

1 Q. Update the response to PUB-NLH-148 to include data for 2014 year to date (July
2 31). Include in the response an explanation for each forced outage in 2014.
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5 A. Please refer to PUB-NLH-287 Attachment 1 which provides an update of PUB-NLH-
6 148 with 2014 data year to date data (August 31, 2014). It is important to note that
7 comparison of the 2014 year to date data to other years is not meaningful due to
8 the impact of the operating pattern and annual maintenance outage schedules on a
9 number of the performance measures. In particular, any measure which utilizes
10 operating hours and planned outage hours in its calculation will be skewed because
11 there is significant operating time on the generating units in the fall and some
12 planned outage work has not yet been completed.
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14 PUB-NLH-287 Attachment 2 provides the details for all forced outages to the
15 generation contained in this update, up to August 31, 2014. This list includes all
16 outages that resulted in a forced outage to the generating unit.
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18 Please note that the Bay d'Espoir Generating Station figures are impacted by the
19 removal of Unit 6 of the Bay d'Espoir Generating Station from service for an
20 extended period (as shown in PUB-NLH-287 Attachment 2) due to failure and
21 replacement of a rectifying transformer. Hydro has reported separately to the
22 Board on this matter.

Holyrood Thermal Generating Station	2008	2009	2010	2011	2012	2013	2014 YTD
Unit 1							
Gross Unit Rating (MW)	170	170	170	170	170	170	170
Gross Capacity Factor (%)	19.6%	24.2%	22.9%	26.4%	26.0%	11.7%	34.3%
Gross Generation (MWh)	292,915	360,410	340,820	392,490	388,490	173,740	510,470
Gross Unit Efficiency (%)	34.4%	34.8%	34.3%	34.1%	34.4%	34.0%	34.4%
Gross Unit Heat Rate (BTUs/kWh)	9,919	9,805	9,948	10,006	9,919	10,026	9,910
Unit Operating Time (hours)	3,486	4,520	4,420	4,952	4,555	1,985	4,045
Unit Planned Outage Time (hours)	2,622	1,925	1,760	1,808	2,350	1,366	639
Unit Maintenance Outage Time (hours)	77	60	103	10	7	60	177
Unit Forced Outage Time (hours)	1,476	1,670	128	218	221	5,186	231
Number of Planned Outages	3	1	2	4	3	2	2
Number of Maintenance Outages	2	1	2	3	3	1	3
Number of Forced Outages	8	10	3	4	6	5	4
Failure Rate (Forced Outages/Oper. Hours x 8760)	17.64	15.30	-	3.54	7.71	13.24	5.85
Incapability factor (% of time)	49.38	44.23	23.47	23.52	29.85	78.35	22.80
DAFOR (% of time)	32.35	32.52	4.22	4.21	4.73	75.70	12.34
Utilization Forced Outage Probability (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Unit 2							
Gross Unit Rating (MW)	170	170	170	170	170	170	170
Capacity factor (%)	36.7%	26.5%	20.6%	24.2%	22.9%	33.2%	30.6%
Gross Generation (MWh)	548,220	394,200	306,590	360,310	342,210	494,710	455,910
Gross Unit Efficiency (%)	35.0%	33.5%	33.6%	33.8%	33.4%	33.2%	33.9%
Gross Unit Heat Rate (BTUs/kWh)	9,749	10,185	10,155	10,095	10,216	10,280	10,080
Unit Operating Time (hours)	4,994	4,922	3,954	4,470	3,906	5,280	3,187
Unit Planned Outage Time (hours)	1,581	2,258	1,079	1,805	1,369	1,140	2,416
Unit Maintenance Outage Time (hours)	238	-	295	23	48	945	11
Unit Forced Outage Time (hours)	175	34	137	119	15	237	6
Number of Planned Outages	2	2	3	4	3	4	4
Number of Maintenance Outages	5	-	5	4	2	6	4
Number of Forced Outages	3	3	5	1	4	8	4
Failure Rate (Forced Outages/Oper. Hours x 8760)	1.76	3.56	11.08	-	9.00	8.34	1.86
Incapability factor (% of time)	23.10	29.04	18.15	24.85	17.03	27.84	41.46
DAFOR (% of time)	3.54	5.50	5.28	3.64	0.77	6.44	0.84
Utilization Forced Outage Probability (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: 1. The outage information excludes impacts from outside sources that result in the generating unit being restricted or a unit outage. This includes outages caused by transmission equipment or any condition Outside of Plant Management Control.

2. It is important to note that comparison of the 2014 year to date data to other years is not meaningful due to the impact of the operating pattern and annual maintenance outage schedules on a number of the performance measures. In particular, any measure which utilizes operating hours and planned outage hours in its calculation will be skewed because there is significant operating time on the generating units in the fall and some planned outage work has not yet been completed.

Holyrood Thermal Generating Station (cont'd)	2008	2009	2010	2011	2012	2013	2014 YTD
Unit 3							
Gross Unit Rating (MW)	150	150	150	150	150	150	150
Capacity factor (%)	23.6%	19.1%	16.3%	14.9%	14.1%	27.1%	25.4%
Gross Generation (MWh)	310,380	251,130	214,450	196,100	186,180	355,930	333,380
Gross Unit Efficiency (%)	35.3%	34.3%	33.6%	33.6%	32.7%	33.5%	33.4%
Gross Unit Heat Rate (BTUs/kWh)	9,666	9,948	10,155	10,155	10,434	10,179	10,228
Unit Operating Time (hours)	3,082	2,946	2,811	2,443	2,221	3,664	3,484
Synchronous Condensor Time (hours)(1)	4,403	4,117	3,181	4,889	4,361	3	-
Unit Planned Outage Time (hours)	1,899	3,524	3,264	3,847	1,655	4,320	2,015
Unit Maintenance Outage Time (hours)	27	292	2	13	54	36	-
Unit Forced Outage Time (hours)	213	236	20	584	299	13	91
Number of Planned Outages	6	22	5	14	6	6	5
Number of Maintenance Outages	1	1	2	3	3	2	-
Number of Forced Outages	3	3	4	3	4	3	4
Failure Rate (Forced Outages/Oper. Hours x 8760)	5.70	5.95	9.35	7.17	7.91	7.17	3.40
Incapability factor (% of time)	25.61	46.35	39.31	51.60	24.87	55.68	42.66
DAFOR (% of time)	8.80	7.69	6.20	21.80	16.87	12.77	12.47
Utilization Forced Outage Probability (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall Plant							
Gross Plant Rating (MW)	490	490	490	490	490	490	490
Gross Capacity Factor (%)	26.8%	23.4%	20.1%	22.1%	21.3%	23.9%	30.3%
Gross Generation (MWh)	1,151,515	1,005,740	861,860	948,900	916,880	1,024,380	1,299,760
Station Services (MWh)	71,287	65,875	58,790	63,586	61,054	66,938	82,587
Net Generation (MWh)	1,080,228	939,865	803,070	885,314	855,826	957,442	1,217,173
No. 6 fuel usage (bbls)	1,728,681	1,534,707	1,363,179	1,469,169	1,428,337	1,610,966	2,068,884
Plant Net Fuel Conversion Factor (kWh/bbl)	625	612	589	603	599	594	588
Failure Rate (Forced Outages/Oper. Hours x 8760)	7.60	8.11	6.27	2.95	8.22	8.84	3.87
Incapability factor (% of time)	32.70	39.88	26.98	33.32	26.92	53.96	35.64
Weighted DAFOR (% of time)	15.65	17.38	5.07	7.88	5.98	36.58	9.00
Utilization Forced Outage Probability (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: 1. The outage information excludes impacts from outside sources that result in the generating unit being restricted or a unit outage. This includes outages caused by transmission equipment or any condition Outside of Plant Management Control.

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3. In 2013 Unit 3 sync condense time was for testing only. The unit was not available for synchronous condensor operation during the late spring and summer due to planned capital work. Avalon voltage support was provided by the capacitor banks at Come by Chance.

Hardwoods Gas Turbine Plant

	2008	2009	2010	2011	2012	2013	2014 YTD
Overall Plant (Hardwoods Gas Turbine)							
Gross Unit Rating (MW) ⁽¹⁾	54	54	50	50	50	50	50
Gross Capacity Factor (%)	0.83%	0.50%	0.71%	0.14%	0.35%	0.39%	1.19%
Gross Generation (MWh)	3,938	2,369	3,089	634	1,534	1,699	5,227
Station Services (MWh)	939	964	1,198	823	873	714	776
Synchronous Condensor Use (MWh)	<u>3,521</u>	<u>3,406</u>	<u>6,336</u>	<u>3,319</u>	<u>4,068</u>	<u>266</u>	<u>3,240</u>
Net Generation (MWh)	(522)	(2,001)	(4,445)	(3,508)	(3,407)	719	1,211
No. 2 fuel usage (gal) ⁽²⁾	397,039	223,967	289,309	73,044	151,158	140,958	504,593
Unit Gross Fuel Conversion Factor (kWh/gal)	9.9	10.6	10.7	8.7	10.1	12.1	10.4
Operating Time (hours)	206.40	104.13	150.00	38.38	103.30	80.98	301.00
Synchronous Condensor Time (hours)	3,398	3,458	5,943	3,187	3,790	75	4,124
Unit Planned Outage Time (hours)	-	-	953	594	51	-	22
Unit Maintenance Outage Time (hours)	41	211	163	19	-	1,831	6
Unit Forced Outage Time (hours)	8	40	221	28	474	300	264
Number of Planned Outages	5	-	5	4	5	-	2
Number of Maintenance Outages	4	10	8	2	-	3	2
Number of Forced Outages	14	12	7	5	13	4	11
Failure Rate (Forced Outages/Oper. Hours x 8760)	85.11	168.25	-	228.22	255.10	216.34	98.43
Incapability factor (% of time)	8.42	14.45	23.47	7.58	13.42	30.89	11.39
DAFOR (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Utilization Forced Outage Probability (% of time)	13.23	16.84	19.34	10.20	35.14	15.94	14.97

Note: 1. The outage information excludes impacts from outside sources that result in the generating unit being restricted or a unit outage. This includes outages caused by transmission equipment or any condition Outside of Plant Management Control.

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3. The gas turbine unit was derated to 50 MW as of January 1, 2010, however it remained as a 54 MW rated MCR unit in Hydro's Generation Equipment Status (GES) database until January 1, 2013.

4. There was fuel consumed at the Hardwoods GT in December 2013 that was not reported until January 2014.

Stephenville Gas Turbine Plant	2008	2009	2010	2011	2012	2013	2014 YTD
Overall Plant (Stephenville Gas Turbine)							
Gross Unit Rating (MW) ⁽¹⁾	54	54	50	50	50	50	50
Gross Capacity Factor (%)	0.05%	0.04%	0.09%	0.04%	0.00%	0.44%	1.37%
Gross Generation (MWh)	223	202	382	173	-	1,908	5,983
Station Services (MWh)	1,525	1,286	1,221	1,083	466	1,285	1,675
Synchronous Condensor Use (MWh)	6,077	4,550	5,105	5,803	-	2,858	4,723
Net Generation (MWh)	(7,379)	(5,634)	(5,944)	(6,713)	(466)	(2,235)	(415)
No. 2 fuel usage (gal) ⁽²⁾	27,081	21,291	48,665	18,446	-	39,674	508,544
Unit Gross Fuel Conversion Factor (kWh/gal)	8.2	9.5	7.8	9.4	n/a	48.1	11.8
Operating Time (hours) ⁽³⁾	22.97	9.57	51.45	13.03	-	65.63	327.00
Synchronous Condensor Time (hours)	7,929	6,421	6,433	8,096	-	4,169	5,003
Unit Planned Outage Time (hours)	53	37	262	65	-	295	5
Unit Maintenance Outage Time (hours)	209	163	71	37	-	283	256
Unit Forced Outage Time (hours)	11	220	28	189	8,784	3,663	114
Number of Planned Outages	9	5	8	6	-	1	1
Number of Maintenance Outages	8	7	7	7	-	6	2
Number of Forced Outages	6	6	4	7	-	5	13
Failure Rate (Forced Outages/Oper. Hours x 8760)	-	915.68	-	-	n/a	266.94	144.73
Incapability factor (% of time)	51.72	56.09	49.63	54.76	100.00	54.28	31.73
DAFOR (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Utilization Forced Outage Probability (% of time)	9.77	12.70	5.83	16.41	n/a	50.00	11.70

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3. The gas turbine unit was derated to 50 MW as of January 1, 2010, however it remained as a 54 MW rated MCR unit in Hydro's Generation Equipment Status (GES) database until January 1, 2013.

4. There was fuel consumed at the Stephenville GT in December 2013 that was not reported until January 2014.

5. The unit was on a forced outage in 2012.

Bay d'Espoir Generating Station

	2008	2009	2010	2011	2012	2013	2014 YTD
Overall Plant (Units 1-7)							
Gross Unit Rating (MW)	613.4	613.4	613.4	613.4	613.4	613.4	613.4
Gross Capacity Factor (%)	53.8%	45.5%	45.8%	52.3%	48.8%	53.5%	49.3%
Gross Generation (MWh)	2,897,002	2,445,773	2,462,069	2,811,437	2,627,702	2,876,419	2,651,040
Station Services (MWh)	6,477	5,171	5,178	5,776	5,203	5,482	5,255
Synchronous Condensor Use (MWh)	49	110	152	148	172	112	199
Net Generation (MWh)	2,890,476	2,440,492	2,456,739	2,805,513	2,622,327	2,870,825	2,645,586
Plant Net Hydraulic Conversion Factor (GWh/MCM)	0.433	0.434	0.436	0.434	0.434	0.432	0.431
Total Unit Operating Time (hours)	39,349	32,749	33,809	39,509	36,641	40,275	26,218
Synchronous Condensor Time (hours) ⁽¹⁾	130	290	399	391	444	296	467
Unit Planned Outage Time (hours)	2,689	2,363	5,042	3,450	4,148	5,741	3,739
Unit Maintenance Outage Time (hours)	59	1,234	797	520	2,064	283	94
Unit Forced Outage Time (hours)	285	72	5	12	379	332	4,383
Number of Planned Outages	15	14	15	8	12	13	4
Number of Maintenance Outages	13	21	22	10	20	11	3
Number of Forced Outages	7	4	2	3	14	9	11
Failure Rate (Forced Outages/Oper. Hours x 8760)	0.45	-	0.26	0.22	0.71	1.08	1.77
Incapability factor (% of time)	4.93	5.98	9.55	6.54	10.72	10.37	19.21
Weighted DAFOR (% of time)	0.60	0.18	0.05	0.08	0.83	0.68	12.44
Utilization Forced Outage Probability (% of time)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: 1. The outage information excludes impacts from outside sources that result in the generating unit being restricted or a unit outage. This includes outages caused by transmission equipment or any condition Outside of Plant Management Control.

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3. Synchronous condenser capability is for Unit 7 only.

Listing of Generating Units Forced Outages for 2014 (up to August 31, 2014)

Unit	Start Date	Finish Date	Comment
Hardwoods GT	2014/01/01 0:01	2014/01/07 19:39	Fuel System Problem
Stephenville GT	2014/01/03 21:32	2014/01/03 21:33	Fuel System Transfer Problem
Stephenville GT	2014/01/04 14:10	2014/01/04 14:28	Vibration Alarm
Stephenville GT	2014/01/04 15:33	2014/01/04 15:56	External Cause - Related to the Sunnyside Event
Bay d'Espoir Unit 5	2014/01/04 15:34	2014/01/04 16:48	External Cause - Related to the Sunnyside Event
Bay d'Espoir Unit 6	2014/01/04 15:34	2014/01/04 16:45	External Cause - Related to the Sunnyside Event
Holyrood Unit 1	2014/01/04 21:34	2014/01/05 21:30	Vibration issues
Holyrood Unit 2	2014/01/04 9:05	2014/01/04 21:34	External Cause - Related to the Sunnyside Event
Stephenville GT	2014/01/04 9:05	2014/01/04 9:57	External Cause - Related to the Sunnyside Event
Holyrood Unit 1	2014/01/04 9:05	2014/01/04 21:34	External Cause - Related to the Sunnyside Event
Holyrood Unit 3	2014/01/04 9:05	2014/01/05 1:40	External Cause - Related to the Sunnyside Event
Stephenville GT	2014/01/05 21:27	2014/01/05 22:31	External Cause - Related to the Sunnyside Event
Holyrood Unit 2	2014/01/05 21:30	2014/01/06 5:30	External Cause - Related to the Sunnyside Event
Holyrood Unit 1	2014/01/05 21:30	2014/01/08 15:38	External Cause - Unit tripped after B1T1 was closed
Holyrood Unit 3	2014/01/05 21:30	2014/01/06 7:15	External Cause - Unit tripped when Holyrood B1T1 was closed
Stephenville GT	2014/01/06 21:48	2014/01/06 22:06	Fuel System Problem
Stephenville GT	2014/01/06 22:10	2014/01/06 23:14	Fuel System Problem
Stephenville GT	2014/01/07 9:33	2014/01/07 11:29	Fuel System Problem
Stephenville GT	2014/01/08 8:25	2014/01/09 13:19	Unit Trip - Engine B failure
Holyrood Unit 2	2014/01/10 18:56	2014/01/11 1:22	No. 1 Compressor motor shorted to ground
Hardwoods GT	2014/01/11 20:59	2014/01/11 21:52	Unit Trip - Cause not recorded
Holyrood Unit 3	2014/01/12 17:35	2014/01/12 18:28	Main feed water isolator would not open trip low drum level
Hardwoods GT	2014/01/12 18:00	2014/01/12 18:58	Unit Trip - Cause not recorded
Holyrood Unit 1	2014/01/13 11:16	2014/01/14 1:03	Air Heater West bearing jacket failure
Holyrood Unit 2	2014/01/16 8:44	2014/01/16 15:50	External Cause - Tripped during testing on unit breaker in terminal station.
Hardwoods GT	2014/01/22 13:26	2014/01/22 13:57	Unit Trip during testing
Hardwoods GT	2014/01/22 14:12	2014/01/22 15:06	Unit Trip during testing
Hardwoods GT	2014/01/22 15:20	2014/01/22 15:52	Unit Trip during testing
Hardwoods GT	2014/01/22 16:02	2014/01/22 16:50	Unit Trip during testing
Holyrood Unit 1	2014/01/27 16:50	2014/01/27 18:49	Burner Management Issue
Bay d'Espoir Unit 6	2014/01/30 5:09	2014/02/01 22:56	Rectifying transformer failure
Holyrood Unit 1	2014/02/01 16:12	2014/02/04 15:21	Steam line to top valves flange gasket blown
Stephenville GT	2014/02/10 16:19	2014/02/10 17:04	High temperature alarm
Stephenville GT	2014/02/11 9:45	2014/02/11 11:53	Alternator belt failure
Bay d'Espoir Unit 6	2014/02/17 4:20	2014/08/05 13:26	Rectifying transformer failure (spare unit)
Stephenville GT	2014/03/06 15:45	2014/03/06 16:18	Fuel Forwarding Pump
Stephenville GT	2014/03/06 6:27	2014/03/06 6:54	Unit Trip - Cause not recorded
Stephenville GT	2014/03/06 9:17	2014/03/06 9:56	Fuel tanks didn't transfer
Stephenville GT	2014/03/10 5:54	2014/03/10 10:09	Unit Trip during testing
Bay d'Espoir Unit 3	2014/03/18 22:03	2014/03/19 1:48	External Cause - Breaker B2T4 failed close on opening. Bus lock out operated
Bay d'Espoir Unit 4	2014/03/18 22:04	2014/03/21 19:16	External Cause - Breaker B2T4 failed close on opening.
Hardwoods GT	2014/03/19 10:22	2014/03/19 10:43	Unit tripped during testing

Note: The External Cause events are not included in the calculation of statistics. They are presented here to show all unit forced outages only.

Unit	Start Date	Finish Date	Comment
Bay d'Espoir Unit 2	2014/03/27 13:40	2014/03/28 12:53	Speed switch problem.
Holyrood Unit 1	2014/04/10 1:20	2014/04/10 3:34	Disconnect B1T1 did not close on all three phases
Bay d'Espoir Unit 2	2014/04/10 9:04	2014/04/10 10:30	External Cause - Shutdown to investigate air leak on B1T2
Bay d'Espoir Unit 4	2014/05/04 9:42	2014/05/04 11:42	T4 deluge system trouble (Deluge activated)
Hardwoods GT	2014/05/05 20:50	2014/05/05 21:52	Tripped on vibration
Bay d'Espoir Unit 7	2014/05/06 20:19	2014/05/10 19:06	Water in Bearing Oil Alarm. Faulty bearing coolers.
Hardwoods GT	2014/05/06 21:34	2014/05/06 23:14	Proximity/Speed switch problem.
Bay d'Espoir Unit 5	2014/05/11 11:33	2014/05/11 17:26	Shutdown to investigate possible Surface Air Cooler leak. Operators noted excessive water accumulation.
Bay d'Espoir Unit 7	2014/05/11 7:58	2014/05/11 11:01	Water in Bearing Oil Alarm/Vibration. Removed residual water from bearing.
Holyrood Unit 1	2014/05/12 2:15	2014/05/12 22:28	Disconnect B1T1 middle & west phases arcing
Stephenville GT	2014/05/16 10:53	2014/05/16 14:44	Glycol Leak
Bay d'Espoir Unit 2	2014/05/16 11:06	2014/05/16 11:45	Pit flood alarm
Bay d'Espoir Unit 5	2014/05/28 4:02	2014/05/28 9:30	Exciter Alarm. Card replaced in Exciter.
Stephenville GT	2014/06/06 14:00	2014/06/09 11:00	Loose Wire in controls, speed sensing error.
Hardwoods GT	2014/06/06 16:15	2014/06/10 13:18	GGA and GGB wouldn't start during test.
Bay d'Espoir Unit 4	2014/06/13 9:32	2014/06/14 15:47	Water in generator bearing oil due a leaking cooler.
Holyrood Unit 1	2014/06/25 17:40	2014/06/30 18:00	Air Heater East top bearing bolts sheared
Hardwoods GT	2014/07/04 18:59	2014/07/04 19:10	Fuel Supply Problems
Holyrood Unit 3	2014/07/08 20:00	2014/07/12 12:47	Fuel Oil Heater East end cover gasket failure, H2 leak
Holyrood Unit 3	2014/07/14 14:50	2014/07/14 16:35	Trip on high fan amps
Bay d'Espoir Unit 2	2014/07/16 7:03	2014/07/16 16:54	External Cause - Shutdown to investigate air leak on B1T2
Holyrood Unit 3	2014/07/28 7:28	2014/07/28 17:47	Switching on station service
Holyrood Unit 3	2014/07/29 9:43	2014/07/29 23:29	Switching in terminal station

Note: The External Cause events are not included in the calculation of statistics. They are presented here to show all unit forced outages only.