

1           **NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING –**  
2           **REVENUE REQUIREMENT TREATMENT OF NUCLEAR LIABILITIES**

3  
4           **1.0     PURPOSE**

5           The purpose of this evidence is to explain how nuclear liabilities are treated in determining  
6           OPG's revenue requirement and present the forecast amounts for nuclear liabilities included  
7           in the revenue requirement.

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9           **2.0     OVERVIEW**

10          A summary of the revenue requirement impact of the nuclear liabilities for the prescribed  
11          nuclear facilities and the Bruce facilities is provided in Ex. C2-T1-S2 Table 5. The test period  
12          revenue requirement impact is \$291.3M for the prescribed facilities and \$110.3M for the  
13          Bruce facilities.

14  
15          For the 2011 - 2012 test years, OPG proposes to maintain the revenue requirement  
16          treatment for nuclear liabilities approved by the OEB in EB-2007-0905 for Pickering,  
17          Darlington and the Bruce facilities.<sup>1</sup> OPG is continuing to investigate the impacts of the OEB  
18          approved revenue requirement treatment on its ability to fully recover its nuclear liabilities.  
19          Based on the results of this investigation, OPG may propose modifications to the existing  
20          treatment or an alternative treatment in a future application.

21  
22          Section 3.0 sets out the approved methodology and how it applies to the revenue  
23          requirement respecting the nuclear liabilities. Section 4.0 addresses the changes in the asset  
24          retirement obligation, the unamortized asset retirement costs and the segregated fund  
25          balances for the period 2008 to 2012.

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<sup>1</sup> As explained fully in EX. C1-T1-S1, OPG as the owner of the Bruce facilities is responsible for the management of all levels of nuclear waste generated at the Bruce facilities and for decommissioning. However, because the revenue requirement treatment approved for the Bruce facilities in EB-2007-0905 differs from that approved for Pickering and Darlington, it is discussed in a separate section.

1 The revenue requirement impact of the nuclear liabilities decreases significantly in the 2010 -  
2 2012 period compared to the historical years as a result of the changes in the asset  
3 retirement obligation (“ARO”) and depreciation expense associated with the decision to move  
4 to the definition phase of the Darlington Refurbishment project. A presentation of the impact  
5 of the Darlington Refurbishment project on the nuclear liabilities is provided in Ex. C2-T1-S2  
6 Table 4 and discussed in section 4.1 below.

7

8 **3.0 APPLICATION OF THE METHODOLOGY FOR RECOVERY NUCLEAR**  
9 **LIABILITIES APPROVED IN EB-2007-0905**

10 **3.1 Background**

11

12 OPG’s nuclear liabilities represent the present value of the lifecycle cost of decommissioning  
13 and nuclear waste management programs. These lifecycle costs include the fixed cost  
14 components of each program as well as the lifetime variable costs for waste already  
15 generated. The present value of the committed costs is recorded as an ARO on the balance  
16 sheet of OPG.

17

18 To the extent that the ARO increases or decreases from changes such as an approved  
19 Ontario Nuclear Fund Agreement (“ONFA”) Reference Plan or a change in the accounting  
20 estimate, an equal amount must be recorded as an increase or decrease in the net book  
21 value of the assets to which the retirement obligation relates. This addition to net book value  
22 is known as an asset retirement cost (“ARC”). The only exception to this is related to the  
23 annual incremental waste to be generated which increases the ARO but is expensed directly  
24 in the year and does not impact the ARC.

25

26 Asset retirement costs represent a substantial portion of the net book value of the Pickering,  
27 Darlington and Bruce nuclear facilities. The ARC is amortized over the useful life of these  
28 assets like any other capital cost. This amortization gives rise to depreciation expense.

29

30 The ARO is allocated to the station level based on each of the five programs involved in  
31 retiring nuclear stations and managing nuclear waste. These five programs are:

1 decommissioning; used fuel storage; used fuel disposal; low and intermediate level waste  
2 (“L&ILW”) storage and L&ILW disposal. The methodology for allocating these five programs  
3 to the station level’s ARO is:

- 4 • Decommissioning and Used Fuel Storage programs: The cost estimates for these two  
5 programs are prepared at the station level with individual estimates prepared for each  
6 station; therefore no allocation is required.
- 7 • Used Fuel disposal, L&ILW storage and L&ILW disposal programs: As these three  
8 programs involve central facilities, the cost estimates are prepared at the program level.  
9 The costs are allocated to stations based on the most up-to-date lifecycle waste volume  
10 estimate.

11  
12 The ARC is recorded to the station level using the same methodologies described above.  
13 The allocation of the ARO and ARC as it impacts the prescribed facilities and Bruce facilities  
14 is reflected in Ex C2-T1-S2 Table 1 and Table 2.

15  
16 OPG’s contributions to the used fuel fund and the decommissioning fund are determined  
17 based on the current ONFA reference plan. The allocation of ONFA liabilities to the station  
18 level are based on lifecycle waste volumes for the three programs that involve central  
19 facilities discussed above. For the decommissioning and used fuel storage programs,  
20 estimates are prepared at the station level. ONFA contribution requirements are calculated at  
21 the station levels based on the difference between the station level liabilities and fund  
22 balances. Fund balances at the station level represent the cumulative balance of the  
23 segregated funds since the inception of ONFA. Cumulative station level fund balances are  
24 adjusted for contributions, disbursements and fund returns. The difference between OPG’s  
25 ARO and segregated fund balances is the unfunded nuclear liability (“UNL”).

26  
27 Continuity schedules showing the opening, closing and average<sup>2</sup> balances for ARO,  
28 segregated funds, UNL and ARC are provided in Ex C2-T1-S2 Table 1 (for the prescribed

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<sup>2</sup> Averages are only provided for the prescribed facilities as they are required to determine rate base values used in the approved methodology for the prescribed assets only.

1 facilities) and Table 2 (for the Bruce facilities<sup>3</sup>). Annual changes in these balances are  
2 discussed in section 4.0 below.

3  
4 For the 2011 - 2012 test years, OPG proposes to maintain the revenue requirement  
5 treatment for nuclear liabilities approved by the OEB in EB-2007-0905 for Pickering,  
6 Darlington and the Bruce facilities. The determination of the revenue requirement arising  
7 from the nuclear liabilities for the prescribed facilities and the Bruce facilities is discussed  
8 sections 3.2 and 3.3 below. The treatment determined by the OEB in EB-2007-0905 for  
9 nuclear liabilities is significantly different from that proposed by OPG in its application. OPG  
10 does not present information for 2007, the year prior to OEB regulation, in the Ex. C2-T2-S1  
11 tables as the revenue requirement impact under the methodology in place at that time is not  
12 comparable to that in the 2008 to 2012 period.

### 13 14 **3.2 Application of the Approved Methodology to the Prescribed Facilities**

15 Under the approved methodology, depreciation expense, variable incremental used fuel  
16 costs and variable incremental L&ILW costs related to the revenue requirement impact of  
17 OPG's nuclear liabilities are determined in accordance with GAAP.

18  
19 The approved regulatory approach discussed in section 3.2.4 requires that the return on a  
20 portion of the rate base be limited to the average accretion rate on OPG nuclear liabilities.

21  
22 Each of these components is discussed separately below.

#### 23 24 **3.2.1 Depreciation Expense**

25 Depreciation on the unamortized ARC is treated in the same manner as the depreciation  
26 associated with other capital assets.

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<sup>3</sup> Under the approved methodology UNL is used to determine return on rate base. The approved methodology for the Bruce facilities does not include a return on rate base; therefore UNL is not in the continuity schedule for the Bruce facilities.

1 Nuclear depreciation expense is presented in Ex. F4-T1-S2. A portion of this depreciation  
2 expense is attributable to unamortized ARC for each year. For the 2008 to 2012 period,  
3 these amounts are shown in Ex C2-T1-S2 Table 1, line 26. The amounts of depreciation  
4 expense attributable to unamortized ARC for each year for the 2008 to 2012 period are  
5 shown in Ex C2-T1-S2 Table 5, line 1.

6  
7 3.2.2 Variable Incremental Used Fuel Costs

8 Nuclear fuel expense is presented in Ex. F2-T5-S1 Table 1. A portion of the nuclear fuel  
9 expense is attributable to the present value of the variable costs related to incremental  
10 quantities of used fuel generated in each period. The difference between the lifecycle  
11 estimate and the amount of committed costs relating to used fuel included in the nuclear  
12 liabilities balance represents the variable costs of future fuel waste. Using a present value  
13 basis, these variable costs are divided by the forecast number of future fuel bundles to  
14 calculate the \$/bundle rate. Used fuel expenses are then calculated by applying the \$/bundle  
15 rate to forecast used fuel generated. Each bundle is charged an equal amount in present  
16 value terms. The amount of this expense for each year for the 2008 to 2012 period are  
17 shown in Ex C2-T1-S2 Table 5, line 2.

18  
19 3.2.3 Variable Incremental Low and Intermediate Level Waste Expense

20 Low and intermediate level waste is a separate component of the depreciation expense  
21 presented in Ex. F4-T1-S2. A portion of this depreciation expense is attributable to the  
22 present value of the variable costs related to incremental volumes of L&ILW produced in  
23 each period. The difference between the lifecycle estimate and the amount of committed  
24 costs included in the nuclear liabilities balance represents the variable costs of future waste.  
25 Using a present value basis, these variable costs are divided by the L&ILW volume estimates  
26 to calculate the \$/m<sup>3</sup> rate. Low and intermediate level waste expenses are then calculated by  
27 applying the \$/m<sup>3</sup> rate to the forecast waste volumes generated. The amount of this expense  
28 for the 2008 to 2012 period are shown in Ex C2-T1-S2 Table 5, line 3.

29  
30  
31

1    3.2.4   Return on Rate Base

2    The approved methodology for the prescribed assets recognized that OPG's rate base  
3    includes an amount associated with ARC. However, the approved methodology also requires  
4    that the return on a portion of the rate base be limited to the weighted average accretion rate  
5    of 5.6 per cent (as established in EB-2007-0905). This portion is equal to the lesser of: (i) the  
6    forecast amount of the average unfunded nuclear liabilities related to the Pickering and  
7    Darlington facilities, and (ii) the average unamortized ARC included in the fixed asset  
8    balances for Pickering and Darlington. As seen in Ex C2-T1-S2 Table 5, note 3 the ARC is  
9    less than unfunded nuclear liabilities ("UNL"). The remainder of OPG's rate base earns the  
10   weighted average cost of capital. For OPG's prescribed assets the average UNL, average  
11   unamortized ARC and the determination of the amounts to be receive the accretion rate or  
12   the Weighted Average Cost of Capital ("WACC") rate is provided in Ex C2-T1-S2 Table 1.

13  
14   The approved methodology requires a forecast of the value of the unfunded nuclear liabilities  
15   for the test period. As discussed in Ex C2-T1-S1 the target rate of return on these funds is  
16   currently 5.15 per cent, which OPG applies in determining its forecast return on its  
17   segregated funds.

18  
19   For the period April 1, 2008 to December 31, 2012 the amount of the average unamortized  
20   ARC is less than the amount of the average unfunded nuclear liability. Therefore, the  
21   unamortized ARC amount earns the weighted average accretion rate of 5.6 per cent for the  
22   period April 1, 2008 to December 31, 2009 and 5.58 per cent for the 2010 to 2012 fiscal  
23   years<sup>4</sup>. The resulting amount of earnings calculated by applying the weighted average  
24   accretion rate to the average amount of unamortized ARC is shown in Ex. C2-T1-S2 Table 5.  
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<sup>4</sup> As discussed in Section 4.1 the Darlington Refurbishment Project results in an increase in the ARO of \$293M at an accretion rate of 4.8 percent, reducing the accretion rate of 5.6 percent in EB-2007-0905 marginally to 5.58 percent during the 2010 to 2012 period.

1    **3.3    Application of the Approved Methodology to the Bruce Facilities**

2  
3    As a result of determining that the Bruce facilities were not prescribed facilities, the OEB  
4    approved a GAAP approach to determine the net revenue impact for the nuclear liabilities  
5    associated with the Bruce facilities. In summary, the difference is that for Bruce facilities the  
6    OEB substitutes the net income determinants of accretion expense and earnings on  
7    segregated funds in lieu of a return on the unamortized ARC (rate base) used in determining  
8    the revenue requirement for prescribed facilities.

9  
10   Each of the components of the net revenue impact of nuclear liabilities associated with the  
11   Bruce facilities is discussed separately below.

12  
13    3.3.1   Depreciation Expense

14    Depreciation on the unamortized ARC is treated in the same manner (GAAP basis) as the  
15    depreciation associated with other capital assets.

16  
17    Depreciation expense presented in Ex. G2-T2-S1 Table 5 is a cost component of the  
18    calculation of the Bruce Lease net revenues. A portion of this depreciation expense is  
19    attributable to the unamortized ARC for each year for the 2008 to 2012 period and is shown  
20    in Ex C2-T1-S2 Table 2, line 24. The amounts of depreciation expense attributable to  
21    unamortized ARC for each year for the 2008 to 2012 period are shown in Ex C2-T1-S2 Table  
22    5, line 7.

23  
24    3.3.2   Variable Incremental Used Fuel Costs

25    Nuclear fuel for Bruce facilities is determined in the same manner (GAAP basis) as described  
26    in section 3.2 to determine the nuclear fuel expense for prescribed facilities.

27  
28    Nuclear fuel expense presented in Ex. G2-T2-S1 Table 5 is a cost component of the  
29    calculation of the Bruce Lease net revenues. Used fuel expenses are calculated by applying  
30    the \$/bundle rate discussed above to forecast used fuel generated. Each bundle is charged

1 an equal amount in present value terms. The amounts of this expense for the 2008 to 2012  
2 period are shown in Ex C2-T1-S2 Table 5, at line 8.

3  
4 3.3.3 Variable Incremental Low and Intermediate Level Waste Expense

5 Low and intermediate level waste for Bruce facilities is determined in the same manner  
6 (GAAP basis) as described in section 3.2 to determine the L&ILW expense for prescribed  
7 facilities.

8  
9 Low and intermediate level waste presented in Ex. G2-T2-S1 Table 5 is a cost component of  
10 the calculation of the Bruce Lease net revenues. The L&ILW expenses are calculated by  
11 applying the  $\$/m^3$  rate discussed above to forecast L&ILW volumes generated. The amount  
12 of this expense for the 2008 to 2012 period are shown in Ex C2-T1-S2 Table 5, line 9.

13  
14 3.3.4 Accretion Expense

15 For the April 1, 2008 to 2012 period, accretion expense for Bruce is calculated by applying  
16 the weighted average accretion rate to the amount of nuclear liability associated with Bruce  
17 in each year as shown in Ex. C2-T1-S2 Table 2. The allocation between Bruce and the  
18 prescribed facilities is based on the amounts set out in the most recently approved ONFA  
19 Reference Plan as discussed in section 3.1 above. The accretion expense for the Bruce  
20 facilities is shown in Ex C2-T1-S2 Table 5, line 10.

21  
22 3.3.5 Earnings on the Segregated Funds

23 For the April 1, 2008 to 2012 period, segregated funds earnings are calculated by taking the  
24 difference between the opening and closing balances less contributions plus disbursements  
25 from each fund each year as shown in Ex. C2-T1-S2 Table 2. The attribution of earnings to  
26 Bruce is based on the amounts set out in the most recently approved ONFA Reference Plan.  
27 This methodology is applied to both actual earnings and disbursements in 2008 and 2009 as  
28 well as forecast amounts for 2010 – 2012. The segregated fund earnings for the Bruce  
29 facilities are shown in Ex C2-T1-S2 Table 5, line 11.



1    3.3.6   Return on Rate Base

2    For the period January 1, 2008 to March 31, 2008, the unamortized ARC for the Bruce  
3    facilities received the same treatment and the same WACC (5.55 per cent) as the prescribed  
4    facilities as reflected in the payment amounts established by the Province. The revenue  
5    requirement impact is shown in Ex C2-T1-S2 Table 5.

6

7    **4.0    CHANGES IN ARO, UNAMORTIZED ARC and SEGREGATED FUND BALANCES**

8    The segregated fund balances, ARO and ARC for prescribed facilities and the Bruce facilities  
9    are presented in Ex. C2-T1-S2 Tables 1 and 2, respectively for the period 2008 to 2012.

10

11   The segregated fund balances in the 2008 to 2009 period reflect the turmoil in the financial  
12   markets over 2008 and 2009. Contributions do not change as a result of the Darlington  
13   Refurbishment project; rather they continue to be made in accordance with the 2006 ONFA  
14   Reference Plan per Ex C2-T1-S1, Attachment 1 until the ONFA reference plan is updated.  
15   For 2010 to 2012, OPG has used the target rate of growth of 5.15 per cent on its segregated  
16   funds as the rate of earnings the funds are forecast to achieve during that period.

17

18   The growth in the ARO over the 2008 to 2012 period is primarily the result of accretion and  
19   the impact of the decision on Darlington Refurbishment as of January 1, 2010. The impact of  
20   the Darlington Refurbishment project is considered in section 4.1 below.

21

22   Depreciation is the primary cause of the declining trend in the ARC balance from 2008 to  
23   2012. The major exception reflects the forecast accounting impact of the Darlington  
24   Refurbishment project on January 1, 2010 as discussed in section 4.1.

25

26   **4.1    Impact of the Darlington Refurbishment Project**

27   A summary of the impacts of the Darlington Refurbishment project on revenue requirement  
28   impact of the nuclear liabilities is in Ex. C2-T1-S2 Table 4.

29

30   GAAP accounting requires OPG to change the ARO to reflect the recently announced  
31   decision to move to the definition phase of the Darlington Refurbishment project.

1 Refurbishment of the Darlington facility will allow for it to operate with replaced components  
2 until the year 2051. The main impacts of the refurbishment decision are: (a) a decrease in  
3 the ARO for Darlington decommissioning as the present value of the work reflects the  
4 deferral of the decommissioning work for approximately 30 years; and (b) an increase in the  
5 cost of used fuel storage and disposal activities to account for the incremental volumes of  
6 used fuel to be generated. The net impact is a \$293M increase in both ARC and ARO.

7

8 An allocation of this incremental ARO/ARC has been made to the stations on the same basis  
9 as the balance of the ARO/ARC. The allocation of ARO to stations and the related allocation  
10 of ARC amounts are presented in Ex C2-T1-S2 Table 3.

11

12 The impact of the change in ARO/ARC results in a reduction in revenue requirement impacts  
13 for both the prescribed facilities and the Bruce facilities (the latter through a reduction in the  
14 net revenues used to offset the revenue requirement of the prescribed facilities) as presented  
15 in Ex C2-T1-S2 Table 4.

16

17 The average accretion rate for the ARO liability with this change is 5.58 per cent for the 2010  
18 to 2012 period<sup>5</sup>.

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<sup>5</sup> The Darlington Refurbishment project results in an increase in the ARO of \$293M at an accretion rate of 4.8 percent, reducing the accretion rate of 5.6 percent in EB-2007-0905 marginally to 5.58 percent during the 2010 to 2012 period.