. The contribution profile of the used fuel fund was updated in 2008 to reflect the settlement of the extraordinary payment required for Bruce fuel obligations. The funding profiles are provided in Attachment 1. Total contributions from both funds are used to determine OPG's unfunded nuclear liability and to support income tax calculations. In accordance with the ONFA, segregated fund contributions are made at the end of each quarter. Contributions continue until the end of individual station lives as assumed within the reference plan.

The Province has significant oversight on funds management and as such provides approval of contributions to segregated funds and fund investment decisions. Ontario Nuclear Funds Agreement funds management is the responsibility of OPG's Treasury Department which uses external fund managers to manage the funds.

Withdrawals by OPG for ONFA-eligible expenditures require the approval of the Province. Disbursements of funds are allowed to address cost for long term programs such as used fuel disposal, L&ILW disposal and decommissioning as discussed in Ex. C2-T1-S2, section 3.1 and reflected in Ex. C2-T1-S2 Tables 1 and 2.

3.2 Provincial Guarantees for Used Fuel

Under the ONFA, the limit to OPG's financial exposure with respect to the cost of long-term management of used fuel was capped at $5.94B (January 1, 1999 present value) for the first 2.23M fuel bundles. OPG is responsible for funding the incremental costs associated with the long-term management of fuel bundles in excess of 2.23M. It is currently estimated that physically, the 2.23M bundle threshold will be reached in 2012.

Under the ONFA, the Province guarantees the rate of return earned in the used fuel fund for the first 2.23M bundles at a specified rate of 3.25 per cent over the change in the Ontario consumer price index. The Province is obligated to make additional contributions to the used fuel fund if this fund earns a rate of return that is less than the rate of return guaranteed by the Province for the first 2.23M bundles. If the return on the assets in the used fuel fund exceeds the Province's guaranteed rate for the first 2.23M bundles, the Province is entitled to the excess.

The same rate of return is used as the target rate of return for the used fuel fund for bundles in excess of 2.23M, although the rate of return is not guaranteed by the Province. Every 5 years, after the update to the ONFA reference plan, the contribution profile is recalculated to reflect the change in contributions necessary in accordance with the terms of the ONFA agreement that in part limit downward adjustment to the contribution profile.

For the decommissioning fund, the rate of return target is presently 5.15 per cent per annum. As defined in ONFA, this consists of a 3.25 per cent real rate of return plus an inflation adjustment. For the 2006 Reference Plan, this inflation adjustment is 1.9 per cent per annum. This rate of return is not guaranteed by the Province; therefore, OPG is required to fund any shortfall between the achieved and target rate of return through additional contributions as part of a renewed reference plan assessment. To the extent the ratio of the decommissioning fund assets exceeds 120 per cent of the decommissioning liabilities, OPG has the option to elect to transfer amounts in excess of 120 per cent. While no such transfer has occurred to date, to the extent a transfer may occur at some point in the future, the transfer of the amounts in excess of 120 per cent would be attributed 50 per cent to the OEFC and 50 per cent to the used fuel fund. As discussed above, the used fuel fund contribution profile is then reassessed to reflect the impact of this transfer from the decommissioning fund.

3.3 Provincial Guarantee to the CNSC

The provincial guarantee provided to the CNSC is intended to supplement accumulated funds in the ONFA nuclear funds to meet the requirements of the CNSC financial guarantee. OPG pays a guarantee fee to the Province for providing this guarantee. This fee is included

in the revenue requirement as a centrally-held cost that is directly assigned to the nuclear revenue requirement (see Ex. F4-T4-S1 section 9). The value of the required provincial guarantee was re-evaluated as part of the updated 2008 - 2012 financial guarantee submitted to the CNSC. This submission proposed a provincial guarantee level of $760M for the years 2008 to 2010. Subsequently, OPG proposed an increase of the provincial guarantee to $1,545M to address the funding shortfall as a result of the adverse impacts of the financial markets volatility in 2008. This change was accepted by the CNSC at a hearing in December 2009. The revised provincial guarantee level is now in place to the end of year 2012 and is reflected in OPG's forecast OM&A costs described in Ex. F4-T4-S1.

3.4 Nuclear Fuel Waste Act

The handling and disposal of radioactive material in Canada is subject to federal legislation. The NFWA, administered by Natural Resources Canada, addresses the long-term management of used nuclear fuel.

In response to the NFWA, in 2002, OPG and other Canadian nuclear fuel waste owners incorporated the NWMO. In June 2007, Natural Resources Canada announced that the Government of Canada had accepted the recommendation proposed by the NWMO for long-term management of used fuel. The selected approach described as adaptive-phased management includes the isolation and containment of used nuclear fuel in a separate (from L&ILW) deep geologic repository with an option for initial temporary shallow underground storage. The earliest in-service date for the central facility to support this approach is estimated to be 2035.

Funding for the long-term management of used fuel is shared amongst the Canadian owners of used nuclear fuel, based on the respective quantities of used fuel they generate and the timing for delivery of this fuel to the central repository. Based on current plans, OPG's share of this fuel is approximately 91 per cent. The NFWA requires the nuclear fuel waste owners to establish and make payments into trust funds for the purpose of funding the implementation of the long term management plan. For OPG, the NFWA trust fund is part of the ONFA used fuel fund which is described in section 3.1 of this exhibit.

3.5 Other Legislation

The development and operation of radioactive waste management sites is also subject to federal environment assessment requirements under the *Canadian Environmental Assessment Act*, as well as provincial and federal environmental protection legislation. Of particular note, the transportation of radioactive materials is regulated by both the CNSC and Transport Canada.

4.0 NUCLEAR LIABILITIES

In accordance with Generally Accepted Accounting Principles ("GAAP"), the amount of nuclear liabilities recorded on OPG's balance sheet at any point in time represents the present value of the committed portion of the lifecycle cost estimate in the financial reference plan, where the discount rate is the GAAP determined average accretion rate. This amount is the asset retirement obligation ("ARO"). The committed portion includes the fixed cost components of each program as well as the lifetime variable costs for wastes already generated. As new waste is created, the nuclear liabilities increase by the additional variable cost of such waste. These increases in the liabilities are booked as fuel and depreciation expenses for used fuel and L&ILW, respectively (see Ex. F2-T1-S1 Table 1 and Ex. F4-T1-S2 Table 2). Exhibit C2-T1-S2 explains how costs associated with the nuclear liabilities are recovered through the revenue requirement.

The nuclear liabilities used to determine OPG's contributions to ONFA segregated funds represent the present value of the lifecycle cost estimate in the reference plan where the discount rate is 5.15 per cent.

LIST OF ATTACHMENTS

Attachment 1: Segregated Fund Contribution Schedule

ATTACHMENT 1 – Segregated Fund Contribution Schedule

Table 1 provides the actual contributions made to the Ontario Nuclear Funds by OPG and the Province up until 2007. Table 2 provides the required contributions by OPG to the Used Fuel Fund for the period 2008 to 2036 according to the ONFA contribution schedule approved by the Province on March 7, 2008.

The funding schedules in the attachments are based on the current liability estimates arising from the approved reference plan.

Table 1

Year	Actual ONFA Funds Contributions ($M)			
	Contribution From		Contribution To	
	OPG	Province	Used Fuel Fund[1]	Decommissioning Fund
2003	2,090	3,051	1,556	3,585[2]
2004	454		454	
2005	454		454	
2006	454		454	
2007	788		788	

Notes:

(1) All contributions to the Used Fuel Fund were made by OPG

(2) Of the $3,585M contribution to the Decommissioning Fund in 2003, $534 M was made by OPG, the balance of $3,051M was made by the Province.

Table 2

OPG Required Contributions to the Used Fuel Fund

Year	Amended Payment Schedule: due to Bruce Extraordinary Payment ($)
2008	453,883,577
2009	338,789,893
2010	264,053,055
2011	250,483,401
2012	240,035,242
2013	156,641,909
2014	94,061,565
2015	95,730,194
2016	83,594,408
2017	83,401,866
2018	82,867,764
2019	78,593,923
2020	49,293,049
2021	29,094,214
2022	17,048,442
2023	17,048,442
2024	17,048,442
2025	17,048,442
2026	17,048,442
2027	17,048,442
2028	17,048,442
2029	17,048,442
2030	17,048,442
2031	17,048,442
2032	17,048,442
2033	17,048,442
2034	17,048,442
2035	17,048,442
2036	17,048,442