

## Financial Guarantee for Decommissioning and Nuclear Waste Management Activities at OPG J. van den Hengel (Ontario Power Generation)

### **Abstract**

This paper provides an overview on the establishment and maintenance of a financial guarantee for decommissioning and nuclear waste management activities at Ontario Power Generation (OPG) in accordance with CNSC requirements. The process and timelines are documented leading to the establishment of the guarantee effective July 31, 2003. Reference plans, cost estimates, funding mechanisms and reporting mechanisms are summarized. The renewal process projected at the end of the 5-year initial financial guarantee period is also included.

### **I. Introduction**

This paper provides a history of activities at OPG for establishment and maintenance of a financial guarantee for decommissioning and nuclear waste management required by the CNSC as licence conditions for OPG facilities licenced by the CNSC. The financial guarantee is based upon decommissioning and nuclear waste management plans submitted to the CNSC.

The Nuclear Safety and Control Act (NSCA) and its regulations require that licensees make adequate provisions for the safe operation and decommissioning of existing or proposed operations. Safe operation and decommissioning include the development of acceptable decommissioning plans, the provision of credible estimates of the costs of implementing such decommissioning plans, the provision of corresponding measures to ensure that the costs of decommissioning will be met, and, ultimately, the implementation and completion of accepted decommissioning plans.

CNSC Regulatory Guides which are applicable to this subject matter include:

Regulatory Guide G-219: Decommissioning Planning for Licensed Activities

Regulatory Guide G-206: Financial Guarantees for the Decommissioning of Licensed Activities

### **II. Regulatory Requirements**

The above regulatory guides provide guidance on practices that the CNSC recommends for meeting regulatory requirements.

Regulatory Guide G-219 provides guidance regarding the preparation of decommissioning plans for activities licensed by the CNSC. The CNSC requires that planning for decommissioning take place throughout a licensed activity's life cycle, and that both a preliminary decommissioning plan and eventually a detailed decommissioning plan be prepared for approval by the CNSC. The structure and content of these decommissioning plans is included within the Guide along with discussion on alternative decommissioning strategies. Decommissioning plans form the basis for calculating the financial guarantee as outlined in Regulatory Guide G-206.

Regulatory Guide G-206 provides guidance regarding the establishment and maintenance of measures to fund the decommissioning of activities licensed by the CNSC. The NSCA and its regulations do not prescribe specific decommissioning methods or the types of funding to be established. Licensees propose those decommissioning plans and the financial guarantee that they consider appropriate to their individual situations. The financial guarantee must be sufficient to cover the cost of decommissioning and waste management programs resulting from licensed activities that have taken place prior to the licence period or will take place under the current licence. The Guide provides direction on preparation of decommissioning plans; preparation of cost estimates for decommissioning and waste management; and acceptable funding measures. As part of the provision of the financial guarantee, the CNSC must be assured that they have access to adequate funds if a licensee is not available to fulfill its obligations. Examples of acceptable financial guarantees include cash, irrevocable letters of credit, surety bonds, insurance and expressed commitments from a government (either federal or provincial). Parent company guarantees and pledges are not acceptable as a financial guarantee.

### **III. OPG Financial Guarantee Development**

OPG initially filed a Notice of Intent to the CNSC in October 2002 to apply for amendments to its power reactor and waste facility licences to include reference to the decommissioning plans and financial guarantee. This notice was for a consolidated guarantee for all Class 1A and 1B facilities owned by OPG and a suggestion that all licences would be amended concurrently. Also in October 2002, OPG submitted to the CNSC updated decommissioning and waste management cost estimates consistent with the Notice of Intent. Preliminary decommissioning plans and cost estimates for decommissioning and waste management programs had been submitted to the CNSC in the period from 2000 to 2002. The October 2002 update did not represent a change from previous submissions but was an update for latest economic indices and for waste quantities projected over the five-year period from 2003 to 2007 to recognize a proposed five-year financial guarantee period.

The application for the amendment of the OPG Class 1 power reactor and waste management facility licences to include the conditions for the decommissioning plans and consolidated financial guarantee was sent to the CNSC on November 20, 2002. This application stated that the guarantee was composed of two Ontario Nuclear Funds Agreement (ONFA) custodial funds, the trust fund established under the Nuclear Fuel Waste Act (NFWA) and a provincial guarantee.

OPG and the Province of Ontario entered into the Ontario Nuclear Funds Agreement (ONFA) effective 01 April 1999:

- (a) to ensure that sufficient funds were accumulated or otherwise were readily available to pay for the costs of managing nuclear waste and decommissioning each of the stations and other facilities.
- (b) to limit the financial exposure that OPG faced with respect to increases in the cost of managing used fuel resulting from changes in approved reference plans for nuclear waste management
- (c) to permit OPG to meet the requirements for a financial guarantee under the Nuclear Safety and Control Act (Canada)

The Nuclear Fuel Waste Act (Bill C-27) was passed by the House of Commons on February 21, 2002 to deal with the long-term management of nuclear fuel waste. As part of this Act, OPG was required to deposit \$500M into a trust fund in November 2002 and \$100M annually until a government decision was made on long-term management of used fuel.

Draft versions of a Provincial Guarantee Agreement and a CNSC Financial Security and ONFA Access Agreement were introduced along with the licence amendment application. The Provincial Guarantee Agreement is a guarantee by the Minister of Finance, on behalf of the Province of Ontario, for due payment of all amounts owing by OPG to the CNSC with respect to decommissioning obligations to an aggregate maximum amount not to exceed the lesser of:

- (a) \$1.51 billion minus the total of all amounts previously paid to the CNSC under the Provincial Guarantee; and
- (b) the Total CNSC Requirement, as determined by Section 1 of the ONFA Access Agreement, minus the fair market value of the Ontario NFWA Trust

The Provincial Guarantee remains in effect until December 31, 2007.

The CNSC Financial Security and ONFA Access Agreement states that the total amount of the financial guarantee would be as specified over the period from 2003 to 2007 less withdrawals from the Ontario NFWA Trust and payments to the CNSC from the ONFA Funds or under the Provincial Guarantee. The Agreement also states that the total CNSC Requirement shall at any time be satisfied by:

- (a) the then fair market value of Ontario NFWA Trust;
- (b) the then fair market value of the ONFA Funds; and
- (c) the maximum amount then payable to the CNSC under the Provincial Guarantee

A hearing was held on April 10, 2003 before the Commission to address the Decommissioning Plans and Financial Guarantee Amendment. A subsequent submission was made to the CNSC on July 25, 2003 containing final copies of:

- (a) Provincial Guarantee Agreement
- (b) CNSC Financial Security and ONFA Access Agreement
- (c) Documentary Information Summary – A submission to the CNSC in support of Licence Conditions for the purpose of Decommissioning Plans and Financial Guarantee for all Class 1 facilities owned by OPG dated July 2003.

The effective date for the financial guarantee was July 31, 2003 and the period of time covered by the Documentary Information Summary (DIS) was to year end 2007.

#### **IV. OPG Plan and Cost Estimates**

OPG plans and cost estimates are documented within the DIS.

The financial guarantee associated with waste management and decommissioning is for all Class 1 facilities owned by OPG. These facilities include the Pickering A and B and the Darlington reactors which are operated by OPG and the Bruce A and B reactors which are leased to and operated by Bruce Power L.P. Also included are the Pickering and Western Waste Management Facilities, and lifecycle management for used fuel and low and intermediate level waste. Under agreements with Bruce Power, OPG retains responsibility for decommissioning of Bruce A and B and lifecycle management of all used fuel and low and

intermediate level waste produced by Bruce A and B. OPG is also responsible for providing the CNSC financial guarantee required to cover the liability for nuclear waste management and decommissioning related to Bruce A and B.

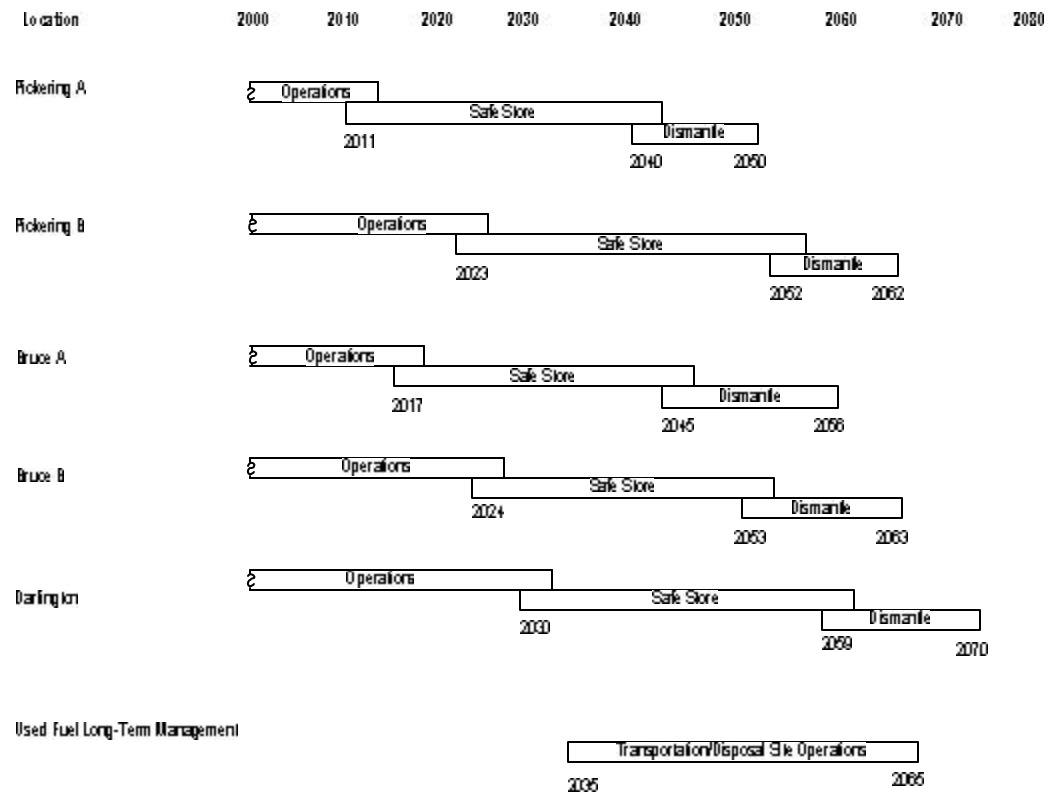
Cost estimates are first prepared in constant dollars, which assume that expenditures occur at the time of estimate preparation. These estimates are then escalated to the scheduled expenditure period using economic forecasts prepared by external experts contracted by OPG. These escalators average at approximately 2.5% per year. A discount rate is then applied to determine the present value of future costs. This discount rate has been established at a conservative real rate of 3.25% above CPI (Ontario). Historical information available through Statistics Canada and the Bank of Canada shows that the real rate of return of Canada long bonds has averaged approximately 4.8% over the past 25 years.

The year 2003 cost estimates for nuclear waste management and decommissioning were \$18.2B constant dollars (2003\$) and \$6.4B present value (01 Jan 2003\$). Cost estimates are based on quantities of used fuel and operational low and intermediate level waste projected to December 2003. This represented OPG's accumulated liability as of December 31, 2003.

- **Reactor Decommissioning Plans and Cost Estimates**

The reactor decommissioning plans are based on a planned operating life for all units of 40 years. Following initial shutdown, all reactors are placed in a safe store mode. Facility dismantling is planned to start 30 years after shutdown. Figure #1 shows reactor decommissioning timelines from the end of operations through the safe storage period and subsequently through the dismantling period. Also shown are the reference dates for financial planning purposes for the transportation and long-term management of used fuel.

**Figure #1**  
**Reactor Decommissioning/ Used Fuel Management Timelines**



**Notes:**

- 1) Start dates shown for Safe Store and Dismantle are for the first unit at individual stations
- 2) Used Fuel is stored at station sites until the Disposal Site Operations period which starts in 2035 and ends in 2065

- **Used Fuel Management Plans and Cost Estimates**

Used fuel is initially stored in station wet storage bays that have a capacity ranging between 15 and 20 years of station used fuel production. Fuel stored in dry storage containers requires initial cooling in the wet bays for a minimum of ten years. Dry storage containers are to be stored at the Pickering, Western and eventually Darlington Waste Management Facilities. Long-term management is assumed to be disposal in a deep geologic repository starting in 2035.

The *Nuclear Fuel Waste Act* (Canada) received Royal Assent in June 2002 and was proclaimed into force on November 15, 2002. This Act requires major owners of nuclear fuel waste, including OPG, to establish a waste management organization (WMO) to carry out the managerial, financial and operational activities to implement the long-term management of nuclear fuel waste and to establish trust funds and make annual payments to finance the long-term management of nuclear fuel waste. It also authorizes the Governor in Council to make a decision on the choice of approach for longer-term management of nuclear fuel waste for Canada. The WMO is studying alternative plans for the long-term management of used fuel, including deep geological disposal, centralized storage and extended reactor site storage. The study is to be completed and submitted to the Government of Canada by November 2005, and a decision from the Governor in Council is not expected before 2006.

The current reference plan used by OPG for financial planning purposes assumes geological disposal at the earliest practical in-service date of 2035.

- **Low and Intermediate Level Waste Management Plans and Cost Estimates**

Low and intermediate level waste (L&ILW) generated at OPG owned reactors at Bruce, Pickering and Darlington is stored at the Western Waste Management Facility (WWMF). For financial planning purposes, it is assumed that a low level waste permanent repository will be in-service in 2015 and that a permanent repository for long-lived intermediate level waste will be available in 2035, co-located with a used fuel repository.

## V. **Financial Guarantee**

As noted earlier, the accumulated liability for year 2003 in present value terms was estimated at \$6.4B

Over the 5-year period to 2007, the financial guarantee requirement changes due to changes in the present value of the cost estimates and as a result of additional waste volumes generated. The financial guarantee is based on the present value of future liabilities as of year-end in any given year. As the years progress, one less year of discounting occurs for every passing year. The July 31, 2003 and future financial guarantee, annually as of 01 January, resulting from the discounting change, the increase in waste volumes, and adjusted for on-going program expenditures, for the 5-year period to 2007 is:

<u>Year</u>	<u>Financial Guarantee M\$</u>
July 31, 2003	6,430
2004	6,650
2005	7,055
2006	7,485
2007	7,994

The financial guarantee is provided through the Ontario Nuclear Funds and the Ontario NFWA Trust supplemented by the Guarantee by the Province of Ontario. As of July 2003, the financial guarantee requirement was made up of \$4,920M contained within the Ontario Nuclear Funds and the NFWA Trust and a \$1,510M Provincial Guarantee. OPG continues to contribute to the Ontario Nuclear Funds/NFWA Trust on an annual basis.

The amount required under the provincial guarantee will decrease over time as the value of the Ontario Nuclear Funds and the Ontario NFWA Trust increases more than the change in the financial guarantee requirement.

Over the 5-year period, the sources which make up the financial guarantee will be approximately as shown below upon implementation and at the beginning of each following year. Actual amounts will be dependent on fund growth.

Source	Annual Values (\$M)				
	July 31, 2003	2004	2005	2006	2007
Fund Accumulation ONF/NFWA Trust	4,920	5,246	5,973	6,735	7,532
Provincial Guarantee	1,510	1,403	1,081	750	461
<b>Total Required Financial Guarantee</b>	<b>6,430</b>	<b>6,650</b>	<b>7,055</b>	<b>7,485</b>	<b>7,994</b>

An annual report is submitted to the CNSC on the status of the financial guarantee. This report updates the status of reference plans and cost estimates and the make up of the financial guarantee. To year end 2004, no appreciable changes in values had been entered from those included in the initial submission above.

## **VI. Renewal of Financial Guarantee**

The 5-year term for the current financial guarantee expires at year end 2007. In advance of this, it will be necessary to update reference plans and cost estimates consistent with latest corporate and industry plans. In addition, the Provincial Guarantee Agreement and the CNSC Financial Security and ONFA Access Agreement will require update. Potential changes in reference plans and cost estimates include a possible decision by the federal government on the option to be pursued resulting from the NWMO recommendations on nuclear fuel waste emanating from the NFWA; progress on low and intermediate level waste long-term management; decommissioning cost estimate updates; economic indice changes; changes in station life projections. These potential changes will be addressed on an on-going basis through the annual report to the CNSC and through the five-year financial guarantee renewal process.