

COMPARISON OF NUCLEAR OUTAGE OM&A

1.0 PURPOSE

This evidence presents period-over-period comparisons of outage OM&A by station for 2013-2021 in support of the approval of OPG's forecast outage OM&A for the test period.

2.0 OVERVIEW

Outage OM&A costs are impacted by the frequency, duration and scope of planned outages, as well as specific outage initiatives requiring support work.

Period-over-period variances are presented in Ex. F2-4-2 Table 1 and are explained below, along with the extent to which the above factors influence outage OM&A in the 2017-2021 test period.

3.0 PERIOD-OVER-PERIOD CHANGES – TEST YEARS

2017 Plan versus 2016 Budget

2017 Plan outage OM&A expenditures increase (+\$73.3M) versus 2016 Budget. The variances are largely due to Darlington (+\$41.8M), Nuclear Support Divisions (i.e., Inspection and Maintenance Services, and Fleet Operations and Maintenance) (+\$14.2M), and Pickering Extended Operations (+\$12.2M). Darlington planned outage costs in 2017 are higher primarily due to the routine station inspection and maintenance work required on Unit 2 during the Unit 2 refurbishment outage (+\$33.2M) and increased scope in relation to generator and transformer work and Single Fuel Channel Replacement (+\$8.6M). Increases in Nuclear Support Divisions are largely due to requirements to support Pickering Extended Operations, as described in Ex. F2-2-3.

2018 Plan versus 2017 Plan

2018 Plan outage OM&A expenditures decrease (-\$0.8M) versus 2017 Plan. The decrease is due to Darlington (-\$10.4M) and largely offset by Nuclear Support Divisions (i.e., Inspection and Maintenance Services) (+\$5.9M), and Pickering (+\$4.3M). Darlington planned outage

1 costs in 2018 are lower due to reduced scope during the Unit 2 routine inspection and
2 maintenance activities (-\$11.5M). Inspection and Maintenance Services planned outage
3 costs are higher due to Pickering Extended Operations, partially offset by no Single Fuel
4 Channel Replacement at Darlington in 2018. Pickering planned outage costs in 2018 are
5 higher due to additional scope changes.

6
7 **2019 Plan versus 2018 Plan**

8 2019 Plan outage OM&A expenditures increase (+\$21.5M) versus the 2018 Plan. The
9 variances are largely due to Nuclear Support Divisions (i.e., Inspection and Maintenance
10 Services) (+\$24.6) and work activities at Pickering related to Pickering Extended Operations
11 (+\$9.2M), partially offset by Darlington (-\$7.3M) and Pickering's remaining outage work (-
12 \$5.0M). Inspection and Maintenance Services costs in 2019 are significantly higher due to
13 Pickering Extended Operations. Darlington planned outage costs in 2019 are lower due to
14 the completion of routine inspection and maintenance work required on Unit 2 and due to a
15 Low Pressure Service Water outage not required in 2019, partly offset by the start up of
16 routine inspection and maintenance work required on Unit 3 (the next refurbishment unit after
17 Unit 2) (-\$5.0M). Pickering costs for remaining outage work is lower due largely to reduced
18 turbine scope in 2019.

19
20 **2020 Plan versus 2019 Plan**

21 2020 Plan outage OM&A expenditures decrease (-\$20.9M) versus the 2019 Plan. The
22 variances are due to lower expenditures at Pickering (-\$30.1M) and Nuclear Support
23 Divisions (i.e., Inspection and Maintenance Services) (-\$24.7M), partially offset by higher
24 Darlington expenditures (+\$32.0M). Inspection and Maintenance Services is lower largely
25 due to less Pickering outage support (-\$20.5M). The higher Darlington expenditures are
26 primarily due to the ramp up of station maintenance work required on Unit 3 during the Unit 3
27 refurbishment outage (+\$11.3M), Feeder and Single Fuel Channel Replacement, additional
28 Emergency Cooling Injection overhaul work on Unit 1, and a post refurbishment mini-outage
29 on Unit 2 (+\$20.7M). Pickering costs are lower primarily due to two outages in 2020 versus
30 three outages in 2019.

1 **2021 Plan versus 2020 Plan**

2 2021 Plan outage OM&A expenditures decrease (-\$85.9M) versus the 2020 Plan. The
3 variances are largely due to Darlington (-\$92.3M), Nuclear Support Divisions (i.e., Inspection
4 and Maintenance Services, and Fleet Operations and Maintenance) (-\$39.0M) and Pickering
5 Extended Operations (-\$22.8M), partially offset by higher Pickering outage costs (+\$68.1M).
6 Darlington planned outage costs in 2021 are lower as there are no scheduled planned
7 outages except a short post-refurbishment outage for Unit 2 and the wind down of Unit 3
8 station maintenance work, slightly offset by higher start up of station maintenance work
9 required on Unit 1 during the Unit 1 refurbishment outage. Inspection and Maintenance
10 Services, and Fleet Operations and Maintenance are lower due to the completion of
11 Pickering Extended Operations work. Pickering outage costs are higher primarily due to the
12 station Vacuum Building Outage and a third outage in 2021.

13
14 **4.0 PERIOD-OVER-PERIOD CHANGES – BRIDGE YEAR**

15
16 **2016 Budget versus 2015 Actual**

17 2016 Budget outage OM&A expenditures increase (+\$7.5M) versus 2015 Actual. The
18 variances are for Nuclear Support Divisions (i.e., Inspection and Maintenance Services)
19 (+\$23.2M) and Pickering (+\$18.8M), partially offset by a variance for Darlington (-\$34.5M).
20 Inspection and Maintenance Services costs (+\$19.1M) are higher due to Single Fuel Channel
21 Replacement at Pickering and increased support for Darlington outage work. Pickering costs
22 are higher due to support for an increase in contractor resources working on outages.
23 Darlington outage costs are lower as the Vacuum Building Outage was completed in 2015,
24 partially offset by the routine station inspection and maintenance work required on Unit 2
25 during refurbishment.

26
27 **5.0 PERIOD-OVER-PERIOD CHANGES – HISTORICAL YEARS**

28
29 **2015 Actual versus 2015 OEB Approved¹**

¹ As OEB Approved adjustments shown on Ex. F2-1-1 Table 2 were made at the aggregate Nuclear OM&A level, the figures presented here are 2015 Plan (from EB-2013-0321) rather than 2015 OEB Approved.

1 2015 Actual outage OM&A decreased (-\$17.0M) versus 2015 OEB Approved. The variances
2 were primarily in Nuclear Support Divisions (i.e., Inspection and Maintenance Services) (-
3 \$17.7M). Inspection and Maintenance Services costs were lower as Single Fuel Channel
4 Replacement work was re-scheduled to 2016. There was a partial offset due to higher
5 Pickering costs (+\$3.1M) as a result of the Unit 1 planned outage shifted from 2014 into 2015
6 partially offset by the Unit 4 outage deferred to 2016.

7
8 **2015 Actual versus 2014 Actual**

9 Outage OM&A expenditures for 2015 Actual were higher (+\$92.4M) than 2014 Actual. The
10 main driver of this increase was the Vacuum Building Outage at Darlington (+\$67.4M) and
11 Vacuum Building Outage support costs incurred by Nuclear Support Divisions (i.e.,
12 Inspection and Maintenance Services, and Fleet Operations and Maintenance) (+\$14.4M).
13 Pickering costs were also higher (+\$14.3M) partially offset by lower Pickering Continued
14 Operations costs (-\$3.7M). Pickering costs were higher as a result of longer outage duration
15 including additional rotor and spindle work, partially offset by the completion of all outage
16 OM&A expenditures on Pickering Continued Operations in 2014.

17
18 **2014 Actual versus 2014 OEB Approved²**

19 2014 Actual outage OM&A expenditures were lower (-\$41.4M) than the 2014 OEB Approved
20 amounts. The main drivers of this decrease were as follows:

- 21
- 22 • Pickering costs were lower (-\$17.1M) primarily as a result the Unit 8 outage being
23 under spent due to scope reduction, lower overtime costs, and higher than planned
24 efficiency gains by contract staff. In addition, outage costs were lower as the Unit 1
25 outage scheduled for 2014 was shifted into 2015 and replaced by a Unit 4 outage
26 deferred from 2013. Darlington costs were lower (-\$9.5M) primarily as a result of
27 lower than expected discovery work and use of lower cost temporary staff versus
28 purchased services.
 - 29 • Pickering Continued Operations costs were lower (-\$2.5M) primarily as a result of
lower material spending.

² As OEB Approved adjustments shown on Ex. F2-1-1 Table 2 were made at the aggregate Nuclear OM&A level, the figures presented here are 2014 Plan (from EB-2013-0321) rather than 2014 OEB Approved.

- 1 • Nuclear Support Divisions costs were lower (-\$12.2M) primarily as a result of lower
2 Inspection and Maintenance Services (-\$8.7M) due to the deferral of the Unit 1 Fall
3 2014 outage to first quarter 2015, and lower Projects and Modifications costs (-
4 \$3.4M) due to lower outage requirements, where internal resources were used rather
5 than the planned external support.

6
7 **2014 Actual versus 2013 Actual**

8 2014 Actual outage OM&A expenditures were lower (-\$56.2M) than 2013 Actual
9 expenditures. The main drivers of this decrease were as follows:

- 10 • Darlington costs were lower (-\$39.3M) primarily as a result of one planned outage in
11 2014 versus two in 2013.
- 12 • Pickering Continued Operations costs were lower (-\$6.5M) primarily as a result of
13 reduced work programs.
- 14 • Support Divisions (i.e., Inspection and Maintenance Services) costs were lower (-
15 \$15.8M) primarily as a result of one planned outage in 2014 versus two in 2013.
16 Demand for Inspection and Maintenance Services was lower in 2014 than 2013 (-
17 \$14.2M). In 2013 Inspection and Maintenance Services performed a Single Fuel
18 Channel Inspection at Darlington where none was required in 2014.
- 19 • Decreases were partially offset by Pickering (+\$5.4M) as a result of the deferral of the
20 Pickering Unit 4 outage from fall 2013 to winter 2014.

21
22 **2013 Actual versus 2013 Budget**

23 2013 Actual outage OM&A expenditures were lower (-\$33.5M) than the 2013 Budget. The
24 main drivers of this decrease were as follows:

- 25 • Pickering costs were lower (-\$12.1M) primarily as a result of the deferral of the
26 Pickering Unit 4 outage from fall 2013 to winter 2014.
- 27 • Darlington costs were lower (-\$1.2M) primarily as a result of lower pre-requisite work
28 associated with future year planned outages.
- 29 • Decreases were partially offset by Pickering Continued Operations (+\$1.9M) as a
30 result of additional work orders completed during the outage windows, coupled with
31 earlier staging of materials for the 2014 outage.

- 1 • Nuclear Support Divisions costs were lower (-\$22.1M) primarily as a result of lower
- 2 Inspection and Maintenance Services costs (-\$19.7M) due to the Pickering 1341
- 3 outage being executed in 2014 rather than 2013, and lower staff costs (-\$2.0M) due
- 4 to lower outage requirements where internal resources were used rather than the
- 5 planned external support.

Table 1
 Comparison of Outage OM&A - Nuclear (\$M)

Line No.	Business Unit	2013 Budget	(c)-(a) Change	2013 Actual	(g)-(c) Change	2014 OEB Approved ¹	(g)-(e) Change	2014 Actual	(k)-(g) Change	2015 OEB Approved ¹	(k)-(i) Change	2015 Actual
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Nuclear Stations:												
1	Darlington NGS	96.9	(1.2)	95.7	(39.3)	65.9	(9.5)	56.4	67.4	126.2	(2.3)	123.8
2	Pickering NGS	89.7	(12.1)	77.6	5.4	100.1	(17.1)	83.0	14.3	94.3	3.1	97.4
3	Pickering Continued Operations	8.3	1.9	10.2	(6.5)	6.2	(2.5)	3.7	(3.7)	0.0	0.0	0.0
4	Pickering Extended Operations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Total Stations	194.9	(11.4)	183.5	(40.4)	172.3	(29.1)	143.1	78.0	220.5	0.7	221.2
6	Nuclear Support Divisions²	116.1	(22.1)	94.0	(15.8)	90.4	(12.2)	78.2	14.4	110.3	(17.7)	92.5
7	Total Outage OM&A	311.0	(33.5)	277.5	(56.2)	262.7	(41.4)	221.3	92.4	330.7	(17.0)	313.7

Line No.	Business Unit	2015 Actual	(c)-(a) Change	2016 Budget	(e)-(c) Change	2017 Plan	(g)-(e) Change	2018 Plan	(i)-(g) Change	2019 Plan	(k)-(i) Change	2020 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Nuclear Stations:												
8	Darlington NGS	123.8	(34.5)	89.3	41.8	131.1	(10.4)	120.7	(7.3)	113.4	32.0	145.4
9	Pickering NGS	97.4	18.8	116.2	5.1	121.3	4.3	125.6	(5.0)	120.6	(30.1)	90.5
10	Pickering Continued Operations	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Pickering Extended Operations	0.0	0.0	0.0	12.2	12.2	(0.6)	11.6	9.2	20.8	2.0	22.8
12	Total Stations	221.2	(15.7)	205.5	59.2	264.6	(6.7)	257.9	(3.1)	254.8	3.9	258.7
13	Nuclear Support Divisions³	92.5	23.2	115.7	14.2	129.9	5.9	135.8	24.6	160.5	(24.7)	135.7
14	Total Outage OM&A	313.7	7.5	321.2	73.3	394.6	(0.8)	393.8	21.5	415.3	(20.9)	394.4

Line No.	Business Unit	2020 Plan	(c)-(a) Change	2021 Plan
		(a)	(b)	(c)
Nuclear Stations:				
15	Darlington NGS	145.4	(92.3)	53.1
16	Pickering NGS	90.5	68.1	158.7
17	Pickering Extended Operations	22.8	(22.8)	0.0
18	Total Stations	258.7	(46.9)	211.8
19	Nuclear Support Divisions³	135.7	(39.0)	96.7
20	Total Outage OM&A	394.4	(85.9)	308.5

Notes:

- As OEB Approved adjustments shown on Ex. F2-1-1 Table 2 were made at the aggregate Nuclear OM&A level, the figures presented here are 2014 Plan and 2015 Plan (from EB-2013-0321) rather than 2014 OEB Approved and 2015 OEB Approved, respectively.
- Nuclear Support Divisions includes Outage OM&A expenditures for Pickering Continued Operations of \$10.5M for 2013 Actual and \$10.7M for 2014 Actual.
- Nuclear Support Divisions includes Outage OM&A expenditures for Pickering Extended Operations of \$9.9M in 2017, \$25.7M in 2018, \$67.9M in 2019 and \$62.8M in 2020.