

September 22, 2015

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: EB-2015-0200 – Union Gas Limited (“Union”) - 2017 Dawn Parkway Project Interrogatory Responses

Please find attached Union’s responses to the interrogatories received in the above case. These will be filed in RESS and copies will be sent to the Board.

The responses reflect an update to Union’s evidence that will be filed shortly. Specifically, the evidence update includes the impact of Union modifying its Term-Up Provision threshold from \$20.0 million to \$50.0 million as outlined in its letter to the Board dated September 3, 2015. The update also reflects the impact of revisions made to the 2017 Dawn Parkway Project’s revenue requirement to reflect the appropriate tax treatment of certain tax-deductible Project expenses.

With respect to responses to Exhibit B.Staff.6c), Exhibit B.BOMA.31 and Exhibit B.Energy Probe.11 a), Union is filing an unredacted form of these responses in confidence with the Board. Union submits that due to the competitive environment in which Siemens operates and, the requirements of the contractual agreement between Union and Siemens with respect to the compressor package purchases, the pricing details requested need to be treated as confidential. Union requests this information be treated as confidential pursuant to the Board’s *Practice Guidelines on Confidential Filings* and Rule 10 of the Board’s *Rules of Practice and Procedures* however with access granted only to certain intervenors involved in this proceeding. Specifically, Union opposes this information being made available in confidence to Alberta Northeast Gas Ltd., Enbridge Gas Distribution, Gaz Métro Limited Partnership, Shell Energy North America, TransAlta Cogeneration L.P. and TransAlta Cogeneration Corporation, TransCanada Energy Ltd., and TransCanada Pipeline Ltd. The intervenors listed represent potential customers of Siemens.

As stated in its response to Exhibit B.BOMA.3, the report requested is a proprietary and commercially sensitive product. As a result, Union has filed it in confidence with the Board under separate cover.

In addition, certain live excel spreadsheets as requested at Exhibit B.ANE.4, Exhibit B.ANE.11, and Exhibit B.Energy Probe.14, have been provided to the requesting parties via email, copying the Board. Other parties who wish to receive a copy of the document can contact Union directly.

If you have any questions with respect to this submission please contact me at 519-436-5473.

Yours truly,

[original signed by]

Karen Hockin
Manager, Regulatory Initiatives

Encl.

c.c.: C. Smith, Torys
EB-2015-0200 Intervenors

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 5, Schedule 1, p. 9, ICF Report on Impact of Natural Gas Market Trends on Utilization of the Union Gas Dawn Parkway System

What percentage of the total supplies does Union envision to procure from the Marcellus and Utica shale basins in the long-term (10 years)?

Response:

Union currently expects that by 2018 approximately 30% of its total Union North and Union South sales service gas supply portfolio will be procured from the Utica and Marcellus supply basin (includes supply at Niagara and supply to Dawn on the NEXUS Pipeline assuming OEB approval of Union's NEXUS transportation contract). Union does not have a forecast beyond 2018.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 5, Schedule 1, p. 21, ICF Report on Impact of Natural Gas Market Trends on Utilization of the Union Gas Dawn Parkway System
The ICF Report notes that between 2016 and 2020, the basis between Henry Hub and Dawn is projected to fall from \$0.35/MMBtu to an average of about \$0.25/MMBtu.

Is the price differential quoted in US dollars or Canadian dollars?

Response:

The following response was prepared by ICF.

The price differential is quoted in U.S. dollars.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 6, pp. 7-10

Union has indicated that Enbridge Gas Distribution Inc., Gaz Métro, St. Lawrence Gas, Utilities Kingston, TransCanada Energy and DTE Energy Trading have executed an M12 transportation contract, a Precedent Agreement and Financial Backstopping Agreement and has waived or satisfied all shipper conditions precedent. Please explain the meaning of “waived or satisfied all shipper conditions precedent”.

Response:

The obligation of Union to provide transportation services under the M12 transportation contract is subject to conditions precedent. A condition precedent requires an action or an event to take place before a contract becomes binding (not withstanding binding commitments made through the Financial Backstopping Agreement). Conditions precedent can be to the benefit of Union or to the benefit of the shipper.

A shipper can provide notice that it is voluntarily relinquishing its right (or waiving its right) that a condition precedent to its benefit be satisfied. For instance, a shipper could provide notice waiving a condition precedent where balancing agreements noted in standard conditions precedent, do not apply or already exist.

A shipper can also provide notice that it has fulfilled, or satisfied, a condition precedent to its benefit (i.e. confirmation the shipper has received internal approval).

When a shipper has waived or satisfied all conditions precedent, the transportation services contract is then subject to conditions precedent to the benefit of Union that have not been waived or satisfied by Union.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 6, p. 14, lines 9-11

Union has noted that the proposed expansion of the Dawn-Parkway System is not dependent upon the NEXUS pipeline or ETP Rover Pipeline projects.

- a) If the NEXUS pipeline and Union's long-term contract with NEXUS are approved, how would Union move the NEXUS volumes from Dawn to Parkway?
 - b) Are any of the M12 contracts described in Exhibit A / Tab 6 / Pages 7-10, refer to volumes that would also be transported through the NEXUS pipeline?
 - c) Would Union require further expansion of the Dawn-Parkway system if the NEXUS long-term contract is approved by the Ontario Energy Board?
-

Response:

- a) Union would move gas delivered to Dawn on the NEXUS Pipeline to Parkway using its Dawn Parkway System assets similar to any other supply that Union has at Dawn.
- b) Enbridge could transport natural gas from the proposed NEXUS Pipeline on the Dawn Parkway System using its M12 Dawn to Parkway contracts. However, like Union, Enbridge would view its NEXUS transportation contract as one option to source Dawn-based gas supply to serve its markets. Union is not aware of the gas supply arrangements of the other shippers supporting the 2017 Dawn Parkway Project however those shippers could potentially transport natural gas from the proposed NEXUS Pipeline on the Dawn Parkway System.
- c) The expansion of the Dawn Parkway System as proposed in the 2017 Dawn Parkway Project is independent of the pre-approval of Union's NEXUS transportation contract. Expansion of the Dawn Parkway System is driven by incremental demand for transportation capacity whether a shipper is purchasing NEXUS supply, Rover supply or any other supply flowing through or originating at Dawn. To the extent that the NEXUS Pipeline and/or Rover Pipeline are constructed and make the Dawn Hub more liquid, more shippers and markets may be attracted to the Dawn Hub in the future.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 9, pp. 2-3

Union has completed a discounted cash flow (DCF) analysis for the proposed project. The results indicate a net present value of \$344.2 million and a profitability index of 0.43.

- a) Please confirm if the DCF analysis takes into account the costs of installing the replacement compressor (Plant B).
 - b) If the compressor to replace Plant B has been included in the DCF analysis, please provide a revised analysis that excludes replacement of Plant B.
-

Response:

- a) There is only one compressor (Plant H) which is of sufficient capacity to accommodate the retirement of existing Plant B and the growth demands. Union's DCF analysis includes the costs of installation of Plant H in 2016 and 2017 and the removal of Plant B in 2018.
- b) Please see the response at Exhibit B.Energy Probe.14.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 11, p. 2, lines 8-10

Union has indicated that with the addition of the three compressors requested in the Application, Union will have nine similar plants across the Dawn Parkway system. Union has further noted that it will be purchasing a spare RB211 gas generator turbine engine to support the nine plants.

- a) Why does Union need a spare gas generator turbine engine?
 - b) How old is the current gas generator turbine engine?
 - c) Is the cost of the spare RB211 gas generator turbine engine included in this Application? If yes, please provide details.
-

Response:

- a) Having a spare gas generator available is good practice and will substantially reduce plant recovery time in the event of a significant failure that would require a gas generator to be removed from the plant for repair at a Siemens approved shop. The volume discount associated with the purchase of the three compressors specific to the Project will also apply to the purchase of the spare gas generator. Union currently does not have a spare RB 211. The spare RB 211 (24GT-DLE) engine would be an exact duplicate of current and proposed engines at the following plants in Union's system: Dawn I, Dawn H, Lobo C, Lobo D, Bright C, Parkway B, Parkway C, and Parkway D. This engine will also fit into the Bright A1 and A2 berths with very minor hardware and control changes. All total, this engine would act as spare for 10 of the 17 RB211 engines in Union's fleet (following completion of the 2017 builds).
- b) The gas generators range in age from 2007 through to the gas generator purchased for the Project.
- c) Yes. The cost of the spare gas generator is included in the overall application project costs. The pricing included is [REDACTED] in Canadian funds, inclusive of change order allowance and HST extra. This price to Union represents a discount of [REDACTED] from standard pricing when this engine is purchased as part of the overall purchase contract with Siemens for the Lobo D, Bright C, and Dawn H compressor packages.

UNION GAS LIMITED

Answer to Interrogatory from
Board Staff

Reference: Exhibit A, Tab 11, p. 3, lines 18-20

Union has provided information with respect to the retirement and removal of Plant B. The scope of retirement and removal includes decommissioning the compressors and removal of piping, building and all other auxiliary facilities.

What is the total cost of decommissioning and removal of Plant B? Is the cost included in the current application?

Response:

The estimated cost for decommissioning and removal of Dawn Plant B is included in the application. The total capital cost of \$622.5 million includes \$5.0 million in 2018 for the decommissioning and removal of Plant B.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 6, pp. 16-9

Please provide the following information related to ex-franchise service on the Dawn Parkway system for each of the last ten years:

- a) Shipper, MDQ, rate schedule, contract number, contract start date, contract end date.
- b) Turn-back quantities by shipper and rate schedule indicating effective dates.

Response:

a) and b) The last 10 years of Dawn Parkway System contracts including turnback can be found in Attachment 1. Contracts are listed by primary contract holder. Any contract listed that is not renewed or capacity reduced (i.e. turned back) would show a lesser quantity or zero in the "Capacity as at" column in the following years.

[illegible]

Gaz Metro Limited Partnership	M12074/M12132	01-Apr-03	31-Mar-18		70,196	70,196	70,196	70,196	52,343	52,343	52,343	52,343	52,343	52,343
Gaz Metro Limited Partnership	M12076/M12172	01-Apr-04	31-Mar-18		24,908	24,908	24,908	24,908	24,908	24,908	24,908	22,908	22,908	22,908
1425445 Ontario Limited o/a Utilities Kingston	M12077	01-Apr-04	31-Mar-18		11,322	11,322	11,322	11,322	11,322	11,322	11,322	11,322	6,322	6,322
Gaz Metro Limited Partnership	C10054/C10057/C10087	01-Jun-06	31-Mar-18		110,390	110,390	110,390	110,390	110,390	110,390	110,390	100,000	100,000	100,000
Enbridge Gas Distribution Inc.	C10059	01-Apr-06	31-Mar-18		436,586	436,586	436,586	436,586	436,586	436,586	236,586	236,586	236,586	236,586
St. Lawrence Gas Company, Inc.	C10076	01-Apr-07	31-Mar-18			10,785	10,785	10,785	10,785	10,785	10,785	10,785	10,785	10,785
Enbridge Gas Distribution Inc.	M12080	01-Nov-06	31-Oct-18		106,000	106,000	106,000	106,000	106,000	106,000	106,000	106,000	106,000	106,000
U.S. Steel Canada Inc.	M12085	01-Nov-06	31-Oct-18		17,351	17,351	17,351	17,351	17,351	17,351	17,351	17,351	11,087	11,087
Vermont Gas Systems, Inc.	M12119	01-Nov-07	31-Oct-18			10,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Greater Toronto Airports Authority	M12120	01-Nov-07	31-Oct-18			7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
TransCanada Power, a division of TransCanada Energy Ltd.	M12131	01-Nov-09	31-Oct-18					132,000	132,000	132,000	132,000	132,000	84,348	84,348
Connecticut Natural Gas Corporation	M12206	01-Nov-07	31-Oct-18			9,170	9,170	9,170	9,170	9,170	9,170	9,170	9,170	9,170
The Southern Connecticut Gas Company	M12207	01-Nov-07	31-Oct-18			13,970	13,970	13,970	13,970	13,970	13,970	13,970	13,970	13,970
The Brooklyn Union Gas Company d/b/a National Grid NY	M12208	01-Nov-07	31-Oct-18			30,217	30,217	30,217	30,217	30,217	30,217	30,217	30,217	30,217
KeySpan Gas East Corporation d/b/a National Grid	M12209	01-Nov-07	31-Oct-18			22,772	22,772	22,772	22,772	22,772	22,772	22,772	22,772	22,772
Yankee Gas Services Company	M12210	01-Nov-10	31-Oct-18			20,560	20,560	20,560	20,560	20,560	20,560	20,560	20,560	20,560
Greenfield Energy Centre LP	C10083	01-Mar-08	31-Oct-18				92,845	92,845	92,845	92,845	92,845	92,845	92,845	92,845
TransCanada PipeLines Limited	M12258	01-Oct-15	31-Mar-19											35,872
Enbridge Gas Distribution Inc.	M12108	01-Nov-07	31-Oct-19			57,100	57,100	57,100	57,100	57,100	57,100	57,100	57,100	57,100
Yankee Gas Services Company	M12212	01-Nov-08	31-Oct-19				5,380	5,380	5,380	5,380	5,380	5,380	5,380	5,380
The Southern Connecticut Gas Company	M12213	01-Nov-08	31-Oct-19				9,735	9,735	9,735	9,735	9,735	9,735	9,735	9,735
Connecticut Natural Gas Corporation	M12214	01-Nov-08	31-Oct-19				6,489	6,489	6,489	6,489	6,489	6,489	6,489	6,489
Mercuria Commodities Canada Corporation	C10111	01-Apr-15	31-Mar-20											42,202
Emera Energy Incorporated	C10108	01-Apr-15	31-Mar-20											26,335
Ag Energy Co-operative Ltd.	M12151	01-Nov-08	31-Oct-20				1,600	1,600	1,600	1,600	1,600	1,600	1,363	1,363
Vermont Gas Systems, Inc.	M12190	01-Nov-10	31-Oct-20					500	500	500	500	500	500	500
TransCanada PipeLines Limited	M12X004	01-Sep-11	31-Aug-21						50,000	50,000	50,000	50,000	50,000	50,000
TransCanada PipeLines Limited	M12X005	01-Sep-11	31-Aug-21						78,316	78,316	78,316	78,316	78,316	78,316
Ag Energy Co-operative Ltd.	M12167	01-Nov-11	31-Oct-21						1,900	1,900	1,900	1,900	1,900	1,900
Enbridge Gas Distribution Inc.	M12079/M12079B	01-Apr-04	31-Oct-22		1,764,678	1,764,678	1,764,678	1,764,678	1,764,678	1,764,678	1,764,678	1,764,678	1,764,678	1,764,678
York Energy Centre LP	M12184	01-Apr-12	31-Oct-22							76,000	76,000	76,000	76,000	76,000
TransCanada PipeLines Limited	M12219	01-Nov-12	31-Oct-22							88,497	88,497	88,497	88,497	88,497
Emera Energy Incorporated	M12221	01-Nov-12	31-Oct-22							36,751	36,751	36,751	36,751	36,751
Enbridge - Consumers	M12X006	01-Nov-12	31-Oct-22							200,000	200,000	200,000	200,000	200,000
TransCanada PipeLines Limited	M12220	01-Nov-13	31-Oct-23								174,752	174,752	174,752	174,752
TransCanada PipeLines Limited	M12X013	01-Nov-12	31-Oct-23							62,695	62,695	62,695	62,695	62,695
KPUC (Kingston Public Utilities Commission)	M12X015	01-Apr-14	31-Mar-24										5,000	5,000
Vermont Gas Systems, Inc.	M12224	01-Nov-14	31-Oct-24										8,100	8,100
Gaz Metro Limited Partnership	M12109	01-Nov-07	31-Oct-27			65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000
Goreway Station Partnrship	M12110	01-Nov-07	31-Oct-28			125,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000
Portlands Energy Centre L.P.	M12130	13-Jan-09	31-Oct-28					100,000	100,000	100,000	100,000	100,000	100,000	100,000
Thorold CoGen L.P.	M12129	01-Sep-09	31-Aug-29					49,500	49,500	49,500	49,500	49,500	49,500	49,500

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 6, pp. 16-9

Please describe the results of all reverse open seasons conducted by Union associated with potential Dawn Parkway service over the last years including shipper and quantities as well as the impact on any proposed facility construction.

Response:

Please see Attachment 1.

The attachment summarizes the results of the reverse open seasons conducted over the past five years related to the Dawn Parkway System expansions. There have been no facility design changes resulting from the reverse open seasons. The quantity of turnback had no impact on the facility design for the proposed 2015-2017 expansions.

As noted in EB-2013-0074 (Pre-filed Evidence, Section 8, p. 6) and EB-2014-0261 (Exhibit A, Tab 8, p. 10), the Dawn Parkway System was in a shortfall position after each build at November 1, 2015 and November 1, 2016. Therefore, any turnback received was used to manage the Dawn Parkway System shortfall position only.

Union did not accept the 1,363 GJ/d of turnback requested effective November 1, 2017 as the scope of the 2017 Dawn Parkway Project facilities would not be impacted and Union was in a surplus position on the Dawn Parkway System. Please see the response at Exhibit B.BOMA.26 c).

One reverse open season was held in February 2014 to specifically offer turnback on the Dawn to Kirkwall path. This reverse open season was used to reduce the Parkway Delivery Obligation as agreed to in the Parkway Obligation Settlement EB-2013-0365 (i.e. not linked to any of the proposed facility expansions).

Reverse Open Season Summary

Shipper	Contract #	Volume (GJ/d)	Receipt	Delivery	Contract Start Date	Contract End Date	Requested End Date	Accepted End Date
Greenfield Ethanol	M12156	1,917	Dawn	Parkway	01-Nov-08	31-Oct-19	01-Nov-14	01-Nov-15
BP Canada Energy Group (1)	M12087	20,000	Dawn	Parkway	01-Nov-06	31-Oct-22	01-Nov-14	01-Nov-15
National Fuel (2)	M12196	10,791	Dawn	Kirkwall	01-Nov-10	31-Oct-17	01-Nov-14	01-Nov-15
National Fuel (2)	M12211	15,904	Dawn	Kirkwall	01-Nov-10	31-Oct-20	01-Nov-14	01-Nov-15
Keyspan (3)	M12116	138,600	Dawn	Kirkwall	01-Nov-07	31-Oct-18	01-Nov-15	01-Nov-15
AG Energy Co-Operative Ltd.	M12151	1,363	Dawn	Parkway	01-Nov-08	31-Oct-20	01-Nov-17	not accepted

(1) BP Canada Energy Group requested 20,000 GJ/d of turnback in the 2015, 2016 and 2017 reverse open seasons.

(2) National Fuel requested 26,695 GJ/d of turnback in the 2015 and 2016 reverse open seasons.

(3) Keyspan turnback effective November 1, 2015 applies to reduction of Parkway Delivery Obligation.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Please provide an estimated breakdown of the \$622.5 million project cost between replacement of existing facilities and construction of new facilities along with associated workpapers.

Response:

Dawn Plant B is the only facility being replaced as part of this Project. All other facilities required are for expansion. Exhibit A, Tab 9, Schedule 1 shows the cost of Dawn Plant H at \$249.83 million. Union is unable to provide a breakdown of the schedule as requested. Please see the response at Exhibit B.Energy Probe.14 where a scenario of allocation of costs is proposed by Energy Probe.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 9, Schedule 6

Please provide Exhibit A, Tab 9, Schedule 6 in Microsoft Excel format with inputs and formulas intact.

Response:

Attachment 1 to this response is a file with the summary DCF as a modified version of Exhibit A, Tab 9, Schedule 6 with the inclusion of the Income Tax Calculation added to the bottom of the page. Union has provided an Excel version (Excel Attachment 1) directly to ANE via email, copying the Board. Should any other interested parties wish to receive the document, please contact Union directly.

All of the inputs are fully described in Exhibit A, Tab 9, Schedules 1 through 5.

The following additional notes are provided to supplement Schedules 1 through 5.

Discount Methodology:

Cash Outflows (Capital spending) is discounted using beginning of period.

Cash Inflows uses mid period discounting.

<u>Project Year</u> (\$000's)	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
<u>Cash Inflow</u>										
Revenue	-	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
Expenses:										
O & M Expense	-	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	-	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
Income Tax	2,466	14,106	18,900	14,612	11,913	9,622	7,677	6,025	4,622	3,430
Net Cash Inflow	2,466	26,998	31,792	27,504	24,805	22,514	20,569	18,917	17,514	16,322
<u>Cash Outflow</u>										
Incremental Capital - 2016 In-Service	107,400	6,723	-	-	-	-	-	-	-	-
Incremental Capital - 2017 In-Service	-	494,114	14,267	-	-	-	-	-	-	-
Change in Working Capital	-	182	-	-	-	-	-	-	-	-
Cash Outflow	107,400	501,020	14,267	-	-	-	-	-	-	-
<u>Cumulative Net Present Value</u>										
Cash Inflow	2,405	27,462	55,537	78,646	98,476	115,602	130,489	143,515	154,991	165,166
Cash Outflow	107,400	584,108	597,024	597,024	597,024	597,024	597,024	597,024	597,024	597,024
NPV By Year	(104,994)	(556,646)	(541,487)	(518,378)	(498,547)	(481,422)	(466,535)	(453,509)	(442,033)	(431,858)
<u>Project NPV</u>	-343,066									
<u>Profitability Index</u>										
By Year PI	0.02	0.05	0.09	0.13	0.16	0.19	0.22	0.24	0.26	0.28
Project PI	0.43									
<u>Calculation of Income Tax</u>										
Revenue	-	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
O&M Expense	-	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	-	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
CCA	(9,306)	(66,121)	(84,214)	(68,032)	(57,848)	(49,203)	(41,862)	(35,629)	(30,334)	(25,836)
Taxable Income	(9,306)	(53,229)	(71,323)	(55,140)	(44,956)	(36,311)	(28,970)	(22,737)	(17,442)	(12,944)
Income Tax Rate	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%
Current Income Taxes	(2,466)	(14,106)	(18,900)	(14,612)	(11,913)	(9,622)	(7,677)	(6,025)	(4,622)	(3,430)
Income Tax Cash Flow	2,466	14,106	18,900	14,612	11,913	9,622	7,677	6,025	4,622	3,430

<u>Project Year</u> (\$000's)	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>	<u>20</u>
<u>Cash Inflow</u>										
Revenue	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
Expenses:										
O & M Expense	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
Income Tax	2,417	1,556	824	202	(328)	(629)	(886)	(1,254)	(1,567)	(1,833)
Net Cash Inflow	<u>15,309</u>	<u>14,448</u>	<u>13,716</u>	<u>13,094</u>	<u>12,564</u>	<u>12,263</u>	<u>12,006</u>	<u>11,638</u>	<u>11,325</u>	<u>11,059</u>
<u>Cash Outflow</u>										
Incremental Capital - 2016 In-Service	-	-	-	-	-	-	-	-	-	-
Incremental Capital - 2017 In-Service	-	-	-	-	-	7,500	-	-	-	-
Change in Working Capital	-	-	-	-	-	-	-	-	-	-
Cash Outflow	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>7,500</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>Cumulative Net Present Value</u>										
Cash Inflow	174,247	182,401	189,766	196,456	202,564	208,236	213,520	218,394	222,906	227,099
Cash Outflow	<u>597,024</u>	<u>597,024</u>	<u>597,024</u>	<u>597,024</u>	<u>597,024</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>
NPV By Year	<u>(422,777)</u>	<u>(414,623)</u>	<u>(407,258)</u>	<u>(400,568)</u>	<u>(394,460)</u>	<u>(392,344)</u>	<u>(387,060)</u>	<u>(382,186)</u>	<u>(377,674)</u>	<u>(373,482)</u>
<u>Project NPV</u>										
<u>Profitability Index</u>										
By Year PI	0.29	0.31	0.32	0.33	0.34	0.35	0.36	0.36	0.37	0.38
Project PI										
<u>Calculation of Income Tax</u>										
Revenue	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
O&M Expense	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
CCA	(22,013)	(18,764)	(16,002)	(13,653)	(11,655)	(10,518)	(9,549)	(8,162)	(6,980)	(5,974)
Taxable Income	(9,121)	(5,872)	(3,110)	(761)	1,237	2,374	3,343	4,730	5,912	6,918
Income Tax Rate	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%
Current Income Taxes	<u>(2,417)</u>	<u>(1,556)</u>	<u>(824)</u>	<u>(202)</u>	<u>328</u>	<u>629</u>	<u>886</u>	<u>1,254</u>	<u>1,567</u>	<u>1,833</u>
Income Tax Cash Flow	2,417	1,556	824	202	(328)	(629)	(886)	(1,254)	(1,567)	(1,833)

<u>Project Year</u> (\$000's)	<u>21</u>	<u>22</u>	<u>23</u>	<u>24</u>	<u>25</u>	<u>26</u>	<u>27</u>	<u>28</u>	<u>29</u>	<u>30</u>	<u>31</u>
<u>Cash Inflow</u>											
Revenue	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
Expenses:											
O & M Expense	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
Income Tax	(2,061)	(2,254)	(2,419)	(2,560)	(2,680)	(2,783)	(2,871)	(2,945)	(3,010)	(3,064)	(2,962)
Net Cash Inflow	<u>10,831</u>	<u>10,638</u>	<u>10,473</u>	<u>10,332</u>	<u>10,212</u>	<u>10,109</u>	<u>10,021</u>	<u>9,946</u>	<u>9,882</u>	<u>9,828</u>	<u>9,930</u>
<u>Cash Outflow</u>											
Incremental Capital - 2016 In-Service	-	-	-	-	-	-	-	-	-	-	-
Incremental Capital - 2017 In-Service	-	-	-	-	-	-	-	-	-	-	7,500
Change in Working Capital	-	-	-	-	-	-	-	-	-	-	-
Cash Outflow	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>7,500</u>
<u>Cumulative Net Present Value</u>											
Cash Inflow	231,005	234,656	238,076	241,286	244,305	247,148	249,830	252,363	254,757	257,023	259,201
Cash Outflow	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>600,580</u>	<u>602,267</u>
NPV By Year	<u>(369,575)</u>	<u>(365,924)</u>	<u>(362,504)</u>	<u>(359,294)</u>	<u>(356,276)</u>	<u>(353,432)</u>	<u>(350,750)</u>	<u>(348,217)</u>	<u>(345,823)</u>	<u>(343,558)</u>	<u>(343,066)</u>
<u>Project NPV</u>											
<u>Profitability Index</u>											
By Year PI	0.38	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.42	0.43	0.43
Project PI											
<u>Calculation of Income Tax</u>											
Revenue	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
O&M Expense	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)	(3,611)
Municipal Tax	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)	(1,048)
CCA	(5,116)	(4,386)	(3,763)	(3,231)	(2,778)	(2,390)	(2,060)	(1,777)	(1,535)	(1,328)	(1,713)
Taxable Income	7,776	8,506	9,129	9,661	10,114	10,501	10,832	11,115	11,357	11,564	11,179
Income Tax Rate	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%	26.50%
Current Income Taxes	<u>2,061</u>	<u>2,254</u>	<u>2,419</u>	<u>2,560</u>	<u>2,680</u>	<u>2,783</u>	<u>2,871</u>	<u>2,945</u>	<u>3,010</u>	<u>3,064</u>	<u>2,962</u>
Income Tax Cash Flow	(2,061)	(2,254)	(2,419)	(2,560)	(2,680)	(2,783)	(2,871)	(2,945)	(3,010)	(3,064)	(2,962)

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 9, Schedule 6

Please explain why general overheads are not shown in the economic feasibility analysis provided as Exhibit A, Tab 9, Schedule 6.

Response:

General overheads are not applied under the EBO 134 guidelines because EBO 134 requires an incremental cash flow analysis and the Project does not create incremental overheads.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 9, pp. 2-3

Please provide the Stage 1 DCF Economic Feasibility Test analysis of the proposed project excluding the estimated cost of the replacement facilities including associated workpapers.

Response:

Please see the response at Exhibit B.Energy Probe.14.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, p. 4

Please provide all relevant materials setting forth in detail the EB-2011-0210 Board-Approved cost allocation methodologies including Board approvals and associated materials detailing the methodologies.

Response:

A detailed description of Union's cost allocation methodologies can be found in Union's 2013 cost of service proceeding (EB-2011-0210) at Exhibit G1 and Exhibit G3. Please see the link below.

https://www.uniongas.com/~media/aboutus/regulatory/rate-cases/eb-2011-0210-2013-rebasing/UNION_Exhibit%20G_Updated_20120713.pdf?la=en

The Board's approval can be found in the EB-2011-0210 Decision and Order dated October 24, 2012.

Subsequent to the Board's Decision and Order, Union updated the general plant allocator for 2013 base rates and filed an updated 2013 cost allocation study as part of Union's 2014 Rates Settlement Agreement (EB-2013-0365). The update resulted in a revenue requirement decrease of \$0.381 million. The description of the change to the 2013 Board-approved cost allocation study can be found at EB-2013-0365 Settlement Agreement dated April 24, 2014, p. 10.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, p. 4

Please provide Union's 2013 Board-Approved cost allocation study including all applicable workpapers and supporting materials.

Response:

As described at Exhibit B.ANE.7, the 2013 (EB-2011-0210) Board-approved cost allocation study was updated as per Union's 2014 Rates Settlement Agreement (EB-2013-0365). The updated cost study was filed on April 30, 2014 as part of the EB-2013-0365 proceeding and labelled as EB-2011-0210, Exhibit G3, updated April 30, 2014.

The updated working papers that support the 2013 Board Decision were not filed. An applicable updated working paper can be found at Attachment 1.

UNION GAS LIMITED
Blended Allocation Detail Report - Storage
Year Ending December 31, 2013

Line No.	Particulars	Total	Gen. Service	Gen. Service	Firm	Interruptible	Interruptible	Special	Special	Large	Small	Storage &	Storage &	Storage &	Storage &	Wholesale
			Small Volume	Large Volume	Contract	Contract-Firm	Contract-Interruptible	Large Volume Contract - Firm	Large Volume Contract - Interruptible	Wholesale Service	Wholesale Service	Transportation Service - Firm	Transportation Service - Interruptible	Transportation Service - Firm	Transportation Service - Interruptible	Storage & Transportation Service
			M1	M2	M4	M5	M5	M7	M7	M9	M10	T1	T1	T2	T2	T3
<u>Storage Demand Allocator</u>																
1	Design Day Demand (10 ³ m ³ /day)	196,190	28,724	9,650	3,113	51	0	1,128	0	362	11	2,654	0	19,541	0	2,511
2	Winter Volumes		2,106,038	707,549												
3	Less: Design Day Deliveries (10 ³ m ³ /day)	153,126	13,365	4,436	1,819	44	0	647	0	276	2	1,199	0	13,286	0	1,011
4	NETFROMSTOR - Union (10 ³ m ³ /day)	43,064	15,358	5,214	1,295	7	0	481	0	86	9	1,455	0	6,255	0	1,500
5	North allocated on XSPK&AVG															
6																
7	NETFROMSTOR (10 ³ m ³ /day)	43,064	15,358	5,214	1,295	7	0	481	0	86	9	1,455	0	6,255	0	1,500
<u>Storage Commodity Allocator</u>																
8	Storage Commodity (10 ³ m ³)	4,467,621	-----	-----	-----	-----	2,632,836	-----	-----	-----	-----	72,856	0	208,471	0	118,137
9	Infranchise Delivery Volume excluding T1/T3 (10 ³ m ³)	5,057,103	2,939,543	975,571	400,129	17,385	516,392	142,488	4,655	60,750	189					
10	Union North - NWINSALES-EX25	640,431														
11	Infranchise Storage Commodity (10 ³ m ³)	2,632,836	1,530,389	507,903	208,316	9,051	268,845	74,182	2,424	31,628	98					
12	STORAGECOM (10 ³ m ³)	4,467,621	1,530,389	507,903	208,316	9,051	268,845	74,182	2,424	31,628	98	72,856	0	208,471	0	118,137
<u>Storage Space Allocator</u>																
12	Storage Space (Excl. Contingency) (10 ³ m ³)	2,396,632	-----	-----	-----	-----	1,312,591	-----	-----	-----	-----	49,441	0	234,095	0	80,826
13	Winter Volumes (Nov-Mar) (10 ³ m ³)	3,418,644	2,106,038	707,549	211,980	7,212	276,667	76,023	0	33,013	161					
14	151 days based on Average Annual Volumes (10 ³ m ³)	2,090,191	1,216,085	403,592	165,533	7,192	213,631	58,947	0	25,132	78					
15	Aggregate Excess	1,328,453	889,953	303,956	46,447	20	63,036	17,076	0	7,881	83					
16	North allocated on XSPK&AVG	8,685														
17	Infranchise Space Allocated on Aggregate Excess (10 ³ m ³)	1,312,591	879,328	300,327	45,892	19	62,284	16,872	0	7,787	82					
18	STORAGEEXCESS (10 ³ m ³)	2,396,632	879,328	300,327	45,892	19	62,284	16,872	0	7,787	82	49,441	0	234,095	0	80,826

UNION GAS LIMITED
Blended Allocation Detail Report - Storage
Year Ending December 31, 2013

Line No.	Particulars	Total	Excess Utility Storage Space	Firm Transportation Service C1	Interruptible Trans. Service & Exchanges C1	Dawn- Trafalgar Transport Service M12	Local Production Transportation Service M13	Storage Transportation Service M16	Small Volume General Firm Service R01	Large Volume General Firm Service R10	Medium Volume Firm Service R20	Large Volume High Load Factor Firm Service R100	Large Volume Interruptible Service R25
<u>Storage Demand Allocator</u>													
1	Design Day Demand (10 ³ m ³ /day)	196,190	3,645	0	0	117,041	0	0	-----	7,759	-----		
2	Winter Volumes												
3	Less: Design Day Deliveries (10 ³ m ³ /day)	153,126	0	0	0	117,041							
4	NETFROMSTOR - Union (10 ³ m ³ /day)	43,064	3,645			0			-----	7,759	-----		
5	North allocated on XSPK&AVG								6,498	1,701	455	32	0
6									5,805	1,520	406	29	0
7	NETFROMSTOR (10 ³ m ³ /day)	43,064	3,645	0	0	0	0	0	5,805	1,520	406	29	0
<u>Storage Commodity Allocator</u>													
8	Storage Commodity (10 ³ m ³)	4,467,621	595,744						-----	839,577	-----		
9	Infranchise Delivery Volume excluding T1/T3 (10 ³ m ³)	5,057,103											
10	Union North - NWINSALES-EX25	640,431							447,816	140,953	50,073	1,589	0
11	Infranchise Storage Commodity (10 ³ m ³)	2,632,836							587,067	184,783	65,644	2,083	0
12	STORAGECOM (10 ³ m ³)	4,467,621	595,744	0	0	0	0	0	587,067	184,783	65,644	2,083	0
<u>Storage Space Allocator</u>													
12	Storage Space (Excl. Contingency) (10 ³ m ³)	2,396,632	299,890						-----	419,789	-----		
13	Winter Volumes (Nov-Mar) (10 ³ m ³)	3,418,644											
14	151 days based on Average Annual Volumes (10 ³ m ³)	2,090,191											
15	Aggregate Excess	1,328,453											
16	North allocated on XSPK&AVG	8,685							6,498	1,701	455	32	0
17	Infranchise Space Allocated on Aggregate Excess (10 ³ m ³)	1,312,591											
18	STORAGEXCESS (10 ³ m ³)	2,396,632	299,890	0	0	0	0	0	314,050	82,217	21,975	1,546	0

UNION GAS LIMITED
Blended Allocation Detail Report - Storage
Year Ending December 31, 2013

Line No.	Particulars	Total	Gen. Service Small Volume M1	Gen. Service Large Volume M2	Firm Contract M4	Interruptible Contract-Firm M5	Interruptible Contract-Interruptible M5	SLV Contract - Firm M7	SLV Contract - Interruptible M7	Large Wholesale Service M9	Small Wholesale Service M10	Storage & Transportation Service - Firm T1	Storage & Transportation Service - Interruptible T1	Storage & Transportation Service - Firm T2	Storage & Transportation Service - Interruptible T2	Wholesale Storage & Transportation Service T3
<u>Dehydrator Demand Allocator</u>																
1	Storage Deliverability (10 ³ m ³ /day)	43,064	15,358	5,214	1,295	7	0	481	0	86	9	1,455	0	6,255	0	1,500
2	DEHYDEMAND (10 ³ m ³ /day)	43,064	15,358	5,214	1,295	7	0	481	0	86	9	1,455	0	6,255	0	1,500
<u>Dehydrator Commodity Allocator</u>																
3	Storage Commodity	862,485	-----	-----	-----	-----	542,179	-----	-----	-----	-----	9,657	0	37,488	0	20,835
4	Infranchise Delivery Vol excluding T1/T3 (10 ³ m ³)	5,057,103	2,939,543	975,571	400,129	17,385	516,392	142,488	4,655	60,750	189	0	0	0	0	0
5	North on NWINSALES-EX25	640,431														
6	Infranchise Dehy Commodity (10 ³ m ³)	695,214	315,153	104,592	42,898	1,864	55,363	15,276	499	6,513	20					
7	DEHYCOMMODITY (10 ³ m ³)	862,485	315,153	104,592	42,898	1,864	55,363	15,276	499	6,513	20	9,657	0	37,488	0	20,835

UNION GAS LIMITED
Blended Allocation Detail Report - Storage
Year Ending December 31, 2013

Line No.	Particulars	Total	Excess Utility Storage Space	Firm Transportation Service C1	Interruptible Trans. Service & Exchanges C1	Dawn-Trafalgar Transport Service M12	Local Production Transportation Service M13	Storage Transportation Service M16	Small Volume General Firm Service R01	Large Volume General Firm Service R10	Medium Volume Firm Service R20	Large Volume High Load Factor Firm Service R100	Large Volume Interruptible Service R25
<u>Dehydrator Demand Allocator</u>													
Monthly													
1	Storage Deliverability (10 ³ m ³ /day)	43,064	3,645	0	0	0	0	0	5,805	1,520	406	29	0
2	DEHYDEMAND (10 ³ m ³ /day)	43,064	3,645	0	0	0	0	0	5,805	1,520	406	29	0
<u>Dehydrator Commodity Allocator</u>													
3	Storage Commodity	862,485	99,291						-----				
4	Infranchise Delivery Vol excluding T1/T3 (10 ³ m ³)	5,057,103	0	0	0	0	0	0					
5	North on NWINSALES-EX25	640,431							447,816	140,953	50,073	1,589	0
6	Infranchise Dehy Commodity (10 ³ m ³)	695,214							107,008	33,681	11,965	380	0
7	DEHYCOMMODITY (10 ³ m ³)	862,485	99,291	0	0	0	0	0	107,008	33,681	11,965	380	0

Line No.	Particulars	Allocator	Total	Gen. Service Small Volume M1	Gen. Service Large Volume M2	Firm Contract M4	Interruptible Contract-Firm M5	Interruptible Contract-Interruptible M5	Large Volume Contract - Firm M7	Large Volume Contract - Interruptible M7	Large Wholesale Service M9	Small Wholesale Service M10	Transportation Service - Firm T1	Transportation Service - Interruptible T1	Transportation Service - Firm T2	Transportation Service - Interruptible T2	Storage & Transportation Service T3
Components																	
1	Temperature Risk (10 ³ m ³)	Winter volumes	2,813,587	2,106,038	707,549												
2	(1.9 PJ)		100%	74.85%	25.15%												
3			51,273	38,379	12,894												
4	Supply Backstopping (10 ³ m ³)	Aggregate excess	1,328,453	889,953	303,956	46,447	20	63,036	17,076	0	7,881	83	0	0	0	0	0
5	(0.7 PJ)		100%	66.99%	22.88%	3.50%	0.00%	4.75%	1.29%	0.00%	0.59%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
6			19,546	13,094	4,472	683	0	927	251	0	116	1	0	0	0	0	0
7	Line Pack (10 ³ m ³)	Firm design day	31,737	1,820	612	178	2	0	82	0	29	1	88	0	570	0	207
8	(1.1 PJ)		100%	5.74%	1.93%	0.56%	0.01%	0.00%	0.26%	0.00%	0.09%	0.00%	0.28%	0.00%	1.80%	0.00%	0.65%
9			28,611	1,641	551	160	2	0	74	0	26	1	79	0	514	0	186
10	OBA (10 ³ m ³)	Delivery Volumes	40,781,431	2,939,543	975,571	400,129	17,385	516,392	142,488	4,655	60,750	189	473,443	63,286	4,258,722	135,097	272,712
11	(0.9 PJ)	North uses excess of design day	100%	7.21%	2.39%	0.98%	0.04%	1.27%	0.35%	0.01%	0.15%	0.00%	1.16%	0.16%	10.44%	0.33%	0.67%
12		peak and average	24,645	1,776	590	242	11	312	86	3	37	0	286	38	2,574	82	165
13	UFG (10 ³ m ³)	Transmission volumes	10,491	939	312	128	6	165	46	1	19	0	151	20	1,360	43	87
14	(2.2 PJ)	Storage injection & withdrawal volumes	2,293	426	141	58	3	75	21	1	9	0	20	0	58	0	33
15		Volumes are multiplied by the UFG factor	12,784	1,365	453	186	8	240	66	2	28	0	171	20	1,418	43	120
16		plus excess utility and long-term storage	100%	10.67%	3.54%	1.45%	0.06%	1.88%	0.52%	0.02%	0.22%	0.00%	1.34%	0.16%	11.09%	0.34%	0.94%
17		direct assignment	59,488	6,351	2,108	864	38	1,116	308	10	131	0	798	94	6,599	201	558
18	Hysteresis - Empty Space (10 ³ m ³)	Revised Storage Space excluding	2,280,306	940,569	320,942	47,842	69	64,639	17,591	13	8,097	84	50,604	132	243,781	282	81,735
19	(0.7 PJ)	excess utility and long-term storage volumes	100%	41.25%	14.07%	2.10%	0.00%	2.83%	0.77%	0.00%	0.36%	0.00%	2.22%	0.01%	10.69%	0.01%	3.58%
20			19,263	7,945	2,711	404	1	546	149	0	68	1	427	1	2,059	2	690
21	Hysteresis - Filled Space (10 ³ m ³)	Revised Storage Space	4,341,819	940,569	320,942	47,842	69	64,639	17,591	13	8,097	84	50,604	132	243,781	282	81,735
22	(1.2 PJ)		100%	21.66%	7.39%	1.10%	0.00%	1.49%	0.41%	0.00%	0.19%	0.00%	1.17%	0.00%	5.61%	0.01%	1.88%
23			32														

Line No.	Particulars	Allocator	Total	Excess Utility Storage Space	Firm Transportation Service C1	Interruptible Trans. Service & Exchanges C1	Trafalgar Transport Service M12	Production Transportation Service M13	Storage Transportation Service M16	Volume General Firm Service R01	Volume General Firm Service R10	Medium Volume Firm Service R20	High Load Factor Firm Service R100	Volume Interruptible Service R25
Components														
1	Temperature Risk (10 ³ m ³) (1.9 PJJs)	Winter volumes	2,813,587											
2			100%											
3			51,273											
4	Supply Backstopping (10 ³ m ³) (0.7 PJJs)	Aggregate excess	1,328,453	0	0	0	0	0	0	0	0	0	0	0
5			100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6			19,546	0	0	0	0	0	0	0	0	0	0	0
7	Line Pack (10 ³ m ³) (1.1 PJJs)	Firm design day	31,737	0	0	0	26,557	0	0	1,191	312	83	6	0
8			100%	0.00%	0.00%	0.00%	83.68%	0.00%	0.00%	3.75%	0.98%	0.26%	0.02%	0.00%
9			28,611	0	0	0	23,941	0	0	1,074	281	75	5	0
10	OBA (10 ³ m ³) (0.9 PJJs)	Delivery Volumes	40,781,431	5,425,323	1,050,671	4,702,773	18,846,004	157,205	330,405	6,498	1,701	455	32	0
11		North uses excess of design day	100%	13.30%	2.58%	11.53%	46.21%	0.39%	0.81%	0.02%	0.00%	0.00%	0.00%	0.00%
12		peak and average	24,645	3,279	635	2,842	11,389	95	200	4	1	0	0	0
13	UFG (10 ³ m ³) (2.2 PJJs)	Transmission volumes	10,491	0	292	1,309	5,244	44	92	163	51	18	1	0
14		Storage injection & withdrawal volumes	2,293	1,216	0	0	0	0	0	163	51	18	1	0
15		Volumes are multiplied by the UFG factor	12,784	1,216	292	1,309	5,244	44	92	327	103	37	1	0
16		plus excess utility and long-term storage	100%	9.51%	2.29%	10.24%	41.02%	0.34%	0.72%	2.56%	0.80%	0.29%	0.01%	0.00%
17		direct assignment	59,488	5,658	1,360	6,088	24,399	204	428	1,520	478	170	5	0
18	Hysteresis - Empty Space (10 ³ m ³) (0.7 PJJs)	Revised Storage Space excluding	2,280,306	8,937	1,995	8,930	59,729	299	627	316,649	82,978	22,220	1,557	0
19		excess utility and long-term storage volumes	100%	0.39%	0.09%	0.39%	2.62%	0.01%	0.03%	13.89%	3.64%	0.97%	0.07%	0.00%
20			19,263	75	17	75	505	3	5	2,675	701	188	13	0
21	Hysteresis - Filled Space (10 ³ m ³) (1.2 PJJs)	Revised Storage Space	4,341,819	2,070,450	1,995	8,930	59,729	299	627	316,649	82,978	22,220	1,557	0
22			100%	47.69%	0.05%	0.21%	1.38%	0.01%	0.01%	7.29%	1.91%	0.51%	0.04%	0.00%
23			32,577	15,535	15	67	448	2	5	2,376	623	167	12	0
24	SYSINTEGRITY (10 ³ m ³) (8.9 PJJs)		235,404	24,547	2,027	9,073	60,682	303	637	7,649	2,084	600	36	0
25			100%	10%	1%	4%	26%	0%	0%	3%	1%	0%	0%	0%
Allocation of System Integrity to the North (10 ³ m ³):														
26	(0.6 PJJs)	Excess of design day peak and average	8,685							6,498	1,701	455	32	0
27			16,997							12,716	3,329	890	63	0
28			100%							75%	20%	5%	0%	0%
29</														

UNION GAS LIMITED
Blended Allocation Detail Report - Dawn-Trafalgar Transmission
Year Ending December 31, 2013

Line No.	Particulars	Total	Gen. Service Small Volume M1	Gen. Service Large Volume M2	Firm Contract M4	Interruptible Contract-Firm M5	Interruptible Contract-Interruptible M5	Special Large Volume Contract - Firm M7	Special Large Volume Contract - Interruptible M7	Large Wholesale Service M9	Small Wholesale Service M10	Storage & Transportation Service - Firm T1	Storage & Transportation Service - Interruptible T1	Storage & Transportation Service - Firm T2	Storage & Transportation Service - Interruptible T2	Wholesale Storage & Transportation Service T3
Dawn-Trafalgar Demand Allocator																
1	Dawn-Trafalgar Demand (10 ⁶ m ³ /day)	31,737	-----	-----	-----	-----	-----	-----	3,588	-----	-----	-----	-----	-----	-----	-----
2	Infranchise Peak Day Demand (10 ³ m ³ /day)	43,624	22,132	7,435	2,162	20		997		356	11	1,068	0	6,931	0	2,511
3	North allocated on XSPK&AVG	8,685														
4	Infranchise Dawn -Trafalgar Demand															
4	Allocated on Infranchise Peak Day Demand (10 ⁶ m ³ /day)	5,180	1,820	612	178	2	0	82	0	29	1	88	0	570	0	207
5	DTTRANS (10 ⁶ m ³ /day)	31,737	1,820	612	178	2	0	82	0	29	1	88	0	570	0	207
Dawn Compression Allocator																
6	Dawn Compression (10 ³ m ³ /day)	150,183	-----	-----	-----	-----	-----	-----	26,186	-----	-----	-----	-----	-----	-----	-----
7	OSE load not requiring Dawn Compression	-1,100	-----	-----	-----	-----	-----	-----	-192	-----	-----	-----	-----	-----	-----	-----
8	Dawn Compression excl. OSE (10 ³ m ³ /day)	149,083	-----	-----	-----	-----	-----	-----	25,994	-----	-----	-----	-----	-----	-----	-----
9	Infranchise Peak Day Demand (10 ³ m ³ /day)	43,624	22,132	7,435	2,162	20	0	997	0	356	11	1,068	0	6,931	0	2,511
10	North allocated on XSPK&AVG															
11	Infranchise Dawn Compression Allocation (10 ³ m ³ /day)	32,899	13,188	4,431	1,288	12	0	594	0	212	7	637	0	4,130	0	1,496
12	DAWNCOMP (10 ³ m ³ /day)	149,083	13,188	4,431	1,288	12	0	594	0	212	7	637	0	4,130	0	1,496

UNION GAS LIMITED
Blended Allocation Detail Report - Dawn-Trafalgar Transmission
Year Ending December 31, 2013

Line No.	Particulars	Total	Excess Utility Storage Space	Firm Transportation Service C1	Interruptible Trans. Service & Exchanges C1	Dawn- Trafalgar Transport Service M12	Local Production Transportation Service M13	Storage Transportation Service M16	Small Volume General Firm Service R01	Large Volume General Firm Service R10	Medium Volume Firm Service R20	Large Volume High Load Factor Firm Service R100	Large Volume Interruptible Service R25
<u>Dawn-Trafalgar Demand Allocator</u>													
1	Dawn-Trafalgar Demand (10 ⁶ m ³ /day)	31,737				26,557			-----		1,592	-----	
2	Infranchise Peak Day Demand (10 ³ m ³ /day)	43,624											
3	North allocated on XSPK&AVG	8,685							6,498	1,701	455	32	0
4	Infranchise Dawn -Trafalgar Demand												
4	Allocated on Infranchise Peak Day Demand (10 ⁶ m ³ /day)	5,180							1,191	312	83	6	0
5	DTTRANS (10 ⁶ m ³ /day)	31,737	0	0	0	26,557	0	0	1,191	312	83	6	0
<u>Dawn Compression Allocator</u>													
6	Dawn Compression (10 ³ m ³ /day)	150,183				117,041					6,956		
7	OSE load not requiring Dawn Compression	-1,100				-857			-----		-51	-----	
8	Dawn Compression excl. OSE (10 ³ m ³ /day)	149,083				116,184			-----		6,905	-----	
9	Infranchise Peak Day Demand (10 ³ m ³ /day)	43,624											
10	North allocated on XSPK&AVG								6,498	1,701	455	32	0
11	Infranchise Dawn Compression Allocation (10 ³ m ³ /day)	32,899							5,166	1,352	361	25	0
12	DAWNCOMP (10 ³ m ³ /day)	149,083	0	0	0	116,184	0	0	5,166	1,352	361	25	0

UNION GAS LIMITED																
Blended Allocation Detail Report - Other Transmission																
Year Ending December 31, 2013																
Line No.	Particulars	Total	Gen. Service Small Volume M1	Gen. Service Large Volume M2	Firm Contract M4	Interruptible Contract-Firm M5	Interruptible Contract-Interruptible M5	Special Large Volume Contract - Firm M7	Special Large Volume Contract - Interruptible M7	Large Wholesale Service M9	Small Wholesale Service M10	Storage & Transportation Service - Firm T1	Storage & Transportation Service - Interruptible T1	Storage & Transportation Service - Firm T2	Storage & Transportation Service - Interruptible T2	Wholesale Storage & Transportation Service T3
Other Transmission Demand Allocator																
1	OTHERTRANS (10 ³ m ³ /day)	67,745	28,724	9,650	3,113	51	0	1,128	0	362	11	2,654	0	19,541	0	2,511
Ojibway-St. Clair Demand Allocator																
2	Ojibway-St. Clair Peak Day Demand (10 ³ m ³ /day)	15,188	-----						12,452	-----						
3	Infranchise Ojibway-St. Clair Demand Allocation (10 ³ m ³ /day) North allocate on XSPK&AVG	23,722	6,331	2,127	941	30	0	131	0	0	0	1,570	0	12,592	0	0
4	(10 ³ m ³ /day)	12,452	3,323	1,116	494	16	0	69	0	0	0	824	0	6,610	0	0
5	O/SC_DEMAND (10 ³ m ³ /day)	15,188	3,323	1,116	494	16	0	69	0	0	0	824	0	6,610	0	0

UNION GAS LIMITED
Blended Allocation Detail Report - Other Transmission
Year Ending December 31, 2013

Line No.	Particulars	Total	Excess Utility Storage Space	Firm Transportation Service C1	Interruptible Trans. Service & Exchanges C1	Dawn-Trafalgar Transport Service M12	Local Production Transportation Service M13	Storage Transportation Service M16	Small Volume General Firm Service R01	Large Volume General Firm Service R10	Medium Volume Firm Service R20	Large Volume High Load Factor Firm Service R100	Large Volume Interruptible Service R25
<u>Other Transmission Demand Allocator</u>													
1	OTHERTRANS (10 ³ m ³ /day)	67,745	0	0	0	0	0	0	0	0	0	0	0
<u>Ojibway-St. Clair Demand Allocator</u>													
2	Ojibway-St. Clair Peak Day Demand (10 ³ m ³ /day)	15,188	0	2,264	0	0	0	473					
3	Infranchise Ojibway-St. Clair Demand Allocation (10 ³ m ³ /day) North allocate on XSPK&AVG	23,722							6,498	1,701	455	32	0
4	(10 ³ m ³ /day)	12,452							0	0	0	0	0
5	O/SC_DEMAND (10 ³ m ³ /day)	15,188	0	2,264	0	0	0	473	0	0	0	0	0

UNION GAS LIMITED
Distribution Allocation Factors
Year Ending December 31, 2013

Line No.	Particulars	Total	Gen. Service Small Volume M1	Gen. Service Large Volume M2	Firm Contract M4	Interruptible Contract-Firm M5	Interruptible Contract-Interruptible M5	Special Large Volume Contract - Firm M7	Special Large Volume Contract - Interruptible M7	Large Wholesale Service M9	Small Wholesale Service M10	Storage & Transportation Service - Firm T1	Storage & Transportation Service - Interruptible T1	Storage & Transportation Service - Firm T2	Storage & Transportation Service - Interruptible T2	Wholesale Storage & Transportation Service T3
<u>Distribution Demand Allocator</u>																
1	Infranchise Peak Day Demand (10 ⁴ m ³ /day)	74,701	28,724	9,650	3,113	51	3,801	1,128	152	0	0	2,654	390	19,541	5,498	0
2	Less: Customers Serviced Off Transmission Lines	<u>25,382</u>	<u>0</u>	<u>0</u>	<u>386</u>	<u>0</u>	<u>46</u>	<u>543</u>	<u>152</u>	<u>0</u>	<u>0</u>	<u>939</u>	<u>250</u>	<u>18,373</u>	<u>4,694</u>	<u>0</u>
3	DISTDEMAND (10 ³ m ³ /day)	49,319	28,724	9,650	2,727	51	3,755	585	0	0	0	1,716	140	1,167	805	0
4		100.0%	58.2%	19.6%	5.5%	0.1%	7.6%	1.2%	0.0%	0.0%	0.0%	3.5%	0.3%	2.4%	1.6%	0.0%

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, Tables 10-1 and 10-2, pp. 6-7

Please provide workpapers detailing the information presented in Exhibit A, Tab 10, Tables 10-1 and 10-2.

Response:

Please see the response at Exhibit B.Energy Probe.16 a).

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, pp. 8-9

Please provide workpapers showing the derivation of cost components allocated on the basis of rate base and O&M as described on Exhibit A, Tab 10, pages 8-9. Also provide the cost allocation study and associated workpapers showing the reallocation of the cost components.

Response:

Please see Attachment 1.

UNION GAS LIMITED
Detailed Functionalization of the 2018 Dawn H, Lobo D and Bright C Compressor Project Revenue Requirement by Cost Component.

Line No.	Particulars (\$000's)	Total	Functionalization Factors (1)	Purchase Production	Storage		Transmission				Distribution
					Dehydrator	Excluding Dehydrator	Dawn Station	Dawn-Parkway Easterly	Other Transmission	Ojibway/ St. Clair	
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
<u>Gross Plant</u>											
1	Underground Storage Plant	246,905	Direct Assign	-	-	-	246,905	-	-	-	-
2	Transmission Plant	368,128	Direct Assign	-	-	-	-	368,128	-	-	-
3	General Plant - Indirect	-	INDIRECT_I&II	(89)	(18)	(1,164)	8,516	8,307	(1,574)	(185)	(13,793)
4	Total Gross Plant in Service	615,033		(89)	(18)	(1,164)	255,421	376,436	(1,574)	(185)	(13,793)
<u>Accumulated Depreciation</u>											
5	Underground Storage	9,196	Direct Assign	-	-	-	9,196	-	-	-	-
6	Transmission Plant	13,498	Direct Assign	-	-	-	-	13,498	-	-	-
7	General Plant - Indirect	-	INDIRECT_I&II	(41)	(8)	(541)	3,955	3,858	(731)	(86)	(6,406)
8	Total Accumulated Depreciation	22,694		(41)	(8)	(541)	13,151	17,357	(731)	(86)	(6,406)
<u>Working Capital</u>											
9	O&M Working Capital - Project	186	Direct Assign	-	-	-	83	103	-	-	-
10	O&M Working Capital - Indirect	-	INDIRECT_II	(13)	(0)	(32)	155	178	(42)	(5)	(241)
11	Inventory of Stores and Spare Equipment - Indirect	-	INDIRECT_I	-	(4)	(209)	1,651	1,569	(284)	(34)	(2,690)
12	Prepaid and Deferred Expense - Indirect	-	INDIRECT_I	-	(1)	(35)	276	263	(47)	(6)	(450)
13	Total Working Capital	186		(13)	(5)	(276)	2,166	2,112	(373)	(44)	(3,382)
14	Accumulated Deferred Taxes	(0)	DEFTAXDIRECT / DEFERTAXBASE	0	7	3,363	(3,949)	(1,184)	1,397	304	62
15	Total Rate Base	592,525		(60)	(8)	2,463	240,487	360,007	181	161	(10,706)
<u>Return on Rate Base</u>											
16	Return on Project Rate Base @ 5.77%	34,217		-	-	-	13,732	20,485	-	-	-
17	Return on Board Approved Rate Base @ 7.32%	(0)		(4)	(1)	180	197	386	13	12	(784)
18	Total Return on Rate Base	34,217		(4)	(1)	180	13,929	20,871	13	12	(784)
<u>Operating Expenses</u>											
19	Underground Storage - Compressors	1,622	Direct Assign	-	-	-	1,622	-	-	-	-
20	Transmission - Compressors	2,001	Direct Assign	-	-	-	-	2,001	-	-	-
21	General Operating and Engineering - Indirect	(0)	GENOPACT	-	(0)	(198)	223	355	(341)	(36)	(4)
22	Administrative and General - Indirect	(0)	O&MEXP	(68)	(0)	(195)	932	1,062	(260)	(30)	(1,441)
23	Employee Benefits - Indirect	(0)	LABOUR	(35)	(0)	(103)	498	533	(139)	(17)	(737)
24	Total Operating Expenses	3,623		(103)	(1)	(496)	3,276	3,951	(739)	(83)	(2,182)
<u>Depreciation Expense</u>											
25	Underground Storage Plant	7,757	Direct Assign	-	-	-	7,757	-	-	-	-
26	Transmission Plant	11,660	Direct Assign	-	-	-	-	11,660	-	-	-
27	General Plant - Indirect	0	INDIRECT_I&II	(12)	(2)	(152)	1,108	1,081	(205)	(24)	(1,795)
28	Total Depreciation Expense	19,416		(12)	(2)	(152)	8,865	12,741	(205)	(24)	(1,795)
29	Accumulated Deferred Tax Drawdown	-	DTDRAWDOWN	0	1	732	(860)	(258)	304	66	14
<u>Taxes</u>											
30	Income Taxes - Project	(15,669)	RATEBASE	145	(10)	(1,485)	(1,161)	(4,343)	(826)	(100)	(7,890)
31	Income Taxes - Indirect	-	RATEBASE	46	(3)	(456)	1,670	1,663	(264)	(31)	(2,625)
32	Property Tax	1,051	PROPTAX	0	(0)	(278)	357	271	116	(15)	601
33	Total Taxes	(14,618)		192	(13)	(2,220)	866	(2,409)	(974)	(146)	(9,913)
34	Total Project related revenue requirement (2)	42,639		145	(10)	(1,764)	22,307	30,073	(711)	(115)	(7,288)
35	Total indirect shift in cost (3)	(0)		(72)	(7)	(924)	4,628	5,080	(1,194)	(126)	(7,386)
36	Total Revenue Requirement (line 34 + line 35)	42,639		73	(15)	(1,955)	26,076	34,896	(1,601)	(175)	(14,661)

Notes:

- (1) Functionalization factor descriptions as per EB-2011-0210, Exhibit G3, Tab 1, Schedule 1, Appendix A, page 1-8.
- (2) Calculated as (line 16 + lines 19-20 + lines 25-26 + line 30 + line 32)
- (3) Calculated as (line 17 + lines 21-23 + line 27 + line 31)

UNION GAS LIMITED
Detailed Allocation of the 2018 Dawn H, Lobo D and Bright C Compressor Project Revenue Requirement by Cost Component.

Line No.	Particular's (\$000's)	Total	Allocation Factors (1)	In-franchise		Ex-franchise	
				Union South	Union North	M12	Other Ex-franchise
		(a)	(b)	(c)	(d)	(e)	(f)
<u>Gross Plant</u>							
1	Underground Storage Plant	246,905	DAWNCOMP	38,828	10,314	197,763	-
2	Transmission Plant	368,128	DTTRANS	28,609	12,698	326,822	-
3	General Plant - Indirect	0	Various (2)	(9,797)	(4,376)	14,337	(164)
4	Total Gross Plant in Service	615,033		57,640	18,636	538,921	(164)
<u>Accumulated Depreciation</u>							
5	Underground Storage Plant	9,196	DAWNCOMP	728	193	8,275	-
6	Transmission Plant	13,498	DTTRANS	(2,513)	(1,115)	17,127	-
7	General Plant - Indirect	0	Various (2)	(4,552)	(2,031)	6,659	(76)
8	Total Accumulated Depreciation	22,694		(6,337)	(2,953)	32,060	(76)
<u>Working Capital</u>							
9	O&M Working Capital - Dawn Station	83	DAWNCOMP	14	4	66	-
10	O&M Working Capital - DT East	103	DTTRANS	11	5	87	-
11	Inventory of Stores and Spare Equipment - Indirect	-	Various (3)	(2,225)	(476)	2,726	(26)
12	Prepaid and Deferred Expense - Indirect	(0)	Various (3)	(372)	(80)	456	(4)
13	Other Working Capital - Indirect	0	Various (4)	(295)	(105)	405	(5)
14	Total Working Capital	186		(2,868)	(651)	3,740	(35)
15	Accumulated Deferred Taxes - Indirect	(0)	Various (5)	3,648	477	(4,473)	347
16	Total Rate Base	592,525		64,668	21,375	506,257	224
<u>Return on Rate Base</u>							
17	Return on Project Rate Base @ 5.77%	34,217		4,406	1,555	28,256	-
18	Return on Board Approved Rate Base @ 7.32%	(0)		(852)	(406)	1,242	16
19	Total Return on Rate Base	34,217		3,555	1,149	29,497	16
<u>Operating Expense</u>							
20	Underground Storage - Compressors	1,622	DAWNCOMP	247	66	1,309	-
21	Transmission - Compressor	2,001	DTTRANS	196	87	1,718	-
22	General Operating and Engineering - Indirect	(0)	GENOPACT/SCADA	(489)	(33)	555	(34)
23	Administrative and General - Indirect	0	O&M Expense Allocators	(1,315)	(428)	1,773	(30)
24	Employee Benefits - Indirect	(0)	LABOUR	(678)	(226)	920	(16)
25	Other Storage and Transmission Operating Expenses - Indirect	(0)	DAWNCOMP / DTTRANS	(84)	(33)	117	-
26	Total Operating Costs	3,623		(2,122)	(567)	6,393	(81)
<u>Depreciation Expense</u>							
27	Underground Storage Plant	7,757	DAWNCOMP	1,270	337	6,149	-
28	Transmission Plant	11,660	DTTRANS	1,228	545	9,886	-
29	General Plant - Indirect	(0)	Various (2)	(1,552)	(688)	2,262	(21)
30	Total Depreciation Expense	19,416		946	194	18,298	(21)
31	Accumulated Deferred Tax Drawdown - Indirect	0	Various (5)	794	104	(974)	76
<u>Taxes</u>							
32	Income Taxes - Project	(15,669)	Various (3)	(7,545)	(3,385)	(4,630)	(109)
33	Income Taxes - Indirect	-	Various (3)	(1,875)	(906)	2,808	(27)
34	Property Tax	1,051	Various (6)	259	127	692	(27)
35	Total Taxes	(14,618)		(9,161)	(4,164)	(1,130)	(163)
36	Total Project Related Revenue Requirement (7)	42,639		61	(668)	43,381	(136)
37	Total Indirect Shift in Costs (8)	(0)		(6,050)	(2,616)	8,704	(37)
38	Total Revenue Requirement (line 36 + line 37)	42,639		(5,988)	(3,284)	52,085	(173)

Notes:

- (1) Allocation factor descriptions as per EB-2011-0210, Exhibit G3, Tab 1, Schedule 1, Appendix C, page 1-15.
- (2) General plant allocation is based on a 50/50 split of rate base and O&M.
- (3) Income taxes are allocated in proportion to rate base.
- (4) Shift in costs based on incremental M12 Project demands of 452,911 GJ/d.
- (5) Various based on functionalization of deferred taxes.
- (6) Property tax allocation is based on plant and property tax detail.
- (7) Calculated as (line 17 + lines 20-21 + lines 27-28 + line 32 + line 34)
- (8) Calculated as (line 18 + lines 22-25+ lines 29 + line 31 + line 33)

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, Schedules 1 and 2

Please provide Exhibit A, Tab 10, Schedules 1 and 2 in Microsoft Excel format with inputs and formulas intact.

Response:

Exhibit A, Tab 10, Schedules 1 and 2 have been provided in Microsoft Excel format directly to ANE via email, copying the Board. Should any other interested parties wish to receive the documents, Union requests they be contacted directly.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, Schedule 4

Please provide detailed workpapers associated with Exhibit A, Tab 10, Schedule 4.

Response:

Please see Attachment 1 for the working paper associated with Exhibit A, Tab 10, Schedule 4, column (b). Please see Attachment 2 for the working paper associated with Exhibit A, Tab 10, Schedule 4, column (e).

UNION GAS LIMITED
M12 Rate Design
Lobo D, Bright C and Dawn H Compressor Project
Effective January 1, 2018

Line No.	Particulars		Westerly Parkway to Kirkwall/Dawn (a)	Dawn to Parkway (b)	Easterly Dawn to Kirkwall (c)	Kirkwall to Parkway (d)	Total (e)	Dawn Compression (f)
	<u>Revenue Requirements (\$ 000's)</u>	(1)						
1	Dawn Easterly Demand						154,702	
2	System Integrity						862	
3	Total Transportation excl. Dawn Compression						155,565	
4	Dawn Compression							36,393
	<u>Allocation Units (GJ)</u>							
5	Easterly Demands	(2), (3), (4)		4,340,810	725,681	202,476	5,268,967	
6	Distance (km)			228.94	188.67	40.27		
7	Distance weighted 10 ⁶ m ³ /km (line 5 * line 6)			993,785	136,914	8,154	1,138,853	
8	Revenue Requirement (\$ 000's) (line 3 allocated using line 7)			135,749	18,702	1,114	155,565	
	<u>Westerly Demands (GJ)</u>							
9	Demand from C1	(5)	360,960					
10	Demand from Westerly M12-X	(6)	391,011					
11	Total Westerly Demands		751,971					
12	Commoditized (line 11 x 12 / 365)		24,722					
13	Recovered over 100 days (line 12 * 100)		2,472,234					
14	Units split between Parkway & Kirkwall (line 13 allocated using line 7)			2,157,319	297,215	17,700	2,472,234	
	<u>Dawn to Parkway Annual Demand Units (GJ)</u>							
15	Dawn to Parkway Demand 12 months	(7)		51,433,716				
16	Dawn to Parkway Demand 10 months	(8)		650,000				
17	Dawn to Parkway Demand 3 months	(9)		6,000				
18	Westerly Demand Units (line 14, col (b))			2,157,319				
19	Total Annual Billing Units (lines 15 + line 16 + line 17 + line 18)			54,247,035				
20	Dawn to Parkway Demand Rate (\$/GJ/day) (line 8 / line 19)			2.502				
21	Westerly Demand Rate (line 20 * 100 / 365)		0.686					
	<u>Westerly Revenue Adjustment (\$ 000's)</u>							
22	Annual Revenue (col. (a) line 11 * line 21 * 12 / 1000)				6,187	6,187		
23	Portion to Parkway (line 22 allocated using line 7)				5,399	5,399		
24	Net revenue requirement reduction to Kirkwall (total) (line 22 - line 23)				788	788		
25	Dawn to Kirkwall & Kirkwall to Parkway revenue requirement reduction (line 24 allocated using line 7)				744	44		
26	Revenue requirement to be recovered (\$000's) (line 8 - line 25)				17,958	1,069		
27	Annual billing units Dawn to Kirkwall (GJ) (line 5 * 12)				8,708,176			
28	Annual billing units Kirkwall to Parkway (GJ) (line 5 * 12)					2,429,716		
29	Dawn to Kirkwall Demand Charge (\$/GJ) (line 26 * 1000 / line 27)				2.062			
30	Kirkwall to Parkway Demand Charge (\$/GJ) (line 26 * 1000 / line 28)					0.440		
	<u>Dawn Compression Annual Billing Units (GJ)</u>							
31	Dawn to Parkway 12 months (line 15)							51,433,716
32	Dawn to Parkway 10 months (line 16)							650,000
33	Dawn to Parkway 3 months (line 17)							6,000
34	Dawn to Kirkwall (line 27)							8,708,176
35	Total Easterly M12 Demand (line 31 + line 32 + line 33 + line 34)							60,797,892
36	Dawn Compression Demand Charge (\$/GJ) (line 4 * 1000 / line 35)							0.599
	<u>Demand Charges: \$/GJ</u>							
37	Parkway to Kirkwall/Dawn (line 21)		0.686					
38	Dawn to Parkway with compression (line 20 + line 36)			3.101				
39	Dawn to Kirkwall with compression (line 29 + line 36)				2.661			
40	Kirkwall to Parkway without compression (line 30)					0.440		
41	<u>Commoditized Demand Charges: \$/GJ/day</u> (lines 37-40 * 12 / 365) (10)		0.023	0.102	0.087	0.014		0.020

Notes:
(1) Includes 2015 Revenue Requirement of \$152.0 million less 2015 capital pass-throughs of \$11.8 million (EB-2014-0271 Rate Order, Working Papers, Schedule 10 Updated, line 19, column (d)), plus 2017 Dawn-Parkway Revenue Requirement of \$52.1 million (EB-2015-0200 Exhibit A, Tab 10, Schedule 5, line 14, col (e)).
(2) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a), line 6 *10/12, line 7*3/12, line 8, line 9, incremental Dawn-Parkway project demands of 362,082 GJ/day.
(3) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 1 col (a), line 2 *10/12, line 3*2/12, line 4.
(4) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 11 col (a), line 12 *2/12, incremental Kirkwall-Parkway project demands of 84,854 GJ/day.
(5) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 23, line 4 col (a), line 5*3/12.
(6) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 10 col (a).
(7) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a) * 12, line 8 * 12, line 9 * 12, incremental Dawn-Parkway project demands of 362,082 GJ/day * 12.
(8) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 6 col (a) * 10.
(9) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 7 col (a) * 3.
(10) M12-X calculated as the sum of line 41 col (b) and (c).

UNION GAS LIMITED
M12 Rate Design
Lobo D, Bright C and Dawn H Compressor Project including Parkway Projects (1)
Effective January 1, 2018

Line No.	Particulars		Westerly Parkway to Kirkwall/Dawn (a)	Dawn to Parkway (b)	Easterly Dawn to Kirkwall (c)	Kirkwall to Parkway (d)	Total (e)	Dawn Compression (f)
	<u>Revenue Requirements (\$ 000's)</u>	(1)						
1	Dawn Easterly Demand						221,381	
2	System Integrity						817	
3	Total Transportation excl. Dawn Compression						222,197	
4	Dawn Compression							35,934
	<u>Allocation Units (GJ)</u>							
5	Easterly Demands	(2), (3), (4)		5,003,658	725,681	238,777	5,968,116	
6	Distance (km)			228.94	188.67	40.27		
7	Distance weighted $10^6 \text{ m}^3 / \text{km}$ (line 5 * line 6)			1,145,537	136,914	9,616	1,292,067	
8	Revenue Requirement (\$ 000's) (line 3 allocated using line 7)			196,999	23,545	1,654	222,197	
	<u>Westerly Demands (GJ)</u>							
9	Demand from C1	(5)	360,960					
10	Demand from Westerly M12-X	(6)	391,011					
11	Total Westerly Demands		751,971					
12	Commoditized (line 11 x 12 / 365)		24,722					
13	Recovered over 100 days (line 12 * 100)		2,472,234					
14	Units split between Parkway & Kirkwall (line 13 allocated using line 7)			2,191,865	261,971	18,398	2,472,234	
	<u>Dawn to Parkway Annual Demand Units (GJ)</u>							
15	Dawn to Parkway Demand 12 months	(7)		59,387,892				
16	Dawn to Parkway Demand 10 months	(8)		650,000				
17	Dawn to Parkway Demand 3 months	(9)		6,000				
18	Westerly Demand Units (line 14, col (b))			2,191,865				
19	Total Annual Billing Units (lines 15 + line 16 + line 17 + line 18)			62,235,757				
20	Dawn to Parkway Demand Rate (\$/GJ/day) (line 8 / line 19)			3.165				
21	Westerly Demand Rate (line 20 * 100 / 365)		0.867					
	<u>Westerly Revenue Adjustment (\$ 000's)</u>							
22	Annual Revenue (col. (a) line 11 * line 21 * 12 / 1000)				7,826	7,826		
23	Portion to Parkway (line 22 allocated using line 7)				6,938	6,938		
24	Net revenue requirement reduction to Kirkwall (total) (line 22 - line 23)				887	887		
25	Dawn to Kirkwall & Kirkwall to Parkway revenue requirement reduction (line 24 allocated using line 7)				829	58		
26	Revenue requirement to be recovered (\$000's) (line 8 - line 25)				22,716	1,595		
27	Annual billing units Dawn to Kirkwall (GJ) (line 5 * 12)				8,708,176			
28	Annual billing units Kirkwall to Parkway (GJ) (line 5 * 12)					2,865,328		
29	Dawn to Kirkwall Demand Charge (\$/GJ) (line 26 * 1000 / line 27)				2.609			
30	Kirkwall to Parkway Demand Charge (\$/GJ) (line 26 * 1000 / line 28)					0.557		
	<u>Dawn Compression Annual Billing Units (GJ)</u>							
31	Dawn to Parkway 12 months (line 15)							59,387,892
32	Dawn to Parkway 10 months (line 16)							650,000
33	Dawn to Parkway 3 months (line 17)							6,000
34	Dawn to Kirkwall (line 27)							8,708,176
35	Total Easterly M12 Demand (line 31 + line 32 + line 33 + line 34)							68,752,068
36	Dawn Compression Demand Charge (\$/GJ) (line 4 * 1000 / line 35)							0.523
	<u>Demand Charges: \$/GJ</u>							
37	Parkway to Kirkwall/Dawn (line 21)		0.867					
38	Dawn to Parkway with compression (line 20 + line 36)			3.688				
39	Dawn to Kirkwall with compression (line 29 + line 36)				3.131			
40	Kirkwall to Parkway without compression (line 30)					0.557		
41	<u>Commoditized Demand Charges: \$/GJ/day</u> (lines 37-40 * 12 / 365) (10)		0.029	0.121	0.103	0.018		0.017

Notes:
(1) Includes 2015 Revenue Requirement of \$152.0 million less 2015 capital pass-throughs of \$11.8 million (EB-2014-0271 Rate Order, Working Papers, Schedule 10 Updated, line 19, column (d)), plus Parkway Projects Revenue Requirement of \$34.6 million (EB-2012-0433 and EB-2013-0074), 2016 Dawn-Parkway Expansion Revenue Requirement of \$31.6 million (EB-2014-0261 Settlement Agreement), and 2017 Dawn-Parkway Revenue Requirement of \$52.1 million (EB-2015-0200 Exhibit A, Tab 10, Schedule 5, line 14, col (e)).
(2) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a), line 6 *10/12, line 7*3/12, line 8, line 9, incremental Dawn-Parkway project demands of 1,024,930 GJ/day.
(3) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 1 col (a), line 2 *10/12, line 3*2/12, line 4.
(4) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 11 col (a), line 12 *2/12, incremental Kirkwall-Parkway project demands of 121,155 GJ/day.
(5) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 23, line 4 col (a), line 5*3/12.
(6) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 10 col (a).
(7) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a) * 12, line 8 * 12, line 9 * 12, incremental Dawn-Parkway project demands of 362,082 GJ/day * 12.
(8) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 6 col (a) * 10.
(9) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 7 col (a) * 3.
(10) M12-X calculated as the sum of line 41 col (b) and (c).

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, p. 1

Please provide a list of other major capital projects that qualified for treatment under the capital pass-through mechanism during the term of Union's existing IRM.

Response:

The following major capital projects qualified for capital pass through mechanism treatment:

EB-2012-0433 – Parkway West Project
EB-2013-0074 – Brantford-Kirkwall/Parkway D Project
EB-2014-0261 – Dawn Parkway 2016 Project
EB-2014-0182 – Burlington Oakville Pipeline Project
EB-2015-0200 – Dawn Parkway 2017 Project

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, p. 1

Please indicate the annual revenue requirement and rate impact by rate schedule of any reallocation of general or other overhead costs resulting from each capital project identified in the previous question and all associated workpapers.

Response:

The revenue requirement and the reallocation of indirect costs for each capital project are provided at Attachment 1, pp. 1-4.

The 2018 cost allocation impacts of Lobo D, Bright C and Dawn H can be found at updated Exhibit A, Tab 10, Schedule 2.

UNION GAS LIMITED
Indirect Cost Allocation Impacts of 2016 Parkway West Project

Line No.	Particulars (\$000's)	Total Cost Allocation Impacts (a) = (d + h)	Dawn-Parkway Easterly Transmission				Other Functional Classifications		
			Project Costs (b)	Indirect Costs (c)	Total Costs (d) = (b + c)	Allocation (%) (1) (e)	Property and Income Tax Costs (2) (f)	Indirect Costs (g)	Total Costs (h) = (f + g)
1	Rate M1	(1,652)	979	227	1,206	6%	(835)	(2,024)	(2,859)
2	Rate M2	26	329	76	405	2%	(120)	(260)	(380)
3	Rate M4	13	96	22	118	1%	(29)	(76)	(105)
4	Rate M5	(87)	1	0	1	0%	(24)	(64)	(89)
5	Rate M7	20	44	10	54	0%	(10)	(24)	(34)
6	Rate M9	13	16	4	19	0%	(2)	(4)	(6)
7	Rate M10	0	0	0	1	0%	(0)	(0)	(0)
8	Rate T1	(19)	47	11	58	0%	(20)	(57)	(78)
9	Rate T2	38	307	71	378	2%	(97)	(243)	(340)
10	Rate T3	98	111	26	137	1%	(11)	(28)	(39)
11	Subtotal - Union South	(1,552)	1,930	448	2,378	11%	(1,149)	(2,781)	(3,930)
12	Excess Utility Space	(36)	0	0	0	0%	(15)	(21)	(36)
13	Rate C1	(21)	0	0	0	0%	(5)	(16)	(21)
14	Rate M12	17,466	14,282	3,319	17,601	84%	(47)	(88)	(135)
15	Rate M13	(1)	0	0	0	0%	(1)	0	(1)
16	Rate M16	(1)	0	0	0	0%	(1)	(1)	(1)
17	Subtotal - Ex-franchise	17,407	14,282	3,319	17,601	84%	(68)	(126)	(194)
18	Rate 01	(395)	641	149	790	4%	(381)	(804)	(1,184)
19	Rate 10	56	168	39	207	1%	(56)	(95)	(150)
20	Rate 20	(58)	45	10	55	0%	(39)	(74)	(113)
21	Rate 100	(88)	3	1	4	0%	(30)	(62)	(92)
22	Rate 25	(35)	0	0	0	0%	(11)	(24)	(35)
23	Subtotal - Union North	(519)	856	199	1,055	5%	(515)	(1,059)	(1,574)
24	In-franchise (line 11 + line 23)	(2,071)	2,786	647	3,433	16%	(1,664)	(3,840)	(5,504)
25	Ex-franchise (line 17)	17,407	14,282	3,319	17,601	84%	(68)	(126)	(194)
26	Total (line 24 + line 25)	15,336	17,068	3,966	21,034	100%	(1,732)	(3,966)	(5,698)

Notes:

- (1) The Dawn-Parkway demand allocation is provided at EB-2011-2010, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5.
- (2) Allocation of the property and income taxes associated with the Parkway West Project.

UNION GAS LIMITED
2018 Cost Allocation Impacts of Brantford to Kirkwall and Parkway D Compressor Project

Line No.	Particulars	Total Cost Allocation Impacts (\$000's)	Cost Allocation Change in Demands (1)		Dawn-Parkway Easterly Transmission (2)		Other Indirect Cost Impacts (\$000's)
		(a) = (b + d + f)	(b)	(c)	(d)	(e)	(f)
1	Rate M1	(1,403)	(756)	(4%)	1,017	5%	(1,665)
2	Rate M2	(121)	(254)	(1%)	342	2%	(209)
3	Rate M4	(29)	(74)	0%	99	1%	(55)
4	Rate M5	(49)	(1)	0%	1	0%	(49)
5	Rate M7	(7)	(34)	0%	46	0%	(18)
6	Rate M9	1	(12)	0%	16	0%	(3)
7	Rate M10	(0)	(0)	0%	1	0%	(0)
8	Rate T1	(27)	(36)	0%	49	0%	(39)
9	Rate T2	(83)	(237)	(1%)	319	2%	(164)
10	Rate T3	9	(86)	0%	115	1%	(20)
11	Subtotal - Union South	(1,708)	(1,490)	(8%)	2,005	10%	(2,224)
12	Excess Utility Space	(25)	0	0%	0	0%	(25)
13	Rate C1	(8)	0	0%	0	0%	(8)
14	Rate M12	16,083	99	1%	16,074	84%	(90)
15	Rate M13	(0)	0	0%	0	0%	(0)
16	Rate M16	(0)	0	0%	0	0%	(0)
17	Subtotal - Ex-franchise	16,050	99	1%	16,074	84%	(123)
18	R01	1,162	1,041	5%	843	4%	(722)
19	R10	400	272	1%	221	1%	(93)
20	R20	64	73	0%	59	0%	(68)
21	R100	(45)	5	0%	4	0%	(54)
22	R25	(21)	0	0%	0	0%	(21)
23	Subtotal - Union North	1,561	1,391	7%	1,127	5.870%	(958)
24	In-franchise	(147)	(99)	(1%)	3,133	16%	(3,181)
25	Ex-franchise	16,050	99	1%	16,074	84%	(123)
26	Total	15,902	(0)	0%	19,207	100%	(3,304)

Notes:

- (1) The 2013 Board approved cost allocation study updated to include incremental demands for the Union North of 70,000 GJ/d and Rate M12 of 363,000 GJ/d.
- (2) The Dawn-Parkway costs of \$15.902 million for the Parkway Growth project, including indirect costs of \$3.304 million, are allocated in proportion to Dawn to Parkway demand allocation provided at EB-2011-2010, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 70,000 GJ/d Union North and 363,000 GJ/d Rate M12 demands.

UNION GAS LIMITED
2018 Cost Allocation Impacts of Burlington to Oakville Project

Line No.	Particulars	Total Cost	Other Transmission Demand (1)				Other Functional Classifications		
		Allocation Impacts	Project Costs (2)	Indirect Costs	Total		Project Costs (3)	Indirect Costs	Total
		(\$000's)	(\$000's)	(\$000's)	(\$000's)	(%)	(\$000's)	(\$000's)	(\$000's)
		(a) = (d + h)	(b)	(c)	(d) = (b + c)	(e)	(f)	(g)	(h) = (f + g)
1	Rate M1	3,528	3,936	1,028	4,964	42%	(291)	(1,144)	(1,435)
2	Rate M2	1,486	1,322	345	1,668	14%	(40)	(142)	(181)
3	Rate M4	495	427	111	538	5%	(9)	(34)	(43)
4	Rate M5	(40)	7	2	9	0%	(9)	(39)	(49)
5	Rate M7	181	155	40	195	2%	(3)	(11)	(14)
6	Rate M9	61	50	13	63	1%	(1)	(1)	(2)
7	Rate M10	2	2	0	2	0%	(0)	(0)	(0)
8	Rate T1	431	364	95	459	4%	(6)	(22)	(28)
9	Rate T2	3,291	2,677	699	3,377	29%	(22)	(63)	(85)
10	Rate T3	423	344	90	434	4%	(3)	(8)	(11)
11	Subtotal - Union South	9,858	9,282	2,425	11,707	100%	(384)	(1,464)	(1,849)
12	Excess Utility Space	(22)	0	0	0	0%	(5)	(17)	(22)
13	Rate C1	(3)	0	0	0	0%	(2)	(1)	(3)
14	Rate M12	(361)	0	0	0	0%	(164)	(197)	(361)
15	Rate M13	2	1	0	1	0%	(0)	0	(0)
16	Rate M16	(0)	0	0	0	0%	(0)	0	(0)
17	Subtotal - Ex-franchise	(384)	1	0	1	0%	(171)	(215)	(386)
18	Rate 01	(694)	0	0	0	0%	(148)	(546)	(694)
19	Rate 10	(100)	0	0	0	0%	(22)	(78)	(100)
20	Rate 20	(71)	0	0	0	0%	(13)	(58)	(71)
21	Rate 100	(56)	0	0	0	0%	(10)	(46)	(56)
22	Rate 25	(20)	0	0	0	0%	(4)	(17)	(20)
23	Subtotal - Union North	(943)	0	0	0	0%	(197)	(746)	(943)
24	In-franchise (line 11 + line 23)	8,915	9,282	2,425	11,707	100%	(581)	(2,210)	(2,791)
25	Ex-franchise (line 17)	(384)	1	0	1	0%	(171)	(215)	(386)
26	Total (line 24 + line 25)	8,531	9,283	2,425	11,708	100%	(752)	(2,425)	(3,177)

Notes:

- (1) The Other Transmission Demand allocation is provided at EB-2011-2010, Exhibit G3, Tab 5, Schedule 23, Updated, page 9 and page 10, line 1.
- (2) The Project costs of \$9.283 million include \$9.341 million in Project costs directly allocated to Other Transmission Demand and an allocation of (\$0.058) million of property and income tax associated with the Project.
- (3) The Project costs include (\$0.752) million of property and income tax allocated to distribution, storage and other transmission-related functional classifications.

UNION GAS LIMITED
2018 Cost Allocation Impacts of Hamilton-Milton Pipeline and Lobo C Compressor Project - Per Settlement

Line No.	Particulars	Total Cost Allocation Impacts (\$000's)	Cost Allocation Change in Demands (1) (\$000's)	Dawn-Parkway Easterly Transmission (2)				Other Functional Classifications		
		(a) = (b + e + i)	(b)	Project Costs (3) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)	(%)	Project Costs (3) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)
		(a) = (b + e + i)	(b)	(c)	(d)	(e) = (c + d)	(f)	(g)	(h)	(i) = (g + h)
1	Rate M1	(2,168)	472	1,938	512	2,450	6%	(863)	(4,227)	(5,089)
2	Rate M2	304	158	651	172	823	2%	(113)	(565)	(678)
3	Rate M4	113	46	189	50	239	1%	(25)	(147)	(173)
4	Rate M5	(159)	0	2	0	2	0%	(25)	(137)	(162)
5	Rate M7	75	21	87	23	110	0%	(9)	(48)	(57)
6	Rate M9	38	8	31	8	39	0%	(2)	(8)	(9)
7	Rate M10	1	0	1	0	1	0%	(0)	(1)	(1)
8	Rate T1	17	23	94	25	118	0%	(17)	(107)	(124)
9	Rate T2	403	148	607	160	767	2%	(79)	(433)	(512)
10	Rate T3	275	53	220	58	278	1%	(8)	(49)	(57)
11	Subtotal - Union South	(1,104)	929	3,820	1,008	4,828	12%	(1,140)	(5,722)	(6,862)
12	Excess Utility Space	(74)	-	-	-	-	0%	(18)	(57)	(74)
13	Rate C1	(29)	-	-	-	-	0%	(6)	(23)	(29)
14	Rate M12	30,535	(2,488)	26,326	6,950	33,276	82%	(124)	(128)	(253)
15	Rate M13	(1)	-	-	-	-	0%	(0)	(1)	(1)
16	Rate M16	(3)	-	-	-	-	0%	(1)	(2)	(3)
17	Subtotal - Ex-franchise	30,427	(2,488)	26,326	6,950	33,276	82%	(150)	(211)	(360)
18	Rate 01	(57)	542	1,310	346	1,655	4%	(403)	(1,851)	(2,254)
19	Rate 10	265	142	343	91	433	1%	(57)	(254)	(311)
20	Rate 20 (4)	963	873	256	68	324	1%	(18)	(216)	(234)
21	Rate 100	(174)	3	6	2	8	0%	(32)	(153)	(185)
22	Rate 25	(68)	-	-	-	-	0%	(12)	(57)	(68)
23	Subtotal - Union North	928	1,559	1,915	506	2,421	6%	(521)	(2,531)	(3,052)
24	In-franchise (line 11 + line 23)	(177)	2,488	5,735	1,514	7,249	18%	(1,661)	(8,253)	(9,914)
25	Ex-franchise (line 17)	30,427	(2,488)	26,326	6,950	33,276	82%	(150)	(211)	(360)
26	Total	30,251	(0)	32,061	8,463	40,525	100%	(1,811)	(8,463)	(10,274)

Notes:

- (1) Allocation of the 2013 Board-approved costs updated to include the incremental Dawn-Parkway Project demands of 474,949 GJ/d.
- (2) The Project costs of \$32.061 million and the indirect costs of \$8.463 million are allocated in proportion to the Dawn to Parkway demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 474,949 GJ/d.
- (3) The total 2018 Project costs of \$30.251 million include \$32.061 million directly allocated to the Dawn-Parkway Easterly functional classification and (\$1.811) million of property and income taxes allocated to distribution, storage and other transmission-related functional classifications.
- (4) Of the total \$0.963 million in costs allocated to Rate 20, \$1.039 million is associated with a new Dawn-based storage service for North T-service customers.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, Schedule 1

Please provide detailed calculations showing the derivation of Exhibit A, Tab 10, Schedule 1, line 9.

Response:

Please see Attachment 1.

UNION GAS LIMITED
Income Tax - Utility Timing Differences Component of Revenue Requirement

Line No.	Particulars (\$000's)	Updated (2) 2016 (a)	As Filed 2016 (b)	Difference 2016 (c)	As Filed 2017 (d)	Updated (2) 2018 (e)	As Filed 2018 (f)	Difference 2018 (g)
	<u>Utility Timing Differences:</u>							
	<u>Temporary Timing Differences</u>							
1	Capital Cost Allowance	(8,197)	(8,197)	-	(50,641)	(79,214)	(79,214)	-
2	Depreciation Expense	1,677	1,677	-	11,310	19,416	19,416	-
3	Total Temporary Timing Differences	<u>(6,520)</u>	<u>(6,520)</u>	<u>-</u>	<u>(39,331)</u>	<u>(59,798)</u>	<u>(59,798)</u>	<u>-</u>
	<u>Permanent Differences</u>							
4	Tax Deductible Interest During Construction	(5,687)	(1,106)	(4,581)	(10,582)	-	-	-
5	Tax Deductible Plant B Removal Costs	-	-	-	-	(5,000)	-	(5,000)
6	Total Permanent Differences	<u>(5,687)</u>	<u>(1,106)</u>	<u>(4,581)</u>	<u>(10,582)</u>	<u>(5,000)</u>	<u>-</u>	<u>(5,000)</u>
7	Total Utility Timing Differences (line 3 + line 6)	(12,207)	(7,626)	(4,581)	(49,913)	(64,798)	(59,798)	(5,000)
8	Income Tax Gross-up (1)	34.2%	34.2%	34.2%	34.2%	34.2%	34.2%	34.2%
9	Total Income Tax Gross-up (line 7 x line 8)	<u>(4,178)</u>	<u>(2,610)</u>	<u>(1,568)</u>	<u>(17,084)</u>	<u>(22,179)</u>	<u>(20,468)</u>	<u>(1,711)</u>
10	Pre-Tax Impact of Utility Timing Differences (line 7 + line 9)	(16,386)	(10,237)	(6,149)	(66,997)	(86,978)	(80,266)	(6,711)
11	Income Tax Rate (1)	<u>25.5%</u>	<u>25.5%</u>	<u>25.5%</u>	<u>25.5%</u>	<u>25.5%</u>	<u>25.5%</u>	<u>25.5%</u>
12	Income Tax - Utility Timing Differences Component of Revenue Requirement (line 10 x line 11)	<u>(4,178)</u>	<u>(2,610)</u>	<u>(1,568)</u>	<u>(17,084)</u>	<u>(22,179)</u>	<u>(20,468)</u>	<u>(1,711)</u>

Notes:

- (1) Income Tax Rate per IRM Settlement Agreement 25.5%
Income Tax Gross-up [$(1 / (1 - 25.5\%) - 100\%)$] 34.2%
- (2) A revised DCF will be filed to correct the tax calculations for the 2016 and 2018 revenue requirements

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 10, Schedule 4

Please recalculate the rates shown in Exhibit A, Tab 10, Schedule 4 by allocating 100% of the incremental tax impacts noted on Exhibit A, Tab 10, Schedule 1, line 9 to the rates for rate schedules associated with the proposed expansion.

Response:

Please see Attachment 1.

UNION GAS LIMITED
2018 Rate M12/M12-X/C1 Transportation Demand Charges Impacts of the
Lobo D, Bright C and Dawn H Compressor Project

Line No.	Services	EB-2015-0035 Approved (\$/GJ/day) (1) (a)	EB-2015-0200 Proposed (\$/GJ/day) (b)	Difference (c) = (b - a)	% Change (d) = (c / a)	EB-2015-0200 Including Parkway Projects (\$/GJ/day) (2) (e)	Difference (f) = (e - a)	% Change (g) = (f / a)
1	M12/C1 Dawn to Kirkwall	0.072	0.082	0.010	13.3%	0.098	0.026	35.6%
2	M12/C1 Dawn to Parkway	0.086	0.096	0.010	11.8%	0.116	0.030	35.1%
3	M12/C1 Kirkwall to Parkway	0.014	0.014	0.001	3.7%	0.018	0.004	32.5%
4	C1 Parkway to Kirkwall	0.021	0.022	0.001	3.7%	0.028	0.007	32.5%
5	C1 Parkway to Dawn	0.021	0.022	0.001	3.7%	0.028	0.007	32.5%
6	M12-X	0.107	0.118	0.011	10.2%	0.144	0.037	34.6%

Notes:

(1) EB-2015-0035, Appendix A, Pages 14-16, column (c), effective April 1, 2015.

(2) Parkway Projects includes Parkway West, Brantford to Kirkwall Pipeline, Parkway D Compressor Project, Hamilton-Milton Pipeline and Lobo C Compressor.

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 8, Table 8-2, p. 9

Please indicate potential opportunities for incremental service to utilize the 30,393 GJ/d of surplus capacity as indicated on Exhibit A, Tab 8, Table 8-2.

Response:

Please see the response at Exhibit B.TCPL.2 f).

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 8, pp. 6-8

What is the maximum annual revenue that could be realized from the sale of all surplus capacity on the Dawn Parkway system.

Response:

The forecasted surplus effective November 1, 2017 is 30,393 GJ/d. The maximum annual revenue that could be realized from the sale of this surplus capacity is \$1.34 million (30,393 GJ/d x \$0.121/GJ/d x 365 days). Also, please see the response at Exhibit B.TCPL.2 f).

UNION GAS LIMITED

Answer to Interrogatory from
Alberta Northeast Gas, Limited ("ANE")

Reference: Exhibit A, Tab 8, Pages 6 – 8; Application, Exhibit A, Tab 10, Schedules 1 - 5

Please provide the cost allocations and rates that would result if the incremental revenues identified in the previous question were realized at the time the facilities are placed in service. Provide workpapers including schedules that correspond to Exhibit A, Tab 10, Schedules 1 through 5.

Response:

Please see Attachment 1 for the Exhibit A, Tab 10, Schedules 1 through 5 reflecting the requested scenario.

Please see Attachment 2 for the associated M12 Rate Design working papers.

UNION GAS LIMITED

Lobo D, Bright C and Dawn H Compressor Project Revenue Requirement including 30,393 GJ/day of Incremental Dawn-Parkway M12 Demands

Line No.	Particulars (\$000's)	2016 (a)	2017 (b)	2018 (c)
	<u>Rate Base Investment</u>			
1	Capital Expenditures	107,400	500,838	14,267
2	Average Investment	11,432	171,034	592,525
	<u>Revenue Requirement Calculation:</u>			
	<u>Operating Expenses:</u>			
3	Operating and Maintenance Expenses (1)	0	602	3,623
4	Depreciation Expense (2)	1,677	11,310	19,416
5	Property Taxes (3)	0	175	1,051
6	Total Operating Expenses	<u>1,677</u>	<u>12,086</u>	<u>24,091</u>
7	Required Return (5.77% x line 2) (4)	660	9,877	34,217
	<u>Income Taxes:</u>			
8	Income Taxes - Equity Return (5)	126	1,879	6,510
9	Income Taxes - Utility Timing Differences (6)	<u>(4,178)</u>	<u>(17,084)</u>	<u>(22,179)</u>
10	Total Income Taxes	<u>(4,053)</u>	<u>(15,205)</u>	<u>(15,669)</u>
11	Total Revenue Requirement (line 6 + line 7 + line 10)	<u>(1,716)</u>	<u>6,758</u>	<u>42,639</u>
12	Incremental Project Revenue (7)	-	2,925	17,551
13	Net Revenue Requirement (line 11 - line 12)	<u>(1,716)</u>	<u>3,833</u>	<u>25,088</u>

Notes:

- (1) Expenses include salaries and wages, employee-related expenses, fleet costs, materials and operating expenses.
- (2) Depreciation expense at 2013 Board-approved depreciation rates.
- (3) Property taxes in 2018 include \$0.366 million for the Dawn H compressor and facilities and \$0.685 million for Lobo D and Bright C compressors and facilities.
- (4) The required return of 5.77% assumes a capital structure of 64% long-term debt at 4.0% and 36% common equity at the 2013 Board-approved return of 8.93% ($0.64 \times 0.04 + 0.36 \times 0.0893$)
The 2018 required return calculation is as follows:
\$592.525 million $\times$ 64% $\times$ 4.0% = \$15.169 million plus
\$592.525 million $\times$ 36% $\times$ 8.93% = \$19.048 million for a total of \$34.217 million.
- (5) Taxes related to the equity component of the return at a tax rate of 25.5%.
- (6) Taxes related to utility timing differences are negative as the capital cost allowance deduction in arriving at taxable income exceeds the provision of book depreciation in the year.
- (7) Project revenue assumes an estimated M12 Dawn-Parkway rate of \$2.937 GJ/mth, an M12 Kirkwall-Parkway rate of \$0.517 GJ/mth and a Dawn Compression rate of \$0.232 GJ/mth.
The 2018 revenue is calculated as follows:
M12 Dawn-Parkway demands of 441,778 GJ $\times$ \$2.937 $\times$ 12 / 1000 = \$15.570 million plus
C1 Dawn-Parkway demands (North T-Service) of 5,975 GJ $\times$ \$2.937 $\times$ 12 / 1000 = \$0.211 million plus
M12 Kirkwall-Parkway demands of 84,854 GJ $\times$ \$0.517 $\times$ 12 / 1000 = \$0.526 million plus
M12/C1 Dawn Compression demands of 447,753 GJ $\times$ \$0.232 $\times$ 12 / 1000 = \$1.247 million

UNION GAS LIMITED
2018 Cost Allocation Impacts of Lobo D, Bright C and Dawn H Compressor Project, including 30,393 GJ/day of Incremental Dawn-Parkway M12 Demands.

Line No.	Particulars	Total Cost Allocation Impacts	Cost Allocation Change in Demands (1)	Dawn Station Transmission (2)				Dawn-Parkway Easterly Transmission (3)				Other Functional Classifications		
		(\$000's)	(\$000's)	Project Costs (4)	Indirect Costs	Total	(%)	Project Costs (4)	Indirect Costs	Total	(%)	Project Costs (4)	Indirect Costs	Total
		(a) = (b + e + i + m)	(b)	(\$000's)	(\$000's)	(\$000's)		(\$000's)	(\$000's)	(\$000's)		(\$000's)	(\$000's)	(\$000's)
				(c)	(d)	(e) = (c + d)	(f)	(g)	(h)	(i) = (g + h)	(j)	(k)	(l)	(m) = (k + l)
1	Rate M1	(6,095)	(720)	1,844	311	2,155	8.3%	1,599	256	1,855	5.3%	(4,777)	(4,608)	(9,385)
2	Rate M2	(113)	(242)	619	105	724	2.8%	537	86	623	1.8%	(702)	(517)	(1,219)
3	Rate M4	3	(70)	180	30	211	0.8%	156	25	181	0.5%	(170)	(148)	(318)
4	Rate M5	(309)	(1)	2	0	2	0.0%	1	0	2	0.0%	(151)	(161)	(312)
5	Rate M7	45	(32)	83	14	97	0.4%	72	12	84	0.2%	(58)	(45)	(103)
6	Rate M9	36	(12)	30	5	35	0.1%	26	4	30	0.1%	(10)	(7)	(17)
7	Rate M10	1	(0)	1	0	1	0.0%	1	0	1	0.0%	(0)	(1)	(1)
8	Rate T1	(69)	(35)	89	15	104	0.4%	77	12	90	0.3%	(125)	(103)	(228)
9	Rate T2	96	(225)	577	98	675	2.6%	501	80	581	1.7%	(544)	(391)	(935)
10	Rate T3	278	(82)	209	35	244	0.9%	181	29	210	0.6%	(63)	(32)	(95)
11	Subtotal - Union South	(6,127)	(1,419)	3,634	614	4,248	16.3%	3,151	505	3,656	10.5%	(6,600)	(6,012)	(12,613)
12	Excess Utility Space	(110)	-	-	-	-	0.0%	-	-	-	0.0%	(102)	(8)	(110)
13	Rate C1	(56)	-	-	-	-	0.0%	-	-	-	0.0%	(28)	(28)	(56)
14	Rate M12 (5)	52,279	2,009	17,708	2,992	20,699	79.4%	25,524	4,093	29,617	84.9%	(27)	(20)	(47)
15	Rate M13	(2)	-	-	-	-	0.0%	-	-	-	0.0%	(2)	(0)	(2)
16	Rate M16	(5)	-	-	-	-	0.0%	-	-	-	0.0%	(4)	(1)	(5)
17	Subtotal - Ex-franchise	52,105	2,009	17,708	2,992	20,699	79.4%	25,524	4,093	29,617	84.9%	(163)	(57)	(220)
18	Rate 01	(2,459)	(441)	722	122	844	3.2%	1,046	168	1,214	3.5%	(2,168)	(1,908)	(4,076)
19	Rate 10	(118)	(116)	189	32	221	0.8%	274	44	318	0.9%	(325)	(216)	(542)
20	Rate 20	(304)	(31)	51	9	59	0.2%	73	12	85	0.2%	(236)	(182)	(417)
21	Rate 100	(332)	(2)	4	1	4	0.0%	5	1	6	0.0%	(184)	(156)	(340)
22	Rate 25	(126)	-	-	-	-	0.0%	-	-	-	0.0%	(66)	(61)	(126)
23	Subtotal - Union North	(3,339)	(590)	965	163	1,128	4.3%	1,399	224	1,623	4.7%	(2,978)	(2,522)	(5,500)
24	In-franchise (line 11 + line 23)	(9,467)	(2,009)	4,599	777	5,376	20.6%	4,549	730	5,279	15.1%	(9,579)	(8,534)	(18,113)
25	Ex-franchise (line 17)	52,105	2,009	17,708	2,992	20,699	79.4%	25,524	4,093	29,617	84.9%	(163)	(57)	(220)
26	Total	42,639	(0)	22,307	3,769	26,076	100.0%	30,073	4,823	34,896	100.0%	(9,742)	(8,591)	(18,333)

Notes:

(1) Allocation of the 2013 Board-approved costs updated to include the incremental Project demands of 483,304 GJ/d.

(2) The Project costs of \$22.307 million and the indirect costs of \$3.769 million are allocated in proportion to the Dawn compression demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 398,450 GJ/d.

(3) The Project costs of \$30.073 million and the indirect costs of \$4.823 million are allocated in proportion to the Dawn-Parkway demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 483,304 GJ/d.

(4) The total 2018 Project costs of \$42.6390 million include \$22.307 million directly allocated to the Dawn Station functional classification and \$30.073 million directly allocated to the Dawn-Parkway Easterly functional classification and (\$9.742) million of property and income taxes allocated to distribution, storage and other transmission-related functional classifications.

(5) Includes \$0.038 million in costs attributable to the new north T-service Dawn based storage service.

UNION GAS LIMITED
2018 General Service Bill Impacts
Rate Impacts of the Lobo D, Bright C and Dawn H Compressors Project
Annual Consumption of 2,200 m³

Line No.	Rate M1 - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill	EB-2015-0200 Proposed 01-Jan-18 Total Bill	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
1	Monthly Charge	252.00	252.00	-	
2	Delivery Commodity Charge	81.16	74.63	(6.53)	
3	Storage Services	16.32	15.77	(0.55)	
4	Total Delivery Charge	349.47	342.40	(7.08)	-2.0%
	<u>Supply Charges</u>				
5	Transportation to Union	77.43	77.43	-	
6	Commodity & Fuel	264.58	264.58	-	
7	Total Gas Supply Charge	342.01	342.01	-	
8	Total Bill (line 4 + line 7)	691.49	684.41	(7.08)	-1.0%
9	Impacts for Customer Notices - Sales (line 8)			(7.08)	
10	Impacts for Customer Notices - Direct Purchase (line 4)			(7.08)	

Line No.	Rate 01 Eastern Zone - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill	EB-2015-0200 Proposed 01-Jan-18 Total Bill	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
11	Monthly Charge	252.00	252.00	-	
12	Delivery Commodity Charge	195.00	182.18	(12.81)	
13	Total Delivery Charge	447.00	434.18	(12.81)	-2.9%
	<u>Supply Charges</u>				
14	Transportation to Union	172.43	172.55	0.11	
15	Storage Services	95.59	99.06	3.47	
16	Subtotal	268.02	271.61	3.59	1.3%
17	Commodity & Fuel	264.80	264.80	-	
18	Total Gas Supply Charge (line 16 + line 17)	532.82	536.41	3.59	
19	Total Bill (line 13 + line 18)	979.82	970.59	(9.22)	-0.9%
20	Impacts for Customer Notices - Sales (line 19)			(9.22)	
21	Impacts for Customer Notices - Direct Purchase (line 13 + line 16)			(9.22)	

Note:

(1) Calculated as per Appendix A, EB-2015-0035.

UNION GAS LIMITED
2018 Rate M12/M12-X/C1 Transportation Demand Charges Impacts of the
Lobo D, Bright C and Dawn H Compressor Project Including 30,393 GJ/d of incremental Dawn-Parkway M12 Demands.

Line No.	Services	EB-2015-0035 Approved (\$/GJ/day) (1) (a)	EB-2015-0200 Proposed (\$/GJ/day) (b)	Difference (c) = (b - a)	% Change (d) = (c / a)	EB-2015-0200 Including Parkway Projects (\$/GJ/day) (2) (e)	Difference (f) = (e- a)	% Change (g) = (f / a)
1	M12/C1 Dawn to Kirkwall	0.072	0.087	0.015	20.7%	0.102	0.030	42.1%
2	M12/C1 Dawn to Parkway	0.086	0.101	0.016	18.5%	0.121	0.035	41.0%
3	M12/C1 Kirkwall to Parkway	0.014	0.014	0.001	6.6%	0.018	0.005	34.9%
4	C1 Parkway to Kirkwall	0.021	0.022	0.001	6.6%	0.028	0.007	34.9%
5	C1 Parkway to Dawn	0.021	0.022	0.001	6.6%	0.028	0.007	34.9%
6	M12-X	0.107	0.124	0.017	16.2%	0.149	0.042	39.8%

Notes:

(1) EB-2015-0035, Appendix A, Pages 14-16, column (c), effective April 1, 2015.

(2) Parkway Projects includes Parkway West, Brantford to Kirkwall Pipeline, Parkway D Compressor Project, Hamilton-Milton Pipeline and Lobo C Compressor.

UNION GAS LIMITED
Lobo D, Bright C and Dawn H Compressor Project Revenue Requirement by Rate Class,
Including 30,393 GJ/day of Incremental Dawn-Parkway M12 Demands.

Line No.	Particulars (\$000's)	2016 (a)	Variance (b) = (c - a)	2017 (c)	Variance (d) = (e - c)	2018 (e)
1	Rate M1	(1,448)	(4,461)	(5,909)	(185)	(6,095)
2	Rate M2	(183)	(501)	(684)	571	(113)
3	Rate M4	(43)	(118)	(162)	165	3
4	Rate M5	(52)	(167)	(219)	(90)	(309)
5	Rate M7	(13)	(33)	(46)	91	45
6	Rate M9	(1)	(1)	(2)	38	36
7	Rate M10	(0)	(0)	(0)	1	1
8	Rate T1	(33)	(92)	(125)	56	(69)
9	Rate T2	(125)	(323)	(448)	543	96
10	Rate T3	(4)	10	6	272	278
11	Subtotal - Union South	<u>(1,902)</u>	<u>(5,686)</u>	<u>(7,588)</u>	<u>1,461</u>	<u>(6,127)</u>
12	Excess Utility Space	(21)	(52)	(73)	(37)	(110)
13	Rate C1	(6)	(22)	(28)	(28)	(56)
14	Rate M12	1,120	17,045	18,165	34,113	52,279
15	Rate M13	(1)	(2)	(2)	(0)	(2)
16	Rate M16	(1)	(3)	(4)	(2)	(5)
17	Subtotal - Ex-franchise	<u>1,091</u>	<u>16,967</u>	<u>18,059</u>	<u>34,047</u>	<u>52,105</u>
18	Rate 01	(660)	(2,046)	(2,706)	247	(2,459)
19	Rate 10	(91)	(268)	(359)	240	(118)
20	Rate 20	(73)	(229)	(302)	(2)	(304)
21	Rate 100	(60)	(194)	(254)	(78)	(332)
22	Rate 25	(22)	(71)	(92)	(34)	(126)
23	Subtotal - Union North	<u>(906)</u>	<u>(2,807)</u>	<u>(3,712)</u>	<u>373</u>	<u>(3,339)</u>
24	In-franchise	(2,807)	(8,493)	(11,301)	1,834	(9,467)
25	Ex-franchise	1,091	16,967	18,059	34,047	52,105
26	Total	<u><u>(1,716)</u></u>	<u><u>8,474</u></u>	<u><u>6,758</u></u>	<u><u>35,881</u></u>	<u><u>42,639</u></u>

UNION GAS LIMITED
Southern Operations Area
M12 Rate Design
Effective January 1, 2018

Line No.	Particulars	Westerly Parkway to Kirkwall/Dawn (a)	Dawn to Parkway (b)	Easterly Dawn to Kirkwall (c)	Kirkwall to Parkway (d)	Total (e)	Dawn Compression (f)
	<u>Revenue Requirements (\$ 000's)</u>	(1)					
1	Dawn Easterly Demand					154,849	
2	System Integrity					862	
3	Total Transportation excl. Dawn Compression					155,711	
4	Dawn Compression						36,440
	<u>Allocation Units (GJ)</u>						
5	Easterly Demands	(2), (3), (4)	4,371,203	725,681	202,476	5,299,360	
6	Distance (km)		228.94	188.67	40.27		
7	Distance weighted $10^6 \text{m}^3 / \text{km}$ (line 5 * line 6)		1,000,743	136,914	8,154	1,145,811	
8	Revenue Requirement (\$ 000's) (line 3 allocated using line 7)		135,997	18,606	1,108	155,711	
	<u>Westerly Demands (GJ)</u>						
9	Demand from C1	(5)	360,960				
10	Demand from Westerly M12-X	(6)	391,011				
11	Total Westerly Demands		751,971				
12	Commoditized (line 11 x 12 / 365)		24,722				
13	Recovered over 100 days (line 12 * 100)		2,472,234				
14	Units split between Parkway & Kirkwall (line 13 allocated using line 7)		2,159,231	295,410	17,593	2,472,234	
	<u>Dawn to Parkway Annual Demand Units (GJ)</u>						
15	Dawn to Parkway Demand 12 months	(7)	51,798,432				
16	Dawn to Parkway Demand 10 months	(8)	650,000				
17	Dawn to Parkway Demand 3 months	(9)	6,000				
18	Westerly Demand Units (line 14, col (b))		2,159,231				
19	Total Annual Billing Units (lines 15 + line 16 + line 17 + line 18)		54,613,663				
20	Dawn to Parkway Demand Rate (\$/GJ/day) (line 8 / line 19)		2.490				
21	Westerly Demand Rate (line 20 * 100 / 365)		0.682				
	<u>Westerly Revenue Adjustment (\$ 000's)</u>						
22	Annual Revenue (col. (a) line 11 * line 21 * 12 / 1000)			6,156	6,156		
23	Portion to Parkway (line 22 allocated using line 7)			5,377	5,377		
24	Net revenue requirement reduction to Kirkwall (total) (line 22 - line 23)			779	779		
25	Dawn to Kirkwall & Kirkwall to Parkway revenue requirement reduction (line 24 allocated using line 7)			736	44		
26	Revenue requirement to be recovered (\$000's) (line 8 - line 25)			17,871	1,064		
27	Annual billing units Dawn to Kirkwall (GJ) (line 5 * 12)			8,708,176			
28	Annual billing units Kirkwall to Parkway (GJ) (line 5 * 12)				2,429,716		
29	Dawn to Kirkwall Demand Charge (\$/GJ) (line 26 * 1000 / line 27)			2.052			
30	Kirkwall to Parkway Demand Charge (\$/GJ) (line 26 * 1000 / line 28)				0.438		
	<u>Dawn Compression Annual Billing Units (GJ)</u>						
31	Dawn to Parkway 12 months (line 15)						51,798,432
32	Dawn to Parkway 10 months (line 16)						650,000
33	Dawn to Parkway 3 months (line 17)						6,000
34	Dawn to Kirkwall (line 27)						8,708,176
35	Total Easterly M12 Demand (line 31 + line 32 + line 33 + line 34)						61,162,608
36	Dawn Compression Demand Charge (\$/GJ) (line 4 * 1000 / line 35)						0.596
	<u>Demand Charges: \$/GJ</u>						
37	Parkway to Kirkwall/Dawn (line 21)	0.682					
38	Dawn to Parkway with compression (line 20 + line 36)		3.086				
39	Dawn to Kirkwall with compression (line 29 + line 36)			2.648			
40	Kirkwall to Parkway without compression (line 30)				0.438		
41	<u>Commoditized Demand Charges: \$/GJ/day</u> (lines 37-40 * 12 / 365) (10)	0.022	0.101	0.087	0.014		0.020

Notes:

- (1) Includes 2015 Revenue Requirement of \$152.0 million less 2015 capital pass-throughs of \$11.8 million (EB-2014-0271 Rate Order, Working Papers, Schedule 10 Updated, line 19, column (d)), plus 2017 Dawn-Parkway Revenue Requirement of \$52.8 million (EB-2015-0200 Exhibit B.ANE.19 Attachment 1, p.5).
- (2) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a), line 6 *10/12, line 7*3/12, line 8, line 9, incremental Dawn-Parkway project demands of 392,475 GJ/day (362,082 GJ/day plus 30,393 GJ/day of surplus capacity).
- (3) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 1 col (a), line 2 *10/12, line 3*2/12, line 4.
- (4) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 11 col (a), line 12 *2/12, incremental Kirkwall-Parkway project demands of 84,854 GJ/day.
- (5) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 23, line 4 col (a), line 5*3/12.
- (6) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 10 col (a).
- (7) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a) * 12, line 8 * 12, line 9 * 12, incremental Dawn-Parkway project demands of 392,475 GJ/day * 12.
- (8) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 6 col (a) * 10.
- (9) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 7 col (a) * 3.
- (10) M12-X calculated as the sum of line 41 col (a) and (b).

UNION GAS LIMITED
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Line No.	Particulars	Westerly Parkway to Kirkwall/Dawn (a)	Dawn to Parkway (b)	Easterly Dawn to Kirkwall (c)	Kirkwall to Parkway (d)	Total (e)	Dawn Compression (f)
	<u>Revenue Requirements (\$ 000's)</u>	(1)					
1	Dawn Easterly Demand					221,527	
2	System Integrity					817	
3	Total Transportation excl. Dawn Compression					222,344	
4	Dawn Compression						35,981
	<u>Allocation Units (GJ)</u>						
5	Easterly Demands	(2), (3), (4)	5,034,051	725,681	238,777	5,998,509	
6	Distance (km)		228.94	188.67	40.27		
7	Distance weighted $10^6 \text{m}^3 / \text{km}$ (line 5 * line 6)		1,152,496	136,914	9,616	1,299,025	
8	Revenue Requirement (\$ 000's) (line 3 allocated using line 7)		197,264	23,435	1,646	222,344	
	<u>Westerly Demands (GJ)</u>						
9	Demand from C1	(5)	360,960				
10	Demand from Westerly M12-X	(6)	391,011				
11	Total Westerly Demands		751,971				
12	Commoditized (line 11 x 12 / 365)		24,722				
13	Recovered over 100 days (line 12 * 100)		2,472,234				
14	Units split between Parkway & Kirkwall (line 13 allocated using line 7)			260,568	18,300	2,472,234	
	<u>Dawn to Parkway Annual Demand Units (GJ)</u>						
15	Dawn to Parkway Demand 12 months	(7)	59,752,608				
16	Dawn to Parkway Demand 10 months	(8)	650,000				
17	Dawn to Parkway Demand 3 months	(9)	6,000				
18	Westerly Demand Units (line 14, col (b))		2,193,367				
19	Total Annual Billing Units (lines 15 + line 16 + line 17 + line 18)		62,601,975				
20	Dawn to Parkway Demand Rate (\$/GJ/day) (line 8 / line 19)		3.151				
21	Westerly Demand Rate (line 20 * 100 / 365)		0.863				
	<u>Westerly Revenue Adjustment (\$ 000's)</u>						
22	Annual Revenue (col. (a) line 11 * line 21 * 12 / 1000)			7,790	7,790		
23	Portion to Parkway (line 22 allocated using line 7)			6,911	6,911		
24	Net revenue requirement reduction to Kirkwall (total) (line 22 - line 23)			879	879		
25	Dawn to Kirkwall & Kirkwall to Parkway revenue requirement reduction (line 24 allocated using line 7)			821	58		
26	Revenue requirement to be recovered (\$000's) (line 8 - line 25)			22,614	1,588		
27	Annual billing units Dawn to Kirkwall (GJ) (line 5 * 12)			8,708,176			
28	Annual billing units Kirkwall to Parkway (GJ) (line 5 * 12)				2,865,328		
29	Dawn to Kirkwall Demand Charge (\$/GJ) (line 26 * 1000 / line 27)			2.597			
30	Kirkwall to Parkway Demand Charge (\$/GJ) (line 26 * 1000 / line 28)				0.554		
	<u>Dawn Compression Annual Billing Units (GJ)</u>						
31	Dawn to Parkway 12 months (line 15)						59,752,608
32	Dawn to Parkway 10 months (line 16)						650,000
33	Dawn to Parkway 3 months (line 17)						6,000
34	Dawn to Kirkwall (line 27)						8,708,176
35	Total Easterly M12 Demand (line 31 + line 32 + line 33 + line 34)						69,116,784
36	Dawn Compression Demand Charge (\$/GJ) (line 4 * 1000 / line 35)						0.521
	<u>Demand Charges: \$/GJ</u>						
37	Parkway to Kirkwall/Dawn (line 21)	0.863					
38	Dawn to Parkway with compression (line 20 + line 36)		3.672				
39	Dawn to Kirkwall with compression (line 29 + line 36)			3.117			
40	Kirkwall to Parkway without compression (line 30)				0.554		
41	<u>Commoditized Demand Charges: \$/GJ/day</u> (lines 37-40 * 12 / 365) (10)	0.028	0.121	0.102	0.018		0.017

Notes:

- (1) Includes 2015 Revenue Requirement of \$152.0 million less 2015 capital pass-throughs of \$11.8 million (EB-2014-0271 Rate Order, Working Papers, Schedule 10 Updated, line 19, column (d)), plus Parkway Projects Revenue Requirement of \$34.6 million (EB-2012-0433 and EB-2013-0074), 2016 Dawn-Parkway Expansion Revenue Requirement of \$31.6 million (EB-2014-0261 Settlement Agreement), and 2017 Dawn-Parkway Revenue Requirement of \$52.8 million (EB-2015-0200 Exhibit B.ANE.19 Attachment 1, p.5).
- (2) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a), line 6 *10/12, line 7*3/12, line 8, line 9, incremental Dawn-Parkway project demands of 1,055,323 GJ/day. (1,024,930 GJ/day plus 30,393 GJ/day of surplus capacity).
- (3) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 1 col (a), line 2 *10/12, line 3*2/12, line 4.
- (4) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 11 col (a), line 12 *2/12, incremental Kirkwall-Parkway project demands of 121,155 GJ/day.
- (5) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 23, line 4 col (a), line 5*3/12.
- (6) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 10 col (a).
- (7) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 5 col (a) * 12, line 8 * 12, line 9 * 12, incremental Dawn-Parkway project demands of 362,082 GJ/day * 12.
- (8) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 6 col (a) * 10.
- (9) EB-2014-0271 Rate Order, Working Papers, Schedule 4, p. 20, line 7 col (a) * 3.
- (10) M12-X calculated as the sum of line 41 col (a) and (b).

UNION GAS LIMITED

Answer to Interrogatory from
Association of Power Producers of Ontario ("APPrO")

Reference: i) Exhibit A, Tab 6, pp. 12-14
ii) Exhibit A, Tab 6, p. 3
iii) Exhibit A, Tab 11, p. 8

Preamble: In Reference i) Union notes that the proposed TransCanada Vaughan Mainline Extension will be required by TransCanada to support Union's proposed expansion. Union also notes that TransCanada will make the necessary applications to the National Energy Board (NEB) and an approval would be expected in 2016. Union further notes that Union's proposed construction activities for 2017 "cannot be linked to downstream project approvals without significantly impacting the in-service date of Union's proposed facilities" ... "and would result in a minimum one year delay in the construction of Union's proposed facilities". APPrO would like to understand this potential concern.

- a) Please provide the status of TransCanada's approvals.
- b) Please confirm that Union is not asking for approval to construct the proposed facilities under section 91 of the *Ontario Energy Board Act, 1998* and as such does not require the Board's approval to commence construction. If not confirmed, please explain.
- c) Please confirm that the primary purpose of the application is to seek approval of the cost consequences of the application to adjust rates.
- d) Please explain why it was not possible for Union and TransCanada to coordinate the development of their respective and dependent facilities such that it puts the Board in the position of having to approve Union's facilities (for cost recovery purposes) without conditioning their approval on the approval of any necessary downstream facilities.
- e) Please provide a monthly and cumulative expenditure profile of the proposed facilities commencing as of August 2015 and extending to the project completion date. Please also include all previous expenditures as a 'project-to-date' entry.
- f) Regarding Union's proposed new transportation agreements, Union notes in Reference ii) that it has entered into Precedent Agreements, Financial Backstopping Agreements and Transportation Contracts:
 - i) Please file a generic version of each of these agreements.

- ii) Are any of Union's new transportation agreements or precedent agreements with its shippers conditional on coming on the downstream transportation arrangements in any way? If so please provide all the relevant details.
 - iii) Please describe the purpose of the Financial Backstopping Agreement and who bears the risk of a Union project delay or termination.
 - iv) In the event that the TransCanada facilities are not constructed, but Union constructs its facilities and adjusts rates as proposed, please confirm that all M12 shippers and in-franchise customers bear the costs of such facilities going into service prematurely.
- g) Union requires some work to be completed in 2016 (Reference iii) and further that Union is expecting TransCanada to receive approval of its facilities sometime in 2016 (Reference i), but such NEB approvals are not guaranteed. Please describe the consequences if the Board were to approve cost recovery of Union's facilities only for Union's 2016 facilities (described in Reference iii), but conditioned the cost recovery of the balance of Union's facilities until such time as the NEB approval is received and further that TransCanada commits to its construction of such facilities pursuant to such approval.
- h) Does Union foresee greater coordination with TransCanada and other infrastructure parties in the future, to coordinate the development of assets that will reduce the development risk among parties which would protect customers from one project proceeding in advance of all necessary approvals being received? If so, please explain.

Response:

- a) TransCanada currently has three projects underway in the Parkway to Maple corridor, which will provide incremental downstream transportation capacity.
- The King's North Connector Pipeline Project was approved by the National Energy Board on June 2, 2015 and is expected to be placed into service later in 2016.
 - The Maple Compressor Expansion (Station 130 B3 Unit Addition) Section 58 application was submitted to the National Energy Board for approval on August 28, 2015. The planned in-service date of this project remains November 1, 2016.
 - Union expects TransCanada will submit its Vaughan Mainline Expansion application to the National Energy Board for approval in the fourth quarter of 2015. TransCanada held public open houses in Vaughan in mid-May with respect to its project. As discussed at Exhibit A, Tab 6, page 13, TransCanada switched the order of its Vaughan Mainline Expansion and Maple Compressor Expansion. The Vaughan Mainline Expansion was originally proposed for November 1, 2016 in-service and the Maple Compression Expansion was originally proposed for November 1, 2017 in-service. TransCanada elected to shift the Vaughan Mainline Expansion to 2017 and move forward the Maple Compressor Expansion. This has provided TransCanada an opportunity for further stakeholder consultation on the pipeline project – the Vaughan Mainline Expansion - prior

to submitting its application to the National Energy Board for approval. The planned in-service date for the Vaughan Mainline Expansion remains November 1, 2017. Union is not aware of any delays that would prevent TransCanada from achieving a November 1, 2017 in-service date for the Vaughan Mainline Expansion.

- b) Confirmed. Pursuant to Section 91 of the *Ontario Energy Board Act, 1998* ("the Act"), Union does not require the Board's leave to construct approval for the facilities subject to this application.
- c) As stated in Exhibit A, Tab 2 ("the Application"), Union applied to the Board pursuant to Section 36 of the Act for Orders granting approval of recovery of the cost consequences of all facilities associated with the development of the 2017 Dawn Parkway Project from ratepayers; an accounting order to establish the Dawn H/Lobo D/Bright C Compressor Project Costs Deferral Account; and, the Term-Up Provision to be added to the General Terms and Conditions in the M12 and C1 rate schedules.
- d) Union and TransCanada coordinated new capacity open seasons for service commencing November 1, 2017. As a result, Union and TransCanada will be building expansion facilities – the 2017 Dawn Parkway Project and Vaughan Mainline Expansion, respectively.

Union's 2017 Dawn Parkway Project consists of three new compressors (and associated facilities) at three existing locations on the Dawn Parkway System. TransCanada's Vaughan Mainline Expansion consists of 12 kilometres of NPS 42 pipeline that extends from the end of the NEB-approved King's North Connector Pipeline Project to an existing TransCanada Mainline Valve Site southwest of its Maple Compressor Station.

Fundamentally, the TransCanada and Union facilities require different material order commitments, construction durations and regulatory approvals in meeting a common in-service date (November 1, 2017). TransCanada's 2017 expansion is a pipeline project while Union's 2017 expansion only involves compression. TransCanada is regulated by the National Energy Board which has different approval processes than the OEB (Union's regulator).

Ultimately, Union is accountable to its shippers supporting the 2017 Dawn Parkway Project for meeting a November 1, 2017 in-service date. TransCanada is similarly accountable to its shippers supporting the Vaughan Mainline Expansion for meeting a November 1, 2017 in-service date.

2017 Dawn Parkway Project

Union was required to order the compressor units and other long lead materials well in advance of the start of construction and at a similar time as submitting its regulatory application to the Ontario Energy Board. The three compressors for the 2017 Dawn Parkway Project were required to be ordered in July 2015 in order to meet the November 1, 2017 in-service date at each of the three locations. Delivery of the compressors to site will be staged

and will occur in the summer and fall of 2016 in order to complete installation on time. Union expects to have committed to nearly \$200 million, mostly materials, by April 2016, which is Union's target date for Ontario Energy Board approval of its EB-2015-0200 application.

The 2017 Dawn Parkway Project is unique in that three compressors will be built at three different locations. As shown in Exhibit A, Tab 11, Schedule 1, construction schedules for the three compressors need to be staged or sequenced to ensure specific activities are not occurring at multiple locations at the same time, such as Dawn Parkway System tie-ins or certain elements of commissioning. Staging or sequencing construction of three compressors requires an earlier start in the schedule, including engineering design, material order and construction, than if only one compressor was being built on a single site. This is very different than TransCanada's pipeline construction for the Vaughan Mainline Expansion, which is expected to occur in calendar 2017. Union's compressor station construction extends across multiple years (early civil work is planned to start in fall 2015).

To expedite the project schedule, Union submitted its application to the Ontario Energy Board 28 months in advance of the in-service date which, comparatively, is 4 months earlier than the 2016 Dawn Parkway Expansion Project (EB-2014-0261).

TransCanada's Vaughan Mainline Project

Pipeline projects have longer development time requirements prior to filing a regulatory application to facilitate completion of an environmental assessment and socio-economic impact assessment, environmental field studies, stakeholder engagement and landowner consultations. For pipeline projects, such as the Vaughan Mainline Expansion, however, ordering and manufacture of line pipe can take place much later than ordering and manufacturing a compressor unit. In addition, Union expects that TransCanada will deliver line pipe to the Vaughan Mainline Expansion work site in early 2017 well after compressors have arrived on site for the 2017 Dawn Parkway Project (summer and fall 2016). Union also expects that the Vaughan Mainline Expansion can be constructed in the spring/summer/fall of 2017, not requiring multiple construction years like the 2017 Dawn Parkway Project.

Union expects that TransCanada will submit its application for approval of the proposed Vaughan Mainline Expansion to the National Energy Board in the fourth quarter of 2015, approximately two years in advance of the November 1, 2017 in-service date. Comparatively, this is 9 months earlier than TransCanada filed its King's North Connector Pipeline Project application with the National Energy Board for approval (August 2014 for a November 2015 in-service).

Linking Approval of Union's Facilities to TransCanada Approvals

Linking the start of construction in Union's facility approvals to the National Energy Board approvals of TransCanada's facilities is not practical and is unwarranted. Union does not

expect TransCanada to receive National Energy Board approval until later in 2016. Without an earlier decision from the Ontario Energy Board providing the assurance of cost recovery given the long lead compression facilities, Union would not be in a position to continue project development activities, resulting in the possibility of the project's cancellation or in a delay to the project and adjustment in the in-service date for all 2017 Dawn Parkway Project facilities.

If Union delayed its construction start until TransCanada received regulatory approvals in late 2016, Union would not be able to place the 2017 Dawn Parkway Project into service until at least fall 2018, leaving shippers with at least one full year where their contracted capacity is not available (potentially stranding assets for shippers) and creating a disconnect between the in service date of TransCanada and Union facilities. If Union had delayed ordering of long lead items (including the compressor units) until the National Energy Board approved the Vaughan Mainline Project then the in-service date for the 2017 Dawn Parkway Project would be well beyond 2018. TransCanada's project schedule would not be impacted and TransCanada could place its Vaughan Mainline Expansion facilities into service November 1, 2017, at least one to two years earlier than Union's facilities would be placed into service.

Consequently, this would:

- Work against the financial backstopping commitments made by Union's shippers to ensure the project advances in timely fashion;
- Unfairly burden Union's shippers seeking new transportation capacity;
- Create the opposite in-service timing mismatch (i.e. TransCanada would be earlier than Union) and cost shippers more than if Union was on time and TransCanada was delayed (TransCanada demand charges are higher per unit of capacity contracted); and
- Require Union's shippers to seek alternative natural gas supply arrangements until the 2017 Dawn Parkway Project was placed into service.

In addition, Union believes that linking the approval to start construction of Union's facilities to the approval of any other upstream or downstream facilities would significantly impact the market view of the ability of Ontario's pipeline operators to provide expansion capacity offering customers access to the diversity, security and cost competitiveness of the Dawn Hub and other eastern receipt points, such as Niagara and Chippawa. This was in stark contrast to the efforts of Ontario's pipeline operators (TransCanada, Enbridge and Union along with Gaz Métro) to reach a Mainline Settlement Agreement that would provide for the efficient development of much needed infrastructure, allowing the market to access the Dawn Hub and other eastern receipt points, such as Niagara and Chippawa.

Expansion on the TransCanada Mainline

TransCanada has successfully received approval from the National Energy Board for new facilities in the Parkway to Maple corridor that are supported by long term firm transportation

contracts for service commencing in 2012 (File-OF-Fac-Gas-T211-2011-02-01), 2013 (File-OF-Fac-Gas-T211-2012-02-01) and 2015 (GHW-001-2014). In its GHW-001-2014 Decision for TransCanada's King's North Connector Pipeline, the National Energy Board stated that:

"The Board finds that there is sufficient commercial support for the project in the form of signed Precedent Agreements. Also, the Project addresses an existing bottleneck and will improve access to growing and competitive sources of natural gas supply for Quebec and Ontario customers." (National Energy Board, GHW-001-2014, TransCanada PipeLines Limited King's North Connection Pipeline Project Reasons for Decision, page 26)

"The Board is satisfied that there will be sufficient natural gas demand from markets to underpin the construction and operation of the Project. The Board accepts that consumers' demand for increased supply diversity and for access to supply sources located closer to markets provide sufficient support for the Project." (Ibid, page 22)

In Union's view, it is unlikely that further expansions of TransCanada's Parkway to Maple corridor in 2016 and 2017, which are supported by long term firm shipper commitments, will be denied by the National Energy Board subject to satisfactorily addressing all landowner and related matters.

Linking Union's construction start date to TransCanada's National Energy Board approval will unnecessarily add significant uncertainty to project development timing and create significant risk for Union and its shippers supporting the 2017 Dawn Parkway Project. In Union's view, this would create much more uncertainty than if the approvals for the proposed 2017 Dawn Parkway Project are not linked to approval of TransCanada's proposed Vaughan Mainline Expansion. Stakeholders agreed and the Ontario Energy Board accepted that there was no need to link TransCanada and Union in-service dates for the 2016 Dawn Parkway Expansion Project. It has been Union's experience that each pipeline operator along an expansion path works diligently to reach commercial operation as close as possible to the target and in-service date. Having a large difference of in-service dates is not common (i.e. the mismatch between Union and TransCanada in 2015); mismatches of in-service dates tend to be a few weeks or months.

In both cases, the shipper is contracting for service by a required date, in this case Nov 2017. In Union's case, under the current recovery mechanism Union's shareholder does not earn a return on the investment until the asset is put into service. In TransCanada's case the shareholder is allowed a return on investment during construction (AFUDC) and has deferral account protection for the impact of a delay in the in-service date. For Union, a delay the in-service date and the recovery of costs without a mechanism to address the loss of return to the shareholder are not appropriate.

No Link Was Required For 2016 Expansion Facilities

Projects with different scope (pipeline vs. compression) tend to require different approval processes and timing. A current example is the infrastructure expansion in 2016 proposed by Union and TransCanada. Union's 2016 Dawn Parkway Expansion Project application (EB-2014-0162), which involves new compression and pipeline facilities, was submitted to the Ontario Energy Board in September 2014 and approved in March 2015. This allowed Union to facilitate compressor construction (which is currently underway) and to advance the Niagara Escarpment Commission review and approval of the Hamilton-Milton Pipeline (which requires Ontario Energy Board approval as a prerequisite approval).

TransCanada's 2016 expansion facilities involve expansion of the existing compression at its Maple Compressor Station. TransCanada submitted its Maple Compressor Expansion application to the National Energy Board for approval in August 2015. Union expects that TransCanada will receive National Energy Board approval in early 2016 in advance of TransCanada's required construction start date. TransCanada had no reason to seek approval from the National Energy Board earlier in its project schedule. For the 2016 facilities expansion, the Ontario Energy Board did not link Union's construction to the National Energy Board approval of the Maple Compressor Expansion.

e) The cash flow for the Project is included below:

CASH FLOW in Millions \$

2017 Dawn-Parkway Program	Project-to-Date (up to Aug 31, 2015)	Balance of 2015 (Sep 1 to Dec 31)	2016 Jan-Jun	2016 Jul-Dec	2017 Jan-Jun	2017 Jul-Dec	2018 Jan-Jun	2018 Jul-Dec	TOTAL
PERIOD SPEND	\$ 15.6	\$ 25.5	\$ 146.4	\$ 238.3	\$ 113.1	\$ 69.4	\$ 6.7	\$ 7.6	\$ 622.5
CUMULATIVE SPEND	\$ 15.6	\$ 41.1	\$ 187.4	\$ 425.7	\$ 538.8	\$ 608.2	\$ 614.9	\$ 622.5	

Cash flow does not reflect commitments that have been made that would result in future payments if the Project was cancelled.

f)

- i) The standard Pro Forma Precedent Agreement, standard Financial Backstopping Agreement and Standard M12 Transportation Contract can be found at Attachment 1, Attachment 2 and Attachment 3.
- ii) Please see the response at Exhibit B.APPrO.3a) ii).
- iii) The purpose of the Financial Backstopping Agreement (FBA) is to allocate shippers their proportionate share of cost risk in the development of new pipeline facilities. The risk of project cancellation is shared by all shippers supporting the 2017 Dawn Parkway Project in proportion to their capacity allocation to approximately \$264.0 million. Please see the response to part d) above.
- iv) All M12 shippers and in-franchise customers will be responsible for costs when the proposed 2017 Dawn Parkway Project is available for service whether before, at the same time or after TransCanada's proposed facilities.

- g) Union is requesting that the Board determine that the Project qualifies under the capital pass through mechanism as approved in Union's current 2014-2018 incentive regulation ("IRM") framework (EB-2013-0202). The intent of the capital pass through mechanism is to adjust rates during the IRM term to reflect the associated impacts of significant capital investments made throughout the IRM term. Such investments, deemed "not business as usual", refer to capital expenditures that are significant and cannot be managed within Union's Board-approved capital budget.

If the Board determines the Project as proposed does not qualify, Union would not proceed with the Project.

- h) Union and TransCanada have been coordinating new capacity open seasons to the extent possible (including for transportation services commencing November 1, 2016 and November 1, 2017) so that shippers seeking a path involving both the Union and TransCanada systems can bid for capacity at or about the same time. Shippers that enter these Union and TransCanada new capacity open seasons are seeking transportation services commencing the same date. Therefore, TransCanada and Union have been consistent with targeted in-service dates for new facilities in 2015, 2016 and 2017. Also, as discussed in Exhibit B.TCPL.3d), Union will attempt, to the extent practical, to align its Term-Up Provision notice with TransCanada's where expansion proposed by both companies triggers respective Term-Up Provisions, allowing shippers with capacity on both systems to make decisions on the combined path.

THIS FINANCIAL BACKSTOPPING AGREEMENT made as of the [] day of [], 2015

BETWEEN:

UNION GAS LIMITED, a company existing under the laws of the Province of Ontario,
(hereinafter referred to as “**Union**”)

- and -

[SHIPPER NAME], a [type of entity] existing under the laws of the (Province, State, Country) of [],
(hereinafter referred to as “**Shipper**”)

WHEREAS Shipper has participated in an Open Season held by Union and is one of a group of shippers that have requested and entered into agreements with Union for the provision by Union of transportation services requiring all or a portion of the Expansion Facilities (collectively, the “**Open Season Shippers**”);

AND WHEREAS Union and Shipper have entered into a Precedent Agreement dated [insert date] (the “**Precedent Agreement**”) and an associated firm transportation contract [insert Contract ref # (M12XXX)], dated [insert date] (the “**Contract**”), for transportation service on Union’s pipeline system;

AND WHEREAS pursuant to the Precedent Agreement, Expansion Facilities, as defined therein, must be constructed in order to enable Union to provide the required transportation service for Shipper and potentially other Open Season Shippers by the Commencement Date, as set out in the Contract;

AND WHEREAS the conditions precedent for the benefit of Shipper outlined in Article XXI, Section 2 of Schedule “A2010” of the Contract and Section 3.2 of the Precedent Agreement (if any) (the “**Shipper Conditions**”) must be satisfied or waived by Shipper prior to the applicable date(s) provided in the Contract and the Precedent Agreement, as applicable, (each date a “**Shipper Conditions Precedent Date**”);

AND WHEREAS the Contract and Precedent Agreement provide for certain conditions precedent for the benefit of Union;

AND WHEREAS Union is currently engaging in development and construction activities related to the Expansion Facilities and Shipper has agreed to financially indemnify Union, subject to certain limitations as provided herein, for Shipper’s share of any and all Pre-Service Costs, as defined hereinafter;

THIS CONTRACT WITNESSETH that in consideration of the foregoing and mutual covenants herein contained, the parties hereto agree as follows:

1. DEFINITIONS

“Cancelled Facilities” means that portion of the Expansion Facilities not built as a result of Union’s decision pursuant to the provisions of Subsection 3.a. herein.

“Indemnity Date” means December 12, 2014.

“Pre-Service Costs” shall mean Union’s reasonable costs consistent with good engineering and operating practices generally accepted in the industry, incurred by Union, or which have accrued to or will accrue to Union, or which have been allocated to or which will be allocated to Union, or for which Union is contractually obligated to pay, which are incurred on or after the Indemnity Date, in conjunction with its efforts to develop and construct the Expansion Facilities. Pre-Service Costs shall include, but shall not be limited to, those expenditures and/or costs (including cancellation costs, carrying costs, costs to mitigate, third party claims and litigation costs), incurred by Union, or which have accrued to or will accrue to Union, or which have been allocated to or which will be allocated to Union, or for which Union is contractually obligated to pay associated with engineering, construction, materials and equipment, environmental, the obtaining of land rights, regulatory, and/or legal activities, interest during construction, internal overhead and administration (including amounts paid to affiliates for services rendered in accordance with the Affiliate Relationships Code as established by the Ontario Energy Board) and any other costs, expenses, losses, demands, damages and obligations incurred in furtherance of Union’s efforts to develop and construct the Expansion Facilities.

2. CONSTRUCTION

Unless the context requires otherwise: (a) any capitalized term used herein not specifically defined shall have the definition given to it in the Precedent Agreement or the Contract; (b) the gender (or lack of gender) of all words used in this Financial Backstopping Agreement includes the masculine and feminine; (c) the singular form of nouns, pronouns and verbs shall include the plural and vice versa; (d) “shall” and “will” have equal force and effect; (e) the words “include,” “including,” or “includes” shall be read to be followed by the words “without limitation” or words having similar import; and (f) the word “or” will have the inclusive meaning represented by the phrase “and/or”.

3. TERMS

- a. **Cancelled Facilities, with Precedent Agreement Terminated:** If Shipper fails to satisfy or waive any Shipper Conditions by the associated Shipper Conditions Precedent Date and the Precedent Agreement is terminated in accordance with the terms thereof, and Union, based on such Shipper’s failure, has decided to:
 - i. cancel the development and construction of all of the Expansion Facilities, or
 - ii. cancel the development and construction of a portion of the Expansion Facilities,then such Shipper shall reimburse Union for the Pre-Service Costs pertaining to the Cancelled Facilities.

In addition, in the event that Union has decided to:

- i. cancel the development and construction of all of the Expansion Facilities; or
- ii. cancel the development and construction of a portion of the Expansion Facilities,

based on Shipper's failure to satisfy or waive any Shipper Conditions by the associated Shipper Conditions Precedent Date and the Precedent Agreement is terminated in accordance with the terms thereof AND the similar failure of any other Open Season Shippers to satisfy or waive their shipper conditions by the associated shipper conditions precedent date; then Shipper shall reimburse Union for Shipper's proportionate share (as prorated based on initial contract demand (GJ/d) among the other Open Season Shippers who failed to satisfy or waive their shipper conditions by the associated shipper conditions precedent date and whose transportation services would have required the development and construction of the Cancelled Facilities) of Pre-Service Costs pertaining to the Cancelled Facilities.

b. Union Unable to Meet or Waive Conditions Precedent, with Precedent Agreement Terminated: If Union:

- i. fails to satisfy or waive any of the conditions precedent for its benefit in Article XXI, Section 1 of Schedule "A2010" of the Contract and the Precedent Agreement is terminated in accordance with the terms thereof; or
- ii. fails to satisfy or waive any of the conditions precedent for its benefit set out in Subsection 3.1 in the Precedent Agreement, and the Precedent Agreement is terminated in accordance with the terms thereof,

then Shipper shall reimburse Union for Shipper's proportionate share (as prorated based on initial contract demand (GJ/d) among all Open Season Shippers whose transportation services would have required the development and construction of the Expansion Facilities) of Pre-Service Costs.

c. Union Obligation to Minimize Pre-Service Costs: Union shall use commercially reasonable efforts to minimize all Pre-Service Costs payable by Shipper to Union, including without limitation, mitigating costs by soliciting one or more replacement customers for excess transportation services, if applicable.

4. FINANCIAL ASSURANCES

From time to time, Union may request, and Shipper shall provide to Union, the requisite financial assurances reasonably necessary to ensure Shipper's ability to honour the provisions of this Financial Backstopping Agreement in the form and amount reasonably required by Union (the "**FBA Financial Assurances**"). The FBA Financial Assurances, if required, will be as determined solely by Union.

5. INVOICING PROCESS

Upon final determination by Union of any amounts owing by Shipper under this Financial Backstopping Agreement, Union shall provide an invoice to Shipper, with sufficient supporting evidence, reasonably satisfactory to Shipper, justifying the invoiced amount in relation to the Cancelled Facilities, and Shipper shall pay such amounts within fifteen (15) days following Shipper's receipt of any invoices. Shipper acknowledges and understands that the final determination of any amounts owing by Shipper might not be capable of determination until such time as the Expansion Facilities are completed and placed into service. If Shipper fails to pay any invoice in full within the time herein required, interest on the unpaid portion shall accrue from the date such payment is first overdue until payment is made at a rate of interest equal to an effective monthly interest rate of 1.5%, compounded monthly, for an effective annual interest rate of 19.56%, and such interest shall be immediately due and payable.

6. TERMINATION OF AGREEMENT

This Financial Backstopping Agreement shall terminate on the date that the Expansion Facilities are placed into service or the date Shipper has paid all of its invoices (including all applicable interest thereon) pursuant to Section 5 herein, as applicable; provided however, that any rights or remedies that a party may have for breaches of this Financial Backstopping Agreement prior to such termination and any liability a party may have incurred pursuant to the Financial Backstopping Agreement before such termination shall not thereby be released.

7. ESTIMATE OF PRE-SERVICE COSTS

Shipper acknowledges that it has been provided an initial estimate for the Pre-Service Costs (the "**Estimated Pre-Service Costs**") and that the initial estimate is attached at Schedule 1. Union shall provide an update of the Estimated Pre-Service Costs and Shipper's proportionate share of the Estimated Pre-Service Costs within thirty (30) days of the end of each calendar quarter, beginning at the end of the first quarter of 2016 in a form similar to Schedule 1. Shipper and Union acknowledge and agree that the Estimated Pre-Service Costs are estimates provided for information purposes only and that to the extent Shipper's liability pursuant to this Financial Backstopping Agreement is greater than or less than any Estimated Pre-Service Costs, Shipper shall be obligated to pay its share of Pre-Service Costs as calculated pursuant to the provisions of this Financial Backstopping Agreement.

8. MISCELLANEOUS

- a. The parties hereto shall not assign this Financial Backstopping Agreement without the prior written consent of the other party, which shall not be unreasonably withheld. This Financial Backstopping Agreement shall be binding upon and shall enure to the benefit of the parties hereto and their permitted successors and assigns. In no event will the assignment of this Financial Backstopping Agreement be permitted unless the Precedent Agreement and Contract are also assigned to the same permitted assignee.

- b. This Financial Backstopping Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and each of the parties shall attorn to the exclusive jurisdiction of the courts of the Province of Ontario.
- c. This Financial Backstopping Agreement was negotiated and prepared by both parties with the advice and participation of counsel. The parties have agreed to the wording of this Financial Backstopping Agreement and none of the provisions hereof shall be construed against one party on the ground that such party is the author of this Financial Backstopping Agreement or any part hereof.
- d. The recitals and representations appearing first above are hereby incorporated in and made a part of this Financial Backstopping Agreement.
- e. This Financial Backstopping Agreement may be executed in multiple counterparts (including by means of facsimile or electronic signature pages), each of which shall be deemed an original and all of which shall constitute one and the same instrument.
- f. A waiver of any default, breach of non-compliance under this Financial Backstopping Agreement is not effective unless in writing and signed by the party to be bound by the waiver. No waiver shall be inferred from or implied by any failure to act or delay in acting by a party in respect of any default, breach, non-observance or by anything done or omitted to be done by the other party. The waiver by a party of any default, breach or non-compliance under this Financial Backstopping Agreement shall not operate as a waiver of the party's rights under this Financial Backstopping Agreement in respect of any continuing or subsequent default, breach or non-compliance (whether of the same or any other nature).
- g. This Financial Backstopping Agreement, the Precedent Agreement and the Contract reflect the whole and entire agreement among the parties with respect to the subject matter hereof and supersede all prior agreements and understandings among the parties with respect to the subject matter hereof.
- h. For the period this Financial Backstopping Agreement is in effect, in the event of any conflict between the provisions of this Financial Backstopping Agreement and the main body of the Precedent Agreement and/or the Contract, the provisions of this Financial Backstopping Agreement shall prevail over the main body of the Precedent Agreement and the Contract.

[signature page follows]

IN WITNESS WHEREOF this Financial Backstopping Agreement has been properly executed by the parties hereto by their duly authorized officers effective as of the date first above written.

[SHIPPER]

UNION GAS LIMITED

Name:

Title:

Name:

Title:

Name:

Title:

Name:

Title:

SCHEDULE 1

Initial Estimated Pre-Service Costs

PRECEDENT AGREEMENT

THIS PRECEDENT AGREEMENT (“**Precedent Agreement**”) dated this ____ day of _____, 2015, by and between Union Gas Limited, an Ontario corporation (“**Union**”), and [insert Shipper name], an [Ontario company] (“**Shipper**”) (Union and Shipper may sometimes be referred to separately as “**Party**” or jointly as “**Parties**” in this Precedent Agreement) witness that:

WHEREAS, Union owns and operates a natural gas transmission system in south-western Ontario, through which Union offers firm transportation services;

WHEREAS, Union intends, subject to Shipper’s execution of this Precedent Agreement, Shipper’s execution of the Transportation Agreement defined below, and Union’s determination of capacity requirements, to own, build and operate certain facilities being [insert facilities description], proposed to be in service by November 1, 2017 or as soon as possible thereafter (the “**In-Service Date**”) and herein known as the “**Expansion Facilities**”;

WHEREAS, the development and construction of the Expansion Facilities are dependent on: (i) the TransCanada Pipelines Limited Mainline Settlement Agreement, dated October 31, 2013, between Union, Enbridge Gas Distribution Inc., Gaz Metro Limited Partnership and TransCanada (the “**Settlement Agreement**”) being approved by the parties thereto by way of Acceptable Regulatory Approval (as defined in the Settlement Agreement) of the First NEB Application (as defined in the Settlement Agreement) or the Second NEB application (as defined in the Settlement Agreement) as the case may be, in accordance with Articles 6 and 7 of the Settlement Agreement; (ii) NEB approval of TransCanada’s application for the construction of the King’s North Project connecting the TransCanada Mainline with Segment A of Enbridge Gas Distribution Inc.’s proposed GTA Project; and (iii) TransCanada’s written notice to Union of its commitment to construct the King’s North Project;

WHEREAS, this Precedent Agreement is executed as evidence of Shipper’s binding request for firm transportation service as well as Shipper’s acknowledgement that Union requires the benefit of certain construction and regulatory conditions precedent not contained in the tariff applicable to the Transportation Agreement;

WHEREAS, Shipper acknowledges that Union is relying on Shipper’s commitments and obligations set forth in this Precedent Agreement in order to own, build and operate the Expansion Facilities;

WHEREAS, the design of the Expansion Facilities may change based on the final capacity requirements or project design as determined by Union in Union’s sole discretion;

WHEREAS, Shipper agrees to enter into a transportation agreement whereby Union will provide service and Shipper will receive service in Ontario in accordance with and in the form included in Union’s M12 Rate Schedule (such transportation agreement shall be referred to herein as the “**Transportation Agreement**”); and

WHEREAS, Shipper agrees to enter into a financial backstopping agreement (the “**Financial Backstopping Agreement**”) whereby Shipper agrees to financially indemnify Union for the costs associated with developing and constructing the Expansion Facilities on the terms and conditions contained therein,

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, Union and Shipper agree as follows:

1.0 Effective Date and Term

This Precedent Agreement shall become effective as of the date first stated above and shall remain in effect until the earlier of: (a) all of the conditions precedent in Section 3.0 have been satisfied or waived by the Party claiming the benefit thereof, or (b) either Union or Shipper exercises their respective termination rights pursuant to this Precedent Agreement.

2.0 Firm Transportation Services

Shipper agrees that it will execute the firm Transportation Agreement necessary to satisfy Shipper's firm transportation requirements under the terms set forth below and in the form attached as Schedule 1, Transportation Agreement M12XXX. The Transportation Agreement shall provide firm transportation services including, without limitation, the following terms as described in M12XXX.

- (a) Contract Demand
- (b) Start and End Dates
- (c) Receipt Point(s)
- (d) Delivery Point(s)
- (e) Demand Charge
- (f) Renewal Rights

Shipper shall be responsible for all charges, pursuant to Union's M12 Rate Schedule, as applicable.

3.0 Conditions Precedent

3.1 The obligations of Union to provide the Transportation Services in the Transportation Agreement are subject to the conditions precedent for Union's benefit in the Transportation Agreement and to the following conditions precedent, which are for the sole benefit of Union and which may be waived or extended in whole or in part in the manner provided for in this Precedent Agreement:

- (a) Union shall have obtained, in form and substance satisfactory to Union, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders, and authorizations that are required to:
 - i. construct and operate the Expansion Facilities; and
 - ii. provide the Transportation Services,

under a regulatory framework satisfactory to Union, in its sole discretion;

- (b) Union shall have obtained all internal approvals that are necessary or appropriate to construct and operate the Expansion Facilities and provide the Transportation Services after the satisfaction of Subsection 3.1(f) herein;
- (c) Union shall have completed and placed into service the Expansion Facilities;
- (d) Union, where applicable, shall have received from Shipper an executed Financial Backstopping Agreement, in form and substance reasonably acceptable to the Parties;
- (e) Shipper shall have executed the Transportation Agreement and provided Union with notification of the satisfaction or waiver of the conditions precedent for the benefit of Shipper outlined in Article XXI, Section 2 of Schedule "A2010" of the Transportation Agreement;
- (f) The Settlement Agreement shall have been approved by the parties thereto by way of Acceptable Regulatory Approval (as defined in the Settlement Agreement) of the First NEB Application (as defined in the Settlement Agreement) or the Second NEB application (as defined in the Settlement Agreement) as the case may be, in accordance with Articles 6 and 7 of the Settlement Agreement; and
- (g) TransCanada shall have provided Union written notice of its commitment to build the King's North Project, pursuant to NEB approval of the King's North Project.

3.2 The obligations of Shipper under the Transportation Agreement are subject to the conditions precedent for the benefit of Shipper in the Transportation Agreement and to the following conditions precedent, which are for the sole benefit of Shipper, and which may be waived or extended in whole or in part in the manner provided for in this Precedent Agreement:

3.3 Union and Shipper shall each use due diligence and reasonable efforts to satisfy and fulfill the conditions precedent, if applicable, specified in paragraphs Section 3.1 (a), (c), (d), (e) and (g), and the conditions precedent specified in Section 3.2 (if any). Each Party shall notify the other forthwith in writing of the satisfaction or waiver of each condition precedent for such Party's benefit; provided however, that the conditions precedent in Subsections 3.1(f) and (g) cannot be waived and can only be satisfied by the party entitled to the benefit. Subject to Section 3.5 herein, if a Party concludes that it will not be able to satisfy a condition precedent that is for its benefit, that Party may, upon written notice to the other Party, terminate this Precedent Agreement and the Transportation Agreement and upon the giving of such notice, this Precedent Agreement and the Transportation Agreement shall be of no further force and effect and each of the Parties shall be released from all further obligations hereunder.

3.4 Subject to Section 3.5 herein, if any of the conditions precedent in Section 3.1 (d) or (e) are not satisfied or waived by the Party entitled to the benefit of such condition by [insert date], then either Party may, upon written notice to the other Party, terminate this Precedent Agreement and the Transportation Agreement and upon the giving of such notice, this Precedent Agreement and the Transportation Agreement shall be of no further force or effect and each of the Parties shall be released from all further obligations hereunder.

3.5 In the event of termination of the Precedent Agreement and Transportation Agreement pursuant to Sections 3.3 and/or 3.4 herein, then (i) such termination shall be without prejudice to any rights or remedies that a Party may have for breaches of this Precedent Agreement and the

Transportation Agreement prior to such termination and any liability a Party may have incurred before such termination shall not thereby be released; and (ii) any obligations and any liabilities that the Shipper may have incurred or be liable for pursuant to the Financial Backstopping Agreement shall not thereby be released, affected or diminished.

4.0 Union's Authorizations and Approvals

During the term of this Precedent Agreement, Shipper agrees to support and cooperate with, and to not oppose, obstruct or otherwise interfere with in any manner, the efforts of Union to obtain all authorizations and/or exemptions and supplements and amendments thereto necessary for Union to construct, own, operate, and maintain, under Union's proposed regulatory framework, the Expansion Facilities and to provide the firm transportation service contemplated in this Precedent Agreement and to perform its obligations as contemplated by this Precedent Agreement. In addition, Shipper agrees to support and cooperate with, and to not oppose, obstruct or otherwise interfere with in any manner, the efforts of another party to obtain all authorizations and/or exemptions and supplements and amendments thereto necessary for that party to construct, own, operate, and maintain, under that party's proposed regulatory framework, facilities which are required in conjunction with the Expansion Facilities.

5.0 Allocation of Capacity in the event of partial completion of Expansion Facilities

If Expansion Facilities are required to satisfy any Transportation Services,

- (a) then to the extent that such Expansion Facilities are only partially completed and placed in service by the Commencement Date or at any time thereafter, then any firm capacity available on such partially completed Expansion Facilities (the "**Partial Expansion Capacity**") will be allocated in accordance with this Section 5.0 to all Transportation Agreements: (a) which require the same Expansion Facilities for the Contract Demand; and (b) under which all conditions precedent have been satisfied or waived except for such conditions precedent that relate to the completion and placing in-service of the Expansion Facilities.
- (b) Such allocation shall be made in priority of the NPV as such term is defined in Article XVI of Schedule "A2010" of the M12 Rate Schedule and allocated in accordance with said Article.
- (c) If, pursuant to this Section, a Transportation Agreement is allocated any portion of Partial Expansion Capacity, then the conditions precedent that relate to the completion and placing in-service of the Expansion Facilities shall be deemed to have been waived such that the Initial Term under the Transportation Agreement will commence. If a Transportation Agreement is not allocated the entirety of the Contract Demand under such Transportation Agreement, then such Contract Demand shall be deemed to be such lower allocated amount (and for greater certainty, the Initial Term shall nevertheless be deemed to have commenced) until such time as the Transportation Agreement is allocated additional Partial Expansion Capacity pursuant to this Section or until the entirety of the Expansion Facilities are completed and placed in-service.
- (d) The procedure contemplated by this Section will be applicable from time to time on each occasion that the Expansion Facilities are incrementally completed and placed in service.

6.0 Limitation of Damages

THE PARTIES HERETO AGREE THAT NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY PUNITIVE, SPECIAL, EXEMPLARY, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS OR BUSINESS INTERRUPTIONS) ARISING OUT OF OR IN ANY MANNER RELATED TO THIS PRECEDENT AGREEMENT, AND WITHOUT REGARD TO THE CAUSE OR CAUSES THEREOF OR THE SOLE, CONCURRENT OR CONTRIBUTORY NEGLIGENCE (WHETHER ACTIVE OR PASSIVE), STRICT LIABILITY (INCLUDING, WITHOUT LIMITATION, STRICT STATUTORY LIABILITY AND STRICT LIABILITY IN TORT) OR OTHER FAULT OF EITHER PARTY. THE IMMEDIATELY PRECEDING SENTENCE SPECIFICALLY PROTECTS EACH PARTY AGAINST SUCH PUNITIVE, EXEMPLARY, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES EVEN IF WITH RESPECT TO THE NEGLIGENCE, GROSS NEGLIGENCE, WILLFUL MISCONDUCT, STRICT LIABILITY OR OTHER FAULT OR RESPONSIBILITY OF SUCH PARTY, AND ALL RIGHTS TO RECOVER SUCH DAMAGES OR PROFITS ARE HEREBY WAIVED AND RELEASED.

7.0 Modification or Waiver

No modification or waiver of the terms and provisions of this Precedent Agreement may be made except by the execution of a written amendment to this Precedent Agreement. The waiver by any Party of a breach or violation of any provision of this Precedent Agreement shall not operate as or be construed to be a waiver of any subsequent breach or violation thereof.

8.0 Supersedes Other Agreements

This Precedent Agreement, Transportation Agreement and the Financial Backstopping Agreement reflect the whole and entire agreement among the Parties with respect to the subject matter hereof and supersede all prior agreements and understandings among the Parties with respect to the subject matter hereof.

9.0 Notices

Notices under this Precedent Agreement must be sent,

If to Union:

Union Gas Limited
50 Keil Drive North
Chatham, ON N7M 5M1
Attention: Director, Storage and Transportation, Marketing and Utilization
Facsimile: (519) 436-4643

If to Shipper:

[insert Shipper address]

Attention: [insert name/title]

Facsimile: (XXX)XXX-XXXX

Any Party may change its address by written notice to that effect to the other Party. Notices given under this Section are deemed to have been effectively given upon receipt, if mailed via prepaid overnight mail by a reputable carrier or if delivered by courier. Notices sent by mail will be deemed effectively given on the third (3rd) business day following the day when the notice properly addressed and postpaid is placed in the Canadian mail. It is expressly understood and agreed, however, that any notices must first be delivered by facsimile or other similar means, and if mailed or sent by courier, must be mailed or sent by courier as soon as practicable thereafter.

10.0 Governing Law

This Precedent Agreement shall be interpreted, performed, and enforced in accordance with the laws of the Province of Ontario and each of the parties shall attorn to the exclusive jurisdiction of the courts of the Province of Ontario.

11.0 No Third Party Beneficiaries

This Precedent Agreement shall not create any rights in third parties, and no provision of this Precedent Agreement shall be construed as creating any obligations for the benefit of, or rights in favor of, any person or entity other than the Parties.

12.0 No Drafting Presumption

No presumption shall operate in favor of or against any Party as a result of any responsibility that any Party may have had for drafting this Precedent Agreement.

13.0 Recitals

The recitals and representations appearing first above are hereby incorporated in and made a part of this Precedent Agreement.

14.0 Counterparts

This Precedent Agreement may be executed in multiple counterparts, each of which shall be deemed an original and all of which shall constitute one and the same instrument.

15.0 In Service Timing

Notwithstanding anything in this Precedent Agreement or the Transportation Agreement, Shipper agrees that it shall have no cause of action or claims against Union if the In-Service Date for the Expansion Facilities is later than the date stated in the Recitals so long as Union has used

reasonable efforts to place the Expansion Facilities in-service by the In-Service Date. This Section 15.0 is intended to survive the termination of this Precedent Agreement

16.0 Definitions

Capitalized terms used in this Precedent Agreement shall have the meaning given those terms in the Transportation Agreement, unless defined herein.

17.0 Assignment

The Parties hereto shall not assign this Precedent Agreement without the prior written consent of the other Party, which shall not be unreasonably withheld. This Precedent Agreement shall be binding upon and shall enure to the benefit of the Parties hereto and their permitted successors and assigns. In no event will the assignment of this Precedent Agreement be permitted unless the Transportation Agreement and the Financial Backstopping Agreement are also assigned to the same permitted assignee.

18.0 Conflict

For the period that this Precedent Agreement is in effect, in the event of any conflict between the provisions of the main body of this Precedent Agreement and the Transportation Agreement included as Schedule 1 herein, the provisions of the main body of this Precedent Agreement shall prevail over the Transportation Agreement.

19.0 Delays

Union and Shipper shall, as soon as reasonably practicable, inform the other Party of any delays that may impact the anticipated In-Service Date for the Expansion Facilities.

[signature page follows]

IN WITNESS WHEREOF, the Parties hereto have caused this Precedent Agreement to be duly executed by their duly authorized officers as of the date first written above.

UNION GAS LIMITED

By: _____
Authorized Signatory

[SHIPPER NAME]

By: _____
Authorized Signatory

By: _____
Authorized Signatory

Schedule 1 to the Precedent Agreement

Transportation Agreement

THIS FIRM M12 TRANSPORTATION CONTRACT dated as of the ____ day of _____, 2015,

UNION GAS LIMITED, a company existing under the laws of the
Province of Ontario,
(hereinafter referred to as “**Union**”)

- and -

[SHIPPER NAME]., a company existing under the laws of the **Province**
of XXX,
(hereinafter referred to as “**Shipper**”)

WHEREAS, Union owns and operates a natural gas transmission system in south-western Ontario, through which Union offers “Transportation Services”, as defined in Article II herein;

AND WHEREAS, Shipper wishes to retain Union to provide such Transportation Services, as set out herein, and Union has agreed, subject to the terms and conditions of this Contract, to provide the Transportation Services requested;

NOW THEREFORE, this Contract witnesses that, in consideration of the mutual covenants and agreements herein contained and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

ARTICLE I - INTERPRETATION AND DEFINITIONS

1.01 Divisions, Headings and Index: The division of this Contract into Articles, Sections and Subsections, and the insertion of headings and any table of contents or index provided are for convenience of reference only, and shall not affect the construction or interpretation hereof.

1.02 Industry Usage: Words, phrases or expressions which are not defined herein and which, in the usage or custom of the business of the transportation, storage, and distribution or sale of natural gas have an accepted meaning shall have that meaning.

1.03 Extended Meaning: Unless the context otherwise requires, words importing the singular include the plural and vice versa, and words importing gender include all genders. The words “herein” and “hereunder” and words of similar import refer to the entirety of this Contract, including the Schedules incorporated into this Contract, and not only to the Section in which such use occurs.

1.04 Conflict: In the event of any conflict between the provisions of the main body of this Contract (including Schedule 1) and Union’s M12 Rate Schedule, as defined below, the provisions of Union’s M12 Rate Schedule shall prevail over the main body of this Contract.

1.05 Currency: All reference to dollars in this Contract shall mean Canadian dollars unless otherwise specified.

1.06 Schedules: Refers to the schedules attached hereto which are specifically included as part of this Contract, and include:

Schedule 1 – Contract Parameters

1.07 Rate Schedule: “Union's M12 Rate Schedule” or the “M12 Rate Schedule” or “M12” shall mean Union’s M12 Rate Schedule, (including the Storage and Transportation Rates, Schedule “A 2010” (“**General Terms and Conditions**”), Schedule “B 2010”(“**Nominations**”), Schedule “C”(“**Monthly Fuel Rates and Ratios**”) and Schedule “D 2010”(“**Receipt and Delivery Points and Pressures**”), or such other replacement rate schedule which may be applicable to the Transportation Services provided hereunder as approved by the Ontario Energy Board, and shall apply hereto, as amended from time to time, and which is incorporated into this Contract pursuant to Section 5.03 hereof.

1.08 Measurements: Units set out in SI (metric) are the governing units for the purposes of this Contract. Units set out in Imperial measurement in parentheses beside their SI (metric) equivalent are for reference only and in the event of a conflict between SI (metric) and Imperial measurement herein, SI (metric) shall prevail.

ARTICLE II - TRANSPORTATION SERVICES

2.01 Transportation Services: Union shall, subject to the terms and conditions herein, transport Shipper’s gas on a firm basis on Union’s system (the “**Transportation Services**”). Shipper agrees to the following upon nomination to Union for the provision of the Transportation Services:

(a) Contract Demand, Term, Receipt Point and Delivery Point shall be as set out in Schedule 1.

(b) Gas Transported by Union:

(i) Union agrees, on any Day, and subject to Sections (b) ii) and (b) iii), to receive on Shipper's behalf at the Receipt Point, any quantity of gas which Shipper nominates and which Union has authorized for Transportation Service and to deliver that quantity of gas to Shipper at the Delivery Point as per Shipper’s nomination; and,

(ii) Under no circumstances shall Union be required to transport a quantity of gas in excess of the Contract Demand; and,

(iii) Union agrees that it shall, upon the request of Shipper, use reasonable efforts to transport gas in excess of the Contract Demand, as Authorized Overrun, on an interruptible basis; and,

(iv) Union agrees that it shall, upon request of Shipper, use reasonable efforts to accommodate changes to either the Receipt Point or Delivery Point, after the Timely Nomination Cycle, on an interruptible basis.

(c) Fuel:

Shipper shall provide the fuel requirements per the M12 Rate Schedule based on the Authorized Quantity.

2.02 Accounting for Transportation Services: All quantities of gas handled by Union shall be accounted for on a daily basis.

2.03 Commingling: Union shall have the right to commingle the quantity of gas referenced herein with gas owned by Union or gas being stored and/or transported by Union for third parties.

2.04 Imbalances: The parties hereto recognize that with respect to Section 2.01, on any Day, receipts of gas by Union and deliveries of gas by Union may not always be exactly equal, but each party shall cooperate with the other in order to balance as nearly as possible the quantities transacted on a daily basis, and any imbalances arising shall be allocated to the Facilitating Agreements and shall be subject to the respective terms and charges contained therein, and shall be resolved in a timely manner.

ARTICLE III - CHARGES AND RATES

3.01 Except as otherwise stated herein, the charges and rates to be billed by Union and paid by Shipper for the Transportation Services provided under this Contract will be those specified in Union's M12 Rate Schedule.

ARTICLE IV - NOMINATIONS

4.01 Transportation Services provided hereunder shall be in accordance with the prescribed nominations procedure as set out in Schedule "B 2010" of Union's M12 Rate Schedule.

ARTICLE V - MISCELLANEOUS PROVISIONS

5.01 Notices: All communications provided for or permitted hereunder shall be in writing, personally delivered to an officer or other responsible employee of the addressee or sent by registered mail, charges prepaid, or by facsimile or other means of recorded electronic communication, charges prepaid, to the applicable address or to such other address as either party hereto may from time to time designate to the other in such manner, provided that no communication shall be sent by mail pending any threatened, or during any actual, postal strike or other disruption of the postal service. Shipper contact information, as provided to Union, shall be found on the secured portion of Union's website (the secured portion of Union's website is known as "**Unionline**"). Union's contact information shall be displayed on the unsecured portion of Union's website. Any communication personally delivered shall be deemed to have been validly and effectively received on the date of such delivery. Any communication so sent by facsimile or other means of electronic communication shall be deemed to have been validly and effectively received on the Business Day following the day on which it is sent. Any communication so sent by mail shall be deemed to have been validly and effectively received on the seventh Business Day following the day on which it is postmarked.

Notwithstanding the above, nominations shall be made by facsimile or other recorded electronic means, subject to execution of an agreement for use of *Unionline*, or such other agreement, satisfactory to Union, and will be deemed to be received on the same Day and same time as sent. Each party may from time to time change its address for the purpose of this Section by giving notice of such change to the other party in accordance with this Section.

5.02 Law of Contract: Union and Shipper agree that this Contract is made in the Province of Ontario and that, subject to Article X of the General Terms and Conditions, the courts of the Province of Ontario shall have exclusive jurisdiction in all matters contained herein. The parties further agree that this Contract shall be construed exclusively in accordance with the laws of the Province of Ontario.

5.03 Entire Contract: This Contract (including Schedule 1), all applicable rate schedules and price schedules, and any applicable Precedent Agreement constitutes the entire agreement between the parties hereto pertaining to the subject matter hereof. This Contract supersedes any prior or contemporaneous agreements, understandings, negotiations or discussions, whether oral or written, of the parties in respect of the subject matter hereof.

5.04 Time of Essence: Time shall be of the essence hereof.

5.05 Counterparts: This Contract may be executed in any number of counterparts, each of which when so executed shall be deemed to be an original but all of which together shall constitute one and the same agreement. This Contract may be executed by facsimile or other electronic communication and this procedure shall be as effective as signing and delivering an original copy.

5.06 Severability: If any provision hereof is invalid or unenforceable in any jurisdiction, to the fullest extent permitted by law, (a) the other provisions hereof shall remain in full force and effect in such jurisdiction and shall be construed in order to carry out the intention of the parties as nearly as possible and (b) the invalidity or unenforceability of any provision hereof in any jurisdiction shall not affect the validity or enforceability of any provision in any other jurisdiction.

5.07 General Liability: The liability of the parties hereunder is limited to direct damages only and all other remedies or damages are waived. In no event shall either party be liable for consequential, incidental, punitive, or indirect damages, in tort, contract or otherwise.

[signature page follows]

THIS CONTRACT SHALL BE BINDING UPON and shall enure to the benefit of the parties hereto and their respective successors and permitted and lawful assigns.

IN WITNESS WHEREOF this Contract has been properly executed by the parties hereto by their duly authorized officers as of the date first above written.

UNION GAS LIMITED

Per: _____
Authorized Signatory

[SHIPPER NAME]

Per: _____
Authorized Signatory

Per: _____
Authorized Signatory

CONTRACT PARAMETERS

Contract Demand

Union shall transport a quantity of gas, on a firm basis, on any one Day, of:

- up to XXX,XXX GJ (XXX,XXX MMBtu) (the “**Contract Demand**”).

Receipt Points, Delivery Points and Transportation Services Paths

A “Receipt Point”, as noted in the chart below, shall mean the point where Union shall receive gas from Shipper on a firm basis and a “Delivery Point”, as noted in the chart below, shall mean the point where Union shall deliver gas to Shipper on a firm basis, which points are more particularly described in the M12 Rate Schedule.

The Transportation Services are available for the following paths:

Path	Receipt Point(s)	Delivery Point(s)
1	[insert point]	[insert point]

Term

This Contract shall be effective as of the date of execution hereof; however, the obligations, terms and conditions for the Transportation Services herein shall commence on the later of:

- November 1, 2017 or November 1, 2018;
- the day following the date that all of the conditions precedent set out in Article XXI of Schedule “A 2010” of Union’s M12 Rate Schedule have been satisfied or waived by the party entitled to the benefit thereof;
- and the day following the date that all of the conditions precedent set out in the agreement setting out certain construction and related conditions (“**Precedent Agreement**”), dated [insert date] have been satisfied or waived by the party entitled to the benefit thereof;

(such later date being referred to as the “**Commencement Date**” and shall continue in full force and effect until October 31, 2032 or October 31, 2033 (the “**Initial Term**”).

Conditions Date

As referred to in Article XXI of Schedule “A 2010”: [insert date]

Shipper's Representations and Warranties

If Shipper requests Union to zero rate the GST/HST on any gas transportation charges, Shipper must provide Union with an executed declaration in the form provided by Union.

Special Provisions

Intentionally Blank

THIS FIRM M12 TRANSPORTATION CONTRACT dated as of the [] day of [Month], [year],

UNION GAS LIMITED, a company existing under the laws of the Province of Ontario,
(hereinafter referred to as “**Union**”)

- and -

[SHIPPER NAME], a [type of entity] existing under the laws of the (Province, State, Country) of [],
(hereinafter referred to as “**Shipper**”)

WHEREAS, Union owns and operates a natural gas transmission system in south-western Ontario, through which Union offers “Transportation Services”, as defined in Article II herein;

AND WHEREAS, Shipper wishes to retain Union to provide such Transportation Services, as set out herein, and Union has agreed, subject to the terms and conditions of this Contract, to provide the Transportation Services requested;

NOW THEREFORE, this Contract witnesses that, in consideration of the mutual covenants and agreements herein contained and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

ARTICLE I - INTERPRETATION AND DEFINITIONS

1.01 Divisions, Headings and Index: The division of this Contract into Articles, Sections and Subsections, and the insertion of headings and any table of contents or index provided are for convenience of reference only, and shall not affect the construction or interpretation hereof.

1.02 Industry Usage: Words, phrases or expressions which are not defined herein and which, in the usage or custom of the business of the transportation, storage, and distribution or sale of natural gas have an accepted meaning shall have that meaning.

1.03 Extended Meaning: Unless the context otherwise requires, words importing the singular include the plural and vice versa, and words importing gender include all genders. The words “herein” and “hereunder” and words of similar import refer to the entirety of this Contract, including the Schedules incorporated into this Contract, and not only to the Section in which such use occurs.

1.04 Conflict: In the event of any conflict between the provisions of the main body of this Contract (including Schedule 1) and Union’s M12 Rate Schedule, as defined below, the provisions of Union’s M12 Rate Schedule shall prevail over the main body of this Contract.

1.05 Currency: All reference to dollars in this Contract shall mean Canadian dollars unless otherwise specified.

1.06 Schedules: Refers to the schedules attached hereto which are specifically included as part of this Contract, and include:

Schedule 1 – Contract Parameters

1.07 Rate Schedule: “Union's M12 Rate Schedule” or the “M12 Rate Schedule” or “M12” shall mean Union’s M12 Rate Schedule, (including the Storage and Transportation Rates, Schedule “A 2010” (“**General Terms and Conditions**”), Schedule “B 2010” (“**Nominations**”), Schedule “C” (“**Monthly Fuel Rates and Ratios**”) and Schedule “D 2010” (“**Receipt and Delivery Points and Pressures**”), or such other replacement rate schedule which may be applicable to the Transportation Services provided hereunder as approved by the Ontario Energy Board, and shall apply hereto, as amended from time to time, and which is incorporated into this Contract pursuant to Section 5.03 hereof.

1.08 Measurements: Units set out in SI (metric) are the governing units for the purposes of this Contract. Units set out in Imperial measurement in parentheses beside their SI (metric) equivalent are for reference only and in the event of a conflict between SI (metric) and Imperial measurement herein, SI (metric) shall prevail.

ARTICLE II - TRANSPORTATION SERVICES

2.01 Transportation Services: Union shall, subject to the terms and conditions herein, transport Shipper’s gas on a firm basis on Union’s system (the “**Transportation Services**”). Shipper agrees to the following upon nomination to Union for the provision of the Transportation Services:

(a) Contract Demand, Term, Receipt Point and Delivery Point shall be as set out in Schedule 1.

(b) Gas Transported by Union:

(i) Union agrees, on any Day, and subject to Sections (b) ii) and (b) iii), to receive on Shipper's behalf at the Receipt Point, any quantity of gas which Shipper nominates and which Union has authorized for Transportation Service and to deliver that quantity of gas to Shipper at the Delivery Point as per Shipper’s nomination; and,

(ii) Under no circumstances shall Union be required to transport a quantity of gas in excess of the Contract Demand; and,

(iii) Union agrees that it shall, upon the request of Shipper, use reasonable efforts to transport gas in excess of the Contract Demand, as Authorized Overrun, on an interruptible basis; and,

(iv) Union agrees that it shall, upon request of Shipper, use reasonable efforts to accommodate changes to either the Receipt Point or Delivery Point, after the Timely Nomination Cycle, on an interruptible basis.

(c) Fuel:

Shipper shall provide the fuel requirements per the M12 Rate Schedule based on the Authorized Quantity.

2.02 Accounting for Transportation Services: All quantities of gas handled by Union shall be accounted for on a daily basis.

2.03 Commingling: Union shall have the right to commingle the quantity of gas referenced herein with gas owned by Union or gas being stored and/or transported by Union for third parties.

2.04 Imbalances: The parties hereto recognize that with respect to Section 2.01, on any Day, receipts of gas by Union and deliveries of gas by Union may not always be exactly equal, but each party shall cooperate with the other in order to balance as nearly as possible the quantities transacted on a daily basis, and any imbalances arising shall be allocated to the Facilitating Agreements and shall be subject to the respective terms and charges contained therein, and shall be resolved in a timely manner.

ARTICLE III - CHARGES AND RATES

3.01 Except as otherwise stated herein, the charges and rates to be billed by Union and paid by Shipper for the Transportation Services provided under this Contract will be those specified in Union's M12 Rate Schedule.

ARTICLE IV - NOMINATIONS

4.01 Transportation Services provided hereunder shall be in accordance with the prescribed nominations procedure as set out in Schedule "B 2010" of Union's M12 Rate Schedule.

ARTICLE V - MISCELLANEOUS PROVISIONS

5.01 Notices: All communications provided for or permitted hereunder shall be in writing, personally delivered to an officer or other responsible employee of the addressee or sent by registered mail, charges prepaid, or by facsimile or other means of recorded electronic communication, charges prepaid, to the applicable address or to such other address as either party hereto may from time to time designate to the other in such manner, provided that no communication shall be sent by mail pending any threatened, or during any actual, postal strike or other disruption of the postal service. Shipper contact information, as provided to Union, shall be found on the secured portion of Union's website (the secured portion of Union's website is known as "**Unionline**"). Union's contact information shall be displayed on the unsecured portion of Union's website. Any communication personally delivered shall be deemed to have been validly and effectively received on the date of such delivery. Any communication so sent by facsimile or other means of electronic communication shall be deemed to have been validly and effectively received on the Business Day following the day on which it is sent. Any communication so sent by mail shall be deemed to have been validly and effectively received on the seventh Business Day following the day on which it is postmarked.

Notwithstanding the above, nominations shall be made by facsimile or other recorded electronic means, subject to execution of an agreement for use of *Unionline*, or such other agreement, satisfactory to Union, and will be deemed to be received on the same Day and same time as sent. Each party may from time to time change its address for the purpose of this Section by giving notice of such change to the other party in accordance with this Section.

5.02 Law of Contract: Union and Shipper agree that this Contract is made in the Province of Ontario and that, subject to Article X of the General Terms and Conditions, the courts of the Province of

Ontario shall have exclusive jurisdiction in all matters contained herein. The parties further agree that this Contract shall be construed exclusively in accordance with the laws of the Province of Ontario.

5.03 Entire Contract: This Contract (including Schedule 1), all applicable rate schedules and price schedules, and any applicable Precedent Agreement constitutes the entire agreement between the parties hereto pertaining to the subject matter hereof. This Contract supersedes any prior or contemporaneous agreements, understandings, negotiations or discussions, whether oral or written, of the parties in respect of the subject matter hereof.

5.04 Time of Essence: Time shall be of the essence hereof.

5.05 Counterparts: This Contract may be executed in any number of counterparts, each of which when so executed shall be deemed to be an original but all of which together shall constitute one and the same agreement. This Contract may be executed by facsimile or other electronic communication and this procedure shall be as effective as signing and delivering an original copy.

5.06 Severability: If any provision hereof is invalid or unenforceable in any jurisdiction, to the fullest extent permitted by law, (a) the other provisions hereof shall remain in full force and effect in such jurisdiction and shall be construed in order to carry out the intention of the parties as nearly as possible and (b) the invalidity or unenforceability of any provision hereof in any jurisdiction shall not affect the validity or enforceability of any provision in any other jurisdiction.

5.07 General Liability: The liability of the parties hereunder is limited to direct damages only and all other remedies or damages are waived. In no event shall either party be liable for consequential, incidental, punitive, or indirect damages, in tort, contract or otherwise.

THIS CONTRACT SHALL BE BINDING UPON and shall enure to the benefit of the parties hereto and their respective successors and permitted and lawful assigns.

IN WITNESS WHEREOF this Contract has been properly executed by the parties hereto by their duly authorized officers as of the date first above written.

UNION GAS LIMITED

Per: _____
Authorized Signatory

[NAME OF SHIPPER]

Per: _____
Authorized Signatory

CONTRACT PARAMETERS**Contract Demand**

Union shall transport a quantity of gas, on a firm basis, on any one Day, of:

- up to GJ (MMBtu) (the “**Contract Demand**”).

Receipt Points, Delivery Points and Transportation Services Paths

A “**Receipt Point**”, as noted in the chart below, shall mean the point where Union shall receive gas from Shipper on a firm basis and a “**Delivery Point**”, as noted in the chart below, shall mean the point where Union shall deliver gas to Shipper on a firm basis, which points are more particularly described in the M12 Rate Schedule.

The Transportation Services are available for the following paths:

Path	Receipt Point(s)	Delivery Point(s)
1	[Point]	[Point]
2	[Point]	[Point]

Term

This Contract shall be effective as of the date of execution hereof; however, the obligations, terms and conditions for the Transportation Services herein shall commence on the later of:

- [Month day, year]; and
- the day following the date that all of the conditions precedent set out in Article XXI of Schedule “A 2010” of Union’s M12 Rate Schedule have been satisfied or waived by the party entitled to the benefit thereof;

where applicable for Expansion Facilities or Precedent Agreement:

- and the day following the date that all of the conditions precedent set out in the agreement setting out certain construction and related conditions (“**Precedent Agreement**”) dated [Month day, year] have been satisfied or waived by the party entitled to the benefit thereof;

(such later date being referred to as the “**Commencement Date**” and shall continue in full force and effect until [Month day, year] (the “**Initial Term**”).

Conditions Date

As referred to in Article XXI of Schedule "A 2010": [Month day, year]

Shipper's Representations and Warranties

If Shipper requests Union to zero rate the GST/HST on any gas transportation charges, Shipper must provide Union with an executed declaration in the form provided by Union.

Special Provisions

Here insert any special provisions applicable to this Contract

UNION GAS LIMITED

Answer to Interrogatory from
Association of Power Producers of Ontario ("APPrO")

Reference: i) Exhibit A, Tab 10, p. 2, Table Criterion iv)

The project must be needed to serve customers and/or to maintain system safety, reliability or integrity, and cannot reasonably be delayed, and is demonstrated to be the most cost effective manner of achieving the project's objective relative to the reasonably available alternatives.

Preamble: APPrO would like to better understand this criterion of the capital pass-through mechanism.

- a) Most of the proposed facilities depend on Union's shippers also using TransCanada's proposed transportation facilities downstream of Parkway. In the event that Union receives the approvals requested, proceeds with construction and is ready to put its facilities into service as of November 1, 2017, please comment if Union believes that the above criterion will have been met as a pre-condition of a rate adjustment if:
- i) The TransCanada facilities have not been approved?
 - ii) TransCanada is not prepared to proceed under the conditions of approval they have received from the National Energy Board?
 - iii) TransCanada's facility approval has been rejected?

Response:

- a) Please see the response at Exhibit B.APPrO.1 g).

UNION GAS LIMITED

Answer to Interrogatory from
Association of Power Producers of Ontario ("APPrO")

Reference: i) Exhibit A, Tab 6, p. 15
ii) EB-2015-0166/EB-2015-0175 Exhibit B.T2.Union.FRPO.12 Attachment 1 p. 5

2) Customer Obligations.

a) *No later than 60 days from the execution of this Precedent Agreement for Phase I and no later than November 1, 2014 for Phase II, Customer will advise Pipeline in writing of: (i) any facilities which Customer must construct, or cause to be constructed, in order for Customer to utilize the firm transportation service contemplated in this Precedent Agreement; and (ii) any necessary or desirable contractual and/or governmental or regulatory authorizations having jurisdiction over the Customer which Customer determines are necessary or desirable for Customer in order to execute and deliver the Phase I Service Agreement and Phase II Service Agreement (as those terms are defined in Section 3 below) and to fulfill its obligations thereunder and to otherwise perform its obligations under this Precedent Agreement ("Customer's Authorizations"). [Emphasis added]*

iii) EB-2015-0166/EB-2015-0175 Exhibit B.T1.Union.SEC.11 Attachment 1 slide 8

Conditions Precedent for Bid

1. *(a) Nexus shall have built and placed into service, and/or acquired the necessary infrastructure for the complete path from the Central Receipt Point to Dawn.*

(b) Union shall have deemed the tolls from 1)(a) acceptable, in Union's sole discretion.

2. *Nexus shall have agreed to provide a list of the specific facilities and the schedule (including major milestones) required at the time the Precedent Agreements are executed and shall have agreed to commit to providing ongoing quarterly updates throughout the remainder of the project.*

3. *Union shall have deemed the Final Project Receipt and Delivery points acceptable.*

4. *Union shall have granted internal management approval, in Union's sole discretion.*

5. *(a) Union shall have obtained, in form and substance satisfactory to Union, and all conditions shall have been satisfied under, all governmental and*

regulatory approvals, consents, orders and authorizations that are required with respect to any facilities needed to be constructed by Union in order to utilize the Nexus Capacity.

(b) Trans Canada Pipelines shall have built and placed into service any facilities deemed to be needed by Union in order to utilize the Nexus Capacity, specifically including Parkway Belt to Maple.

6. Union shall have obtained, in form and substance satisfactory to Union, approval from the Ontario Energy Board, as to the prudence and recovery of all gas related costs associated with the contract commitment resulting from this and subsequent bids (if any) into this open season.

7. Union shall have satisfied itself as to the availability of proven and economic reserves in the basins directly connected to Nexus and/or shall have secured sufficient supply at costs deemed acceptable by Union.

8. Nexus shall have demonstrated, to Union's satisfaction, the capability to support Union's Vertical Slice program. [Emphasis added]

Preamble: While Union notes that its 2017 Dawn Parkway expansion approvals should not be dependent on upstream projects being constructed, APPrO would like to better understand Union's concepts of interdependency.

- a) Reference ii) is an excerpt from Union's NEXUS Precedent Agreement which specifically provides that their NEXUS contract would be conditional on "*any facilities which Customer must construct, or cause to be constructed, in order for Customer to utilize the firm transportation service contemplated in this Precedent Agreement*". Furthermore Reference iii) is an excerpt from a Union senior management presentation indicating that the NEXUS agreement would be conditional upon a variety of downstream facilities including Union and TransCanada facilities.
 - i) The NEXUS Precedent Agreement only generally deals with the necessary downstream facilities that must be in place. Please detail what specific Union and TransCanada facilities Union will be required to fulfil the condition in Reference iii).
 - ii) Please explain why the principle that Union included in its NEXUS contract (i.e. conditioning the financial liability of an upstream transportation contract on other dependent facilities) should not similarly be applied to Union's 2017 proposed facility build. More particularly, Union's proposed 2017 facilities would not have rates adjusted until such time as the necessary upstream and downstream facilities are also in service to allow utilization of such facilities.

Response:

- a) i) The conditions precedent in Union's NEXUS bid have been addressed as: i) no regulatory approvals are needed for any incremental facilities at Dawn (Conditions Precedent for Bid –

5(a)); and ii) TransCanada and the Eastern LDCs negotiated the Mainline Settlement Agreement that provided the framework for the rational expansion of infrastructure in Ontario (Conditions Precedent for Bid – 5(b)). Subsequently, the National Energy Board approved the changes to TransCanada's Tolls and Tariffs based on the Mainline Settlement Agreement in RH-001-2014. Additionally, Union had enough uncommitted supply and flexibility in the gas supply portfolio so that natural gas received at Dawn through the NEXUS Pipeline could be used solely in Union South, if required, until such time that access to the Union North markets through the expansion of the TransCanada system downstream of Parkway was completed.

Upstream and/or downstream approvals were not included as a condition precedent in Union's NEXUS Precedent Agreement or NEXUS Restated Precedent Agreement (the Precedent Agreements supercede and replace Union's NEXUS bid). Pre-approval of Union's NEXUS transportation contract by the Ontario Energy Board prior to November 1, 2015 is included as a condition precedent in Union's NEXUS Precedent Agreement and NEXUS Restated Precedent Agreement.

ii) All shippers supporting Union's 2017 Dawn Parkway Project were required to waive or satisfy a condition precedent to the shippers' benefit with respect to securing upstream and downstream transportation. All conditions precedent in favour of the shippers have either been satisfied or waived.

As stated in Exhibit B.APPrO.1 d), interconnected pipeline operators do their best to co-ordinate open seasons and in-service dates – however it is not always possible to have perfect alignment of schedule on projects that have a two to three year development period. Ultimately, Union is accountable to its shippers supporting the 2017 Dawn Parkway Project for meeting a November 1, 2017 in-service date. TransCanada is similarly accountable to its shippers supporting the Vaughn Mainline Expansion for meeting a November 1, 2017 in-service date. Union is not aware of any jurisdiction in North America that requires or expects the strict linkage between in-service dates of projects. Please see the response to a) i) above.

UNION GAS LIMITED

Answer to Interrogatory from
Association of Power Producers of Ontario ("APPrO")

Reference: i) Exhibit A, Tab 6, p. 19-21
ii) Union's letter of September 3, 2015, increasing the term-up threshold to \$50 million

Preamble: Union has proposed a Term-Up Provision to promote efficient expansion of their Dawn-Parkway system similar to the term-up provision recently implemented by TransCanada. APPrO has concerns that two independently administered term-up provisions could create significant contract risk for certain shippers.

- a) Please confirm that the application of Union's Term-Up Provision is for expansion costs only.
- b) Is it Union's intention to trigger the Term-Up Provision in all cases where expansion projects are above the threshold or only those projects that could be deferred in the event that transportation contracts were not renewed? An example of this might be a compressor expansion at Dawn to increase storage injections.
- c) Would Union administer its Term-Up Provision independent of TransCanada's term up provision? Please explain.
- d) Please confirm that Union could have projects that would trigger the application of its Term-Up Provision but would not necessarily trigger a similar downstream term-up provision by TransCanada, or vice versa.
- e) Please confirm that many shippers on Union also are shippers on TransCanada and in the event that Union were to trigger a five year term-up, but TransCanada were not to also trigger a similar term-up, it could result in shippers experiencing a contract mismatch between the two pipelines.
- f) Since TransCanada also uses a term-up provision, does this not substantially reduce the risk to Union, as a shipper that terms up with TransCanada is more likely to renew its transportation contract with Union even without a Term-Up Provision on Union?

Response:

- a) Confirmed.

- b) The Term-Up Provision will be triggered when Dawn Parkway System expansion projects are above the \$50 million threshold. Changes to proposed Dawn Parkway System (transportation) expansion projects or deferral of those projects would be evaluated once reverse open season results are received and once elections under the Term-Up Provision notice are complete. The example given is an expansion for storage injections, not Dawn Parkway System expansion, so the Term-Up Provision would not apply.
- c) Yes. TransCanada currently administers its Term-Up Provision independent of Union. Instances may occur where an expansion on either TransCanada's system or Union's Dawn Parkway System would trigger the Term-Up Provision process (on that respective system) but would not trigger a corresponding Term-Up Provision process on the other system. This would have been the case in 2012 when TransCanada completed its Eastern Mainline Expansion without the need for significant expansion of Union's Dawn Parkway System and also again in 2013 when TransCanada completed its Maple Compressor Upgrade without the need for expansion of Union's Dawn Parkway System (assuming Term-Up Provisions were part of the then-current Union's and TransCanada's Tariffs).
- Additionally, results of the Term-Up Provision elections may impact facilities differently on the Union Dawn Parkway System and TransCanada Mainline. However, as discussed in the response to Exhibit B.TCPL.2f), to the extent practical, Union would coordinate the timing of its Term-Up Provision notice process with TransCanada's Term-Up Provision notice process, if both companies have triggered the need for a Term-Up Provision process.
- d) Please see the response to c) above.
- e) As discussed in c) above, there is a possibility that contract terms could be mismatched on TransCanada and Union. In the event of mismatch, a shipper could approach Union to extend its M12 transportation contract term to match its TransCanada transportation contract or, alternatively, approach TransCanada if there is a mismatch with the Union contracts term.

This is the case now where TransCanada has recently implemented its Term-Up Provision and shippers have extended their contract terms to October 31, 2022. Union has not implemented its Term-Up Provision process. However, Union's M12 transportation contracts contain renewal rights that allow a shipper to elect to extend the term of its contract (annual renewal rights for a period of one year with a two-year notice for termination). Union's shippers could continue to extend the term of their contracts through the annual renewal process to October 31, 2022. As a result, the shipper has more flexibility by not co-ordinating the expiry date given the shipper controls if and when the contract with Union would be terminated based on the annual renewals.

- f) The purpose of the Term-Up Provision is to provide a tool that will assist in promoting efficient expansion of the Dawn Parkway System and help maintain toll stability for Union's in-franchise and ex-franchise customers.

As discussed in part c) above, Union cannot always rely on the assumption that Union and TransCanada will both be required to complete facility expansions for a common in-service date. It is possible that Union could require a facility expansion (at a cost of \$50 million or more) but TransCanada does not, such as:

- if Union's incremental capacity primarily includes deliveries to Enbridge at Parkway;
- if shippers do not require downstream capacity on TransCanada (perhaps TransCanada capacity has been acquired through assignment or incremental capacity has commercially been created); or
- if Union is expanding for incremental in-franchise demands.

Strictly relying on TransCanada's Term-Up Provision does not protect Union's shippers in all cases.

In addition, shippers utilizing the TransCanada system that have termed up on TransCanada have supply options beyond purchasing gas at Dawn and transporting on the Dawn Parkway System. The Union Term-Up Provision provides a level of certainty that shippers who have termed up on TransCanada will maintain their capacity on the Dawn Parkway System.

UNION GAS LIMITED

Answer to Interrogatory from
Association of Power Producers of Ontario ("APPrO")

Reference: i) Exhibit A, Tab 6, pp. 19-21
ii) Union's letter of September 3, 2015, increasing the threshold to \$50 million
iii) Exhibit A, Tab 10, Schedule 4

Preamble: Union has proposed a Term-Up Provision to promote efficient expansion of their Dawn-Parkway system. APPrO has concerns over whether this is the most effective means of promoting the efficiency objective.

- a) What other mechanisms to promote efficient expansion of the Dawn-Parkway system did Union explore prior to proposing the Term-Up Provision? Please describe each alternative mechanism (other than the current reverse open season that allows customers to turn their capacity back to Union) and elaborate on why Union chose the Term-Up Provision to achieve the objective of efficient expansion.
- b) Please provide a list of all parties that have utilized Union's reverse open season for its Dawn-Parkway system over the last 5 years and show in a table the shipper, the contract volume, the delivery point, the original contract term and the date that the capacity was actually turned back.
- c) Union's unit expansion costs continue to increase, which is evidenced by the fact that M12 rates in this application are increasing by about 21% (Reference iii). Such an increase will negatively impact all existing shippers.
 - i) Does Union agree that some markets that are transmission shippers on Union have increasing supply options and could source gas from locations other than Dawn?
 - ii) Did Union consider a 'buy-back capacity auction' mechanism (in addition to a reverse open season) whereby Union would pay a fee to an existing shipper to encourage it to voluntarily terminate capacity in advance of its current contract term (where such maximum unit fee payable would be set by Union and be less than the equivalent unit cost of expansion)?
 - iii) Does Union agree that if an existing customer was prepared to offer capacity back to Union for a fee (which could be used by such customer to offset the cost of gas sourced in an alternative fashion) that such a mechanism (subject to the appropriate regulatory treatment of such Union costs) has the potential to provide the necessary capacity at a cost less than physical expansion and promote the efficient operation of infrastructure in

and around Ontario?

- d) While it may be too late to consider such a mechanism as an alternative for 2017 facilities:
 - i) Will Union consider the merits of such a 'buy-back capacity auction' or other innovative solutions in lieu of physical expansion to optimize facility expansions prior to requesting any further Dawn-Parkway expansions?
 - ii) Will Union engage other stakeholders including TransCanada to obtain their input on such solutions?

Response:

- a) A Term-Up Provision was suggested in evidence submitted by John A. Rosenkranz on behalf of CME, FRPO and OGVG in EB-2014-0261 (2016 Dawn Parkway Expansion Project). Union determined that a Term-Up Provision aligns with TransCanada, is complimentary to Union's existing reverse open season process and enhances Union's ability to efficiently manage facility expansions. The proposed Term-Up Provision would allow Union to secure medium term commitments from applicable shippers when expansion of the Dawn Parkway System greater than \$50 million is planned, providing Union and existing shippers a greater level of certainty of commitment to the Dawn Parkway System. Finally, the proposed Term-Up Provision is consistent with the TransCanada Term-Up Provision process providing shippers contractual alignment between the Union and TransCanada systems.
- b) Please see the response at Exhibit B.ANE.2.
- c) Union does not agree that the increase in Union's unit expansion costs is evidenced by the 21% increase in M12 Rates in this application. Approximately half of the M12 Rates increase is attributable to the planned replacement of Dawn Plant B. The portion of Dawn Plant H that replaces Dawn Plant B is not an expansion.

The Profitability Index (PI) for the 2017 Dawn Parkway Project is less than 1.0. Both EB-2013-0074 and EB-2014-0261 included gas cost savings for Union's sales service customers in the calculation of the PI – neither application included the gas cost savings of other LDCs that were contracting for capacity. Union has not included any gas cost savings for sales service customers in its EB-2015-0200 economic evaluation. Additionally, Union has not included gas cost savings for other shippers (including Enbridge) in the calculation of the PI in this proceeding. The M12 Rates increase proposed in EB-2015-0200 represents less than 1% of the landed cost of gas in the Union EDA delivery area.

Existing shippers on the Dawn Parkway System (including shippers that supported the Dawn Parkway System expansions from 2006 to 2008) have already been experiencing the benefit of access to the Dawn Hub and other eastern receipt points on the TransCanada system.

Shippers supporting the 2015-2017 Dawn Parkway Projects elected to access Dawn and/or Niagara/Chippawa relative to other alternatives in spite of increasing M12 Rates.

- i) Union would agree that some shippers on the Dawn Parkway System have increasing supply options and could source gas from locations other than Dawn. The extent to which those shippers would turn back Dawn Parkway System capacity is dependent upon how those shippers value the liquidity, diversity, and security of the Dawn Hub and is dependent upon whether those shippers can get access to the increasing supply options through existing and greenfield pipelines. ICF International addressed this issue in detail in Exhibit A, Tab 5, Schedule 1 and concluded that:

“Based on our analysis, ICF concludes that the major natural gas market changes currently underway provide incentives for utilities in Ontario and Québec, and the U.S. Northeast to continue to increase reliance on supplies from the Marcellus/Utica shale. The Union Dawn Parkway System provides economic access to these supplies at a liquid trading hub with significant pipeline and storage infrastructure to ensure operational flexibility. ICF finds that the proposed capacity expansion on the Dawn Parkway System in 2017 is supported by market trends.” (page 51)

“...the advantages of holding pipeline capacity back to Dawn are expected to continue to provide incentives for the current customers in the U.S. Northeast to continue to hold capacity back to Dawn. The access to storage, the diversity of supply available at Dawn, and the difficulty in building new or expanded pipeline capacity into certain U.S. Northeast markets provide sound reasons for U.S. Northeast utilities to continue to hold capacity on the Union Dawn Parkway System.” (page 42)

In addition, based on the results of the Union reverse open seasons, and the TransCanada capacity term-up notice, the risk of future capacity turnback prior to 2022 is very limited. While there is additional market uncertainty after 2022, the market trends evaluated by ICF suggest that demand for Union Dawn Parkway System capacity should be expected to increase, and the risks of capacity turnback are limited, and offset by potential market growth.” (page 51)

“The changes in North American natural gas supply and demand patterns have a significant impact on Ontario, and the demand for pipeline assets in Ontario. ICF’s analysis indicates that demand for pipeline flows on the Union Dawn Parkway System during peak winter periods are expected to continue to increase from today’s levels under a variety of different market scenarios.” (page 52)

“While there is always some risk that natural gas markets will change in unanticipated directions, ICF’s analysis indicates that the new facilities proposed by Union respond to market needs, should remain fully contracted and should become more valuable over time. While there is always risk that specific customers may choose release capacity, the risk that the capacity released by these customers will not be contracted by other parties is limited.”

(page 52-53)

- ii) Union did not consider any “buy-back” mechanism to encourage shippers to leave the Dawn Parkway System. Union views this as destructive behaviour which would be negative for the Dawn Parkway System and the Dawn Hub. A “buy-back” mechanism would effectively recapitalize the existing pipeline system. The accounting treatment of a “buy-back” mechanism is unclear to Union since no capital expenditures would be made. It is unclear to Union whether the new shippers would be required to commit to 15 year contract terms to support a “buy-back” when existing capacity will be utilized. This mechanism could create situations where shippers “sell back” capacity to Union in one year (making a profit) and then re-contract for capacity the following year through an open season (or other such means of gaming-the-system). A “buy-back” mechanism could also provide incentive for a shipper to create a mismatch in upstream and/or downstream capacity, creating market uncertainty (i.e. sell Union’s capacity for a profit and keep the TransCanada capacity downstream). Finally, a “buy-back” mechanism would not eliminate the need for a planned replacement of Dawn Plant B.

Union already provides shippers with at least three options to manage no longer needed capacity. Shippers are given an opportunity to voluntarily turn back capacity through reverse open seasons when capital expansions are proposed. Further, Union has proposed to implement a Term-Up Provision which would allow applicable shippers to voluntarily commit to terminate transportation contracts at the end of the current term when capacity expansions greater than \$50 million are proposed. Additionally, existing shippers can permanently assign transportation capacity to another shipper in accordance with the terms of their M12 transportation services contract which would allow an existing shipper to effectively turn back capacity.

All of these mechanisms provide for the efficient development of infrastructure in Ontario. The Term-Up Provision would allow Union to secure medium term commitments from applicable shippers when expansion of the Dawn Parkway System greater than \$50 million is proposed. The reverse open season process and ability to permanently assign transportation contracts are tools that allow Union to efficiently manage the expansion of the Dawn Parkway System today. Union’s preference is to coordinate its open seasons and reverse open seasons with TransCanada’s capacity management processes. As discussed in the response to Exhibit B.TCPL.3 d), Union is prepared to align Term-Up Provision notice periods for existing shippers with TransCanada to the extent practical.

Union believes that offering a “buy-back” mechanism for existing capacity would undermine the reverse open season process and practically eliminate any incentive for shippers to turn back capacity in Union’s reverse open seasons; meaning Union would transition from a voluntary program to a program where shippers would wait until an economic incentive is offered to turn back capacity. A “buy-back” mechanism may also impact shipper behaviour under the proposed Term-Up Provision. Neither, Union, nor ICF International, are aware of

any natural gas pipeline in North America that implements a “buy-back” mechanism.

- iii) Union does not agree (please see the response at Exhibit B.APPrO.3a) ii). The requirements of the Storage and Transportation Access Rule (particularly a reverse open season process) as well as the proposed implementation of the Term-Up Provision, promote the efficient development of infrastructure in and around Ontario. In addition, a shipper has the flexibility to permanently assign transportation capacity to another shipper in accordance with the terms of the M12 transportation services contract.
- d) i) and ii) Union agrees that it is too late to consider a “buy-back” mechanism as an alternative for the 2017 facilities. Union has provided its position on a “buy-back” mechanism in the response to c) above and does not foresee considering this for any future expansions. Union is willing to discuss other innovative solutions that shippers may have in lieu of physical expansion in the future.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: General

Please file or provide a link to the recent "Energy East Agreement" between TCPL and Union/EGD, Gaz Metro (detailed agreement). Please explain the impact of the Agreement on the proposed facilities application. Please discuss.

Response:

Below is a link to the Energy East Settlement Term Sheet amongst TransCanada, Union, Enbridge and Gaz Métro, effective August 18, 2015.

<https://docs.neb-one.gc.ca/ll-eng/llisapi.dll?func=ll&objId=2813285&objAction=browse&viewType=1>

None of the contracts supporting the proposed 2017 Dawn Parkway Project are conditioned upon a settlement with respect to TransCanada's Energy East Project. The Energy East settlement has no impact on this proposed application (EB-2015-0200).

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 5, Schedule 1 (ICF Report)

Page 9 - Please provide a list of and link to all the Reports ICF has prepared for Union, or the Ontario Energy Board ("OEB" or "Board"), beginning with the ICF Report commissioned by the OEB, or Board Staff, beginning with the 2010 Report up to and including the recent ICF Report to the Board on the Energy East Project. Was Mr. Sloan the author of each of these reports? Which ones? Who authored the others? Had ICF done any reports for Union or EGD before it did the 2010 Report for the Board?

Response:

The following response was prepared by ICF.

On p. 1 of ICF's report, ICF listed several public reports on natural gas markets prepared by ICF for Union and for the Ontario Energy Board and presented in various proceedings in Ontario.

These include

- 1) The 2010 report commissioned by the Ontario Energy Board Staff titled "2010 Natural Gas Market Review". This report was authored by Leonard Crook with assistance from other ICF staff including Mr. Sloan. The report is available at:

http://www.ontarioenergyboard.ca/oeb/_documents/eb-2010-0199/icf_market_report_20100820.pdf
- 2) The 2011 report titled "Natural Gas Market Conditions and Impact on Union Gas Limited" was commissioned by Union and filed with the Ontario Energy Board as part of EB-2011-0210. The report was authored by Mr. Bruce Henning with assistance from other ICF staff including Mr. Sloan. The report is available at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/307131/view/Union_Appl_RebasingEvidence%20BinderA_20111110.PDF
- 3) The 2013 report titled "Impact of Changing Supply Dynamics on the Ontario Natural Gas Market – ICF" was filed with the OEB on behalf of Union in the Parkway West Project (EB-2012-0433) - Capital Cost Update EB-2012-0451/EB-2012-0433/EB-2013-0074. The report was authored by Bruce Henning, Michael Sloan, and Briana Adams. The report is available at:

https://www.uniongas.com/~media/aboutus/regulatory/regulatory-projects/eb-2012-0433-parkway-west/UNION_EVD_Parkway%20West_Updated_20130823.pdf

- 4) The 2014 report titled “Impact of Changing North American Supply and Demand on Union Gas Pipeline Facilities” was filed with the OEB in EB-2014-0261. The report was authored by Michael Sloan. The report is available at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/451211/view/Union_appl_evd_Dawn%20to%20Parkway_20140930.PDF

In addition to the reports listed, ICF has prepared a number of other publicly available reports for Union and the Ontario Energy Board between 2010 and 2015. These reports include:

- 1) The 2014 report titled “Evaluation of Union Gas Avoided Costs” filed with the OEB on behalf of Union Gas in the EB-2015-0029 proceeding was authored by Mr. Michael Sloan, Mr. Brian Flannigan, and Mr. Peter Narbaitz. The report is available at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/472262/view/UNION_APPL_2015-2020%20DSM%20Plan_20150401.PDF

- 2) The 2014 presentation by Mr. Kevin Petak to the Ontario Energy Board on behalf of Union Gas titled “Review of Ontario Natural Gas Markets during the 2013-2014 Winter”. This presentation can be found at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/457317/view/Union_2014%20NGMR%20Conference_Session%202_ICF%20Review%20of%20Ontario%20Natural%20Gas%20Markets%20During%20the%202013-2014%20Winter_20141127.PDF

- 3) The 2014 presentation by Mr. Michael Sloan to the Ontario Energy Board on behalf of Union Gas titled “Future Trends: Assessing Ontario Natural Gas Market Requirements Through 2020”. This presentation can be found at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/457319/view/Union_2014NGMR%20Conference_Session%204_ICF%20~%20Trends%20Assessing%20Ontario%20Natural%20Gas%20Market%20Requirements%20Through%202020_20141127.PDF

- 4) The 2015 report commissioned by the Ontario Energy Board Staff titled “Impact of Energy East on Ontario Natural Gas Prices” was authored by Kevin Petak, Leonard Crook, Michael Sloan, Ananth Chikkatur, and Duncan Rotherham. The report is available at:

http://www.ontarioenergyboard.ca/html/oebenergyeast/documents/finalreports/final%20report_Impact_Ontario_Natural_Gas_Prices.PDF

In addition, ICF has conducted regular presentations on natural gas market conditions at Union Gas customer meetings. These presentations typically have been conducted by Mr. Bruce Henning, Mr. Kevin Petak, and Mr. Frank Brock. An example of these presentations, the 2014 briefing “Outlook for the North American and Ontario Gas Markets” presented by Frank Brock can be found on the Union Gas website at:

<https://www.uniongas.com/~media/business/communication-centre/training/rate-t1-rate-t2-customer-meeting-2014/icf.pdf?la=en>

Union has also subscribed to the ICF Gas Market Compass since prior to 2010. This subscription service has included detailed assessments of North American natural gas markets on a quarterly basis.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 5, Schedule 1 (ICF Report)

Page 5 - Please provide a copy of ICF's April 2015 Base Case Outlook.

Response:

ICF's Base Case Outlook is a proprietary and commercially sensitive product covering the entire North American natural gas market.

This report has been provided in confidence under separate cover.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 5, Schedule 1 (ICF Report)

Page 4 – Lower Oil Prices (model)

"Despite the drop in global oil prices, U.S. oil production rose roughly 600,000 barrels per day (b/d) in 2014. Growth in oil production is expected to slow down substantially in 2015 due to the oil price drop. Sustained moderate global oil prices are expected for the next several years due to the ongoing supply glut. Given the oil-indexed nature of a number of LNG export markets, international demand for LNG may be depressed as a result, and ICF has slowed down our forecast for LNG export growth as a result."

Please explain why lower oil prices would depress demand for natural gas (LNG) in European and Asian markets. Which markets and why?

Response:

The following response was prepared by ICF.

Many European and Asian markets determine LNG prices based on the price of oil. As a result, lower oil prices reduce the price of LNG and reduce incentives to develop additional LNG facilities. In addition, lower oil prices reduce the economic advantage of LNG in many markets relative to oil-based competitive alternatives such as fuel oil, and naphtha, therefore reducing demand.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

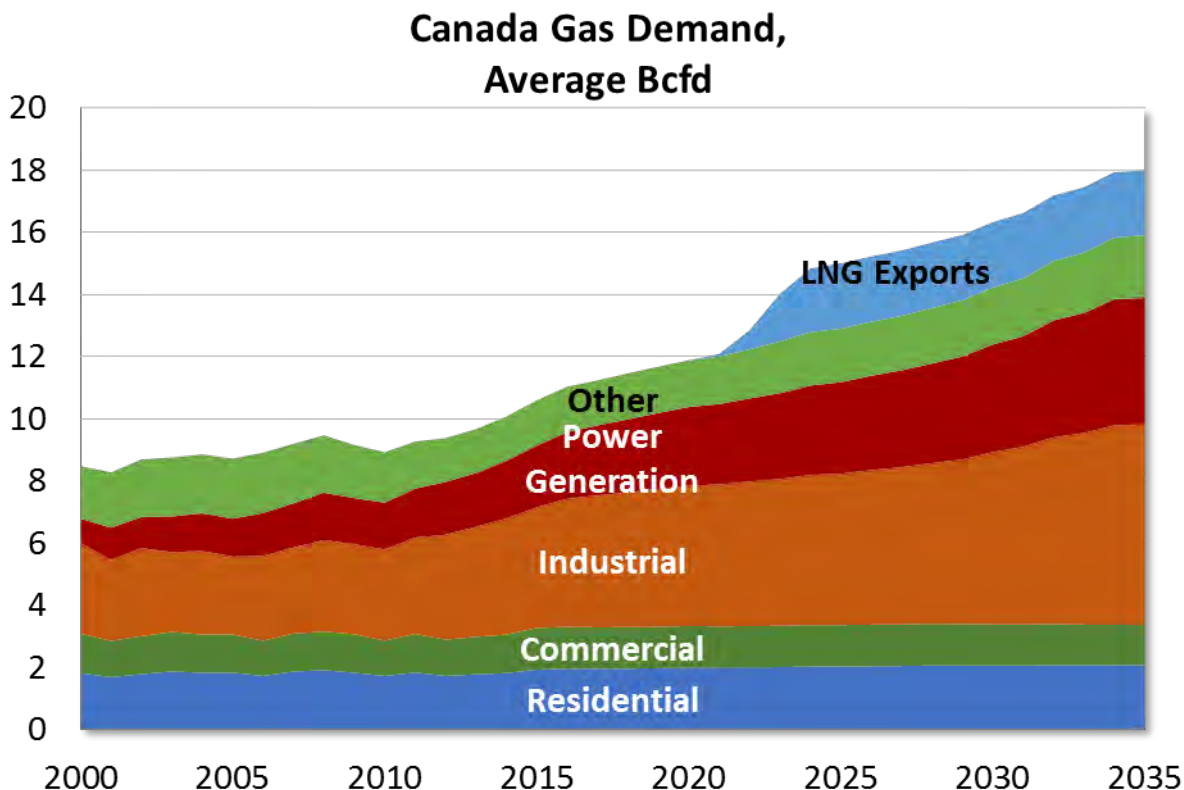
Reference: Exhibit A, Tab 5, Schedule 1 (ICF Report)

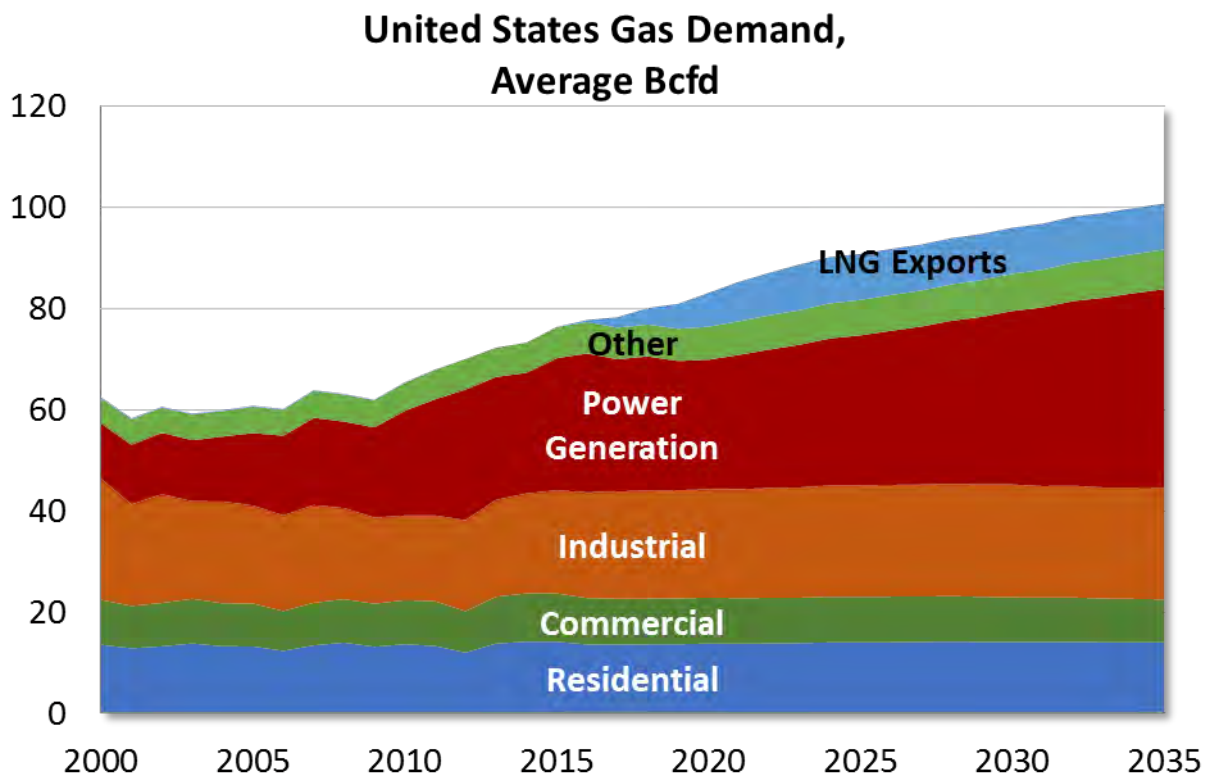
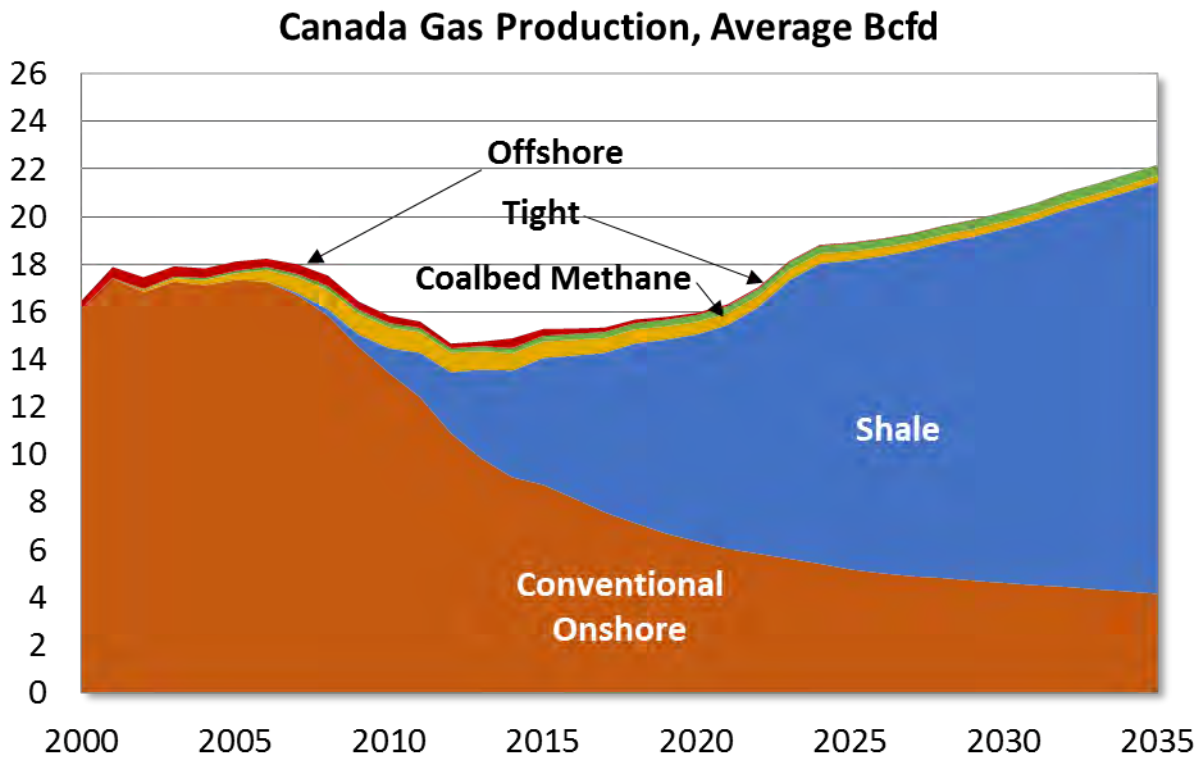
Pages 6-9 - Please provide separate Canadian and US supply/demand outlooks for the period in question, given that the drivers of demand are somewhat different in the two countries (eg. oil sands in Canada).

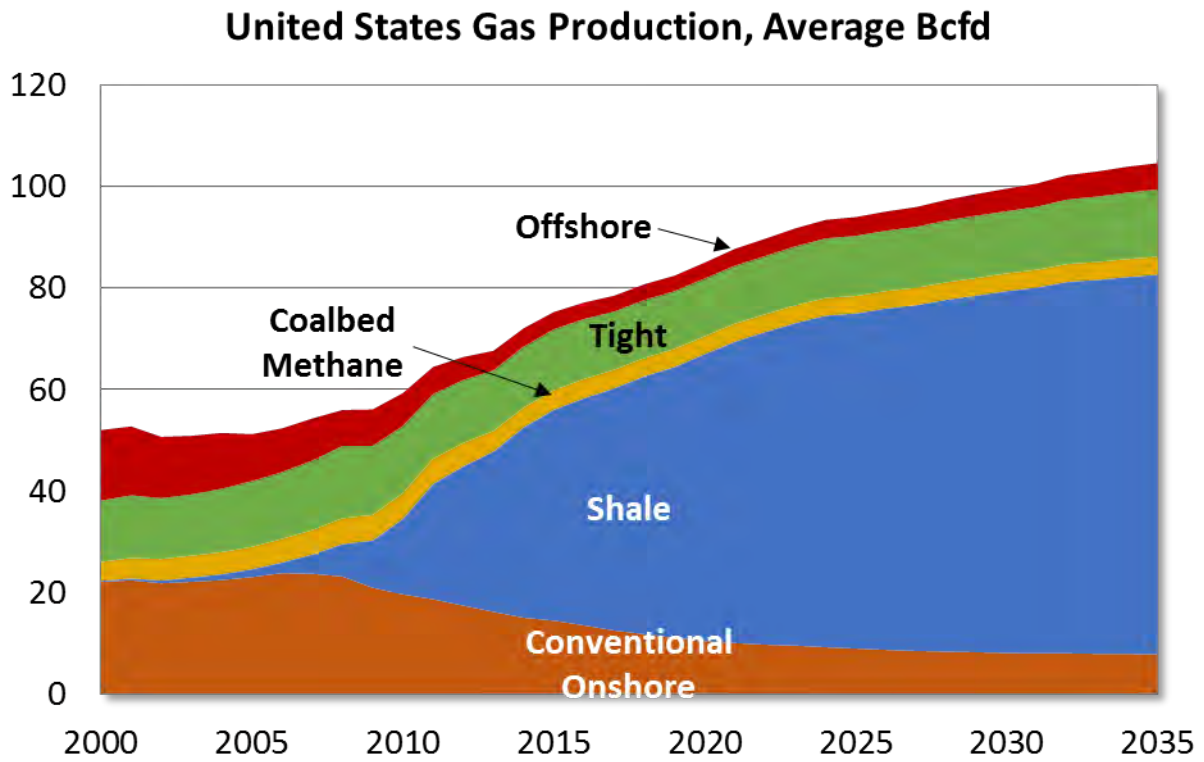
Response:

The following response was prepared by ICF.

Separate Canadian and US supply/demand outlooks for the period in question are shown below:







UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

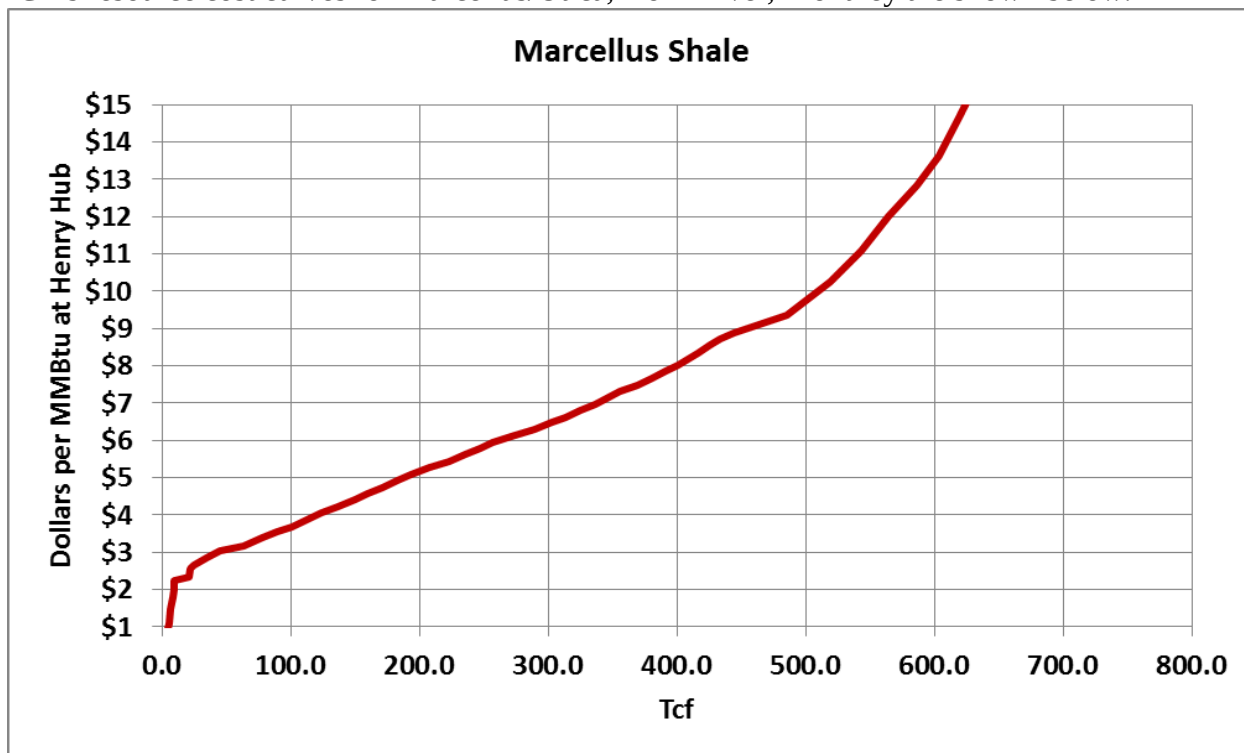
Reference: Exhibit A, Tab 5, Schedule 1 (ICF Report)

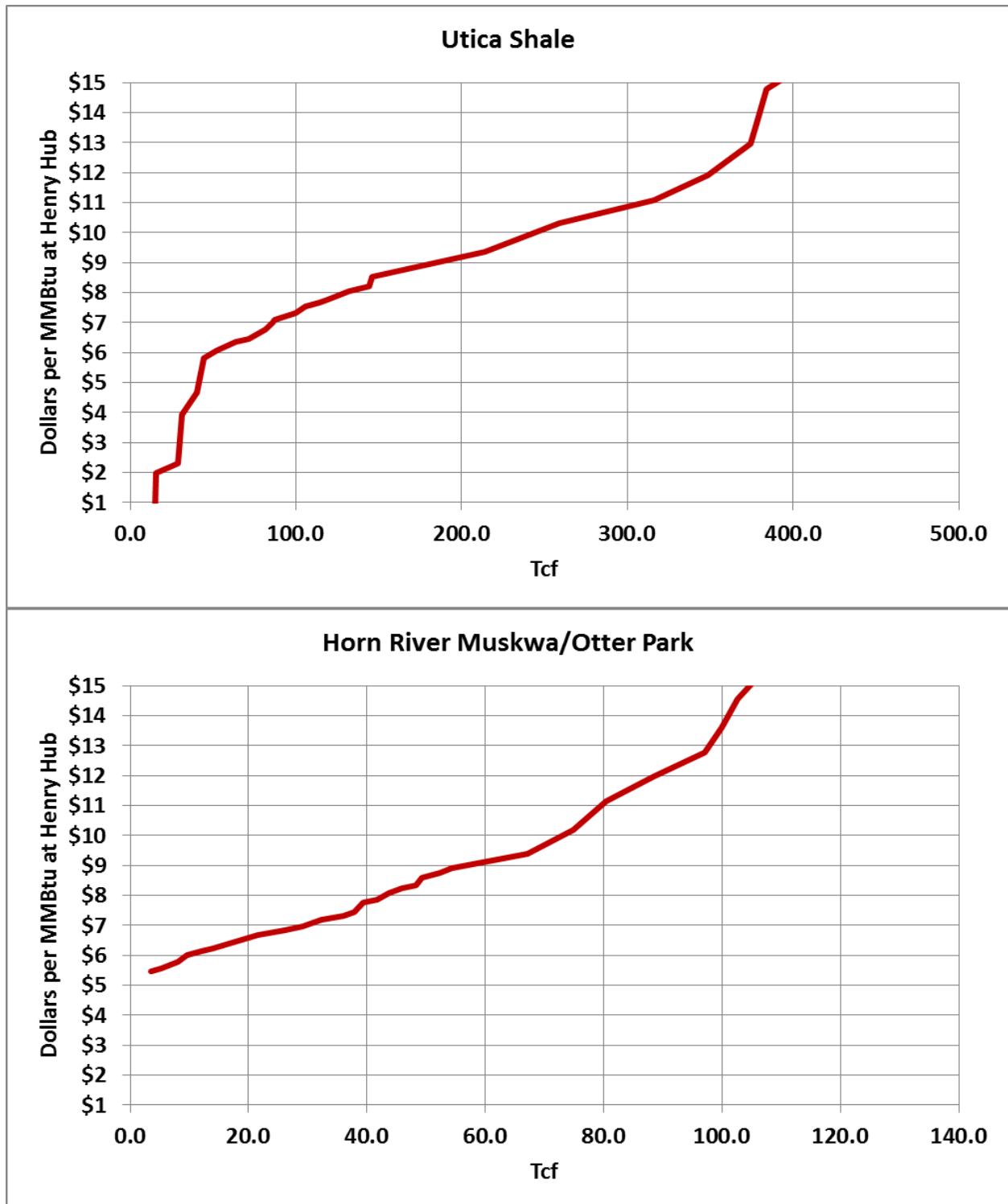
Page 60 - Please provide a comparison of full cycle costs between the Montenay, Horn River basins, and the Marcellus and Utica basins.

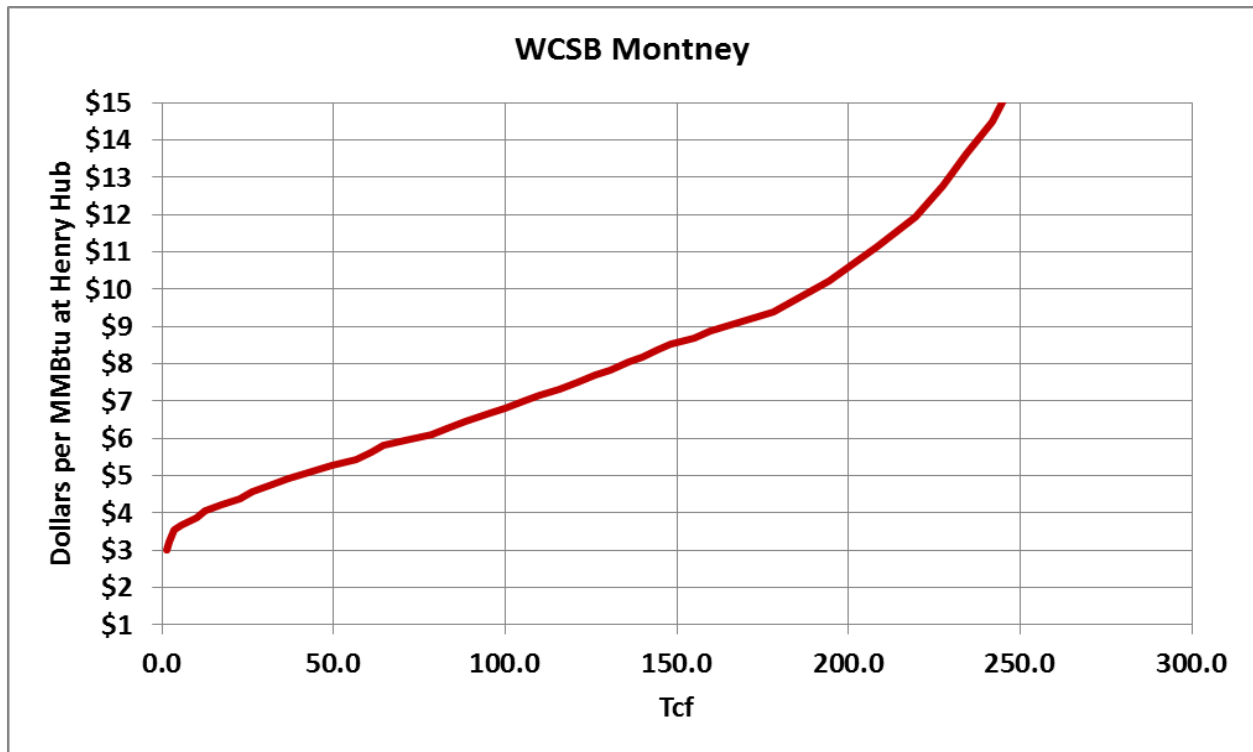
Response:

The following response was prepared by ICF.

ICF’s resource cost curves for Marcellus/Utica, Horn River, Montney are shown below.







UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 7

Please confirm that your 2017 build is not contingent on Board approval of the Burlington-Oakville line. What would be the impact, if any, on your proposals in this case if the Board were not to approve the Burlington Oakville line?

Response:

The proposed 2017 Dawn Parkway Project is not contingent upon the approval of the proposed Burlington Oakville Pipeline (EB-2014-0182). None of the incremental demands for the proposed 2017 Dawn Parkway Project are related to the Burlington Oakville Pipeline (please see the response at Exhibit B.LPMA.1 a).

If the proposed Burlington Oakville Pipeline did not receive Board approval, Union would need to ensure that the Burlington Oakville System had access to capacity to meet design day requirements as of November 1, 2016. This may require Union to implement the second best economic alternative by contracting for transportation services from Parkway to the Union ECDA (Burlington Gate Station and Bronte Gate Station) as described in EB-2014-0182 (Exhibit A, Tab 7, pp. 6-7). In that case, Union would not require 60 TJ/d of transportation capacity reserved on the Dawn Parkway System to meet Burlington Oakville System demand (assumes Dawn-Union CDA contract with TransCanada is renewed). This would increase the Dawn Parkway System surplus at November 1, 2017 by 60 TJ/d (to 91 TJ/d) assuming the proposed facilities are contracted. However, the proposed 2017 Dawn Parkway Project facilities would not be impacted as removing one compressor (Bright C) would then result in a Dawn Parkway System shortfall of 248 TJ/d. Union would not manage such a large shortfall position through third party contracted services.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 8, p. 7 of 12

"These facilities increase the system capacity by 456,647 GJ/day".

- a) Please provide the increase in capacity provided by each of the three compressors.
- b) Does Dawn H just replace the capacity provided by Dawn B (when Dawn B is working at full capacity) or does it create additional capacity? Please explain.

Response:

- a) Lobo D has a capacity of 118,229 GJ/d and Bright C has a capacity of 338,418 GJ/d. Dawn H does not increase the capacity of the Dawn Parkway System. However, Dawn H increases the capacity at Dawn to meet the requirements for additional flow into the Dawn Parkway System.
- b) Dawn H replaces the capacity provided by Dawn B (1.8 PJ/d) and provides additional design day capacity at Dawn of 1.0 PJ/d.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

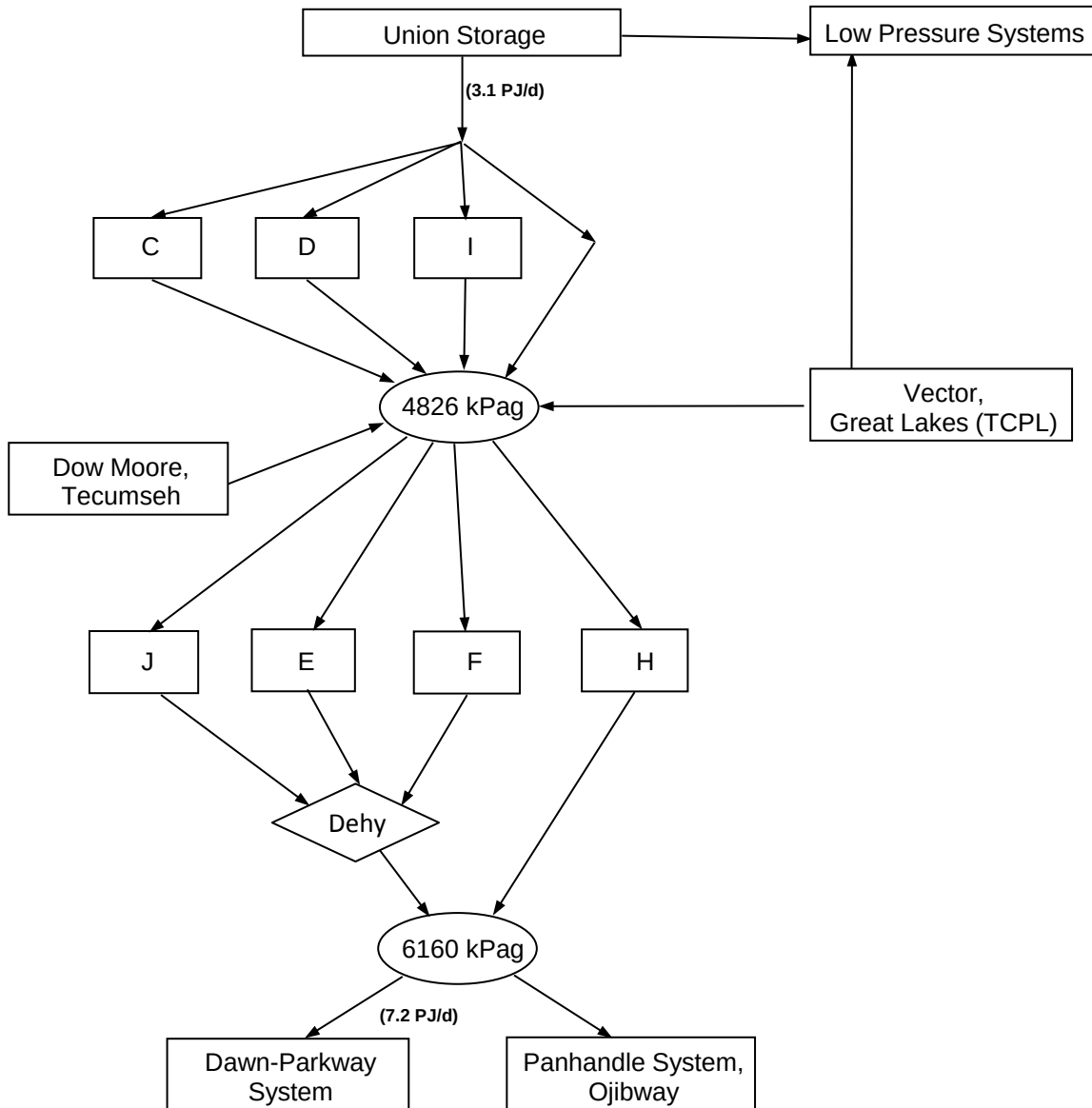
Reference: Replacement of Dawn Compressor

- a) Please provide the documents in which Siemens "declared" that it would no longer support the Dawn B compressor.
- b) Please provide a diagram of the Dawn Station which shows how each compressor is used, and the incoming and outgoing flows into the Dawn Parkway System, as well as flows to and from storage.

Response:

- a) Siemens has not declared that it would no longer support the Dawn B compressor. Rather, as indicated at Exhibit A, Tab 7, p.3, Siemens “declared the RB211-22 compressor package obsolete and does not guarantee the availability of spare parts”. Please see the response at Exhibit B.BOMA.11.
- b) Please see Attachment 1.

Dawn Station - Winter 2017/2018 Design Day



(see Exhibit A, Tab 8, Schedule 2 for
Dawn-Parkway details)

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 4, Schedule 3, p. 1 – Table Compressors at Dawn Hub, Bright and Parkway; Exhibit A, Tab 7; Exhibit A, Tab 3, p. 4 – Dawn B, Early Retirement

Please confirm that the current time in service of Dawn is currently in the thirty-seventh year of its service life, and that the average service to retirement of all retired Dawn compressors is considerably higher than that, more like fifty years.

Response:

Dawn Plant B was installed in 1977 and is entering its 38th year of service. It is not being retired because of its age. Age alone is not a good indicator of when a piece of equipment is reaching end of service life. As stated at Exhibit A, Tab 7, p.2, Plant B poses a maintainability risk as Siemens is no longer guaranteeing availability of spare parts for the RB211-22 compressor package. As existing part inventories are depleted, the ability to repair or rebuild will become increasingly difficult.

Please see the response at Exhibit B.BOMA.11.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 4, Schedule 3, p. 1 – Table Compressors at Dawn Hub, Bright and Parkway; Exhibit A, Tab 7; Exhibit A, Tab 3, p. 4 – Dawn B, Early Retirement

Why is Union proposing to retire the Dawn B compressor at this time, given its relatively short service life (thirty-seven years versus average fifty)?

Response:

Union is proposing to retire the Dawn Plant B compressor as Siemens is no longer guaranteeing the availability of spare parts for the RB211-22 engine. The inability to source parts during the Plant B failure in early 2015 as stated at Exhibit A, Tab 7, p. 4, demonstrates that Siemens inventory is depleted for some parts. As Siemens existing inventory of parts unique to the RB211-22 becomes exhausted, their inventory will not be replenished and more parts will not be available rendering it difficult and unreasonable to repair from a compressor outage duration and economic standpoint.

Please see Attachment 1 for a report prepared by Siemens Canada Ltd regarding the availability of parts for maintenance and repair of Union's Plant B RB211-22 engine. In the report, Siemens notes:

While there is currently some stock of many of the unique parts they are not in the currently supply chain. Reactivating the supply chain ranges from the straight forward to very difficult and therefore leads times could be more than a year for some parts.

They also note:

In the event of a failure and best efforts do not locate existing parts the time to define a modification path to the current standard or create a supply chain for an obsolete part could easily take 6 months to a year or be deemed uneconomic to replace.

As discussed in Exhibit A, Tab 7 pp. 2 and 3, the Plant B compressor package has been declared obsolete and the manufacturer does not guarantee availability of spare parts;

The availability of parts is critical to proper compressor plant maintenance and overall compressor plant reliability. Since its inception, the Siemens (formerly Rolls Royce) compressor

package based on the RB211 engine platform has undergone several technological upgrades. These upgrades resulted in Siemens latest compressor package offering based on the RB211-24GT DLE engine which was introduced in 1994. This latest compressor package differs significantly from the 1977 vintage RB211-22 compressor package installed in Plant B. None of the internal parts or ancillary systems are common. As a result, Siemens declared the RB211-22 compressor package obsolete and does not guarantee availability of spare parts. It is Union's understanding that only three RB211-22 engines are in service worldwide today, one of which is at Plant B.

Challenges of unscheduled outages coupled with the fact that a number of repair parts are no longer available were discussed in evidence at pp. 3 and 4:

Recent upgrades to Plant B have resulted in extended compressor outages due to project re-work required due to customization of standard products to retrofit this 'no longer supported' compressor package. In the fall of 2014, the compressor was out of service due to a fuel valve issue. In early 2015, when the compressor was being commissioned after the installation of a rebuilt fuel valve, a controls communication failure between the upgraded oil skid and the station controls system resulted in the engine seizing due to lack of oil flow. The result was another unscheduled outage. Plant B was unavailable for the entire 2014/2015 winter season and remains unavailable today.

This recent engine seizure confirms Siemen's view that repair parts are scarce or not available. Five of the parts required to repair the engine in accordance with the manufacturer's procedures are no longer available. These parts include a set of starter gears, a rear seal segment, an air seal sleeve and an oil scavenge line. Siemens Technical Support approved a deviation from their normal acceptance criteria and allowed reuse of these existing parts in order to extend the working life of this engine. However, the acquisition of other repair parts will become increasingly difficult, if not impossible, going forward as existing inventories are depleted.

Designing and building Dawn Plant H, with adequate capacity to allow for the planned replacement of Plant B will address all of the Plant B maintainability risks and allow Union to continue to meet its firm transportation commitments from Dawn.

Siemens Canada Ltd, 9545 Cote de Liesse, Montreal, H9P 1A5

Mr. Jim Harradine P. Eng.

Union Gas Limited
3332 Bentpath Line, PO Box 1180
Dresden, Ontario
N0P 1M0

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Department	Services
Telephone	+1 514-828-7243
Mobile	+1 514-236-8632
E-mail	Gerry.Dyck@siemens.com
Date	September 11, 2015

RB211-22 Obsolescence Study Siemens Canada – Power and Gas

Dear Mr. Harradine,

The last of 18 RB211-22's were produced in 1979. The RB211 has evolved through the -24A/B/C (last built 1993) models to the -24G and GT which are currently in production.

There are approximately 100 RB211-24C engines in service most with a few large fleet operators. As such they requested a review of parts supply chain to determine the work required to keep the engine in service for foreseeable future. The study identified areas where existing components could be upgraded to the latest in-service standard as well as those unique to the -24A/B/C variants.

While there is currently some stock of many of the unique parts they are not in the currently supply chain. Re-activating the supply chain ranges from the straight forward to very difficult and therefore leads times could be more than a year for some parts.

This study was used as a reference to review how the -22 engine configuration would differ and given the limited timeframe addressed two key areas:

- Generate Bill of Materials based on Union Gas report on ESN 011 and build records
- Identify key spare parts

The picture is similar to the -24C with some components identified which could potential be upgraded to latest standard in the supply chain but numerous parts would require more analysis and the inventory of such parts is much smaller for the -22 and the supply chain even further out of date.

In the event of a failure and best efforts do not locate existing parts the time to define a modification path to the current standard or create a supply chain for an obsolete part could easily take 6 months to a year or be deemed uneconomic to replace.

The following items would be required for comprehensive report and take about 2 months:

- Analysis of obsolescence & alternative parts identify
- Verification of Supply Chain
- Confirmation of pricing & recommendation of customer stock

Siemens Canada Ltd
Gerry Dyck
PS DGC AGT Division

6545 Cote de Liesse
H9P 1A5 Montreal
Canada

Tel.: +1 514-828-7243
www.siemens.com/energy

Preliminary summary as follows:

DIS1700-A (Build standard of RB211-22)

Module 1:

- ~ 70% of parts common to -24G (latest standard or history which mods can be applied)
- Parts similar to 24C engine: same solutions as -24C study apply (AIC, VIGV, anti-icing)
- **1906125 – Washer facing**

Module 2:

- ~ 95% of parts common to -24G (latest standard or history which mods can be applied)
- ~ 5% of parts similar to 24C engine: same solutions as -24C study apply (LW10792 shroud inner, etc)

– **Module 3:**

- ~ 92% of parts common to -24G (latest standard or history which mods can be applied)
- **Shaft assembly HP Comp / Case assembly Comp INT / collar quill shaft**
- **Cover unit probe / Seal oil / bearings / washers**

Module 4:

- ~ 39% of parts common to -24G (latest standard or history which mods can be applied)
- **Ret HP blade, rotor & disc assembly, seal segment, vane assembly nozzle HP**
- **Combustion outer/inner case, spacers**
- **Liners, casing assembly stages 1-6, Shaft assembly rotor, blade HP comp stg 1-6**

Module 5:

- ~ 73% of parts common to -24G (latest standard or history which mods can be applied)
- **Disc rotor IP, shaft IP turbine, NGV IP turbine**
- **Plate assembly bearing housing, seals, seal segment, case assembly bearing support**
- **Retainer HP turbine bearing**

Module 6:

- ~ 70% of parts common to -24G (latest standard or history which mods can be applied)
- ~ 15% of parts similar to 24C engine: same solutions as -24C study apply
- **Nose bullet, thermocouple, Oil/air tubes, pressure transducer**
- **Harnesses, Control VLV, Starter gas/air**

All of the parts in bold face are unique to the -22 variant and would require further analysis to determine a way forward should it be necessary to replace a damaged part. Note that while some -24C solutions may exist there would still be engineering time required to authorize their use in a -22 engine which in the case of critical part (IP or HP disc rotor) would not be insignificant.

With kind regards,

Dyck Gerry

Signature

Digitally signed by Dyck Gerry
Date: 2015.09.11 14:25:58
-04'00'

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 4, Schedule 3, p. 1 – Table Compressors at Dawn Hub, Bright and Parkway; Exhibit A, Tab 7; Exhibit A, Tab 3, p. 4 – Dawn B, Early Retirement

What revenue has Union recovered or proposed to recover from Siemens in compensation for the fact that Dawn B compressor is a defective unit? Has Union performed an analysis to discover the reason for its poor performance relative to its other compressors? Is the Dawn B unit different in design from other Rolls-Royce (now Siemens) units or other Siemens or other manufacturers' units that Union has used or is using? Why has Siemens not been asked to rebuild the unit, given that the unit would normally be expected to last for at least another ten years?

Response:

The Dawn Plant B compressor is not defective. TransCanada Turbines, a Siemens-approved shop completed an overhaul of the RB211-22 engine in 2011. Costs associated with a recall the following year to replace a suspect part were covered under warranty by the Siemens-approved shop. Compressor reliability has been negatively impacted by recent upgrades to some of the compressor support systems which had become obsolete from a parts support perspective. The Plant B RB211-22 unit is different in design from other Rolls-Royce (now Siemens) units in consideration of its vintage. The RB211-22 was the first industrialized version of the RB211 and, since inception, the RB211 has undergone five version upgrades to reach the current RB211-24GT DLE offering. As Siemens is no longer guaranteeing availability of spare parts for the RB211-22 and as existing inventories are depleted, the ability to repair or rebuild the engine will become increasingly difficult and unreasonable from a compressor outage duration and economic standpoint.

Please see the response at Exhibit B.BOMA.11.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 4, Schedule 3, p. 1 – Table Compressors at Dawn Hub, Bright and Parkway; Exhibit A, Tab 7; Exhibit A, Tab 3, p. 4 – Dawn B, Early Retirement

Is Union issuing an RFP to various compressor manufacturers to acquire the machine? If not, why not? Please discuss fully any preferred vendor or sole source arrangements Union has with compressor manufacturers.

Response:

The compressor packages purchased for Dawn H, Lobo D and Bright C were all negotiated with Siemens alone (formerly known as Rolls Royce) based on recent contract pricing from Union’s standardized design packages at Parkway C, Parkway D, and Lobo C (all currently underway at various stages of construction). The first two of these previous projects, Parkway C and Parkway D, were competitively bid through an RFP process and Rolls Royce was the successful vendor. Subsequent negotiations for the current projects took into account relative scope, appropriate escalations, and leveraging engineering work already completed, in arriving at the contract purchase prices for each package.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 9, p. 2

Please provide a copy of, or link to, EBO-134, Report on System Expansion. Please explain why the project should proceed given its P/I of 0.43.

Response:

EBO 134 Decision dated June 1, 1987 can be found at:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/177859/view/EBO134_BdReport_review%20of%20natural%20gas%20system_19870601.PDF

The PI is only one metric for consideration by the Board for approval. At Exhibit A, Tab 9, p.10, Table 9-1 Union has presented a positive NPV of \$123 million for the Project.

As well, the Board has long recognized that economic feasibility is not the only criteria for Board approval. For example at paragraphs 5.18 and 5.19 of the EBO 134 decision, the Board said...

5.18

“...The Board considers that regardless of the “economic feasibility” test used to evaluate a project, it has not been, nor will it be, the sole criterion examined. Even though “economic feasibility” is an important factor, it may be given more weight in some situations, and less in others such as safety or security of supply projects”

5.19

“Any application to the Board should include evidence on all public interest criteria considered relevant by the participants. Any data that can be quantified in a meaningful fashion should be presented that way with assumptions clearly stated.”

Union has quantified Stage 3 impacts at Exhibit A, Tab 9, Schedule 7.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 9, Schedules 1, 2 and 3

- a) Please explain the very large difference in construction and labour costs for the Dawn H, Lobo D, and Bright L installations.
- b) Please explain the Dawn Compression Margin, why it is included in the costs, and how it is calculated (in detail).

Response:

- a) All three proposed compressor plants utilize standardized designs, as described at Exhibit A, Tab 11, p. 2, for facilities common to all three stations. Construction cost variations are due to differences in infrastructure and piping scopes of work. The Lobo D Compressor scope does not require any major additions to existing infrastructure or any major piping inter-connections with the existing facility. Both Dawn H and Bright C Compressors require additional infrastructure, piping modifications and additional tie-ins and header expansion in order to incorporate the new plant into the existing compressor stations. For further details please refer to scope descriptions included at Exhibit A, Tab 11, pp. 2-4 for Dawn H, pp. 4-5 for Lobo D and pp. 5-7 for Bright C.
- b) The Dawn Compression Margin (DCM) is a revenue stream not a cost. The DCM is the portion of the M12 rate that is attributed to recovering the costs of the Dawn facilities allocated to the M12 rate class. For purposes of the DCF analysis (PI and NPV) the DCM is excluded when the facilities do not include a Dawn asset (eg compression). It is included and attributed to the Dawn assets at the time the Dawn assets are constructed. This avoids a double count of the revenue stream that would occur if it were included in the DCF when a compressor or pipeline section is built and again when a Dawn compression asset is built. It has been a long standing practise to segment the revenue streams because typically the Dawn assets have been constructed in different time frames than the downstream compressors or pipeline sections.

This approach to segmentation is consistent with recognizing the revenue stream for infranchise distribution customers as the distribution portion for distribution expansions and the transmission portions for the transmission expansions.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 10, p. 1

Please confirm that the capital costs of the project are subject to a full prudency review at rebasing.

Response:

Not confirmed. Union is proposing to build the estimated annual costs associated with the Project into rates from 2016 to 2018 and track any variances between the costs approved in rates and the actual revenue requirement of the Project in those years in a new deferral account. Union will dispose of any balance in the deferral account as part of Union’s annual non-commodity deferral account disposition proceedings. The actual revenue requirement of the Project will be subject to a full prudency review as part of the deferral account proceedings, not at rebasing.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 3, p. 7 of 8 – Term-Up

Why is the term-up provision not implemented immediately rather than being deferred to 2018 expansion "or later"? Please explain the reference to "or later". Why is the term-up being proposed as part of this case if it may never be implemented? Please discuss how the term-up provision reduces the risk of the Dawn Parkway facilities.

Response:

The Term-Up Provision is not being implemented immediately because Board approval of the M12 and C1 General Terms and Conditions is required prior to implementation. As stated at Exhibit A, Tab 10, p. 12, Union is requesting approval of the changes to the General Terms and Conditions as proposed, for implementation after approval through a subsequent rates or QRAM application process. Union will be conducting a Dawn Parkway System open season in the fall of 2015 for service commencing November 1, 2018 and plans to implement the Term-Up Provision at that time (if approved by the Board). If no additional facilities are required as a result of that open season then the Term-Up Provision would not be in effect until 2019 or later.

The Term-Up Provision will allow Union to promote the efficient expansion of Union's Dawn Parkway System and will promote toll certainty and rate protection for Union's in-franchise and ex-franchise customers.

UNION GAS LIMITED

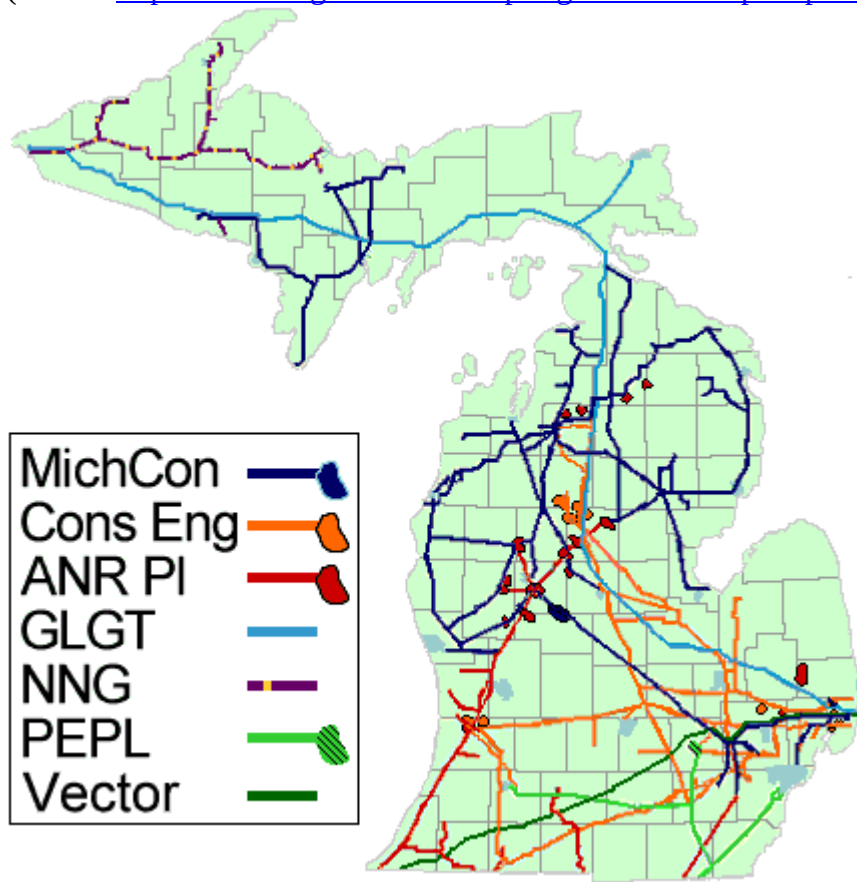
Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 4, p. 4

Please provide the details of, and a map which shows, the 675 Bcf of Michigan storage that Dawn is connected to by various pipelines. For each of the pipelines, please provide the route which Union and its Ontario customers would use to access each of those storage areas to which that pipeline connects, and the various storage services, including high deliverability, offered by each of the storage providers.

Response:

A map showing the location of storage pools and pipelines in Michigan is provided below (source: <http://www.dleg.state.mi.us/mpsc/gas/michsmallplmap.htm>).



Another map can be found at:

<http://mcsts.dteenergy.com/pdfs/stateWideGasSystemMap.pdf>

A link to the source of the approximately 675 Bcf of Michigan storage:

<http://www.dleg.state.mi.us/mpsc/gas/storage.htm>

A well developed pipeline system connects natural gas storage fields to intrastate pipeline systems and to interstate pipeline systems within Michigan. This system of intrastate and interstate pipelines also connects Michigan's natural gas storage fields to Ontario. Specifically, pipelines that connect Michigan to Ontario include Vector, DTE (MichCon), Great Lakes Gas Transmission (GLGT), ANR (via the NiagaraLink Pipeline), Bluewater Gas Storage and Panhandle Eastern Pipeline (PEPL). These pipelines represent nearly all of the major pipeline systems in Michigan and, as shown in the map above, provide access to Michigan's natural gas storage fields. It is not practical for Union to provide a field-by-field assessment of the pipelines that connect each natural gas storage field to Ontario; in fact there would be multiple paths to Ontario from many of Michigan's natural gas storage fields.

With up to 15 separate natural gas storage operators in Michigan (<http://www.dleg.state.mi.us/mpsc/gas/storage.htm>), it is not practical, nor relevant for this case, for Union to conduct an inventory of storage services offered by each storage operator. With the quantity of storage in Michigan, the connectivity to intrastate and interstate pipelines, and the number of natural gas storage operators, Union expects that a wide range of storage services are available in the marketplace.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 4, p. 8

"The majority of the facilities (Parkway West) targeted for Fall 2015 in-service".

Please show to what extent the various parts of the Parkway West project is on time and within its budget.

Response:

The Parkway West Project is on schedule for completion by the end of 2015. Parkway D is currently on track for its November 1, 2015 in-service date and Parkway C is on track for its December 1, 2015 in service date. The current forecast for the combined Parkway West and Parkway D projects is \$318.6 million, which is lower than the OEB approved amount of \$327.5 million.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 3, p. 1, line 6

"The facilities are largely underpinned by signed long-term contracts..."

- a) Please list the signed long-term contracts that underpin the proposed facilities.
- b) Please demonstrate and discuss the extent to which the facilities are not underpinned by long-term contracts.
- c) Please confirm that the "facilities" referred to in (a) above are those new compressors (and associated facilities) at Dawn, Lobo, and Bright compressor stations.
- d) Exhibit A, Tab 4, Schedule 3 shows another compressor being proposed at Lobo (Lobo C) when, and in which application was that facility proposed? When was it approved? When will it be proposed?

Response:

- a) The contracts that underpin the proposed facilities are provided in Exhibit A, Tab 6, p. 4, Table 6-2 which has been reproduced below.

Table 6-2
Open Season Capacity Allocated

<u>Shipper</u>	<u>Start Date</u>	<u>Term (Years)</u>	<u>Path</u>	<u>Allocated Quantity (GJ/d)</u>
Enbridge	01-Nov-17	15	Dawn to Parkway	190,000
Gaz Métro	01-Nov-17	15	Dawn to Parkway	36,670
St. Lawrence Gas	01-Nov-17	15	Dawn to Parkway	10,412
TransCanada Energy	01-Nov-17	15	Dawn to Parkway	120,000
Utilities Kingston	01-Nov-17	15	Dawn to Parkway	5,000
			Kirkwall to Parkway	1,000
Corporation of the City of Kitchener	01-Nov-17	15	Kirkwall to Parkway	10,000
DTE	01-Nov-16 ³	15	Kirkwall to Parkway	73,854
Union	01-Nov-17	15	Dawn to Parkway	5,975
Total				452,911

- b) The facilities proposed in the 2017 Dawn Parkway Project provide 457 TJ/d of capacity as provided at Exhibit A, Tab 8, p. 9, Table 8-2. The contracts totaling 453 TJ/d that underpin the new facilities are listed in part a) above. Therefore nearly all of the capacity created by

the proposed facilities is underpinned by long term contracts. A summary of the forecasted Dawn Parkway System demand changes, including calculation of the surplus, is provided at Exhibit A, Tab 8, p. 4, Table 8-1.

- c) Confirmed. The facilities referred to are the Lobo D, Bright C and Dawn H compressors (and associated facilities).
- d) Union sought approval for the Lobo C Compressor as part of EB-2014-0261 (Union's Dawn Parkway 2016 Project). As a result of settlement negotiations, a proposed partial Settlement Agreement was filed with the Board on February 27, 2015. Issues specific to the Lobo C Compressor were settled and did not proceed to hearing. The Settlement Agreement was presented to the Board at the hearing on March 5, 2015. At that time, the Board requested Union to clarify certain information. Union filed an updated Settlement Agreement on March 6, 2015. The Board issued its Decision and Order on April 30, 2015. As noted on page 4 of the decision, "*the OEB considers that the updated settlement agreement is in the public interest*". The Lobo C Compressor is currently under construction.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 4

Please advise whether the proposed pipeline expansions are contingent on approval of Union/EGD's NEXUS contracts; and indicate if part of the incremental volumes that support the facilities' expansion are volumes that would be delivered to Dawn by the NEXUS project. Please discuss fully.

Response:

Please see the responses at Exhibit B.LPMA.1 b) and Exhibit B.Staff.4.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 5, p. 6

Please provide the amount of FT and FT-NR service contracts held by all shippers on TCPL in 2014-2015 and 2013-2014. Please list the shippers at the amounts in GJ/day.

Response:

TransCanada Mainline Contract Type	TransCanada Contract Energy Demand Report	Total Quantity (GJ/d)
FT	December 31, 2013	4,566,723
FT-NR	December 31, 2013	743,309
FT	December 31, 2014	5,118,392
FT-NR	December 31, 2014	1,178,570

Additional details including lists of shippers, can be found on TransCanada's Contract Demand Energy Archive at the following link:

<http://www.transcanada.com/customerexpress/3531.html>

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 16

- a) Please explain fully what is being depicted by each component of the graph (Figure 5-3).
- b) What are the current Union receipts at Kirkwall, monthly, for the years 2013, 2014, 2015 (to date)? What are forecast receipts for 2016, 2017, and 2018?

Response:

- a) The graph identifies the daily physical activity through Kirkwall. Any physical activity above the dotted line (positive number) is a delivery from Union's Dawn Parkway System to TransCanada at Kirkwall (largely for export to the United States) and any physical activity below the dotted line (negative number) is a delivery from TransCanada to Union's Dawn Parkway System (represents the remaining imported volumes from Niagara and Chippawa after serving the domestic load in the Niagara area).

The grey shaded area represents the range of daily physical activity through Kirkwall between November 1, 2003 and October 31, 2012. Virtually all of the physical activity during this time period involved deliveries from Union's Dawn Parkway System to TransCanada at Kirkwall, facilitating exports to the United States through Niagara and Chippawa.

The green line represents physical activity through Kirkwall from November 1, 2012 to October 31, 2013; the red line represents physical activity through Kirkwall from November 1, 2013 to October 31, 2014; and the yellow line represents physical activity through Kirkwall from November 1, 2014 to April 1, 2015.

During the November 1, 2012 to April 1, 2015 period, nearly all of the physical activity involved deliveries from TransCanada to Union's Dawn Parkway System at Kirkwall, facilitating imports from the United States at Niagara. As of November 1, 2012, the flow on the TransCanada system between Niagara and Kirkwall reversed resulting in an export pipeline now primarily becoming an import pipeline. There were however some periods during the cold winter of 2015 where gas flow returned to the traditional direction from Kirkwall into the United States to meet peak day demands. This indicates that during these cold periods, U.S. markets still required export of gas at Niagara and/or Chippawa to meet market demand.

- b) Actual physical net activity (average monthly) at Kirkwall is shown in the table below. All physical activity represents net receipts at Kirkwall (from TransCanada to Union's Dawn Parkway System).

Average Monthly Net Kirkwall Receipts (GJ/d)			
Month	2013	2014	2015
January	241,105	165,390	210,937
February	175,204	235,397	45,081
March	222,598	270,872	296,239
April	355,572	341,757	348,331
May	428,597	325,065	441,333
June	408,885	348,821	425,931
July	440,454	360,618	459,701
August	442,342	383,050	419,653
September	404,527	403,373	
October	401,214	327,949	
November	288,567	296,483	
December	261,845	319,439	

Union does not forecast physical activity at Kirkwall on a monthly or annual basis.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 6, pp. 3-4 of 23

Is the proposed expansion required to transport the 452,911 GJ/day beginning on November 1, 2017?

Response:

Yes.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 4

Please confirm that DTE interruptible service from November 1, 2016 to October 31, 2017 can be used as Union peaking supply requirements in 2016-2017 winter.

Response:

Not confirmed. Union does not have the ability to access DTE supply for its own use as a peaking supply requirement.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 5

Please discuss the amount of the "slight surplus" position:

- a) after the proposed 2017 expansion;
- b) how many years is that surplus position likely to last;
- c) is Union's general policy not to exempt an accepted turnback of capacity (eg. AG Energy, 1,363 GJ effective November 1, 2017) unless the turn-back, of and by itself, will cause a reduction in facilities and/or the turnback would increase a surplus that Union created by the size of its expansion relative to the stated demand? Please explain fully.

Response:

- a) As shown at Exhibit A, Tab 8, p. 9, Table 8-2, after completion of the proposed facilities (targeted for November 1, 2017) Union expects to be in a slight surplus position of 30,393 GJ/d on the Dawn Parkway System. This represents less than one-half percent of the total Dawn Parkway System capacity. Expansion projects provide new capacity in blocks. It is normal to have a slight shortfall of capacity or a slight surplus of capacity. As a result of the 2015 and 2016 Dawn to Parkway builds, Union forecast a slight shortfall in each year.
- b) Union does not know how long the Dawn Parkway System will be in a surplus position. As discussed in Exhibit B.TCPL.2 f), Union will actively market the surplus capacity, starting with a new capacity open season for service commencing November 1, 2018. As well, the surplus capacity could potentially be used to eliminate a portion of the Parkway Delivery Obligation.
- c) Union did not accept the AG Energy Dawn to Parkway turn back of 1,363 GJ/d effective November 1, 2017. Union utilizes capacity turned back through reverse open seasons to efficiently manage expansion which could result in a reduction in the scope of the facilities required or a reduction in the shortfall on the Dawn Parkway System. As discussed at Exhibit A, Tab 6, p. 5, Union did not accept the AG Energy turnback as it did not impact the scope of the 2017 Dawn Parkway Project facilities and Union was already in a surplus position on the Dawn Parkway System.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Ibid, p. 7

Why did EGD request a reduction in its capacity allocation from 240,599 to 190,000 GJ/day?
Did Union amend the EGD contract?

Response:

Enbridge reduced its capacity request during the new capacity open season process. Enbridge did not provide a reason for the reduction. The change was made prior to Enbridge signing a Precedent Agreement and Financial Backstopping Agreement, therefore a contract amendment was not required.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 6

Must TCPL complete the Vaughan expansion project prior to the Union expansion project being placed into service and flowing gas?

Response:

No. Please see the responses at Exhibit B.APPrO.1 d) and Exhibit B.BOMA.30.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 6

Please confirm that the North T-Service Supply at Dawn's 5,975 GJ/day is the only Union in-franchise incremental demand to be served by the new facilities.

Response:

Confirmed.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Ibid, p. 13

What assurance, if any, does Union have that TCPL Vaughan Mainline Expansion Project will be completed by November 1, 2017?

Response:

Union has no assurances that TransCanada will have the Vaughan Mainline Expansion completed by November 1, 2017. TransCanada and their shippers do not have any assurances that Union will have the 2017 Dawn Parkway Project completed by that same date. Both TransCanada and Union have accountability to their shippers supporting the expansion facilities to provide transportation services commencing November 1, 2017. Please see the response at Exhibit B.APPRO.1 d).

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, Page 13

Has Union signed contracts or letters of intent with Siemens for the compressors? If so, what are the penalties under those contracts if it defers delivery or cancels delivery (specify deferral terms) of one or more compressors?

Response:

Yes, contractual agreements have been entered into for all three compressor packages. Cancellation terms for each of these packages are included below. Deferral terms have not been negotiated for these contracts.

CANCELLATION SCHEDULE

<u>Month</u>	Percentage of Contract - Equipment
7/1/2015	
8/1/2015	
9/1/2015	
9/31/2015	
11/1/2015	
12/1/2015	
1/1/2016	
2/1/2016	
3/1/2016	
4/1/2016	
5/1/2016	
6/1/2016	
7/1/2016	
8/1/2016	
9/1/2016	

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Ibid, p. 16

Please file the remainder of the text of the [truncated] footnote 17.

Response:

Below please find the complete text of the referenced footnote at Exhibit A, Tab 6, p. 16.

Settlement Agreement, Section 8.2(b). TransCanada is contracting 200 TJ/d of transportation capacity to Enbridge from the Niagara and Chippawa receipt points to the Parkway Enbridge CDA delivery point through an expansion of its Hamilton Line commencing November 1, 2015. TransCanada will utilize Union’s Dawn Parkway System to accommodate other additional requests for i) firm transportation capacity from the Niagara and Chippawa receipt points to the Parkway Enbridge CDA delivery point or locations at or north of Parkway; and ii) firm transportation capacity from the Dawn receipt point to locations downstream of Dawn (subject to TransCanada’s ability to utilize up to 500 TJ/d of firm backhaul gas transportation contracts on the Great Lakes Gas Transmission system).

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 17

Please identify the party which has indicated it will turn back 31,246 GJ/day of capacity on November 21, 2017.

Response:

As described in EB-2015-0200, Exhibit A, Tab 8, p. 8, lines 6-7, Union forecast that Consolidated Edison would turn back 31,746 GJ/d of Dawn to Kirkwall transportation service effective November 1, 2017 (not 31,246 GJ/d as noted in the question). Since the time Union filed its evidence, Consolidated Edison has provided notice of turnback of 31,746 GJ/d to Union effective November 1, 2017.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, pp. 17-18

Please list the US North-East utilities that hold the 489 TJ/day with Union. For each utility, state the amount of GJ/day of capacity, the expiry date of the contract, termination notice period, renewal rights, and the TCPL delivery points to which they have contracted. Please assess the risk of a partial or full turnback, for each of the utilities.

Response:

Please see Attachment 1.

Attachment 1 shows the U.S. Northeast customers who hold the 489 TJ/d of Dawn to Parkway contracts with Union. All of the contracts listed have a two year termination notice period and have annual renewal rights for a one year term at the expiry of the current term.

All of the Dawn to Parkway contracts listed in Attachment 1 are associated with downstream transportation contracts on TransCanada with a Waddington delivery point. The majority of shippers listed elected to increase their contract term to October 31, 2022 and have retained renewal rights under their TransCanada contract. Only 6 TJ/d of Parkway to Waddington capacity on TransCanada was turned back. Union is not aware of any U.S. Northeast customers that intend to turn back their Dawn to Parkway contracts upon expiry.

U.S. Northeast Utilities Down to Parkway Contracts (489 TJ/d)

Shipper	Primary Term Expiry Date	Delivery Point	Capacity (GJ/d)	TransCanada Delivery Point
Bay State Gas Company	31-Oct-17	Parkway	27,803	Waddington
Boston Gas Company	31-Oct-17	Parkway	9,282	Waddington
Brooklyn Union Gas Company	31-Oct-18	Parkway	30,217	Waddington
Brooklyn Union Gas Company	31-Oct-17	Parkway	44,019	Waddington
Brooklyn Union Gas Company	31-Oct-17	Parkway	12,953	Waddington
Central Hudson Gas & Electric	31-Oct-17	Parkway	5,467	Waddington
Central Hudson Gas & Electric	31-Oct-17	Parkway	10,792	Waddington
Colonial Gas Company	31-Oct-17	Parkway	6,475	Waddington
Connecticut Natural Gas Corporation	31-Oct-17	Parkway	18,077	Waddington
Connecticut Natural Gas Corporation	31-Oct-18	Parkway	9,170	Waddington
Connecticut Natural Gas Corporation	31-Oct-19	Parkway	6,489	Waddington
Connecticut Natural Gas Corporation	31-Oct-17	Parkway	6,410	Waddington
Consolidated Edison Company of New York, Inc.	31-Oct-17	Parkway	21,825	Waddington
Essex Gas Company	31-Oct-17	Parkway	2,158	Waddington
KeySpan Gas East Corporation	31-Oct-17	Parkway	43,837	Waddington
KeySpan Gas East Corporation	31-Oct-17	Parkway	17,162	Waddington
KeySpan Gas East Corporation	31-Oct-18	Parkway	22,772	Waddington
Liberty Utilities Corp.	31-Oct-17	Parkway	4,317	Waddington
Narragansett Electric Company	31-Oct-17	Parkway	1,081	Waddington
Niagara Mohawk Power	31-Oct-17	Parkway	55,123	Waddington
Northern Utilities, Inc.	31-Oct-17	Parkway	6,333	Waddington
Southern Connecticut Gas Company	31-Oct-17	Parkway	34,950	Waddington
Southern Connecticut Gas Company	31-Oct-18	Parkway	13,970	Waddington
Southern Connecticut Gas Company	31-Oct-19	Parkway	9,735	Waddington
Yankee Gas Services Company	31-Oct-17	Parkway	43,116	Waddington
Yankee Gas Services Company	31-Oct-18	Parkway	20,560	Waddington
Yankee Gas Services Company	31-Oct-19	Parkway	5,380	Waddington
Total			489,473	

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Ibid, pp. 17-18

Of the 489 TJ of Dawn Parkway capacity, Union states that North-East utilities have contracted on TCPL 59 TJ/day to East Herford, Quebec. Please provide the volume contract to Waddington (Iroquois) and any other pertinent delivery points.

Response:

Please see the response at Exhibit B.BOMA.34.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Ibid, p 19

Please confirm that any turnback of North-East utilities will increase the currently proposed surplus of capacity on D-T except to the extent PDO customers currently moving gas on TCPL mainline are permitted to acquire gas at Dawn.

Response:

As discussed in the response at Exhibit B.VECC.3 b), the U.S. Northeast utilities have termed up their downstream TransCanada contracts associated with the 489 TJ/d of Dawn to Parkway capacity until 2022. This reduces the risk of U.S. Northeast utility turnback on the Dawn Parkway System during that period. In addition, Exhibit B.VECC.3 b) discusses ICF International’s view that access to storage, diversity of supply and difficulty in building new or expanding pipeline capacity into certain U.S. Northeast markets provides sound reasons for the U.S. Northeast utilities to continue to hold their Dawn Parkway System capacity (Exhibit A, Tab 5, Schedule 1, p. 42).

Any further turnback of Dawn to Parkway capacity would directionally increase the surplus on the Dawn Parkway System. However, Union has options in addition to reducing the Parkway Delivery Obligation to mitigate surplus capacity and any future turnback. As discussed in Exhibit B.TCPL.2 f), Union intends to continue to market surplus Dawn Parkway System capacity to shippers seeking access to the Dawn Hub or the Niagara/Chippawa receipt points. Union also plans to conduct a 2018 new capacity open season in the fall of 2015.

Further turnback of Dawn to Kirkwall capacity will be used to reduce the Parkway Delivery Obligation as agreed during EB-2013-0365.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Ibid, p. 22

Union does not project substantial growth on its system beyond November 1, 2017. In lower demand scenarios, ICF concludes:

"the proposed Dawn Parkway System expansion facilities should remain fully utilized in peak months".

- a) Which months are being referred to?
- b) In assuming the rate impacts of the expansion, how many months of full utilization are assumed, in calculating the annual volumes transported?

Response:

The following response was prepared by ICF.

- a) Peak demand generally occurs in December, January and February.
- b) ICF does not make an assumption related to utilization when calculating the annual volumes transported. Annual volumes transported is based on a projection of monthly pipeline flows driven by demand, supply, prices and constrained by pipeline capacity. The need for capacity is based on capacity requirements during peak period demands, while utilization is based on normal weather requirements in each month.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 5, Schedule 10, p. 1 - ICF Study

After 2022, the risk of turnback increases. What is ICF's assessment of the likely amount of turnback which would occur in each of the five years after 2022?

Response:

The following response was prepared by ICF.

ICF is not projecting any net turnback during any of the years after 2022.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association (“BOMA”)

Reference: Exhibit A, Tab 5, Schedule 10, p. 1 - ICF Study

Please confirm that there is no Canadian pipeline route connecting Quebec to New Brunswick, Nova Scotia and PEI, and that maritime gas consumers are unlikely to ever purchase gas at Dawn.

Response:

The following response was prepared by ICF.

The statement that: “there is no Canadian pipeline route connecting Quebec to New Brunswick, Nova Scotia and PEI” is confirmed. A Canadian pipeline route is not necessary for Maritimes customers to access gas in Quebec and Ontario.

The statement that “Maritimes gas consumers are unlikely to ever purchase gas at Dawn” is not confirmed.

UNION GAS LIMITED

Answer to Interrogatory from
Building Owners and Managers Association ("BOMA")

Reference: Exhibit A, Tab 5, Schedule 10, p. 1 - ICF Study

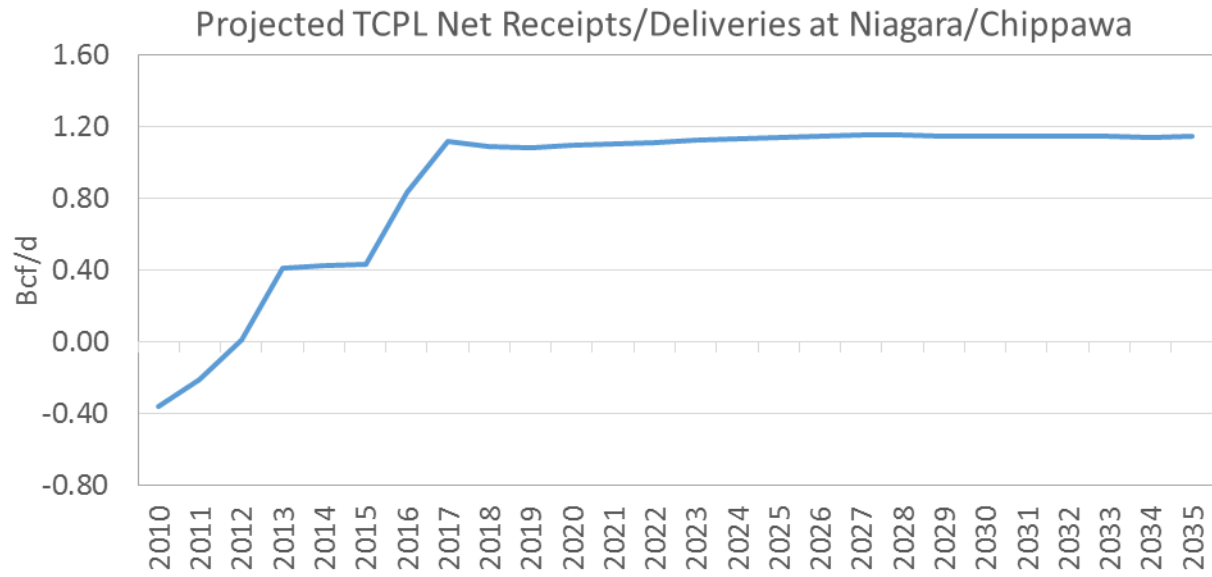
Please provide ICF's analysis of the likely future growth of Marcellus/Utica volumes brought into Canada at Niagara/Chippewa. When is the Chippewa import gate expected to be in service? What is the amount of gas currently being imported at Niagara and from which US pipelines? What is the proposed growth of imports at Niagara in 2015, 2016, 2017, 2018, in GJs/day?

Response:

The following response was prepared by ICF.

ICF projects that Marcellus/Utica volumes to Canada at Niagara/Chippawa will increase over time, as shown in the chart below. ICF assumes that the proposed Greater Golden Horseshoe Facilities Project will be placed into service, increasing the receipt capacity at Niagara (224,000 GJ/day) and Chippawa (123,000 GJ/day) by November 2015. ICF further assumes an incremental capacity expansion of 407,000 GJ/day in November 2016.

In August 2015, TransCanada received 486,000 GJ/day, from Tennessee Gas Transmission at Niagara. The annual average projected imports are 470,000, 900,000, 1,200,000, and 1,200,000 GJ/day, in 2015, 2016, 2017 and 2018 respectively.



UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 3, p. 2

Preamble: Union highlights the “maturation of traditional supply sources from western Canada” as a reason for why Ontario should diversify its natural gas supply.

- a) Can Union provide a detailed breakdown of the remaining reserves in the Western Canadian Sedimentary Basin (WCSB) compared to the Marcellus and Utica shale gas plays?
- b) Can Union provide a comparison of the average cost of production of natural gas from the WCSB to that of the Marcellus and Utica shale gas plays?

Response:

The following response was prepared by ICF.

a) and b) Union relies on ICF International for natural gas market analysis. The response below has been provided by ICF International.

ICF has assessed the remaining technically and economically recoverable gas resources of the WCSB and the Appalachian Basin as shown in the table below:

Economic Resources by Play and Basin

Tcf remaining recoverable as of EOY 2014
ICF September 2015

Shale Play	Technical Recovery Tcf	Economic at \$10 per MMBtu Henry Hub Basis
Horn River	127	67
Montney	263	190
Other*	540	218
WCSB total	930	475
Marcellus	689	500
Utica	445	250
Other*	239	100
Appalachia total	1,373	850

Other WCSB shale plays include Cordova Basin and Cretaceous Shale.

Other Appalachian plays include Huron and NY Utica

Please see the response at Exhibit B.BOMA.6.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 3, p. 2

Preamble: Union refers to the Alberta Energy Regulator's report "Alberta's Energy Reserves 2013 and Supply/Demand Outlook 2014-2023" for the company's forecast of natural gas exports out of Alberta to Ontario and other eastern markets. But the AER report assumes that the WTI price of oil will average \$95.00 (US) in 2014 and will increase to \$111.81 by 2023 (page 7 of report).

Would the recent dramatic decline in the price of oil impact the availability of exports out of Alberta to other markets?

Response:

The following response was prepared by ICF.

Please see the response at Exhibit B.Energy Probe.6.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, Schedule 1, p. 12

Preamble: “ICF is currently projecting completion of 12 North American LNG export facilities between 2016 and 2021, which will export a total of 11.2 Bcfd by 2025.”

- a) Can you provide a detailed list of the 12 projects in question and whether they have been approved or at what stage of the approval process they currently stand?
 - b) How confident is ICF that these 12 export terminals will receive approval from either regulators or backing from investors in the face of environmental opposition and a slowdown in the global economy?
-

Response:

The following response was prepared by ICF.

- a) When similar projects have been announced that will serve the same demand, or will depend on the same resources, ICF does not typically select specific projects to include in its base case assumptions. Instead, ICF includes generic projects that reflect the general characteristics of the proposed projects, but are not tied to a single specific project. Projects that are currently under construction or having firm shipper commitments are included. Others are risk weighted based on their status. The regulatory status of North American LNG import/export projects can be found at this link from the U.S. Federal Energy Regulatory Commission: <http://www.ferc.gov/industries/gas/indus-act/lng.asp>

Additional information on the status of the Canadian LNG facilities can be found at this link from the Canada National Energy Board:

<https://www.neb-one.gc.ca/pplctnflng/mjrpp/lngxprtlcnc/index-eng.html>

- b) ICF reviews its base case assumptions every quarter based on the best information available at the time of its quarterly Base Case release. These assumptions are constantly reassessed each quarter.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, p. 11

Preamble: Union sees no future market opportunity for firm Dawn to Kirkwall transportation capacity intended for natural gas exports to the United States. Any further turn back of Dawn to Kirkwall firm transportation capacity will be utilized to mitigate the Parkway Delivery Obligation for Union's in-franchise customers. [EB-2013-0365 Decision dated June 16, 2014, Appendix B, p. 4 of 7, iii]

- a) Please provide an update to the forecast of Capacity Parkway Delivery Obligation for Union's in-franchise customers (Direct Purchase or contract customers including Halton Hills) and for System supply at November 2015, 2016 and 2017.
- b) Please indicate if the PDO will be removed at that point or whether residual Parkway Delivery Obligations exist for either Direct Purchase or Sales (Union). If the latter, provide the forecast capacity/volumes for 2018.

Response:

- a) Please see Attachment 1.
- b) Union is not currently forecasting any additional PDO shift for Direct Purchase or Sales Service customers in 2018.

Schedule 1
Parkway Delivery Obligation (PDO) for 2014 - 2017
(TJ/day)

Line No.	Particulars	2015 Rates			2016 Rates		
		As Filed (EB-2014-0271) (1)			As Filed (EB-2015-0116)		
		Nov-14	Nov-15	Nov-16	Nov-15	Nov-16	Nov-17
		(a)	(b)	(c)	(d)	(e)	(f)
CAPACITY AVAILABLE FOR PDO SHIFT							
1	Ex-Franchise M12 Dawn to Kirkwall Turnback (2)	0	-123	-11	-123	-10	-29
	Allocation of Capacity Available (turnback):						
2	Opening Balance	-146	-146	-23	-146	-23	-13
3	Temporary Capacity Provided	0	0	0	0	0	0
4	Replacement of Temporary Capacity	0	123	11	123	10	13
5	Closing Balance	-146	-23	-12	-23	-13	0
6	Available for PDO Shift	0	0	0	0	0	-16
TOTAL DIRECT PURCHASE PDO							
7	Beginning PDO (3)	345	345	345	369	369	369
8	Annual PDO Shift <i>line 11 + line 17 + line 21</i>	0	0	0	0	0	-23
9	Remaining PDO	345	345	345	369	369	346
DIRECT PURCHASE PDO DETAIL BY CUSTOMER GROUP							
PDO for Customers without M12 Service:							
10	Beginning PDO	228	228	228	254	254	254
11	PDO Shift	0	0	0	0	0	-16
12	Remaining PDO	228	228	228	254	254	238
13	Annual PDO Shift	0	0	0	0	0	16
14	Allocation to those with PO < 100 GJ/day	0	0	0	0	0	0
15	Percentage Reduction for those with PO > 99 GJ/day	0%	0%	0%	0%	0%	6%
PDO for Customers with M12 Service (except TCE):							
16	Beginning PDO	33	33	33	31	31	31
17	In-Franchise M12 Dawn to Parkway Turnback <i>line 15 * line 16</i>	0	0	0	0	0	-2
18	Remaining PDO	33	33	33	31	31	29
19	Annual PDO Shift	0	0	0	0	0	2
PDO for TCE Halton Hills:							
20	Beginning PDO	84	84	84	84	84	84
21	In-Franchise M12 Dawn to Parkway turnback <i>line 15 * line 20</i>	0	0	0	0	0	-5
22	Remaining PDO	84	84	84	84	84	79
23	Annual PDO Shift	0	0	0	0	0	5
24	PDO for Sales Service	103	103	11	103	11	11

Notes:

- (1) EB-2014-0271, Exhibit B.BOMA.1
- (2) Dawn to Parkway equivalent capacity
The difference between column (c) and column (e) reflects changes in the Dawn to Parkway equivalency factor
- (3) The difference between column (b) and column (d) reflects actual contract changes

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, p. 14

Preamble: Effective November 1, 2017, Union will have 5.9 PJ/d of firm contracted and system Dawn Parkway transportation demands with deliveries at Parkway as shown in Figure 5-4.

- a) Please provide a schedule that lists existing Dawn-Kirkwall and Dawn to Parkway Contracted Shippers and Contract details – Quantity (ies), Receipt Point(s), Delivery Point(s), and Term.
- b) Please provide the same forecast at November 2017.
- c) Please indicate which shippers are expected to terminate, based on the reverse open season or other notice by November 2017.
- d) Please indicate which existing shippers have/are expected to select the as filed and revised True Up Provisions.

Response:

- a) Please see the response at Exhibit B.TCPL.1, Attachment 1.
- b) Please see the response at Exhibit B.TCPL.1, Attachment 1.
- c) Please see the response at Exhibit B.ANE.1.
- d) Union has not yet implemented the proposed Term-Up Provision process and, as such, cannot identify which existing shippers will term up capacity as a result.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, Schedule 1, p. 23

Preamble: ICF's forecast for oil is "between \$60 and \$70" in the short term and \$75 per barrel in the long term. Those figures are already off by as much as 40%. The oil forecast is a major component to this application. With low oil prices, investment in the oil sands declines and subsequently, so does output. With declining output in Alberta's oil sands sector, the industrial demand for gas also declines, freeing up greater reserves for exports to Eastern markets, as well as pushing down the price of those exports compared to gas from the Marcellus and Utica shale gas plays.

Can ICF provide a forecast for natural gas exports from Alberta if the WTI price of crude remains below \$45 for the remainder of 2015 and into 2016? Does that forecast (\$45 oil) materially impact its long-term forecast of oil at \$75?

Response:

The following response was prepared by ICF.

The ICF short term is from one to five years. While oil prices are currently below the ICF short term outlook, it is unlikely that oil prices will remain at today's level throughout the short term. ICF reviews its base case assumptions every quarter based on the best information available at the time of its quarterly Base Case release. These assumptions are constantly reassessed each quarter.

ICF has not conducted an analysis of natural gas exports from Alberta if the WTI price of crude remains below \$45/Bbl for the remainder of 2015 and into 2016. However, the impact on the analysis will not be significant if the low \$45/Bbl oil price stays only for 2015 and 2016. ICF expects that the long-term market equilibrium price remains at \$75/Bbl under normal global economic growth and long-term marginal production costs assumptions.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, Schedule 1, p. 25

Preamble: Nearly the entire growth in natural gas demand in Ontario is a result of the power sector.

Can you provide the electricity demand forecast used to predict the power sector's need for natural gas? Is the forecast based on growing demand for electricity in the province? Declining? Or flat?

Response:

The following response was prepared by ICF.

ICF assumes that total electric generation in Ontario grows at 0.29% (CAGR, 2015-2035). Please see the response at Exhibit B.Energy Probe.8.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 5, Schedule 1, p. 53

Preamble: In Exhibit 5-2, ICF's forecast for natural gas demand in Ontario is significantly higher than that of the National Energy Board (NEB).

Can you explain why your forecast is significantly higher than that of the NEB?

Response:

The following response was prepared by ICF.

ICF expects demand for natural gas fired power generation to be the primary driver of natural gas demand in Ontario. ICF projects higher natural gas demand from the power sector than the NEB due to a more pessimistic outlook for the rate of nuclear refurbishment in the province, requiring additional reliance on gas-fired generation while the nuclear units are off-line.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 6, p. 19

- a) Please provide information on previous approved True Up provisions for Union and Other approved arrangements entered into by Union for transmission contracts.
- b) Please indicate for each of the above arrangements:
 - i) the category of Project (e.g. Existing Pipeline, Pipeline Infrastructure expansion and new Facilities),
 - ii) the term, and
 - iii) penalties.
- c) Please provide details of the driver(s) for the new proposed revised True Up provision to increase the threshold cost from \$20.0 million to \$50.0 million.
- d) Please indicate the change in risks to the company and In-franchise customers.
- e) Please indicate when Union will file updated evidence reflecting the increased threshold.

Response:

- a) There are no previously approved Term-Up Provisions in Union's Tariffs. Union is seeking approval of the Term-Up Provision to be added to the General Term and Conditions in the M12 and C1 Rate Schedules.
- b) Please see the response at Exhibit B.Energy Probe.9 a).
- c) Please see the response at Exhibit B.SEC.9 b).
- d) Please see the response at Exhibit B.SEC.9 b) and Exhibit B.BOMA.17.
- e) On September 3, 2015, Union submitted a letter to the Board in EB-2015-0200 stating the threshold increase from \$20.0 million to \$50.0 million. The threshold change was the result of customer consultation. Union will file updated evidence reflecting the threshold change shortly after the interrogatory responses are filed.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 7

- a) Please provide existing Design Day Capacity Allocation at Dawn for the existing 9 units and position Plant B, DD Capacity of 1.8PJ/d.
 - b) Please provide DD Capacity allocation with Dawn H compressor in service, assuming no incremental demand.
 - c) Please indicate if Plant B will be maintained as Standby or Back-up or dismantled and removed.
 - d) If the latter, is there any Salvage value or negative salvage value related to Plant B and what is the amount? If so, please provide the amount and supporting information.
 - e) What is the Net Book value (Rate Base) of Plant B?
-

Response:

- a) Please see table below providing the W16/17 design day capacities at Dawn for the existing nine units.

COMPRESSOR	PEAK HOUR GAS FLOWRATE (PJ/d)
B	1.8
C	0.2
D	0.4
E	2.9
F1	0.9
F2	0.9
G	n/a
I	0.9
J	0.7

- b) Please see the table below providing the theoretical design day capacities at Dawn if the Dawn Plant H compressor was in service, assuming no incremental demand as indicated in the question.

COMPRESSOR	PEAK HOUR GAS FLOWRATE (PJ/d)
B	n/a
C	0.2
D	0.4
E	2.9
F1	0.9
F2	0.9
G	n/a
H	1.8
I	0.9
J	0.7

- c) Plant B will be dismantled and removed.
- d) Please see the response at Exhibit B.Staff.7.
- e) Please see the response at Exhibit B.LPMA.3.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 9, Schedules 1, 2 and 3

Preamble: The total estimated cost for the Project is \$622.5 million. This includes \$107.4 million coming into service in 2016 and \$500.8 million coming into service in 2017. The remaining \$14.3 million will be spent in 2018. The in-service facilities are described in Exhibit A, Tab 11.

- a) Please provide the on-site delivered cost of each of the 3 Siemens RB-211 44000 HP units.
- b) Compare these prices to delivered costs of the Parkway C and D units.
- c) Please discuss any material differences.
- d) Please indicate the reasons for the apparently high level of Contingencies for each of the 3 Compressors and associated facilities.
- e) In particular, for Dawn H, please indicate the breakdown of the contingency numbers and show how the Contingency number was derived.
- f) Please compare the answer to the Parkway C and D compressors and facilities-- forecast vs actual contingency incurrence.

Response:

- a) The purchase prices for the Lobo D, Bright C, and Dawn H compressor packages are as follows:
Note: the following prices are in Canadian funds inclusive of change order allowance and HST extra.

Lobo D - [REDACTED]
Bright C - [REDACTED]
Dawn H - [REDACTED]

TOTAL -\$71,008,000

- b) Costs for Dawn H, Lobo D and Bright C Siemens compressor packages are consistent with the delivered costs for the Parkway C and Parkway D packages.
- c) There are no material differences. Minor cost variations are due to variations in compressor aerodynamic performance requirements, inflation and other market factors such as fluctuations in the foreign exchange rate.
- d) The contingency costs are calculated at 15% of the material and labour cost estimates. The contingency level is aligned with Union's standards for a pre-budget estimate and is intended to cover remaining unknown risks to the Project such as minor scope changes, delays due to permitting or weather and other factors such as foreign exchange rates for material purchases. Please see the response at Exhibit B.SEC.5, Attachment 1 for more detail.
- e) Please see the response at Exhibit B.LPMA.13 b).
- f) At the time of the original OEB filing, the contingencies included for Parkway West facilities (including Parkway C) and the Parkway D Compressor was 15% for both projects. The project estimates were at the pre-budget level when the applications were filed. The total cost approved for both projects was \$327.5 million and included \$35.5 million in contingency. The most recent forecast for these projects which are expected to be in-service by the end of the year is approximately \$318.6 million. The forecast includes \$4.5 million in contingency on the remaining scope of work. All other contingency has been spent on realized risks to the projects.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 9, Schedule 4

- a) Please explain the following Inputs to Schedule 4:
- Lines 2 and 6 col 1: 441.8 and 447.8 TJ/d demands,
 - Line 2 col 3: 2.937\$/GJ/mo. - As this relates to average flow and peak and design day demands, and
 - Line 6 col 3: 0.232\$/GJ/mo.
- b) Please explain how the revenue forecasts relate to the distance based costs input to the Cost Allocation Model.

Response:

- a) Column 1, lines 2 and 6 are described and calculated in notes 1 and 4 of the same schedule. For additional clarity, the figure 8.9 TJ referenced in Note 1 is the equivalent amount of Dawn to Parkway capacity that is used to transport a demand originating at Kirkwall and moving to Parkway. This “equivalency” figure is referenced in Note 1 because capacity that is being referenced in the evidence is the capacity of the system originating at Dawn and terminating at Parkway.

Note 1 starts with the new capacity of 456.6 TJ/d and deducts 6.0 TJ/d for North Transportation and deducts 8.9 TJ/d for Kirkwall to Parkway requirements leaving a balance of 441.8 TJ/d that is available to be move gas for M12 shippers from Dawn to Parkway. These figures are used in lines 2 and 4 of the schedule multiplied by the rate in column 3 to create the revenue forecast on the same lines.

Union awarded incremental new contracts from Dawn to Parkway equal to 368.057 TJ/d (Reference Exhibit A, Tab 6, p.4, line 1). The difference between the available capacity of 441.8 TJ/d and new contracts of 368.1 TJ/d is a 73.7 TJ/d reduction of the Dawn Parkway System shortfall. This 73.7 TJ/d represents demands that were contracted in prior periods that did not have underpinning Dawn to Parkway capacity allocated in a facilities application. The DCF revenues are based on the capacity of the build not the contracts signed in a given period with the differences flowing into or out of the supply demand balance.

The reference in the 2nd bullet point of the question “... As this related to average flow and peak day design demands ...” is misconstrued. The revenue is the capacity available to be contracted times the toll in the rate schedule. The reference to average flow is in error.

Line 6, column 3 is the portion of the M12 toll that is attributed to the cost recovery of the Dawn facilities and is often referred to as the Dawn Compression Margin (“DCM”). The DCM is typically excluded on project economics where no new Dawn facilities are being constructed. In this application Dawn H is being constructed and the DCM is therefore recognized. The schedule breaks this out separately for transparency. Absent the transparency column 3 of lines 2 and 4, use a figure of \$3.169 /GJ/ month as detailed in Note 2.

- b) The revenue forecast is based on the capacity of the facilities and the demands used in Union’s cost allocation study are incremental Project demands.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 9, Schedules 1, 2 and 3

- a) Please Confirm the EBO 134 Guideline relates primarily to Distribution System Expansion.
- b) Please indicate what is/are the corresponding OEB Guidelines for Transmission and in particular, Compression Projects.
- c) Please either provide a link to the OEB site or electronic copies of the above.
- d) Confirm the Dawn H Compressor is both a Replacement for Dawn Plant B and also a System Expansion Project.
- e) Please provide one or more examples of previous applications/approvals that had this dual requirement.
- f) Please provide for the example(s) a copy of the facilities Costs and Revenues and a sample of the Phase1 DCF analysis. Ensure Notes in Input assumptions are included.

Response:

- a) and b) Not confirmed. EBO 188 relates to Distribution System Expansion. EBO 134 relates to transmission facilities.
- c) Please see the response at Exhibit B.BOMA.14.
- d) The Dawn H Compressor is of sufficient capacity to accommodate the retirement of Dawn Plant B and provide the compression required to meet growth demands. Please see responses to Exhibit B.Staff.5 b) and Exhibit B.BOMA.8 b).
- e) and f) A recent example that is similar in concept is described below.

Sarnia Expansion Pipeline Project (“Sarnia Project”) EB-2014-0333 - The Sarnia Project was a new connection to the Sarnia Industrial Line (SIL) for security of supply reasons to replace capacity that could not be relied upon to meet the SIL demands. The Sarnia Project was sized to accommodate both the security of supply and growth requirements.

The economics and DCF were based on satisfying the immediate requirements for security of supply first and the growth as an increment to the security of supply. The portion of the project associated with growth has costs and revenues attributed in the DCF. The security of supply requirement did not have any revenues (these were existing customers). Attachment 1 includes pages extracted from the filing with the DCF parameters and the narrative associated with project economics.

Link to the full filing can found here:

http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/454807/view/UNION_APPL_Sarnia%20Expansion%20Pipeline%20Project_2014110.PDF

ONTARIO ENERGY BOARD

IN THE MATTER OF The Ontario Energy Board Act,
1998, S.O. 1998, c.15, Schedule B, and in particular, s.90
thereof;

AND IN THE MATTER OF an Application by Union Gas
Limited for an Order granting leave to construct a natural
gas pipeline and ancillary facilities in the Township of St.
Clair, in the County of Lambton.

UNION GAS LIMITED

1. Union Gas Limited (the “Applicant”) hereby applies to the Ontario Energy Board (the “Board”), pursuant to Section 90(1) of the Ontario Energy Board Act (the “Act”), for an Order granting leave to construct approximately 4.8 kilometres of NPS 20 natural gas pipeline (the “Proposed Pipeline”), in the Township of St. Clair, in the County of Lambton.
2. Attached hereto as Schedule “A” is a map showing the general location of the proposed pipeline and the municipalities, highways, railways, utility lines and navigable waters through, under, over, upon or across which the proposed pipeline will pass.
3. The construction of the Proposed Pipeline will allow the Applicant to ensure the continued reliable, safe delivery of natural gas and to serve the growing Sarnia market.
4. The Applicant requests that this Application be dealt with in accordance with Section 34 of the Board’s Rules of Practice and Procedure for written hearings.

5. The Applicant now therefore applies to the Board for an Order granting leave to construct the proposed pipeline as described above.

Dated at Municipality of Chatham-Kent this 4th day of November, 2014.

[Original signed by]

Per: Mark Murray,
Manager, Regulatory Projects and Lands
Acquisition
Union Gas Limited

Comments respecting this Application should be directed to:

Mark Murray
Manager, Regulatory Projects & Lands Acquisition
Union Gas Limited
50 Keil Drive North
Chatham, Ontario
N7M 5M1
Telephone: 519-436-4601
Fax: 519-436-4641

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SARNIA EXPANSION PIPELINE PROJECT

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COSTS AND ECONOMICS

The Proposed Pipeline is described in Schedule 1-1. Total pipeline costs are estimated to be \$18,367,000 and total station costs are estimated to be \$5,951,000. The total capital cost of the Proposed Pipeline is estimated to be \$24,317,000 and is summarized in Schedules 6-1 and 6-2.

Given the estimated cost of \$24,317,000, the project does not meet the capital pass-through criteria as determined from Union's 2014-2018 Incentive Regulation Mechanism proceeding (EB-2013-0202). These costs will be included in rates in Union's 2019 rebasing application.

As described in Section 5, the Proposed Pipeline is being sized to address security of supply and to accommodate SIL System demand growth through winter 2019/2020. The facilities required to solely provide security of supply for the SIL System, as discussed in Section 5, have an estimated capital cost of \$21,499,000. The incremental capital cost to increase the pipeline size to accommodate demand growth is estimated to be \$2,818,000.

The portion of the Proposed Pipeline that provides security of supply to the SIL System serves existing customer load and will not result in incremental revenues. The portion of the Proposed Pipeline that accommodates incremental demand on the SIL System will result in incremental revenues.

A standalone Discounted Cash Flow ("DCF") analysis was completed for the portion of the Proposed Pipeline serving SIL System demand growth. Union has employed an economic

1 feasibility test consistent with the Board's recommendations in the E.B.O. 188 Report on Natural
2 Gas System Expansion.

3
4 The Board has found that new distribution facilities are in the public interest if no undue burden
5 is placed on existing customers. When the estimated costs and revenues for the portion of the
6 Proposed Pipeline to serve demand growth on the SIL System are included in Union's 2014 new
7 business investment portfolio, the resulting Profitability Index ("PI") is estimated to be 1.21.
8 Similarly, when the estimated costs and revenues for the portion of the Proposed Pipeline to
9 serve demand growth on the SIL System are included in Union's rolling portfolio, as at
10 September 2014, the resulting PI is estimated to be 1.44.

11
12 The DCF analysis and parameters for the growth portion of the project can be found at Schedule
13 6-3 and 6-4. This analysis indicates a Net Present Value ("NPV") of \$180,000 and a PI of 1.06.
14 The DCF analysis was conducted using the capital cost of \$2,818,000 and the incremental
15 transmission revenue associated with the new firm T2 Storage and Transportation Carriage
16 Service requests (NOVA and Shell Canada).

17
18 The incremental transmission revenue is the portion of the customers' rate that is attributed to
19 transmission facilities. The remaining portion of the customers' rate would be used to support
20 the customers' distribution facilities. This segmented approach is consistent with previous
21 filings and E.B.O. 188. This approach ensures customer revenue is not counted more than once
22 when facilities are built in different time periods.

- 1 Union therefore submits that the proposed pipeline is economically feasible and in the public
- 2 interest.

TOTAL ESTIMATED PIPELINE CAPITAL COSTS

SARNIA EXPANSION PIPELINE PROJECT

2015 Construction

Pipeline and Equipment

4.8 kms of NPS 20 \$ 1,300,000

Valves, Fittings and Miscellaneous Material \$ 1,031,000

Total Pipeline and Equipment \$ 2,331,000

Construction and Labour

Lay 4,800 metres of NPS 20 Steel Pipe \$ 8,669,000

Miscellaneous Contract Labour

Company Labour, Inspection, X-Ray, Construction Survey,
Legal, Environmental, Archeology, and Permitting \$ 3,594,000

Easements, Lands, Damages & Regulatory \$ 1,150,000

Total Construction and Labour \$ 13,413,000

Subtotal Estimated Pipeline Capital Costs \$ 15,744,000

Contingencies \$ 2,362,000

Interest During Construction \$ 261,000

Total Estimated Pipeline Capital Costs \$ 18,367,000

TOTAL ESTIMATED STATION CAPITAL COSTS

SARNIA EXPANSION PIPELINE PROJECT

2015 Construction

Station Equipment and Labour

Station Equipment	\$	2,155,000
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Construction and Labour	\$	2,348,000
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Company Labour, Inspection, X-Ray, Construction Survey, Legal, Environmental, Archeology, and Permitting	\$	490,000
---	----	---------

Easements, Lands, Damages & Regulatory	\$	105,000
--	----	---------

Subtotal Station Equipment, Construction, and Labour	\$	5,098,000
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Contingencies	\$	765,000
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Interest During Construction	\$	88,000
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Total Estimated Station Capital Costs	\$	5,951,000
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[illegible]

SARNIA EXPANSION PIPELINE PROJECT (Project Specific DCF Analysis) Stage 1 DCF - Listing of Key Input Parameters, Values and Assumptions (\$000's)	
Discounting Assumptions Project Time Horizon Discount Rate	commencing at facilities in-service date of November 1, 2015 10 years from March 1, 2015 contract commencement date (coensides with earliest customer attachment) Incremental after-tax weighted average cost of capital of 5.28%
Key DCF Input Parameters, Values and Assumptions <i>Net Cash Inflow:</i> Incremental Transportation Revenue: Rate T2 Firm Transportation Contract Demand Operating and Maintenance Expense Incremental Tax Expenses: Municipal Tax Income Tax Rate CCA Rates: CCA Classes: Eligible Capital Expenditure (ECE) Class 49 (Transmission Mains)	Approved per EB-2013-0365 Effective January 1, 2014 1,272,000 m ³ Estimated incremental cost Estimated incremental cost 2014 = 26.5% underpinning approved rates Declining balance depreciation rates by CCA class: 7% 8%
<i>Cash Outflow:</i> Incremental Capital Costs Attributed Change in Working Capital	Refer to Schedules 6-1 and 6-2 7.1649% applied to O&M

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 9, Schedule 6

- a) For the Parkway Projects please provide a Table that Separates the Capital Costs and Revenues for Plant H into
 - i) Replacement Capital and Operating Costs and
 - ii) System Expansion Capital and Operating costs based on the Rated Capacity and Peak DD capacity.
- b) Please provide a Scenario with a Phase1 DCF analysis and P.I. based on the assumption that the incremental System Expansion Capital and Operating Costs and Revenues for Dawn H are inputs, rather than the full Capital and Operating cost and revenues and the Lobo D and Bright C Compressors and associated facilities are System Expansion facilities.
- c) Please Tabulate the Results and Compare to the as filed DCF analysis.
- d) Please provide the above as an Excel Work book that includes both the base as filed Phase 1 and the requested Scenario Analyses.
- e) Please provide a Phase 2 and Phase 3 Analysis for the requested Scenario.

Response:

The capacity of Dawn Plant B is 1.8 PJ and the available capacity of the proposed Dawn Plant H is 2.8 PJ. Using the methodology posed in the question would attribute 64% (1.8 divided by 2.8) to “replacement”.

Union has done the calculation as prescribed by the question; however, the results do not represent a realistic scenario where results can be viewed as two separate projects. Using capacity as the allocator, the question requires an attribution of 64% of the proposed Dawn H compression costs to “replacement” and 36% to “expansion”. Using this allocation methodology would ascribe approximately \$160 million to replacement and \$90 million to expansion as indicated in Attachment 1.

Part b) to the question is a scenario with the cost of Lobo D and Bright C plus \$90 million attributed from Dawn Plant H. The resulting DCF is not a valid scenario because the facilities required at Dawn to meet the demands of the 2017 Dawn Parkway Project cannot be constructed

for the allocated \$ 90 million. As a result, although the DCF as requested has been mechanically produced, it has no value.

a) Please see Attachment 1.

b) A DCF analysis was completed based on the requested parameters in a). Please see Attachment 2 for the results of the DCF analysis.

c) The requested table is as follows:

	As Filed - Updated	14b Scenario	Difference
	a	b	c = a - b
Net Present Value (\$000's)	(343,066)	(205,924)	137,142
Profitability Index	0.43	0.54	0.11

d) Union has provided Excel Attachment 1 directly to Energy Probe via email, copying the Board. Should any other interested parties wish to receive the document, please contact Union directly. The base Stage 1 as filed represents updated values. Updated evidence will be filed shortly

e) Please see Attachment 3 which is a calculation in the manner as prescribed by the question. The logic of an apportionment of Stage 3 impacts is flawed for a reason similar to that described above. The GDP, jobs and taxes in Stage 3 (Exhibit A, Tab 9, Schedule 7) occur as a result of the actual expenditure. Creating a scenario of allocating the costs between replacement and expansion would not change the actual expenditure or the Stage 3 impacts.

However, to be complete in the response, using the ascribed methodology the table below shows the NPV calculated for the 3-stage economic analysis completed for the requested scenario as if it was possible to construct the project with the allocated spending. This is compared to the analysis as filed - Updated.

NPV \$ Millions

Stage	NPV Excluding Gas Savings – As Filed (Updated)	NPV Excluding Gas Savings – Requested Scenario	Difference
	(a)	(b)	(c) = (a) – (b)
Stage 1	(343)	(206)	137
Stage 2	Not Quantified	Not Quantified	Not Quantified
Stage 3	+ 467	+ 339	(128)
Total	+ 124	+ 133	9
Jobs Created	6,300	5,100	1,200

UNION GAS LIMITED
Allocation of Capital Costs and Operating Costs Between Replacement and System Expansion

Line No.	Particulars (\$000's)	% Allocated to Replacement	% Allocated to System Expansion	Total Costs/Revenue	Allocated to Replacement	Allocated to System Expansion
	<u>Dawn H</u>					
1	Total Capital Costs	64.0%	36.0%	249,830	159,891	89,939
2	O&M Expense - Year 2 ¹	64.0%	36.0%	1,617	1,035	582
3	Municipal Tax - Year 2 ¹	64.0%	36.0%	365	234	131
	<u>Lobo D</u>					
4	Total Capital Costs	0.0%	100.0%	144,923	-	144,923
5	O&M Expense - Year 2 ¹	0.0%	100.0%	1,224	-	1,224
6	Municipal Tax - Year 2 ¹	0.0%	100.0%	323	-	323
	<u>Bright C</u>					
7	Total Capital Costs	0.0%	100.0%	227,752	-	227,752
8	O&M Expense - Year 2 ¹	0.0%	100.0%	770	-	770
9	Municipal Tax - Year 2 ¹	0.0%	100.0%	360	-	360
	<u>Total Project</u>					
10	Total Capital Costs			622,505	159,891	462,614
11	Revenue ²			17,551	-	17,551
12	O&M Expense - Year 2 ¹			3,611	1,035	2,576
13	Municipal Tax - Year 2 ¹			1,048	234	814

Notes:

- (1) Year 2 is used for O&M expenses and municipal tax since year 1 is a partial in-service year. Year 2 is the first year with full O&M expenses and municipal tax.
- (2) Revenue on this project is by nature attributable 100% to system expansion. As such, no allocation is made between the three compressors.

[illegible]

[illegible]

[illegible]

Economic Benefits from Infrastructure Spending

Figures in \$ Millions

Line No	Description	Note	Capex Spend Out of Country	Capex Spend within Ontario	Capex Spend within Canada Excluding Ontario	Capex Total (d)= sum (a-c)	
			(a)	(b)	(c)		
1	Dawn H	(d)	\$ 21	\$ 59	\$ 10	\$ 90	
2	Lobo D		\$ 58	\$ 73	\$ 14	\$ 145	
3	Bright C		\$ 59	\$ 140	\$ 29	\$ 228	
4	Total		<u>\$ 138</u>	<u>\$ 272</u>	<u>\$ 53</u>	<u>\$ 463</u>	
5							
6	% of Total Spend		30%	59%	11%	100%	Line 4 /Total Line 4 Col (d)
7							
8	GDP						
9	GDP Factor	(a)		1.14			Source : Schedule 9-8
10	GDP Impact \$ Millions			\$ 310			Line 4 * Line 9
11							
12	Employment (Jobs)						
13	Jobs Factor	(b)		16.7			Source : Schedule 9-8
14	Jobs Created			4,542			Line 4 * Line 13
15							
16	Taxes Paid by Union Gas	(c)					
17	Property Tax			\$ 12			Source: NPV DCF
18	Provincial Income Tax			\$ 17			Source: NPV DCF
19	Total Provincial Taxes			\$ 29			
20	Federal Income Tax			\$ 22			Source: NPV DCF
21	Total Taxes Paid			<u>\$ 51</u>			
22							
23	Total Value to Ontario						
24	GDP Impact \$ Millions			\$ 310			Line 10
25	Total Provincial Taxes			\$ 29			Line 19
26	NPV Total Value to Ontario			<u>\$ 339</u>			

Notes:

Schedule 9-8 : The Economic Impact of Ontario's Infrastructure Investment Program Conference Board of Canada

- (a) Schedule 9-8 page 7 (\$ Real GDP \$ 114 million for each \$ 100 million invested)= 1.14
- (b) Schedule 9-8 page 7 (1,670 jobs for each \$ 100 million invested) = 1670/100 = 16.70 per \$ 1million
- (c) Net Present Value taxes by Union paid over 30 years
- (d) The figures from Exhibit A, Tab 9, Schedule 7 were factored by 36%

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 10, Schedule1-Revenue Requirement

- a) Please provide the change in revenue requirement related the Dawn Plant B.
 - b) Please indicate if this has been netted out (with any positive or negative salvage).
 - c) Please discuss how the Rate of Return may change under the Board's Cost of Capital during the period 2015-2018 (Taking into account the term of Union's IRM plan).
 - d) Provide a Revenue Requirement sensitivity based on 100 basis points change in Return.
-

Response:

- a) Included in the updated 2018 total revenue requirement of \$42,639 is (\$1,546) related to the \$5.0 million of project costs for decommissioning and removal of Dawn B.
- b) Yes.
- c) The Rate of Return is fixed over the term of IRM. Please see Section 11.2 of the EB-2013-0202 Settlement Agreement as filed on July 31, 2013.
- d) Union assumes that the question is asking for a Revenue Requirement sensitivity to be calculated based on a 100 basis point change in the OEB approved return on common equity of 8.93%. Accordingly, the results of the Revenue Requirement sensitivity are shown in the table below.

<u>Total Revenue Requirement</u> <u>(\$000's)</u>	<u>2016</u> a	<u>2017</u> b	<u>2018</u> c
Proposed Project (updated)	(1,716)	6,758	42,638
+ 100 basis points Return	(1,661)	7,584	45,501
- 100 basis points Return	(1,771)	5,931	39,775
Summary			
+/- 100 basis point change =	+/- 55	+/- 826	+/- 2,863

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe Research Foundation

Reference: Exhibit A, Tab 10, Table 10-1 and 10-2 Cost Allocation

Preamble: The current Board-approved method for allocating Dawn Station transmission costs associated with the Dawn Parkway System was most recently reviewed and approved by the Board in EB-2011-0210.
The change to the 2013 Board-approved Dawn Parkway System allocation factor is provided at Table 10-1. The allocation of Dawn Parkway System costs includes demands associated with the Project of 452,911 GJ/d, as provided in Exhibit A, Tab 8, Table 8-1.

a) Please assist with understanding the approved 2013 Cost allocation to each Service Area and Ex-franchise Customers and changes/differences due to the Projects:

- Working paper(s) and notes that support the sources of, and calculation of the numbers in Table 10-1 at lines 1-7.
- Working paper(s) that supports the sources of, and calculation of the numbers in Table 10-2 at lines 1-9.

b) Please describe how current the Cost allocation is based; for example, between the Dawn Station and Dawn-Parkway System.

c) Please provide the relevant Dawn-Parkway Demands for 2014-2018.

Response:

a) The calculation of the 2013 Board-approved Dawn Parkway distance weighted design day demands is provided at Attachment 1, p. 1, lines 1-39. The calculation of the distance weighted design day demands associated with the Project demands of 452,911 GJ/d (or $11.998 \times 10^6 \text{ m}^3/\text{d}$) are provided at Attachment 1, p. 1, lines 40-42. The total Dawn Parkway distance weighted design day demands, including the Project demands, is provided at Attachment 1, p. 1, line 44.

The calculation of the 2013 Board-approved design day demands requiring Dawn compression is provided at Attachment 1, p. 2, lines 1-6. The calculation of the design day demands requiring Dawn compression including the Project demands of 368,057 GJ/d (or $9,750 \times 10^3 \text{ m}^3/\text{d}$) are provided at Attachment 1, p. 2, lines 7-14.

- b) The Dawn Parkway transmission costs, including Lobo D and Bright C facility costs, are allocated in proportion to Dawn Parkway System distance weighted design day demands.

The Dawn Station transmission costs, including Dawn H facility costs, are allocated in proportion to easterly design day demands requiring Dawn compression.

The Board-approved cost allocation for Dawn Parkway transmission and Dawn Station transmission costs is provided in a).

- c) The Dawn Parkway design day demands are provided at Attachment 1, p.1, column a).

UNION GAS LIMITED
2013 Board-Approved Dawn-Parkway Allocation Units
Including the Lobo D, Bright C and Dawn H Project Demands

Line No.	Particulars	Demand (10 ⁶ m ³ /d) (a)	Kilometre Post (km) (b)	Commodity Kilometre ((10 ⁶ m ³ /d)*km) (c)
	<u>2013 Board-Approved Cost Allocation (1)</u>			
	<u>Union Demands Supplied by Dawn</u>			
1	Forest, Watford	0.184	44.01	8.094
2	Strathroy	0.204	54.93	11.228
3	Byron	2.935	73.05	214.408
4	Hensall	0.515	85.74	44.161
5	London N	2.542	90.35	229.659
6	Hensall	0.242	85.74	20.754
7	St Mary's	0.169	103.93	17.575
8	Stratford	0.946	121.45	114.898
9	Beachville	1.372	121.45	166.677
10	Oxford	1.129	142.92	161.410
11	Owen Sound Line	6.206	159.39	989.229
12	Cambridge	1.828	175.14	320.219
13	Brantford	2.577	175.14	451.394
14	Guelph	2.177	183.67	399.817
15	Kirkwall- Dominion	2.130	188.67	401.787
16	Gate 3	1.024	188.67	193.188
17	Gates 1 & 2	6.757	199.25	1346.358
18	Milton	0.202	218.09	44.126
19		<u>33.141</u>		<u>5,134.980</u>
20	Northern & Eastern Areas Adjustment	<u>(6.956)</u>	228.94	<u>(1,592.403)</u>
21	Total Union Demands Supplied by Dawn	<u>26.186</u>		<u>3,542.578</u>
	<u>Union Demands Supplied by Parkway</u>			
22	Milton	1.684	10.85	18.271
23	Halton Hills (dist'n)	0.222	7.33	1.630
24	HH Power Plant	3.480	7.33	25.508
25	Burlington	1.433	0.00	0.000
26	Bronte	2.225	0.00	0.000
27	Greenbelt	0.929	0.00	0.000
28		<u>9.974</u>		<u>45.409</u>
29	Northern & Eastern Areas Adjustment	<u>6.956</u>	0.00	<u>-</u>
30	Total Union Demands Supplied by Parkway	<u>16.929</u>		<u>45.409</u>
	<u>Union Demands Supplied by Kirkwall</u>			
31	Gate 3	<u>0.559</u>	0.00	<u>0.000</u>
32		<u>0.559</u>		<u>0.000</u>
33	Total Union (line 21 + line 30 + line 32)	<u>43.674</u>		<u>3,587.987</u>
	<u>Storage & Transportation Contracts</u>			
34	Dawn to Parkway	104.136	228.94	23,840.847
35	Dawn to Kirkwall	12.906	188.67	2,434.883
36	Kirkwall to Parkway	6.973	40.27	280.822
37	Total S & T	<u>124.015</u>		<u>26,556.552</u>
38	Northern & Eastern Areas	<u>6.956</u>	228.940	<u>1,592.495</u>
39	Total Union and S&T (line 33 + line 37 + line 38)	<u>174.645</u>		<u>31,737.034</u>
	<u>Incremental Project Demands</u>			
40	Dawn to Parkway (2)	9.750	228.94	2,232.132
41	Kirkwall to Parkway (3)	<u>2.248</u>	40.27	<u>90.518</u>
42	Total Project Demands	<u>11.998</u>		<u>2,322.65</u>
43	Total S & T Including Project Demands (line 37 + line 42)	<u>136.013</u>		<u>28,879.202</u>
44	Total Union and S&T Including Project Demands (line 39 + line 42)	<u><u>186.643</u></u>		<u><u>34,059.68</u></u>

Notes:

- (1) As per EB-2011-0210, Exhibit J.G-1-7-5, Attachment 1.
- (2) Rate M12 Dawn-Parkway demands of 362,082 GJ/d and Rate C1 Dawn-Parkway demands of 5,975 GJ/d associated with Union North In-franchise Dawn-Parkway transportation service, as per Exhibit A, Tab 8, Table 8-1, converted to 10⁶m³/d using a heat value of 37.75 GJ/10³m³.
- (3) Rate M12 Kirkwall to Parkway demands of 84,854 GJ/d, as per Exhibit A, Tab 8, Table 8-1, converted to 10⁶m³ using a heat value of 37.75 GJ/10³m³.

UNION GAS LIMITED
Calculation of the 2013 Board-Approved Dawn Compression Design Day Demands
Including the Lobo D, Bright C and Dawn H Project Demands

Line No.	Particulars (10 ³ m ³ /d)	Union North In-franchise (a)	Union South In-franchise (b)	Rate M12 (c)	Total (d) = (a+b+c)
<u>2013 Board-Approved Cost Allocation</u>					
1	Design Day Demands (1)	6,956	43,674	124,015	174,645
	Design Day Demands served from:				
2	Parkway	-	16,929	-	16,929
3	Kirkwall	-	559	6,973	7,532
4	Dawn	6,956	26,186	117,041	150,183
5	Load Not Requiring Dawn Compression (OSE/Edys Mills) (2)	(51)	(192)	(857)	(1,100)
6	Total Design Day Demands Requiring Dawn Compression (line 4 + line 5) (3)	6,905	25,994	116,184	149,083
<u>Updated Cost Allocation</u>					
7	Project Demands (4)		-	11,998	11,998
8	Design Day Demands served from:				
9	Parkway	-	-	-	-
10	Kirkwall	-	-	2,248	2,248
11	Dawn	-	-	9,750	9,750
12	Total Design Day Demands served from Dawn (line 4 + line 11)	6,956	26,186	126,791	159,933
13	Load Not Requiring Dawn Compression (OSE/Edys Mills) (5)	(48)	(180)	(872)	(1,100)
14	Total Design Day Demands Requiring Dawn Compression (line 12 + line 13)	6,908	26,005	125,919	158,833

Notes:

- (1) 2013 Board-approved design day demands, as per Attachment 1, p.1, column a).
- (2) Allocated in proportion to line 4.
- (3) As per EB-2013-0365, Exhibit B9.10, p.2.
- (4) Project demands of 452,911 GJ/d, as per Exhibit A, Tab 8, Table 8-1, are converted to 10³m³/d using a heat value of 37.75 GJ/10³m³.
- (5) Allocated in proportion to line 12.

UNION GAS LIMITED

Answer to Interrogatory from
Energy Probe

Reference: Exhibit A, Tab 10, Schedule 3

- a) Please provide the EB-2015-0035 Schedule(s) supporting the estimates.
- b) Please provide for the M1 and R1 Rate classes, the calculations underlying Commodity Delivery Charges on lines 2 and 12 and estimates sales customer bill reduction on lines 8 and 19.
- c) Please indicate in detail, the basis of the Change in the Total Bill for Sales customers and indicate the underlying commodity rate assumptions.

Response:

- a) Please see Attachment 1, pp. 1-5 for the general service bill impacts filed as part of Union's April 1, 2015 QRAM. The bill impacts provided at Exhibit A, Tab 10, Schedule 3 exclude prospective recoveries (Attachment 1, p. 1, line 8 and Attachment 1 pp. 2-5, line 10).
- b) Please see Attachment 2, pp. 1-2.
- c) Please see Attachment 2, pp. 1-2. The blocking of the delivery commodity charge, the billing units, and the rates are provided to show the underlying calculations for each component that make up the total bill. Commodity rate assumptions are consistent with EB-2015-0035 (Union's April 1, 2015 QRAM).

UNION GAS LIMITED
Union South
General Service Customer Bill Impacts

Line No.		Rate M1 - Residential (Annual Consumption of 2,200 m ³)			Rate M2 - Commercial (Annual Consumption of 73,000 m ³)		
		EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (a)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (b)	Impact (\$) (c) = (b) - (a)	EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (d)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (e)	Impact (\$) (f) = (e) - (d)
	<u>Delivery Charges</u>						
1	Monthly Charge	252.00	252.00	-	840.00	840.00	-
2	Delivery Commodity Charge	82.09	81.14	(0.95)	2,584.54	2,558.04	(26.50)
3	Prospective Recovery - Delivery	-	-	-	-	-	-
4	Storage Services	16.31	16.31	-	469.24	469.24	-
5	Total Delivery Charge	350.40	349.45	(0.95)	3,893.78	3,867.28	(26.50)
	<u>Supply Charges</u>						
6	Transportation to Union	72.11	77.45	5.34	2,392.65	2,569.31	176.66
7	Commodity & Fuel	332.33	264.58	(67.75)	11,027.65	8,779.36	(2,248.29)
8	Prospective Recovery - Commodity & Fuel	86.79 (2)	(18.21) (3)	(105.00)	2,879.56 (2)	(604.22) (3)	(3,483.78)
9	Subtotal	419.12	246.37	(172.75)	13,907.21	8,175.14	(5,732.07)
10	Total Gas Supply Charge	491.23	323.82	(167.41)	16,299.86	10,744.45	(5,555.41)
11	Total Bill	841.63	673.27	(168.36)	20,193.64	14,611.73	(5,581.91)
12	Impacts for Customer Notices - Sales (line 11)			(168.36)			(5,581.91)
13	Impacts for Customer Notices - Direct Purchase (line 5)			(0.95)			(26.50)
14	Commodity Bill Impact			(41%) (4)			(41%) (4)

Notes:

(1) Excludes temporary charges/(credits).

(2) Prospective recovery charge of 3.9446 cents/m³ for 12 months.

(3) Prospective recovery credit of (0.8277) cents/m³ for 12 months.

(4) Commodity bill impact reflects the impact of the gas commodity bill change divided by the current approved gas commodity bill shown at line 9.

UNION GAS LIMITED
Union North
General Service Customer Bill Impacts

Line No.		(Fort Frances) Rate 01 - Residential (Annual Consumption of 2,200 m³)			(Western) Rate 01 - Residential (Annual Consumption of 2,200 m³)		
		EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1)	Impact (\$) (c) = (b) - (a)	EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1)	Impact (\$) (f) = (e) - (d)
		(a)	(b)		(d)	(e)	
1	<u>Delivery Charges</u>						
1	Monthly Charge	252.00	252.00	-	252.00	252.00	-
2	Delivery Commodity Charge	196.86	195.26	(1.60)	196.86	195.26	(1.60)
3	Total Delivery Charge	448.86	447.26	(1.60)	448.86	447.26	(1.60)
4	<u>Supply Charges</u>						
4	Transportation to Union	114.34	129.65	15.31	102.57	111.74	9.17
5	Prospective Recovery - Transportation	30.54 (2)	21.58 (3)	(8.96)	30.54 (2)	21.58 (3)	(8.96)
6	Storage Services	75.10	78.49	3.39	70.40	71.31	0.91
7	Prospective Recovery - Storage	-	-	-	-	-	-
8	Subtotal	219.98	229.72	9.74	203.51	204.63	1.12
9	Commodity & Fuel	324.54	258.19	(66.35)	326.37	259.95	(66.42)
10	Prospective Recovery - Commodity & Fuel	45.58 (4)	(12.05) (5)	(57.63)	45.58 (4)	(12.05) (5)	(57.63)
11	Subtotal	370.12	246.14	(123.98)	371.95	247.90	(124.05)
12	Total Gas Supply Charge	590.10	475.86	(114.24)	575.46	452.53	(122.93)
13	Total Bill	1,038.96	923.12	(115.84)	1,024.32	899.79	(124.53)
14	Impacts for Customer Notices - Sales (line 13)			(115.84)			(124.53)
15	Impacts for Customer Notices - Direct Purchase (line 3 + line 8)			8.14			(0.48)
16	Commodity Bill Impact			(33%) (6)			(33%) (6)

Notes:

(1) Excludes temporary charges/(credits).

(2) Prospective recovery charge of 1.3877 cents/m³ for 12 months.

(3) Prospective recovery charge of 0.9810 cents/m³ for 12 months.

(4) Prospective recovery charge of 2.0724 cents/m³ for 12 months.

(5) Prospective recovery credit of (0.5476) cents/m³ for 12 months.

(6) Commodity bill impact reflects the impact of the gas commodity bill change divided by the current approved gas commodity bill shown at line 11.

UNION GAS LIMITED
Union North
General Service Customer Bill Impacts

(Northern)
Rate 01 - Residential
(Annual Consumption of 2,200 m³)

(Eastern)
Rate 01 - Residential
(Annual Consumption of 2,200 m³)

Line No.		EB-2014-0356	EB-2015-0035	Impact (\$)	EB-2014-0356	EB-2015-0035	Impact (\$)
		Approved 01-Jan-15 Total Bill (\$) (1)	Proposed 01-Apr-15 Total Bill (\$) (1)		Approved 01-Jan-15 Total Bill (\$) (1)	Proposed 01-Apr-15 Total Bill (\$) (1)	
		(a)	(b)	(c) = (b) - (a)	(d)	(e)	(f) = (e) - (d)
	<u>Delivery Charges</u>						
1	Monthly Charge	252.00	252.00	-	252.00	252.00	-
2	Delivery Commodity Charge	196.82	195.22	(1.60)	196.62	195.00	(1.62)
3	Total Delivery Charge	448.82	447.22	(1.60)	448.62	447.00	(1.62)
	<u>Supply Charges</u>						
4	Transportation to Union	133.87	145.57	11.70	158.84	172.44	13.60
5	Prospective Recovery - Transportation	30.53 (2)	21.57 (3)	(8.96)	30.53 (2)	21.59 (3)	(8.94)
6	Storage Services	82.92	84.84	1.92	92.89	95.60	2.71
7	Prospective Recovery - Storage	-	-	-	-	-	-
8	Subtotal	247.32	251.98	4.66	282.26	289.63	7.37
9	Commodity & Fuel	329.84	262.63	(67.21)	332.63	264.79	(67.84)
10	Prospective Recovery - Commodity & Fuel	45.60 (4)	(12.04) (5)	(57.64)	45.60 (4)	(12.04) (5)	(57.64)
11	Subtotal	375.44	250.59	(124.85)	378.23	252.75	(125.48)
12	Total Gas Supply Charge	622.76	502.57	(120.19)	660.49	542.38	(118.11)
13	Total Bill	1,071.58	949.79	(121.79)	1,109.11	989.38	(119.73)
14	Impacts for Customer Notices - Sales (line 13)			(121.79)			(119.73)
15	Impacts for Customer Notices - Direct Purchase (line 3 + line 8)			3.06			5.75
16	Commodity Bill Impact			(33%) (6)			(33%) (6)

Notes:

- (1) Excludes temporary charges/(credits).
(2) Prospective recovery charge of 1.3877 cents/m³ for 12 months.
(3) Prospective recovery charge of 0.9810 cents/m³ for 12 months.
(4) Prospective recovery charge of 2.0724 cents/m³ for 12 months.
(5) Prospective recovery credit of (0.5476) cents/m³ for 12 months.
(6) Commodity bill impact reflects the impact of the gas commodity bill change divided by the current approved gas commodity bill shown at line 11.

UNION GAS LIMITED
Union North
General Service Customer Bill Impacts

Line No.		(Fort Frances) Rate 10 - Commercial / Industrial (Annual Consumption of 93,000 m³)			(Western) Rate 10 - Commercial / Industrial (Annual Consumption of 93,000 m³)		
		EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (a)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (b)	Impact (\$) (c) = (b) - (a)	EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (d)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (e)	Impact (\$) (f) = (e) - (d)
	<u>Delivery Charges</u>						
1	Monthly Charge	840.00	840.00	-	840.00	840.00	-
2	Delivery Commodity Charge	5,534.75	5,479.88	(54.87)	5,534.75	5,479.88	(54.87)
3	Total Delivery Charge	6,374.75	6,319.88	(54.87)	6,374.75	6,319.88	(54.87)
	<u>Supply Charges</u>						
4	Transportation to Union	4,244.34	4,842.32	597.98	3,746.00	4,084.82	338.82
5	Prospective Recovery - Transportation	1,292.59 (2)	908.24 (3)	(384.35)	1,292.59 (2)	908.24 (3)	(384.35)
6	Storage Services	2,070.09	2,182.24	112.15	1,870.97	1,879.53	8.56
7	Prospective Recovery - Storage	-	-	-	-	-	-
8	Subtotal	7,607.02	7,932.80	325.78	6,909.56	6,872.59	(36.97)
9	Commodity & Fuel	13,719.07	10,914.31	(2,804.76)	13,796.18	10,988.32	(2,807.86)
10	Prospective Recovery - Commodity & Fuel	1,927.31 (4)	(509.27) (5)	(2,436.58)	1,927.31 (4)	(509.27) (5)	(2,436.58)
11	Subtotal	15,646.38	10,405.04	(5,241.34)	15,723.49	10,479.05	(5,244.44)
12	Total Gas Supply Charge	23,253.40	18,337.84	(4,915.56)	22,633.05	17,351.64	(5,281.41)
13	Total Bill	29,628.15	24,657.72	(4,970.43)	29,007.80	23,671.52	(5,336.28)
14	Impacts for Customer Notices - Sales (line 13)			(4,970.43)			(5,336.28)
15	Impacts for Customer Notices - Direct Purchase (line 3 + line 8)			270.91			(91.84)
16	Commodity Bill Impact			(33%) (6)			(33%) (6)

Notes:

- (1) Excludes temporary charges/(credits).
(2) Prospective recovery charge of 1.3899 cents/m³ for 12 months.
(3) Prospective recovery charge of 0.9766 cents/m³ for 12 months.
(4) Prospective recovery charge of 2.0724 cents/m³ for 12 months.
(5) Prospective recovery credit of (0.5476) cents/m³ for 12 months.
(6) Commodity bill impact reflects the impact of the gas commodity bill change divided by the current approved gas commodity bill shown at line 11.

UNION GAS LIMITED
Union North
General Service Customer Bill Impacts

Line No.		(Northern) Rate 10 - Commercial / Industrial (Annual Consumption of 93,000 m³)			(Eastern) Rate 10 - Commercial / Industrial (Annual Consumption of 93,000 m³)		
		EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (a)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (b)	Impact (\$) (c) = (b) - (a)	EB-2014-0356 Approved 01-Jan-15 Total Bill (\$) (1) (d)	EB-2015-0035 Proposed 01-Apr-15 Total Bill (\$) (1) (e)	Impact (\$) (f) = (e) - (d)
	<u>Delivery Charges</u>						
1	Monthly Charge	840.00	840.00	-	840.00	840.00	-
2	Delivery Commodity Charge	5,529.74	5,474.88	(54.86)	5,542.59	5,487.72	(54.87)
3	Total Delivery Charge	6,369.74	6,314.88	(54.86)	6,382.59	6,327.72	(54.87)
	<u>Supply Charges</u>						
4	Transportation to Union	5,068.28	5,514.76	446.48	6,125.46	6,650.99	525.53
5	Prospective Recovery - Transportation	1,292.62 (2)	908.23 (3)	(384.39)	1,292.61 (2)	908.23 (3)	(384.38)
6	Storage Services	2,399.31	2,450.92	51.61	2,821.81	2,905.05	83.24
7	Prospective Recovery - Storage	-	-	-	-	-	-
8	Subtotal	8,760.21	8,873.91	113.70	10,239.88	10,464.27	224.39
9	Commodity & Fuel	13,943.59	11,102.72	(2,840.87)	14,060.86	11,193.84	(2,867.02)
10	Prospective Recovery - Commodity & Fuel	1,927.32 (4)	(509.26) (5)	(2,436.58)	1,927.32 (4)	(509.24) (5)	(2,436.56)
11	Subtotal	15,870.91	10,593.46	(5,277.45)	15,988.18	10,684.60	(5,303.58)
12	Total Gas Supply Charge	24,631.12	19,467.37	(5,163.75)	26,228.06	21,148.87	(5,079.19)
13	Total Bill	31,000.86	25,782.25	(5,218.61)	32,610.65	27,476.59	(5,134.06)
14	Impacts for Customer Notices - Sales (line 13)			(5,218.61)			(5,134.06)
15	Impacts for Customer Notices - Direct Purchase (line 3 + line 8)			58.84			169.52
16	Commodity Bill Impact			(33%) (6)			(33%) (6)

Notes:

- (1) Excludes temporary charges/(credits).
(2) Prospective recovery charge of 1.3899 cents/m³ for 12 months.
(3) Prospective recovery charge of 0.9766 cents/m³ for 12 months.
(4) Prospective recovery charge of 2.0724 cents/m³ for 12 months.
(5) Prospective recovery credit of (0.5476) cents/m³ for 12 months.
(6) Commodity bill impact reflects the impact of the gas commodity bill change divided by the current approved gas commodity bill shown at line 11.

[illegible]

[illegible]

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 4, Schedule 3

Preamble: We want to understand how the increase in compression will affect fuel use for M12 Dawn-Parkway transportation service.

Please provide the actual annual average M12 Dawn-Parkway fuel percentage for 2014, forecast for 2015 using 6 months actual and 6 months forecast and the projected annual average M12 Dawn-Parkway fuel percentages for 2016, 2017, and 2018.

Response:

Please see Attachment 1.

Union Gas Limited
Average Annual Dawn to Parkway Fuel Ratios

<u>Line No.</u>	<u>Particulars</u>	<u>Average Dawn to Parkway Fuel Ratio</u>
1	2010 Actual	0.581%
2	2011 Actual	0.536%
3	2012 Actual	0.617%
4	2013 Actual	0.562%
5	2014 Actual	0.312%
6	2015 Actual/Forecast (2)	0.472%
7	2016 Forecast	0.554%
8	2017 Forecast	0.670%
9	2018 Forecast	0.771%

Note: (1) Ratios exclude unaccounted for gas.
(2) Calculated using actual fuel and activity for January through June 2015 and forecast fuel and activity from July through December 2015.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1

Preamble: On August 26, 2015, the National Energy Board announced that with Union Gas and Enbridge Gas Distribution were withdrawing their complaint regarding contracting as a result of a Settlement Term sheet reached with TCPL. The term sheet included commitments by TCPL for the provision of capacity to the Eastern Ontario Triangle if Energy East transfers the pipeline assets.

Please provide ICF's evaluation of the implications of the capacity commitments on the Dawn Parkway system as it pertains to the study provided in Tab 5.

Response:

The following response was prepared by ICF.

The ICF Study was completed prior to the announcement of the agreement between Union, Gaz Metro, Enbridge, and TransCanada with respect to Energy East. ICF has not completed a detailed evaluation of the implications of the Energy East Settlement on capacity commitments on the Dawn Parkway System as it pertains to the study provided in Tab 5. Until TCPL updates its evidence and identifies the revised components of the Energy East and the Eastern Mainline Projects, it would be speculative to conduct a detailed analysis of the impacts of the settlement term sheet.

Directionally, there are unlikely to be any implications on the 2017 Dawn Parkway Project because 2017 capacity is included in the Energy East Settlement.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, p. 12

Preamble: Union's contracts originating at Kirkwall (i.e. Kirkwall to Dawn, Kirkwall to Parkway and M12-X transportation services) for firm transportation services total 1.3 PJ/d effective November 1, 2017.

- a) Please break out the 1.3 PJ/d by service (i.e. Kirkwall to Dawn, Kirkwall to Parkway, and M12-X).
- b) Please provide a description of each Kirkwall to Dawn contract that will be in effect on November 1, 2017, including rate schedule, customer, contract quantity, contract start date, and contract end date.
- c) Have the shippers that have contracted for firm Kirkwall to Dawn transportation service also contracted for firm transportation service to Kirkwall on TCPL?
- d) How much of the 1.3 PJ/d under contracts originating at Kirkwall is assumed to be delivered at Kirkwall on a design day for system planning purposes? How much leaves Kirkwall toward Parkway on the design day?

Response:

- a) A break out of the Kirkwall to Dawn, Kirkwall to Parkway and M12X contracts can be found below.

Path	Quantity (TJ/d)
Kirkwall to Dawn	488
Kirkwall to Parkway	421
M12X	396
Total	1,305

- b) A list of Kirkwall to Dawn contracts as of November 1, 2017 can be found at Attachment 1.
- c) An excerpt of the Contract Demand Energy (CDE) report issued by TransCanada is provided below. This report shows the shippers who currently have flowing contracts for firm service from Niagara to Kirkwall. In TransCanada's future CDE report, TransCanada is currently not showing any future contracts for firm service from Niagara to Kirkwall or Chippawa to

Kirkwall at this time, however, Union believes that all shippers who have contracted with Union from Kirkwall to Dawn have contracted on TransCanada from Niagara or Chippawa to Kirkwall. TransCanada will post the capacity on its CDE Report once the contract term starts or on the future CDE Report once the contract is in effect. A link to the full report on TransCanada's website has also been provided.

Contract Number	Service Requester	Contract Start Date	Contract End Date	Service Type	Primary Receipt	Primary Delivery	Contract Demand (GJ/d)	Operational Demand (GJ/d)	Shifted Qty (GJ/d)	Temp Assigned Qty (GJ/d)
45507	DTE Energy Trading, Inc.	2012-Nov-01	2023-Mar-31	FT	Niagara Falls	Kirkwall	25,585	25,585	0	0
45508	Emera Energy Incorporated	2012-Nov-01	2023-Oct-31	FT	Niagara Falls	Kirkwall	26,376	26,376	0	0
45509	Union Gas Limited	2012-Nov-09	2022-Oct-31	FT	Niagara Falls	Kirkwall	21,101	21,101	0	0

<http://www.transcanada.com/customerexpress/888.html>

- d) For Winter 17/18 design day 442,256 GJ/d is assumed to be delivered at Kirkwall. This consists of 21,101 GJ/d of Union's system supply arriving at Kirkwall which is consumed into the Hamilton Gate 3 and Kirkwall Dominion area. It also includes 421,155 GJ/d of supply arriving to support the M12 customers on the Kirkwall to Parkway path. If the M12 Kirkwall to Parkway supply does not arrive, Union is not obligated to deliver volumes at Parkway.

Union cannot count on any other gas supply contracted at Kirkwall arriving on design day and does not include the supply for design day system planning modelling.

The M12X contracts of 396,011 GJ/d are assumed to flow from Dawn to Parkway on design day. There is no contractual obligation for these contracts to arrive at Kirkwall on design day.

The westerly Kirkwall to Dawn contracts are not obligated to arrive on design day and Union does not include these to support firm demand on design day.

Kirkwall to Dawn Contracts as of November 1, 2017

Customer	Contract	Start Date	End Date	Quantity (GJ/day)
Emera Energy Incorporated	C10107	01-Nov-15	31-Oct-20	73,745
Emera Energy Incorporated	C10108	01-Apr-15	31-Mar-20	26,335
Seneca Resources Corporation	C10109	01-Nov-16	31-Mar-23	388,261
Total				488,341

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 21

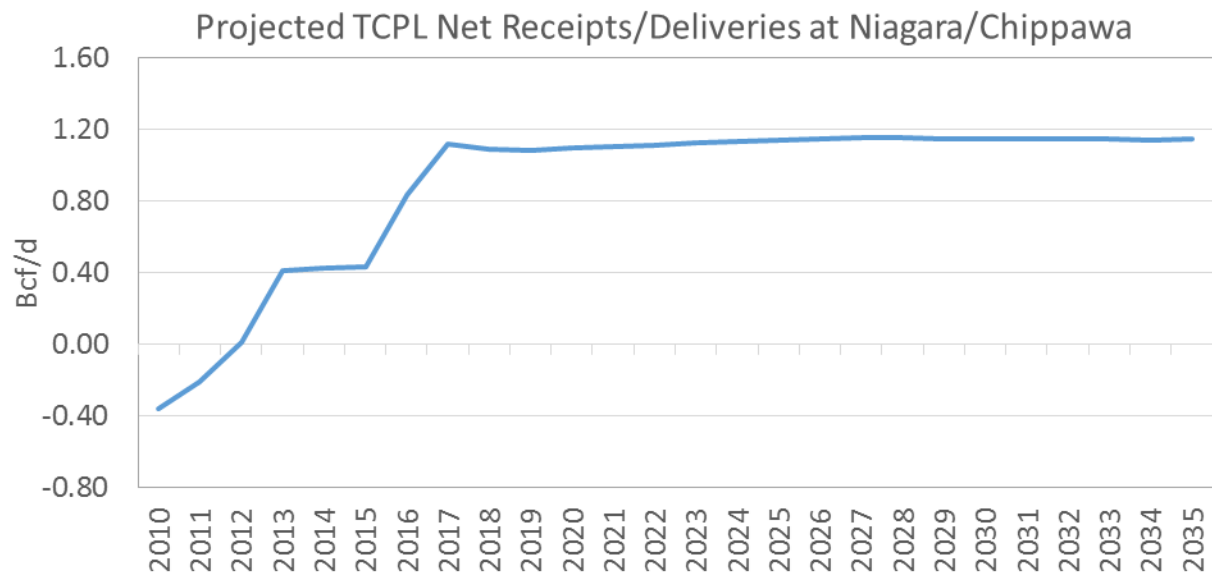
Preamble: Exhibit 2-5 shows a 1,121 MMcf per day increase in January gas flows from New York to Ontario from 2014 to 2035.

- a) What were the actual average daily net deliveries into TCPL at Niagara/Chippewa for January 2014?
 - b) Please provide the projected January net deliveries into TCPL at Niagara/Chippewa for each year of the forecast period (through 2035). How much of this gas is expected to flow to Kirkwall?
-

Response:

The following response was prepared by ICF.

- a) The average daily net delivery into TransCanada at Niagara/Chippewa for January 2014 was 394 MMcf/d (source Ventyx).
- b) The projected January net deliveries into TransCanada at Niagara/Chippewa for each year of the forecast period (through 2035) are shown in the chart below. ICF does not specifically model Kirkwall as a separate node in its model.



UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 26

Preamble: The increase in gas supply from the Marcellus and Utica region will be facilitated by additional pipeline capacity from Eastern Ohio to Michigan and Ontario, or through Niagara, as existing pipeline capacity from this region into Ontario is fully utilized.

Did ICF confirm this assertion with TCPL? If not, please provide TCPL's response to ICF's inquiry on existing capacity.

Response:

The following response was prepared by ICF.

ICF's observations are based on physical capacity, current contracts and flow information. ICF did not confirm this with TransCanada or any of the U.S. Pipelines connected to Niagara.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 39

Preamble: While producers are under pressure to bring gas to market during the summer months, it is uncertain whether a reversal during the summer months would be economic to bring gas into Ontario, given the capital costs.

- a) Please describe the capital costs referred to in the preamble.
- b) Please quantify these costs and reference the sources of data in the quantification.
- c) What impact will these costs have on rates?
- d) What is ICF's landed cost forecast for gas at Iroquois in 2020 assuming there is the availability of flow from Waddington to Iroquois?

Response:

The following response was prepared by ICF.

- a) The capital costs referred to in the preamble include the capital costs required to make the Iroquois Pipeline fully reversible and capable of delivering gas into the TransCanada Mainline.
- b) The capital costs for the Iroquois reversal projects are reflected in the proposed rates in Iroquois' open season document. Please see the response to c) below.
- c) From Iroquois' open season document, the proposed rates for the Iroquois reversal project to Waddington are as follows:

Receipt Points	Rate (US\$/Dt/Day)
DTI/Canajoharie, NY	0.22
CPL/Wright, NY	0.22
AGT/Brookfield, CT	0.45

- d) The Iroquois Pipeline SONO project is not included in the ICF Base Case. ICF's April 2015 Base Case forecast of the 2020 gas price at Waddington is \$5.18/MMBtu (2014\$US).

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 40

Preamble: We want to understand what ICF has assumed for pipeline capacity additions from the Marcellus/Utica areas to Niagara and Chippewa.

Which of the projects listed in Table 4.7 that will deliver to Niagara or Chippewa are included in the modeling analysis that is described in this report? Please provide the capacities and in-service dates any additional capacity expansions into Niagara/Chippewa that are included in the modeling during the forecast period (through 2035).

Response:

The following response was prepared by ICF.

All capacity listed in Table 4-7 is into Niagara and Chippewa are included except for the Iroquois South to North project.

ICF assumes 490 MMcf/d of additional capacity from the Marcellus/Utica region to Niagara and Chippewa region.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 47, Exhibit 5-1

Preamble: The Referenced exhibit depicts Dominion South lower than AECO until about 2025, rising above AECO for a brief period, then reversing to go below AECO a few years after.

What factors does ICF foresee that contribute to the relative rise and then reversal of Dominion South relative to AECO?

Response:

The following response was prepared by ICF.

The price relationship between AECO and Dominion South Point will be determined by a variety of supply and demand factors, and is expected to change over time based on pipeline capacity additions and development of new sources of demand. The AECO price will strengthen relative to Dominion South Point due to demand growth from LNG exports and oil sands. After significant pipeline builds from the Marcellus/Utica region to all markets, Dominion South Point basis will be temporarily strengthened. However, continued production growth will outpace the capacity expansion and Dominion South Point will be relatively depressed compared to AECO again in 2030.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 39

Please explain why ICF concludes that high capital costs will prevent Iroquois and TCPL from making the interconnection facilities at Iroquois bidirectional.

Response:

The following response was prepared by ICF.

ICF projects that flow on the Iroquois Pipeline system will remain north to south during peak winter periods due to growth in U.S. Mid-Atlantic and New England markets served by the Iroquois Pipeline. As a result, if the Iroquois Pipeline system is converted to allow bi-directional flows, flows on the Iroquois Pipeline system from south to north are expected to occur only during off-peak periods such as the summer and other non-peak months. The value of the capacity during the summer months is not expected to be sufficient to cover the capital costs required for the reversal.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 40

Preamble: We want to understand what ICF has assumed for pipeline capacity additions from the Marcellus/Utica areas to Iroquois Gas Transmission System (IGTS) at Wright, NY and other Zone 1 points.

- a) Which of the projects listed in Table 4.7 that delivery into IGTS are included in the modeling analysis that is described in this report? If the Northeast Energy Direct project is included, what capacity is assumed for the Supply Path segment of the project?
 - b) Please provide the capacities and in-service dates for any other capacity expansions into IGTS that are assumed to go into service during the forecast period (e.g. Constitution Expansion, additional Dominion Transmission expansion to Canajoharie, NY).
 - c) Please provide the capacity ICF has assumed from Waddington to Iroquois. If the number is zero, please provide the impact on their analysis if the capacity were actually 0.3PJ/d.
-

Response:

The following response was prepared by ICF.

- a) ICF projects an additional 1 Bcf/d capacity into New England in 2017 from either the Northeast Direct or Access Northeast projects, but does not project which of the two pipelines will be developed. An additional 560 MMcf/d capacity expansion is assumed in 2030 to New England. The capacity is assumed to reach back into the Marcellus supply region.
- b) Please refer to Table 4-7.
- c) ICF has assumed that the pipeline capacity from Waddington to Iroquois (U.S. to Canada) remains at zero. ICF has not conducted an analysis of the impact of increasing the capacity from Waddington to Iroquois from zero to 0.3PJ/d. However, ICF's forecast shows positive flows from Iroquois to Waddington (Canada to U.S.) during the peak winter months. As a result, increasing capacity from Waddington to Iroquois would have no impact on markets during the peak winter months, hence limited to no impacts on Union system capacity requirements.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 5, Schedule 1, p. 41

Preamble: We want to understand what ICF has assumed for pipeline capacity additions from the Marcellus/Utica areas to Michigan and Dawn.

- a) Which of the projects listed in Table 4-8 are included in the modeling analysis that is described in this report? For each included project, please specify the assumed increase in delivery capacity into Michigan and the assumed increase in delivery capacity into Dawn.
 - b) Please provide the capacities and in-service dates for any other capacity expansions to Michigan and Dawn that are assumed to go into service during the forecast period. For each expansion, please specify the assumed increase in delivery capacity into Michigan and the assumed increase in delivery capacity into Dawn.
-

Response:

The following response was prepared by ICF.

- a) ICF included a 1.05 Bcf/d generic capacity expansion from the Marcellus/Utica region to Michigan, representing any portion of either, Rover, NEXUS or the ANR East projects (stand alone or in combination). That capacity comes on-line in June 2017. ICF does not assume any incremental capacity between Michigan and Dawn.
- b) Please see the response to a) above.

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 6, pp. 16-19

Preamble: Union notes that there is a risk of Dawn-Parkway capacity turnback.

Please provide a table showing all Dawn-Parkway M12 contracts that currently have end dates before 11/1/2017. For each contract, please show the current contract quantity and the contract quantity that Union has assumed will be extended past 11/1/2017.

Response:

Please see Attachment 1.

Dawn to Parkway M12 Contracts with End Dates Before November 1, 2017

Customer	Start Date	Expiry Date	Contracted Quantity (GJ/d)	Forecasted Renewal (GJ/d)
York Energy Centre LP	1-Apr-12	30-Sep-15	11,654	-
BP Canada Energy Company	1-Nov-06	31-Oct-15	20,000	-
GreenField Specialty Alcohols	1-Nov-08	31-Oct-15	1,917	-
TransAlta Cogeneration, LP	1-Nov-06	30-Nov-16	7,636	-
Gaz Metro Limited Partnership	1-Nov-06	31-Oct-17	21,021	21,021
TransCanada Pipelines Limited	1-Nov-06	31-Oct-17	83,915	83,915
The Corporation of the City of Kitchener	1-Nov-06	31-Oct-17	2,600	2,600
Gaz Metro Limited Partnership	1-Nov-06	31-Oct-17	35,000	35,000
Enbridge Gas Distribution	1-Nov-08	31-Oct-17	10,692	10,692
St. Lawrence Gas Company	1-Nov-08	31-Oct-17	10,785	10,785
KPUC (Utilities Kingston)	1-Nov-08	31-Oct-17	2,113	2,113
KeySpan Gas East Corporation	1-Nov-11	31-Oct-17	43,837	43,837
The Narragansett Electric Company d/b/a National Grid	1-Nov-11	31-Oct-17	1,081	1,081
Brooklyn Union Gas Company d/b/a National Grid NY	1-Nov-11	31-Oct-17	44,019	44,019
Connecticut Natural Gas Corporation	1-Nov-11	31-Oct-17	6,410	6,410
Central Hudson Gas & Electric Corporation (a subsidiary of CH Energy Group, Inc.)	1-Nov-11	31-Oct-17	5,467	5,467
Niagara Mohawk Power Corporation d/b/a National Grid	1-Nov-11	31-Oct-17	55,123	55,123
Enbridge Gas Distribution	1-Nov-11	31-Oct-17	18,703	18,703
Brooklyn Union Gas Company d/b/a National Grid NY	1-Nov-10	31-Oct-17	12,953	12,953
KeySpan Gas East Corporation	1-Nov-10	31-Oct-17	17,162	17,162
Central Hudson Gas & Electric Corporation (a subsidiary of CH Energy Group, Inc.)	1-Nov-10	31-Oct-17	10,792	10,792
Boston Gas Company d/b/a National Grid	1-Nov-10	31-Oct-17	9,282	9,282
Colonial Gas Company d/b/a National Grid	1-Nov-10	31-Oct-17	6,475	6,475
Essex Gas Company (Boston Gas Company d/b/a National Grid)	1-Nov-10	31-Oct-17	2,158	2,158
Liberty Utilities (EnergyNorth Natural Gas, Inc. d/b/a National Grid NH)	1-Nov-10	31-Oct-17	4,317	4,317
Connecticut Natural Gas Corporation	1-Nov-10	31-Oct-17	18,077	18,077
The Southern Connecticut Gas Company	1-Nov-10	31-Oct-17	34,950	34,950
Yankee Gas Services Company	1-Nov-10	31-Oct-17	43,116	43,116
Bay State Gas Company	1-Nov-10	31-Oct-17	27,803	27,803
Northern Utilities, Inc.	1-Nov-10	31-Oct-17	6,333	6,333
Suncor Energy Products Partnership Produits Suncor Energie	1-Nov-11	31-Oct-17	9,585	9,585
Total			584,976	543,769

UNION GAS LIMITED

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

Reference: Exhibit A, Tab 8, Schedule 2

Preamble: We are interested in the impact of Kirkwall deliveries on the D-P system.

- a) Please confirm that the results in Schedule 2 include all facilities for which approval is requested in this application.
 - b) Please re-run the model using 100,000 GJ/d being delivered to Kirkwall on the peak day providing the results in Figure 2 with the addition of table providing:
 - i) Pressure at each lateral
 - ii) The flow between each lateral
 - c) Would the additional surplus at Parkway impact the facilities expected to be required in 2018?
 - d) What would the value of the surplus capacity be using C1 rates if all surplus was sold for the winter period?
 - e) Please re-run the model providing the results requested in b) after removing each non-Dawn compressor individually.
-

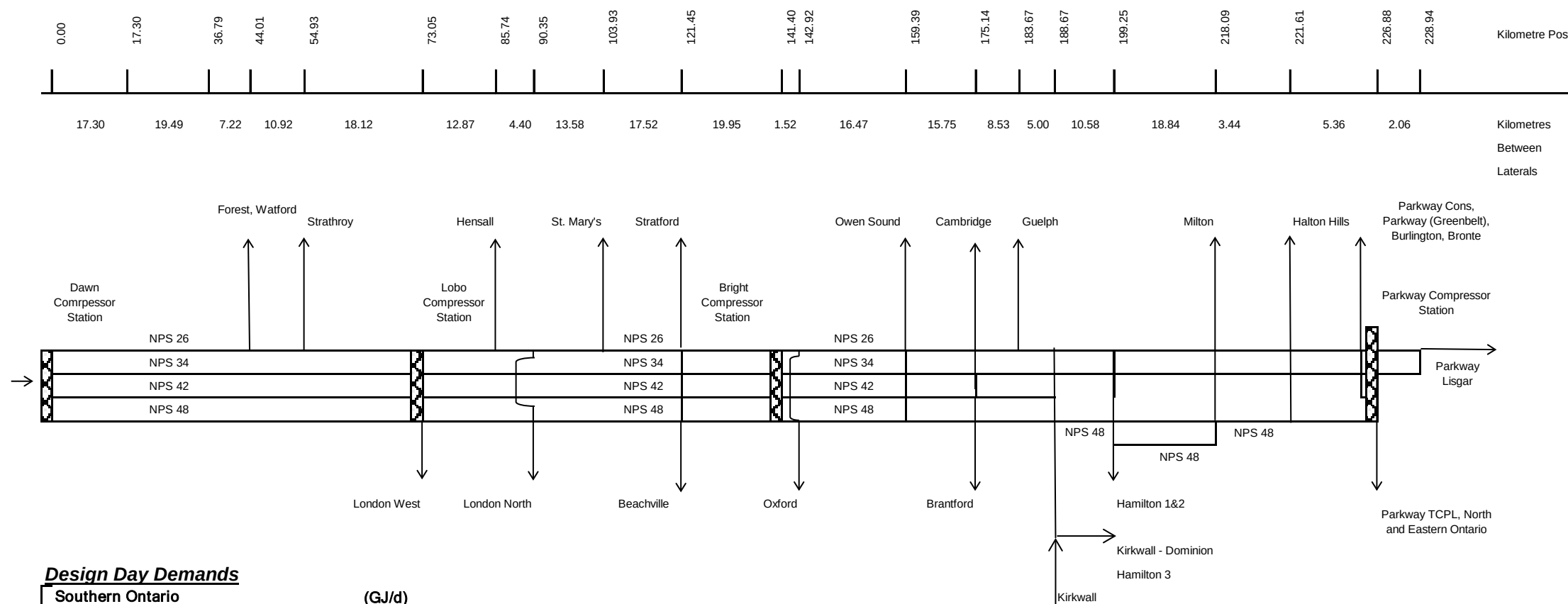
Response:

- a) Please see Attachment 2 showing results of the scenario in b) with the removal of Bright C proposed facilities. The resulting shortfall is 235,352 GJ/d. Please see Attachment 3 showing the results of the scenario in b) with the removal of Bright C and Lobo D proposed facilities. The resulting shortfall is 337,311 GJ/d. Shortfalls of these sizes are not manageable through.
- b) Union completed the scenario assuming 100,000 GJ/d of supply shifted from Dawn to Kirkwall on peak day. Please see Attachment 1 which shows the same format at Exhibit A, Tab 8, Schedule 2 and includes the resulting shortfall/surplus as well as flows and pressures provided at each of the Lobo, Bright and Parkway compressor stations along the Dawn Parkway System.
- c) There is no impact on the facilities proposed in this application to meet demands for November 1, 2017. Union has not completed its open season for service commencing 2018 at

this time.

- d) Based on the model re-run assuming 100,000 GJ/d being shifted at Kirkwall, the surplus would grow from 30,393 GJ/d to 77,034 GJ/d, such that an incremental surplus of 46,641 GJ/d in winter 2017/2018 would exist. Based on Union's M12 Dawn Parkway rate of \$0.121 GJ/d (as of November 1, 2018) the sale of the total surplus capacity of 77,034 GJ/d would be worth approximately \$1.4 million for the winter period (151 days x \$0.121/GJ/d x 77,034 GJ). The incremental surplus capacity of 46,641 GJ/d for the same period and at the same rate would be worth \$0.85 million.
- e) Please see Attachment 2 showing results of the scenario in b) with the removal of Bright C proposed facilities. The resulting shortfall is 235,352 GJ/d. Please see Attachment 3 showing the results of the scenario in b) with the removal of Bright C and Lobo D proposed facilities. The resulting shortfall is 337,311 GJ/d. Shortfalls of these sizes are not manageable through third party services.

Union Gas Dawn to Parkway System



Design Day Demands

Southern Ontario		(GJ/d)
Forest, Watford		11663
Strathroy		8945
London West		102533
Hensall		52695
London North		95779
St. Mary's		7774
Stratford		49051
Beachville		54899
Oxford		49342
Owen Sound		249767
Cambridge		75899
Brantford		104666
Kirkwall - Dominion		94738
Guelph		91335
Hamilton 3		70254
Hamilton 1&2		266213
Milton		74184
Halton Hills		144373
Parkway (Greenbelt)		43203
Burlington, Bronte		146143
Total Southern Ontario		1,793,456
North and Eastern Ontario		415,247
Kirkwall		177,207
Parkway TCPL		4,250,032
Parkway Cons/Lisgar		1,238,085
Total M12		5,665,324
Total Design Day Demands		7,874,027

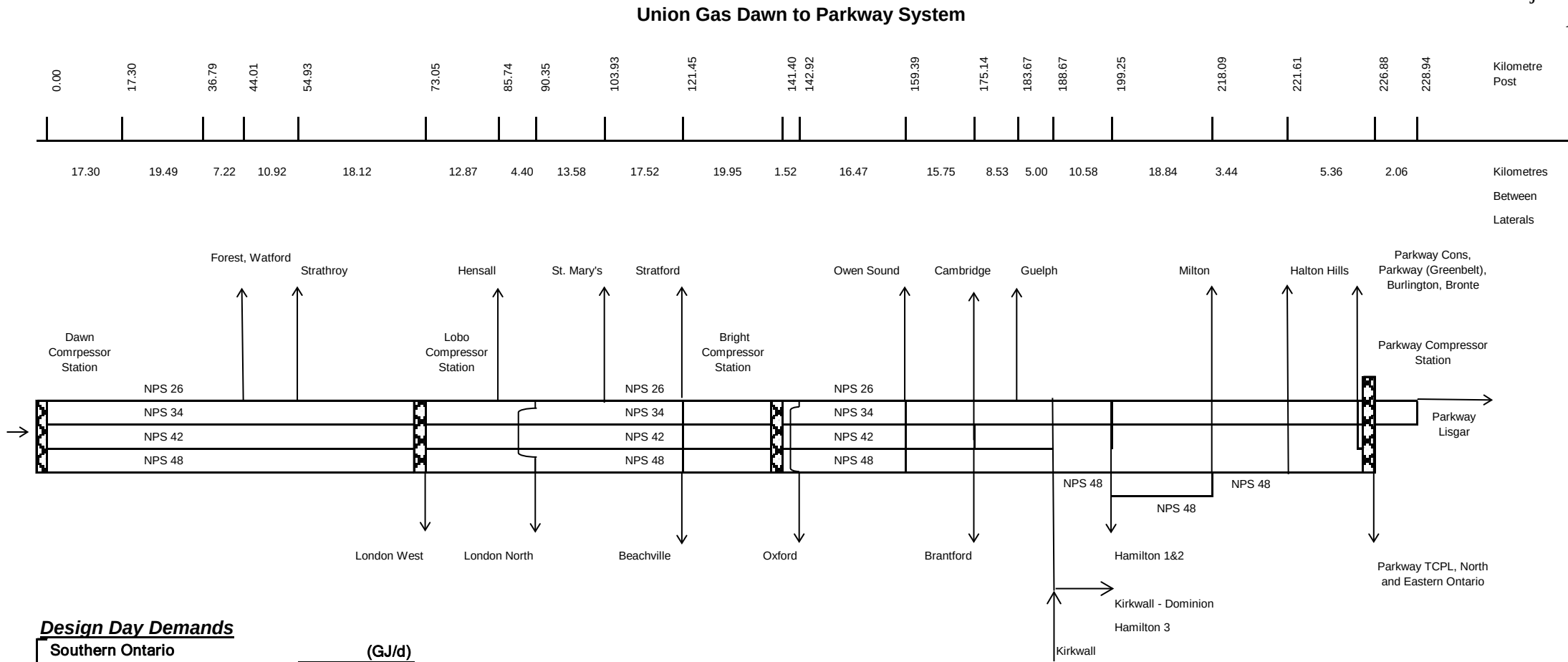
System Capacity

	(GJ/d)
Total System Capacity	7,951,061
including	
Parkway Delivery Obligation	359,969
Supplies for Kirkwall to Parkway Contracts and Union	542,256
Total Requirements	7,874,027
Total (Shortfall) Surplus	77,034
Union Markets	
M12 Transportation	
Kirkwall	
Lisgar, Parkway	77,034

Compressor Stations Operating Conditions at Peak Hour

STATION	LOBO	BRIGHT	PARKWAY
Power Available (MW)	102.3	126.6	87.7
Power Required (MW)	102.3	126.6	87.7
Pressure			
Suction (kPa)	3,780	3,602	3,729
Discharge (kPa)	5,591	6,091	6,453
Compression Ratio	1.48	1.69	1.73
Flow (GJ/d)	7,115,673	7,002,364	4,383,231
Daily Fuel (GJ/d)	30,913	28,310	19,090

WINTER DESIGN DAY
DAWN - PARKWAY SYSTEM
WINTER 2017/2018
Shift 100 TJ/d of Dawn Supply to Kirkwall



Design Day Demands

Southern Ontario		(GJ/d)
U	Forest, Watford	11663
N	Strathroy	8945
I	London West	102533
O	Hensall	52695
N	London North	95779
M	St. Mary's	7774
A	Stratford	49051
R	Beachville	54899
K	Oxford	49342
E	Owen Sound	249767
T	Cambridge	75899
S	Brantford	104666
	Kirkwall - Dominion	94738
	Guelph	91335
	Hamilton 3	70254
	Hamilton 1&2	266213
	Milton	74184
	Halton Hills	144373
	Parkway (Greenbelt)	43203
	Burlington, Bronte	146143
	Total Southern Ontario	1,793,456
	North and Eastern Ontario	415,247
	Kirkwall	177,207
	Parkway TCPL	4,250,032
M	Parkway Cons/Lisgar	1,238,085
1	Total M12	5,665,324
2	Total Design Day Demands	7,874,027

System Capacity

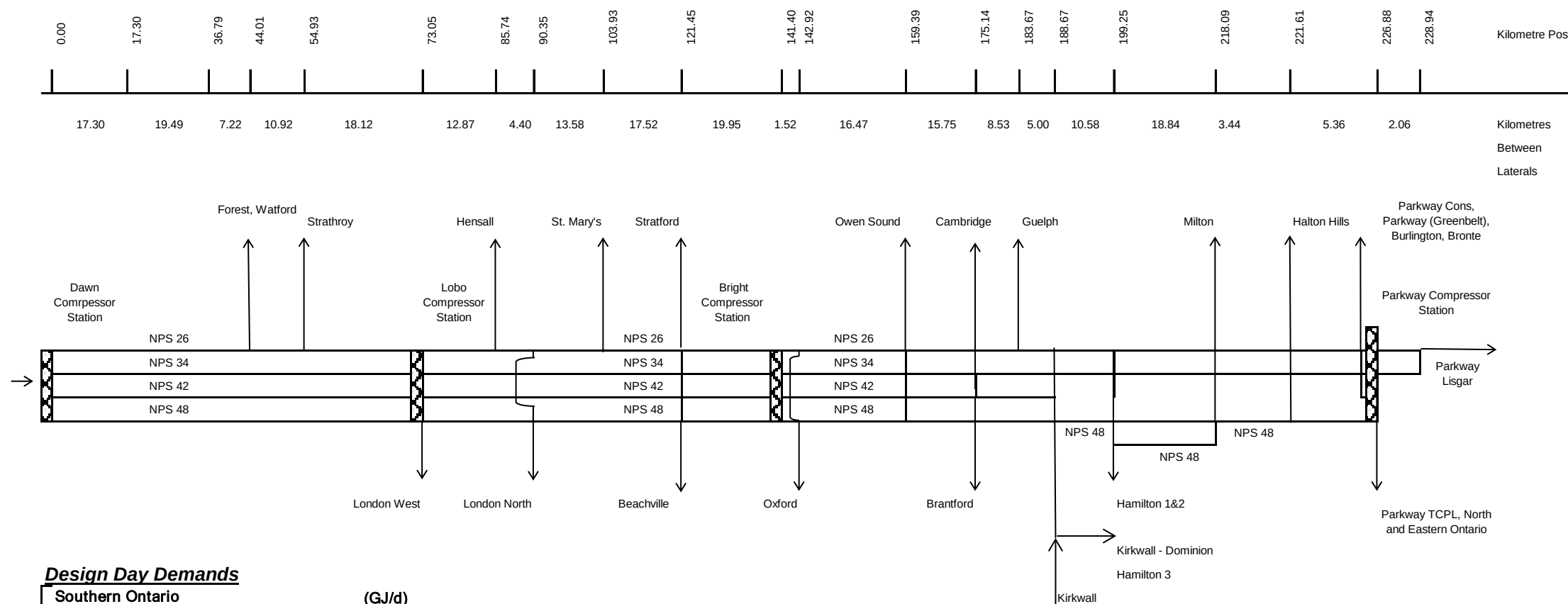
	(GJ/d)
Total System Capacity	7,638,675
including	
Parkway Delivery Obligation	359,969
Supplies for Kirkwall to Parkway Contracts and Union	542,256
Total Requirements	7,874,027
Total (Shortfall) Surplus	-235,352
Union Markets	
M12 Transportation	
Kirkwall	
Lisgar, Parkway	-235,352

Compressor Stations
Operating Conditions at Peak Hour

STATION	LOBO	BRIGHT	PARKWAY
Power Available (MW)	137.9	62.0	87.7
Power Required (MW)	137.9	62.0	87.7
Pressure			
Suction (kPa)	3,902	4,613	3,558
Discharge (kPa)	6,164	5,769	6,453
Compression Ratio	1.58	1.25	1.81
Flow (GJ/d)	6,825,373	6,432,649	4,070,828
Daily Fuel (GJ/d)	29,178	16,487	18,114

WINTER DESIGN DAY
DAWN - PARKWAY SYSTEM
WINTER 2017/2018
Shift 100 TJ/d of Dawn Supply to Kirkwall
NO Bright C

Union Gas Dawn to Parkway System



Design Day Demands

Southern Ontario		(GJ/d)
Forest, Watford		11663
Strathroy		8945
London West		102533
Hensall		52695
London North		95779
St. Mary's		7774
Stratford		49051
Beachville		54899
Oxford		49342
Owen Sound		249767
Cambridge		75899
Brantford		104666
Kirkwall - Dominion		94738
Guelph		91335
Hamilton 3		70254
Hamilton 1&2		266213
Milton		74184
Halton Hills		144373
Parkway (Greenbelt)		43203
Burlington, Bronte		146143
Total Southern Ontario		1,793,456
North and Eastern Ontario		415,247
Kirkwall		177,207
Parkway TCPL		4,250,032
Parkway Cons/Lisgar		1,238,085
Total M12		5,665,324
Total Design Day Demands		7,874,027

System Capacity

	(GJ/d)
Total System Capacity	7,536,716
including	
Parkway Delivery Obligation	359,969
Supplies for Kirkwall to Parkway Contracts and Union	542,256
Total Requirements	7,874,027
Total (Shortfall) Surplus	-337,311
Union Markets	
M12 Transportation	
Kirkwall	
Lisgar, Parkway	-337,311

Compressor Stations Operating Conditions at Peak Hour

STATION	LOBO	BRIGHT	PARKWAY
Power Available (MW)	66.8	93.5	87.7
Power Required (MW)	66.8	93.5	87.7
Pressure			
Suction (kPa)	4,204	3,743	3,522
Discharge (kPa)	5,469	5,653	6,453
Compression Ratio	1.30	1.51	1.83
Flow (GJ/d)	6,598,978	6,317,524	3,967,956
Daily Fuel (GJ/d)	21,693	22,019	17,572

WINTER DESIGN DAY
DAWN - PARKWAY SYSTEM
WINTER 2017/2018
Shift 100 TJ/d of Dawn Supply to Kirkwall
NO Bright C No Lobo D

UNION GAS LIMITED

Answer to Interrogatory from
Gaz Métro Limited Partnership (“Gaz Métro”)

- Reference:
- (i) Union Gas’s Evidence
Exhibit A, Tab 6, p. 13 of 23, Lines 11-14, 21-22
Exhibit A, Tab 6, p. 14 of 23, Lines 1-3.
 - (ii) Ontario Energy Board Decisions EB-2012-0451, EB-2012-0433 and
EB-2013-0074, January 30, 2014, p. 36.
 - (iii) National Energy Board, GHW-001-2014, Reasons for Decision, Table
9-1, p. 34. The Decision was rendered on June 2, 2015.
 - (iv) R-3879-2014, Rate Case 2016, R-3879-2014, Régie’s Information Request
#9 to Gaz Métro – 115, Document 1, pp. 35 and 36 of 77.

Preamble:

- i. Union expects TransCanada to apply to the National Energy Board for approval of the Vaughan Mainline Expansion in late 2015 with a regulatory decision expected later in 2016. At this time, Union is not aware of any delays that would prevent TransCanada from meeting the in-service date of November 1, 2017. [...] Union’s construction activities for its proposed 2017 Dawn Parkway System facilities cannot be linked to downstream project approvals without significantly impacting the in-service date of Union’s proposed facilities. Linking the start of construction to TransCanada’s project approvals would add significant uncertainty to Union’s project development process and would result in a minimum one year delay to the construction of Union’s proposed facilities. [Emphasis added]
- ii. *“However, the Board finds that the Brantford-Kirkwall pipeline and the proposed TransCanada King’s North project are interdependent (as Union has acknowledged). Accordingly, the Board will condition approval of the construction of the Brantford-Kirkwall pipeline on the NEB’s approval of the TransCanada King’s North project. In addition, the Board will condition approval on the receipt by Union of a written commitment from TransCanada (after it receives NEB approval) to proceed with the construction of King’s North in accordance with the proposed schedule.”*
- iii. *“Construction Phase – Timeframe: after receipt of Board approval and clearance of any pre-construction conditions, construction of the Project is expected to take 9 to 12 months, depending on seasonal and environmental conditions.”*

iv. [OFFICIAL VERSION IN FRENCH, TRANSLATION FROM GAZ MÉTRO]

“18.1 Please indicate if Gaz Métro intends to resume the negotiations with Union Gas in the event that TCPL would not be able to make capacity available between Parkway and GMT-EDA in the next following years in order to mitigate stranded costs.”

- a) Is Union Gas aware of the significant stranded costs for Gaz Métro and its customers generated by any delay between the in-service dates of both projects?
- b) Which measure Union Gas intends to implement to mitigate the risk for its transportation customers when the in-service date of an interdependent project on the TCPL Mainline, as mentioned in reference ii, is delayed? Please elaborate.
- c) Would Union Gas be supportive of a mechanism approved by the OEB that would allow to delay the effective date of a transportation contract until downstream capacity is available? Please explain.
- d) Please describe the type of mechanism that would allow Union Gas to defer costs recovery from its transportation customers thus not causing any harm to the distributor from any eventual TCPL Mainline delay, while effectively protecting the distributor's investment.
- e) When would Union intend to implement such a mechanism?

Response:

- a) Union is aware that Gaz Métro and its customers may be exposed to costs as a result of delay or mismatch in in-service dates between the two projects. As indicated in Exhibit B.APPrO.1 d), both Union and TCPL are attempting to mitigate any mismatch by filing well in advance of the expected project in-service dates.

b) c) d) e)

Union has not proposed any mitigation measures for transportation customers when in-service dates between transmission projects are delayed or mismatched in this proceeding. In Union's experience, mismatches between in-service dates have been limited.

To the extent Union meets its contractual commitments by constructing facilities on time, it is Union's view that it should be allowed to collect the related revenues, as per the contract.

Notwithstanding the above, the implementation of an equity AFUDC (Allowance for Funds Used During Construction) mechanism may provide a way to partially balance the risks between the utility and the transportation customer in the event that in-service dates are mismatched. Such a mechanism would require OEB approval before being implemented. Union has not yet determined when it would file such a proposal.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 3

What is the relationship, if any, between the need for additional capacity on the Dawn to Parkway system related to:

- a) The Burlington to Oakville project (EB-2014-0182),
 - b) Approval of the NEXUS gas transportation contract (EB-2015-0166), and/or
 - c) Union's community expansion projects (EB-2015-0179).
-

Response:

- a) 60 TJ/d of Dawn to Parkway transportation capacity is included in the incremental demands that support the 2016 Dawn Parkway Project (EB-2014-0261), Exhibit A, Tab 7, p. 16. None of the incremental demands for the proposed 2017 Dawn Parkway Project are related to the Burlington Oakville Project (EB-2014-0182). Please see the response at Exhibit B.BOMA.7.
- b) The pre-approval of Union's NEXUS gas transportation contract is independent of Union's proposed 2017 Dawn Parkway Project. The NEXUS transportation contract is an option being proposed to deliver gas to Dawn. The 2017 Dawn Parkway Project is intended to provide an opportunity for customers to access the Dawn Hub and other eastern receipt points (such as Niagara and Chippawa). Once at Dawn, customers have multiple options to source gas including purchasing gas at Dawn. Therefore, no capacity created by the proposed 2017 Dawn Parkway Project is dependent upon pre-approval of Union's NEXUS transportation contract. Also, please see the responses at Exhibit B.Staff.4 and Exhibit B.APPrO.3.
- c) No capacity created by the proposed 2017 Dawn Parkway Project is related to Union's community expansion projects (EB-2015-0179).

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 3, p. 2

Given the decline in oil prices over the past year and the expectation of low prices for an extended period of time, what impact has this had on the demand for natural gas from western Canada and the relative price declines for Marcellus and Utica supplies relative to other North American supply centres?

Response:

The following response was prepared by ICF.

ICF has lowered the natural gas demand growth from oil sands and postponed development of proposed LNG terminals in both Canada and the United States in response to the decline in oil prices. The reduction in LNG exports from Western Canada reduces demand for natural gas from western Canada, and reduces the price of WCSB natural gas relative to Marcellus and Utica supplies and other North American supply centres. Marcellus and Utica shale supplies remain highly competitive even under these low oil price assumptions relative to other North American supply centres, including Western Canada.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 3, p. 4

- a) What is the forecasted net book value associated with Dawn Plant B when it is functionally removed from service?
- b) Does Union propose to treat the removal of this asset from rates in the same manner as the inclusion of Dawn H in rates? Please explain fully.

Response:

- a) The current gross book value of Dawn Plant B is \$29.4 million. As Union uses group method accounting, accumulated depreciation is maintained for the entire group, not for an individual asset. The net book value of Dawn B at December 31, 2017 is estimated to be (\$0.8) million using the asset's vintage and the impacts of historical depreciation rate studies.
- b) Yes, the \$5.0 million of project costs for decommissioning and removal of Dawn B is included in rates in the same manner as Dawn Plant H. Union proposes to include the cost consequences of the estimated 2013 Board-approved value of Dawn B in the actual revenue requirement calculation for purposes of the proposed deferral account in the year Dawn B is removed.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 3

What is the status of the work to be done at each of the Dawn, Lobo and Bright sites? If any work (including site preparation) has been initiated, please provide the amount spent to date for each of the sites.

Response:

Construction has not started at any of the three sites. No construction costs have been incurred.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 4, Schedule 3

Will the new compressors at Lobo and Bright result in any of the existing compressors at those sites being removed from service? If yes, please indicate which ones and the date of removal.

Response:

None of the existing compressors at Lobo or Bright will be removed from service as a result of the addition of the Lobo D and Bright C Compressors. However, Plants A1, A2 and B at Lobo and Bright will be modified as per scope description provided in the evidence under Exhibit A, Tab 11, p. 5 for Lobo and pp. 6-7 for Bright.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 4, Schedule 3

Please provide two versions of Schedule 3 that:

- a) shows the loss of critical unit (LCU) based on the existing compressors, and
 - b) shows the LCU based on all of the proposed compressors being in service.
-

Response:

- a) Exhibit A, Tab 4, Schedule 3, p. 1 shows the existing compressor units. Prior to winter 2015/2016, the loss of critical unit ("LCU") compressors are Dawn G and Lobo B. Parkway Compressor station LCU will be installed for winter 2015/2016 and the LCU compressor at Parkway will be Parkway C.
- b) Exhibit A, Tab 4, Schedule 3, p. 2 includes the proposed compressor units. When the 2017 Dawn Parkway Project is in-service the LCU compressors are Dawn G, Lobo C and Parkway C.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 6

Please provide the current status of each of the related projects noted at pp. 11 through 15.

Response:

Projects Related to the 2017 Dawn Parkway Project

The Enbridge GTA Project is currently under construction and will be in-service well in advance of November 1, 2017.

TransCanada's Kings North Connector Pipeline Project received National Energy Board approval on June 2, 2015 and is expected to be placed into service later in 2016. TransCanada applied to the National Energy Board for approval of its Maple Compression Expansion on August 28, 2015. The planned in-service date of this project remains November 1, 2016. Both of these projects will be in-service well in advance of November 1, 2017.

Union expects that TransCanada will submit its Vaughan Mainline Expansion application to the National Energy Board for approval in the fourth quarter of 2015. The planned in-service date of the Vaughan Mainline Expansion remains November 1, 2017. Union is not aware of any delays that would prevent TransCanada from achieving a November 1, 2017 in-service date for this project.

Other Pipeline Projects

The proposed NEXUS Pipeline continues to target November 1, 2017 for service to commence to Dawn. The project proponents have made preliminary filings with the Federal Energy Regulatory Commission (FERC) and expect to submit their primary FERC filing in November 2015.

The proposed ETP Rover Pipeline continues to target November 1, 2017 for service to commence to Dawn. The project proponent made its primary filing with the FERC earlier in 2015.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 6, p. 13

Please confirm that Union has ordered the three compressors. If this is confirmed, please provide the expected cost of each compressor based on the most recent information available. If not confirmed, please indicate when Union plans to order the compressors.

Response:

Yes. Union has ordered all three compressor packages for Lobo D, Bright C and Dawn H. For costing details of the individual packages please see the response at Exhibit B.Energy Probe.11 a).

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 6, pp. 13-14

If Union goes ahead with its proposed facilities and some of the downstream projects are delayed, please confirm that Union could delay the completion of their projects and keep the capital expenditures in CWIP until the projects were completed. If this cannot be done, please explain fully why not.

Response:

If downstream facilities are delayed, Union would not be prepared to delay the completion of its 2017 Dawn Parkway Project and carry the capital expenditures in CWIP.

For the 2015 facilities expansion, Union plans to put its Parkway Projects into service in the fall of 2015 which will be in advance of TransCanada's King's North Connector Pipeline Project. With respect to the 2017 facilities expansion, TransCanada and Union have accountability to their shippers with whom they have entered contracts to provide transportation services commencing November 1, 2017. Union plans to put a portion of the 2017 Dawn Parkway Project into service in 2016 and recover costs.

Union could consider a delay in the in-service date of the remainder of the 2017 Dawn Parkway System facilities but not with Union carrying the capital expenditures in CWIP. Currently Union is not able to recover costs on capital expenditures in CWIP. Please see the responses at Exhibit B.APPrO.1 d) and Exhibit B.APPrO.3 a) ii).

Please see the response at Exhibit B.Gaz Métro.1.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 6, pp. 15-19

- a) Please provide a list of all Dawn to Parkway related projects that Union foresees over the next 10 years. For each project, please provide a description of the project, the need for the project and the interrelation with other projects, including upstream or downstream projects by other parties.
- b) Please discuss how the current project in this proceeding is related to or required for any of the projects listed in part a) above.
- c) What is the timing of the proposed binding transportation open season for transportation capacity commencing November 1, 2018?
- d) Has Union taken into consideration the impact of CDM on its Dawn to Parkway system? Please explain fully the impact CDM is projected to have on the system.

Response:

- a) Union does not have a forecast of Dawn Parkway System expansion projects over the next ten years. Union will be conducting a new capacity open season for the Dawn Parkway System in the fall of 2015 for service commencing November 1, 2018 and will assess the need for further facilities following the close of the open season, the close of an associated reverse open season and, if approved, the close of the Term-Up Provision notice.

Union cannot determine the need for upstream or downstream expansion projects as a result of a Dawn Parkway System expansion over the next ten years.

- b) The 2017 Dawn Parkway Project supports 453 TJ/d of new capacity requests on the Dawn Parkway System for service commencing November 1, 2017 (Exhibit A, Tab 6, p. 4). Expansions of the Dawn Parkway System (and expansions of upstream and downstream pipelines) in 2018 and beyond would require contractual support incremental to these new capacity requests for 2017 service.
- c) Please see the response to a) above.

- d) In general, design day demands for the Dawn Parkway System take into account existing DSM program volume reductions since the design day demands are based on the previous winter's actual daily measured volumes. Any impact of in place DSM programs will be reflected in the actual daily measured volumes. Company forecasts which include, for example, reduction of contract rate customers' volumes due to known energy efficiency changes, are also included in the calculation of forecast design day demand.

The 2017 Dawn Parkway Project is driven primarily by ex-franchise contracted demands as determined through a transportation services open season and as such is not impacted by DSM.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 8, p. 9

Did Union consider any non-facility alternatives to replace a portion of the proposed additional new capacity? If not, why not? If yes, please explain why these alternatives were not used to reduce the scope of the project.

Response:

Union did consider non-facility alternatives. The non-facility alternatives would replace, in whole or in part, expansion facilities but would not eliminate the need for the planned replacement of Dawn Plant B. As a result, a compressor (RB-211) would be required at Dawn in addition to any non-facility alternative.

As noted at Exhibit A, Tab 8, p. 9, with the new transportation capacity demands, the Dawn Parkway System would be short 426,254 GJ/d without constructing any of the proposed facilities in the 2017 Dawn Parkway Project (Dawn H, Bright C and Lobo D Compressors). A Dawn Parkway System shortfall of this magnitude is not possible to manage through purchasing third party contracted services.

Union also evaluated an alternative where one of the proposed compressors along the Dawn Parkway System was not constructed (Bright C). This would reduce the scope of the facilities expansion but would result in a Dawn Parkway System shortfall of approximately 308,000 GJ/d. A shortfall of this size is also too large to manage through purchasing third party contracted services.

One of the third party contracted services that Union could purchase to manage the shortfall is Short Term Firm Transportation (STFT) on the TransCanada system. STFT is a biddable service offered by TransCanada on certain paths (typically long haul and not on the Dawn to Parkway path) for a period less than one year when TransCanada, in its own discretion, determines that capacity is available. An STFT transportation service could be purchased over the winter period with a delivery point of Parkway. STFT capacity does not come with renewal rights and a shipper must bid for service when capacity is required (whether year-over-year or intraseason). STFT availability would create significant risk to firm service reliability on the Dawn Parkway System. If in any year Union was denied access to STFT then Union would not have time to build the necessary replacement capacity. Union would need transportation capacity with renewal rights providing a minimum of three years to termination. In addition, the STFT bid

floor is set by TransCanada resulting in pricing based on market rates. STFT prices are expected to be volatile, creating cost risk for Union's customers. STFT is not a viable option.

Union also considered purchasing a firm Dawn to Parkway transportation service (FT) from TransCanada. The annual cost of this service would be greater than \$50 million under TransCanada's current Dawn to Parkway Belt rate (including the abandonment surcharge and does not include costs for an RB-211 compressor to replace Dawn Plant B). TransCanada would not have this available as existing capacity using its Great Lakes Gas Transmission backhaul transportation contracts (TBO Around the Horn – this path is used today by TransCanada to serve eastern markets – gas flows from Dawn into the Great Lakes Gas Transmission system, is transported north and west through Michigan to northern Ontario, travels across northern Ontario on the TransCanada Mainline to North Bay and then would travel south on the TransCanada Mainline to Parkway) and, in the unlikely event that sufficient backhaul contracts did exist, Union would be required to significantly expand its facilities at Dawn to accommodate further Dawn-Dawn (TCPL) service.

TransCanada would more likely need to provide Dawn to Parkway capacity through transportation contracts on the Dawn Parkway System. Ultimately, Union believes that it would be required to expand its Dawn Parkway System pipeline capacity in order for TransCanada to provide a Dawn to Parkway service and, if TransCanada required capacity on the Dawn to Parkway path, Union believes it would need the same facility set as the 2017 Dawn Parkway Project. Union's customers would be in the position of paying TransCanada for the Dawn to Parkway service and supporting the Dawn Parkway System facilities expansion. Even without considering the impact of expansion on the Dawn Parkway System to facilitate TransCanada Dawn to Parkway transportation service, the annual cost of contracting that capacity (over \$50 million) is more than the cost to carry the project as proposed (\$44 million). FT capacity through TransCanada is also not a viable option.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 9, Schedules 1, 2 and 3

- a) Please update the costs shown in these schedules if Union has more up to date information on the costs.
 - b) Has Union factored in any potential reduction in construction and labour costs due to the decline in oil prices and the resulting reduction in projects related to oil pipelines in Canada?
-

Response:

- a) There is no change to the costs shown in the schedules.
- b) At this time Union does not see any foreseeable reductions in construction labour costs in Ontario.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 9, Schedules 1, 2 and 3

- a) Please confirm that the contingency for the Lobo and Bright stations is 15% of the materials and construction and labour costs.
 - b) Please explain why the contingency for the Dawn station appears to be higher than 15% of the materials and construction and labour costs.
 - c) What interest rate has Union used to calculation the IDC for each of the stations?
 - d) Please break down the costs in Schedule 1 for the Dawn H compressor between costs associated with Dawn H and costs associated with the Plant B retirement and removal.
-

Response:

- a) Yes, Lobo and Bright project contingencies are 15%.
- b) Dawn H contingency is currently 15.6%. The slight increase over the pre-budget estimate standard of 15% is due to the additional complexities of integrating the new Dawn H plant into the Dawn facility and additional scope unknowns associated with the Dawn Plant B retirement.
- c) The OEB sets the IDC rate on a quarterly basis. The actual IDC rate is applied to the actual capital spend as it is incurred using the approved quarterly rates.

For purposes of the DCF and revenue requirement, the IDC rate used for the capital cost estimates was 2.89%.

- d) Please see the responses at Exhibit B.Staff.7 and Exhibit B.Energy Probe.14.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 10

Has Union taken into account the removal of Dawn Plant B in the calculation of the revenue requirement. If not, please explain why not.

Response:

Please see the response at Exhibit B.Staff.7.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 10

- a) Please explain why there are no project demands shown on line 3 in Table 10-1 for Union North in-franchise customers when Table 8-1 in Exhibit A, Tab 8 shows incremental demand of 5,975 GJ/day for these customers.
- b) Similarly, please explain why there are no figures in line 5 in Table 10-2 for Union North in-franchise customers.

Response:

- a) The incremental Union North in-franchise demands of 5,975 GJ/d are included as ex-franchise demands in Table 10-1. The Union North in-franchise demands are associated with the proposed transportation service for Union North T-service customers (Firm North Transportation Service), as described in Union's Dawn Reference Price and North T-Service Application (EB-2015-0181, Exhibit A, Tab 3). In the application, Union proposed that the Dawn to Parkway transportation service component of the Firm North Transportation Service will be under the Board-approved C1 rate schedule. Accordingly, Union included the 5,975 GJ/d of demands associated with the service with the other ex-franchise demands of 446,936 GJ/d for a total of 452,911 GJ/d (or $11.998 \times 10^6 \text{ m}^3/\text{day}$), as per Table 10-1, line 3.
- b) Consistent with the response in a), the incremental project demands of 5,975 GJ/d are included as ex-franchise demands in Table 10-2. Specifically, the 5,975 GJ/d demands associated with the Union Firm North Transportation Service are included with the ex-franchise Project demands that require Dawn compression of 362,082 GJ/d, for a total of 368,057 GJ/d (or $9,750 \times 10^3 \text{ m}^3/\text{d}$), as per Table 10-2, line 5.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 10, Schedule 3

Please provide the estimated impact on average M2 and M4 customers.

Response:

The estimated bill impact for an M2 customer with an average annual consumption of 155,000 m³ is an annual bill decrease of approximately \$25.

The estimated bill impact for an M4 customer with an average annual consumption of 6,437,500 m³ and a firm daily contracted demand of 27,400 m³ is an annual bill increase of approximately \$140.

Please see Attachment 1.

UNION GAS LIMITED
2018 Bill Impacts of the Lobo D, Bright C and Dawn H Compressors Project

Line No.	Particulars	EB-2015-0035	EB-2015-0200	Bill Impact	
		Approved	Proposed		
		01-Apr-15	01-Jan-18		
		Total Bill (1)	Total Bill		
		(\$)	(\$)	(\$)	(%)
		(a)	(b)	(c) = (b - a)	(d) = (c / a)
	Rate M2 - Average				
	<u>155,000 m³ Annual Consumption</u>				
	<u>Delivery Charges</u>				
1	Monthly Charge	840.00	840.00	-	
2	Delivery Commodity Charge	5,348.72	5,357.01	8.29	
3	Storage Services	996.34	962.71	(33.64)	
4	Total Delivery Charge	7,185.06	7,159.72	(25.35)	-0.4%
	<u>Supply Charges</u>				
5	Transportation to Union	5,455.38	5,455.38	-	
6	Commodity & Fuel	18,641.08	18,641.08	-	
7	Total Gas Supply Charge	24,096.46	24,096.46	-	
8	Total Bill (line 4 + line 7)	31,281.52	31,256.17	(25.35)	-0.1%
9	Impacts for Customer Notices - Sales (line 8)			(25.35)	
10	Impacts for Customer Notices - Direct Purchase (line 4)			(25.35)	
	Rate M4 - Average				
	<u>6,437,500 m³ Annual Consumption and 27,400 m³ / day Firm Contract Demand</u>				
	<u>Delivery Charges</u>				
11	Demand Charge	97,288.38	97,358.18	69.80	
12	Delivery Commodity Charge	66,286.94	66,357.75	70.81	
13	Total Delivery Charge	163,575.31	163,715.93	140.61	0.1%
	<u>Supply Charges</u>				
14	Transportation to Union	226,574.25	226,574.25	-	
15	Commodity & Fuel	774,205.94	774,205.94	-	
16	Total Gas Supply Charge	1,000,780.19	1,000,780.19	-	
17	Total Bill (line 13 + line 16)	1,164,355.50	1,164,496.11	140.61	0.0%
18	Impacts for Customer Notices - Sales (line 17)			140.61	
19	Impacts for Customer Notices - Direct Purchase (line 13)			140.61	

Notes:

(1) Calculated as per Appendix A, EB-2015-0035.

UNION GAS LIMITED

Answer to Interrogatory from
London Property Management Association ("LPMA")

Reference: Exhibit A, Tab 10, Schedule 5

- a) Please explain why some rate classes see a reduction in their revenue requirement (notably rates M2 and M4) in 2016 and 2017, followed by small increases in 2018.
 - b) Please explain why the M5 rate class is the only Union South rate class that sees a further reduction in their revenue requirement in 2018 as compared to 2017.
 - c) Are the expected revenue requirement impacts beyond 2018 similar to 2018? Please explain fully.
-

Response:

- a) The change in costs allocated to Union South in-franchise rate classes from i) 2016 to 2017 and ii) 2017 to 2018 are described in detail below. This response is based on the updated Exhibit A, Tab 10, Schedules 1-5.

- i) Cost Allocation Changes from 2016 to 2017

- The allocation of Project costs to Union South in-franchise rate classes decreased from (\$1.902) million in 2016 to (\$7.477) million in 2017, for a total decrease of \$5.575 million. The decrease in allocated costs to Union South in-franchise rate classes from 2016 to 2017 is driven by the decrease in Project-related income taxes and the inclusion of Project demands in 2017. The Project-related income taxes decreased from (\$4.053) million in 2016 to (\$15.205) million in 2017, for a total reduction of (\$11.152) million, as per Exhibit A, Tab 10, Schedule 1.

In 2016, the costs allocated to Union South in-franchise rate classes decreased by (\$1.902) million as a result of the shift in indirect costs and the allocation of Project property and income taxes. Specifically, Union South in-franchise customers will bear 17.4% (or \$0.164 million) of Dawn Station costs and 11.3% (or \$0.054 million) of Dawn Parkway System costs directly attributable to the Project. Those costs are more than offset by the reduction in the allocation of indirect costs (\$0.051 million), Project-related taxes (\$2.068 million) and existing Dawn Parkway System. The detailed cost allocation impacts for 2016 are provided at Attachment 1, p.1.

In 2017, Union South in-franchise allocated costs decreased further to (\$7.477) million as a result of the decrease in Project income taxes and the inclusion of Project demands.

Specifically, Union South in-franchise customers will bear 16.4% (or \$1.514 million) of Dawn Station costs and 10.5% (or \$1.099 million) of Dawn Parkway System costs directly attributable to the Project. Those costs are more than offset by the reduction in the allocation of indirect costs (\$1.324 million), Project-related taxes (\$7.444 million) and existing Dawn Parkway System and Dawn Station costs (\$1.321 million). The detailed cost allocation impacts for 2017 are provided at Attachment 1, p. 2.

Of the total Union South in-franchise decrease of (\$1.902) million in 2016, Rate M2 was allocated (\$0.183) million and Rate M4 was allocated (\$0.043) million, as per Attachment 1, p.1, lines 2-3. Of the total Union South in-franchise decrease of (\$7.477) million in 2017, Rate M2 was allocated (\$0.665) million and Rate M4 was allocated (\$0.156) million, as per Attachment 1, p. 2, lines 2-3. Consistent with the overall decrease to Union South in-franchise rate classes from 2016 to 2017, the allocation to Rate M2 decreased by (\$0.482) million and the allocation to Rate M4 decreased by (\$0.113) million as a result of the income tax decrease and the inclusion of Project demands in 2017.

ii) Cost Allocation Changes from 2017 to 2018

The allocation of Project costs to Union South in-franchise rate classes increased from (\$7.477) million in 2017 to (\$5.988) million in 2018, for a total increase of \$1.488 million by 2018. The increase in costs allocated to Union South in-franchise rate classes from 2017 to 2018 is caused by the increase in Project costs in 2018. The total Project revenue requirement increased from \$6.758 million in 2017 to \$42.639 million in 2018, for a total increase of \$35,881 million, as per Exhibit A, Tab 10, Schedule 1.

In 2018, Union South in-franchise customers will bear 16.4% (or \$4.269 million) of Dawn Station costs and 10.5% (or \$3.676 million) of Dawn Parkway System costs directly attributable to the Project. These costs are more than offset by the reduction in the allocation of indirect costs (\$6.012 million), Project-related taxes (\$6.600 million) and existing Dawn Parkway System and Dawn Station costs (\$1.321 million)

Of the total Union South in-franchise allocated cost of (\$5.988) million, Rate M2 was allocated (\$0.090) million and Rate M4 was allocated \$0.010 million, as per Exhibit A, Tab 10, Schedule 2. As compared to 2017, the allocation to Rate M2 increased by \$0.575 million and the allocation to Rate M4 increased by \$0.166 million. The increase in allocated costs to Rate M2 and Rate M4 is consistent with the overall increase in allocated costs for Union South in-franchise customers, which is driven by the increase in Project costs.

- b) The allocation of Dawn Station and Dawn-Parkway transmission costs include design day demands for firm customers. Rate M5 primarily includes interruptible demands, which result in an immaterial allocation (approximately 0%) of these costs.

Accordingly, as the Project costs increase from 2017 to 2018, an immaterial amount is allocated to Rate M5 as compared to other in-franchise customers with firm design day

demands. These Project costs are more than offset by the reduction in the allocation of indirect costs and Project-related taxes.

- c) The revenue requirement and allocation of costs to rate classes will change over time as the Dawn Station and Dawn-Parkway costs decrease and as the income tax benefit decreases over time. The change in revenue requirement from 2016-2026 is provided at Attachment 2, p. 1.

To estimate the impacts of the changes in revenue requirement, Union included the 2026 Project revenue requirement of \$54.909 million in the 2013 Board-approved cost allocation study. The inclusion of the 2026 Project costs results in \$2.937 million allocated to Union South in-franchise rate classes for an increase of \$8.925 million, as compared to 2018 allocated costs of (\$5.988) million.

The increase in costs allocated to Union South in-franchise customers is the result of the increase in income taxes over time. Specifically, Project-related income taxes increased from (\$15.669) million in 2018 to \$4.251 million in 2018, for a total increase of \$19.920 million, as per Attachment 2, p. 1, line 10.

The increase in the allocation of income taxes is partially offset by the decrease in the other Dawn Station and Dawn Parkway costs.

In 2026, Union South in-franchise customers will bear 16.4% (or \$3.953 million) of Dawn Station costs and 10.5% (or \$3.736 million) of Dawn Parkway System costs directly attributable to the Project. Union South in-franchise customers will also be allocated \$2.336 million of Project-related taxes. Those costs are partially offset by the reduction in the allocation of indirect costs (\$5.766 million) and existing Dawn Parkway System and Dawn Station costs (\$1.321 million). The detailed cost allocation of 2026 Project costs is provided at Attachment 2, p. 2.

UNION GAS LIMITED
2016 Cost Allocation Impacts of Lobo D, Bright C and Dawn H Compressor Project

Line No.	Particulars	Total Cost Allocation Impacts (\$000's)	Dawn Station Transmission (1)				Dawn-Parkway Easterly Transmission (2)				Other Functional Classifications		
			Project Costs (3)	Indirect Costs	Total	(%)	Project Costs (3)	Indirect Costs	Total	(%)	Project Costs (3)	Indirect Costs	Total
		(a) = (d + h + l)	(b)	(c)	(d) = (b + c)	(e)	(f)	(g)	(h) = (f + g)	(i)	(j)	(k)	(l) = (j + k)
1	Rate M1	(1,448)	81	2	83	8.8%	24	4	27	5.7%	(1,509)	(50)	(1,559)
2	Rate M2	(183)	27	1	28	3.0%	8	1	9	1.9%	(217)	(2)	(220)
3	Rate M4	(43)	8	0	8	0.9%	2	0	3	0.6%	(53)	(1)	(54)
4	Rate M5	(52)	0	0	0	0.0%	0	0	0	0.0%	(50)	(2)	(52)
5	Rate M7	(13)	4	0	4	0.4%	1	0	1	0.3%	(18)	(0)	(18)
6	Rate M9	(1)	1	0	1	0.1%	0	0	0	0.1%	(3)	0	(3)
7	Rate M10	(0)	0	0	0	0.0%	0	0	0	0.0%	(0)	0	(0)
8	Rate T1	(33)	4	0	4	0.4%	1	0	1	0.3%	(38)	0	(38)
9	Rate T2	(125)	25	1	26	2.8%	7	1	9	1.8%	(162)	3	(159)
10	Rate T3	(4)	9	0	9	1.0%	3	0	3	0.7%	(17)	1	(16)
11	Subtotal - Union South	(1,902)	160	3	164	17.4%	47	7	54	11.3%	(2,068)	(51)	(2,119)
12	Excess Utility Space	(21)	-	-	-	0.0%	-	-	-	0.0%	(23)	3	(21)
13	Rate C1	(6)	-	-	-	0.0%	-	-	-	0.0%	(8)	1	(6)
14	Rate M12	1,120	717	15	732	77.9%	344	53	397	83.7%	(8)	(1)	(9)
15	Rate M13	(1)	-	-	-	0.0%	-	-	-	0.0%	(1)	(0)	(1)
16	Rate M16	(1)	-	-	-	0.0%	-	-	-	0.0%	(1)	0	(1)
17	Subtotal - Ex-franchise	1,091	717	15	732	77.9%	344	53	397	83.7%	(41)	3	(38)
18	Rate 01	(660)	32	1	33	3.5%	15	2	18	3.8%	(681)	(30)	(710)
19	Rate 10	(91)	8	0	9	0.9%	4	1	5	1.0%	(101)	(3)	(104)
20	Rate 20	(73)	2	0	2	0.2%	1	0	1	0.3%	(76)	(0)	(76)
21	Rate 100	(60)	0	0	0	0.0%	0	0	0	0.0%	(60)	(0)	(61)
22	Rate 25	(22)	-	-	-	0.0%	-	-	-	0.0%	(21)	(0)	(22)
23	Subtotal - Union North	(906)	43	1	44	4.6%	21	3	24	5.0%	(939)	(34)	(973)
24	In-franchise (line 11 + line 23)	(2,807)	203	4	207	22.1%	67	10	77	16.3%	(3,007)	(85)	(3,092)
25	Ex-franchise (line 17)	1,091	717	15	732	77.9%	344	53	397	83.7%	(41)	3	(38)
26	Total	(1,716)	920	19	939	100.0%	412	63	475	100.0%	(3,048)	(82)	(3,130)
												0	

Notes:

- (1) The Project costs of \$0.920 million and the indirect costs of \$0.019 million are allocated in proportion to the Dawn compression demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5.
- (2) The Project costs of \$0.412 million and the indirect costs of \$0.063 million are allocated in proportion to the Dawn-Parkway demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5.
- (3) The total 2016 Project costs of (\$1.716) million include \$0.920 million directly allocated to the Dawn Station functional classification, \$0.412 million directly allocated to the Dawn-Parkway Easterly functional classification and (\$3.048) million of property, income taxes and working capital allocated to distribution, storage and other transmission-related functional classifications.

UNION GAS LIMITED
2017 Cost Allocation Impacts of Lobo D, Bright C and Dawn H Compressor Project

Line No.	Particulars	Total Cost Allocation Impacts (\$000's)	Cost Allocation Change in Demands (1) (\$000's)	Dawn Station Transmission (2)				Dawn-Parkway Easterly Transmission (3)				Other Functional Classifications		
		(a) = (b + e + i + m)	(b)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)	(%)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)	(%)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)
		(a) = (b + e + i + m)	(b)	(c)	(d)	(e) = (c + d)	(f)	(g)	(h)	(i) = (g + h)	(j)	(k)	(l)	(m) = (k + l)
1	Rate M1	(5,853)	(670)	708	60	768	8.3%	492	66	558	5.3%	(5,409)	(1,099)	(6,508)
2	Rate M2	(665)	(225)	238	20	258	2.8%	165	22	187	1.8%	(787)	(98)	(885)
3	Rate M4	(156)	(65)	69	6	75	0.8%	48	6	54	0.5%	(193)	(27)	(220)
4	Rate M5	(219)	(1)	1	0	1	0.0%	0	0	1	0.0%	(177)	(42)	(219)
5	Rate M7	(43)	(30)	32	3	35	0.4%	22	3	25	0.2%	(65)	(8)	(73)
6	Rate M9	(1)	(11)	11	1	12	0.1%	8	1	9	0.1%	(11)	(1)	(12)
7	Rate M10	(0)	(0)	0	0	0	0.0%	0	0	0	0.0%	(0)	(0)	(1)
8	Rate T1	(122)	(32)	34	3	37	0.4%	24	3	27	0.3%	(139)	(14)	(154)
9	Rate T2	(430)	(210)	222	19	240	2.6%	154	21	175	1.7%	(597)	(39)	(635)
10	Rate T3	13	(76)	80	7	87	0.9%	56	7	63	0.6%	(65)	3	(62)
11	Subtotal - Union South	(7,477)	(1,321)	1,396	118	1,514	16.4%	969	130	1,099	10.5%	(7,444)	(1,324)	(8,768)
12	Excess Utility Space	(73)	-	-	-	-	0.0%	-	-	-	0.0%	(94)	21	(73)
13	Rate C1	(28)	-	-	-	-	0.0%	-	-	-	0.0%	(28)	0	(28)
14	Rate M12	18,009	1,871	6,760	569	7,329	79.3%	7,799	1,047	8,846	84.8%	(29)	(8)	(37)
15	Rate M13	(2)	-	-	-	-	0.0%	-	-	-	0.0%	(2)	(0)	(2)
16	Rate M16	(4)	-	-	-	-	0.0%	-	-	-	0.0%	(4)	0	(4)
17	Subtotal - Ex-franchise	17,902	1,871	6,760	569	7,329	79.3%	7,799	1,047	8,846	84.8%	(157)	13	(144)
18	Rate 01	(2,672)	(411)	277	23	301	3.3%	322	43	365	3.5%	(2,445)	(481)	(2,926)
19	Rate 10	(350)	(108)	73	6	79	0.9%	84	11	96	0.9%	(364)	(52)	(416)
20	Rate 20	(299)	(29)	19	2	21	0.2%	23	3	26	0.2%	(268)	(49)	(317)
21	Rate 100	(254)	(2)	1	0	1	0.0%	2	0	2	0.0%	(212)	(43)	(255)
22	Rate 25	(92)	-	-	-	-	0.0%	-	-	-	0.0%	(76)	(17)	(92)
23	Subtotal - Union North	(3,667)	(550)	371	31	402	4.3%	430	58	488	4.7%	(3,366)	(642)	(4,008)
24	In-franchise (line 11 + line 23)	(11,144)	(1,871)	1,767	149	1,916	20.7%	1,399	188	1,587	15.2%	(10,809)	(1,966)	(12,776)
25	Ex-franchise (line 17)	17,902	1,871	6,760	569	7,329	79.3%	7,799	1,047	8,846	84.8%	(157)	13	(144)
26	Total	6,758	(0)	8,527	718	9,245	100.0%	9,198	1,235	10,433	100.0%	(10,967)	(1,953)	(12,920)

0

Notes:

- (1) Allocation of the 2013 Board-approved costs updated to include the incremental Dawn-Parkway Project demands of 452,911 GJ/d.
- (2) The Project costs of \$8.527 million and the indirect costs of \$0.718 million are allocated in proportion to the Dawn compression demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 368,057 GJ/d.
- (3) The Project costs of \$9.198 million and the indirect costs of \$1.235 million are allocated in proportion to the Dawn-Parkway demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 452,911 GJ/d.
- (4) The total 2017 Project costs of \$6.758 million include \$8.527 million directly allocated to the Dawn Station functional classification and \$9.198 million directly allocated to the Dawn-Parkway Easterly functional classification and (\$10.967) million of property, income taxes and working capital allocated to distribution, storage and other transmission-related functional classifications.

UNION GAS LIMITED
Lobo D, Bright C and Dawn H Compressor Project Revenue Requirement

Line No.	Particulars (\$000's)	2016 (a)	2017 (b)	2018 (c)	2019 (d)	2020 (e)	2021 (f)	2022 (g)	2023 (h)	2024 (i)	2025 (j)	2026 (k)
	<u>Rate Base Investment</u>											
1	Capital Expenditures	107,400	500,838	14,267	-	-	-	-	-	-	-	-
2	Average Investment	11,432	171,035	592,525	580,509	560,947	541,385	521,823	502,262	482,700	463,138	443,577
	<u>Revenue Requirement Calculation:</u>											
	<u>Operating Expenses:</u>											
3	Operating and Maintenance Expenses (1)	0	602	3,623	3,695	3,769	3,845	3,921	4,000	4,080	4,161	4,245
4	Depreciation Expense (2)	1,677	11,310	19,416	19,566	19,566	19,566	19,566	19,566	19,566	19,566	19,566
5	Property Taxes	0	175	1,051	1,072	1,093	1,115	1,138	1,160	1,184	1,207	1,231
6	Total Operating Expenses	<u>1,677</u>	<u>12,086</u>	<u>24,090</u>	<u>24,333</u>	<u>24,429</u>	<u>24,526</u>	<u>24,625</u>	<u>24,726</u>	<u>24,829</u>	<u>24,935</u>	<u>25,042</u>
7	Required Return (5.77% x line 2) (3)	660	9,877	34,217	33,523	32,394	31,264	30,134	29,005	27,875	26,745	25,616
	<u>Income Taxes:</u>											
8	Income Taxes - Equity Return (4)	126	1,879	6,510	6,719	6,492	6,266	6,039	5,813	5,587	5,360	5,134
9	Income Taxes - Utility Timing Differences (5)	(4,178)	(17,084)	(22,179)	(17,474)	(13,802)	(10,685)	(8,039)	(5,791)	(3,882)	(2,261)	(882)
10	Total Income Taxes	<u>(4,053)</u>	<u>(15,205)</u>	<u>(15,669)</u>	<u>(10,756)</u>	<u>(7,310)</u>	<u>(4,420)</u>	<u>(2,000)</u>	<u>21</u>	<u>1,704</u>	<u>3,100</u>	<u>4,251</u>
11	Total Revenue Requirement (line 6 + line 7 + line 10)	<u>(1,716)</u>	<u>6,758</u>	<u>42,638</u>	<u>47,101</u>	<u>49,512</u>	<u>51,370</u>	<u>52,760</u>	<u>53,752</u>	<u>54,408</u>	<u>54,779</u>	<u>54,910</u>
12	Incremental Project Revenue (6)	-	2,925	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551	17,551
13	Net Revenue Requirement (line 11 - line 12)	<u>(1,716)</u>	<u>3,833</u>	<u>25,087</u>	<u>29,550</u>	<u>31,961</u>	<u>33,819</u>	<u>35,209</u>	<u>36,201</u>	<u>36,857</u>	<u>37,229</u>	<u>37,359</u>

Notes:

- (1) Expenses include salaries and wages, employee-related expenses, fleet costs, materials and operating expenses.
- (2) Depreciation expense at 2013 Board-approved depreciation rates.
- (3) The required return of 5.77% assumes a capital structure of 64% long-term debt at 4.0% and 36% common equity at the 2013 Board-approved return of 8.93% (0.64 * 0.04 + 0.36 * 0.0893).
- (4) Taxes related to the equity component of the return at a tax rate of 25.5%.
- (5) Taxes related to utility timing differences are negative as the capital cost allowance deduction in arriving at taxable income exceeds the provision of book depreciation in the year.
- (6) Project revenue assumes an estimated M12 Dawn-Parkway rate of \$2.937 GJ/mth, a M12 Kirkwall-Parkway rate of \$0.517 GJ/mth and a Dawn Compression rate of \$0.232 GJ/mth.
The 2018 - 2026 revenue is calculated as follows:
 - M12 Dawn-Parkway demands of 441.778 TJ x \$2.937 x 12 / 1000 = \$15.570 million plus
 - C1 Dawn-Parkway demands (North T-Service) of 5.975 TJ x \$2.937 x 12 / 1000 = \$0.211 million plus
 - M12 Kirkwall-Parkway demands of 84.854 TJ x \$0.517 x 12 / 1000 = \$0.526 million plus
 - M12/C1 Dawn Compression demands of 447.753 TJ x \$0.232 x 12 / 1000 = \$1.247 million

UNION GAS LIMITED
2026 Cost Allocation Impacts of Lobo D, Bright C and Dawn H Compressor Project.

Line No.	Particulars	Total Cost Allocation Impacts (\$000's)	Cost Allocation Change in Demands (1) (\$000's)	Dawn Station Transmission (2)				Dawn-Parkway Easterly Transmission (3)				Other Functional Classifications		
		(a) = (b + e + i + m)	(b)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)	(%)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)	(%)	Project Costs (4) (\$000's)	Indirect Costs (\$000's)	Total (\$000's)
				(c)	(d)	(e) = (c + d)	(f)	(g)	(h)	(i) = (g + h)	(j)	(k)	(l)	(m) = (k + l)
1	Rate M1	623	(670)	1,712	294	2,006	8.3%	1,651	245	1,895	5.3%	1,734	(4,342)	(2,608)
2	Rate M2	824	(225)	575	99	674	2.8%	555	82	637	1.8%	239	(501)	(261)
3	Rate M4	229	(65)	167	29	196	0.8%	161	24	185	0.5%	61	(148)	(87)
4	Rate M5	(82)	(1)	2	0	2	0.0%	2	0	2	0.0%	65	(150)	(84)
5	Rate M7	120	(30)	77	13	90	0.4%	74	11	85	0.2%	20	(45)	(26)
6	Rate M9	47	(11)	28	5	32	0.1%	27	4	31	0.1%	3	(8)	(5)
7	Rate M10	1	(0)	1	0	1	0.0%	1	0	1	0.0%	0	(1)	(1)
8	Rate T1	90	(32)	83	14	97	0.4%	80	12	91	0.3%	40	(106)	(66)
9	Rate T2	747	(210)	536	92	628	2.6%	517	77	594	1.7%	162	(427)	(265)
10	Rate T3	339	(76)	194	33	228	0.9%	187	28	215	0.6%	12	(39)	(28)
11	Subtotal - Union South	2,937	(1,321)	3,374	580	3,953	16.4%	3,253	483	3,736	10.5%	2,336	(5,766)	(3,430)
12	Excess Utility Space	(18)	-	-	-	-	0.0%	-	-	-	0.0%	(1)	(17)	(18)
13	Rate C1	(33)	-	-	-	-	0.0%	-	-	-	0.0%	5	(38)	(33)
14	Rate M12	51,077	1,871	16,335	2,806	19,141	79.3%	26,186	3,885	30,071	84.8%	8	(14)	(6)
15	Rate M13	0	-	-	-	-	0.0%	-	-	-	0.0%	1	(0)	0
16	Rate M16	(1)	-	-	-	-	0.0%	-	-	-	0.0%	1	(2)	(1)
17	Subtotal - Ex-franchise	51,025	1,871	16,335	2,806	19,141	79.3%	26,186	3,885	30,071	84.8%	12	(70)	(58)
18	Rate 01	642	(411)	670	115	786	3.3%	1,080	160	1,241	3.5%	768	(1,741)	(973)
19	Rate 10	342	(108)	176	30	206	0.9%	283	42	325	0.9%	111	(191)	(81)
20	Rate 20	44	(29)	47	8	55	0.2%	76	11	87	0.2%	91	(160)	(69)
21	Rate 100	(54)	(2)	3	1	4	0.0%	5	1	6	0.0%	76	(138)	(62)
22	Rate 25	(27)	-	-	-	-	0.0%	-	-	-	0.0%	27	(54)	(27)
23	Subtotal - Union North	948	(550)	896	154	1,050	4.3%	1,444	214	1,658	4.7%	1,074	(2,285)	(1,211)
24	In-franchise (line 11 + line 23)	3,885	(1,871)	4,270	733	5,003	20.7%	4,697	697	5,394	15.2%	3,410	(8,051)	(4,642)
25	Ex-franchise (line 17)	51,025	1,871	16,335	2,806	19,141	79.3%	26,186	3,885	30,071	84.8%	12	(70)	(58)
26	Total	54,910	(0)	20,605	3,540	24,144	100.0%	30,883	4,582	35,465	100.0%	3,422	(8,121)	(4,699)

Notes:

- (1) Allocation of the 2013 Board-approved costs updated to include the incremental Dawn-Parkway Project demands of 452,911 GJ/d GJ/d.
- (2) The Project costs of \$20.605 million and the indirect costs of \$3.54 million are allocated in proportion to the Dawn compression demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 368,057 GJ/d.
- (3) The Project costs of \$30.883 million and the indirect costs of \$4.582 million are allocated in proportion to the Dawn-Parkway demand allocation provided at EB-2011-0210, Exhibit G3, Tab 5, Schedule 23, Updated, pages 7-8, line 5, updated to include the incremental demands of 452,911 GJ/d.
- (4) The total 2026 Project costs of \$54.910 million include \$20.605 million directly allocated to the Dawn Station functional classification and \$30.883 million directly allocated to the Dawn-Parkway Easterly functional classification and \$3.422 million of property and income taxes allocated to distribution, storage and other transmission-related functional classifications.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A

Please provide copies of all materials that were provided to Union's senior management team, and if applicable, its parent company's Board of Directors, for the approval to undertake either collectively or individually, any aspects of the capital projects that underlie this application.

Response:

Union will be seeking Spectra Energy Board of Directors approval in October, 2015 and will file materials specific to this approval process at that time.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 6, p. 17

Please provide a list of all Dawn-Parkway transportation contracts. For each contract please provide: the type of contract, capacity, commencement and expiry date, name of the contract holder, and receipt and delivery points.

Response:

Please see the response at Exhibit B.ANE.1 Attachment 1.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 7, p. 3

Please provide any internal asset condition or similar condition analysis regarding Plant B.

Response:

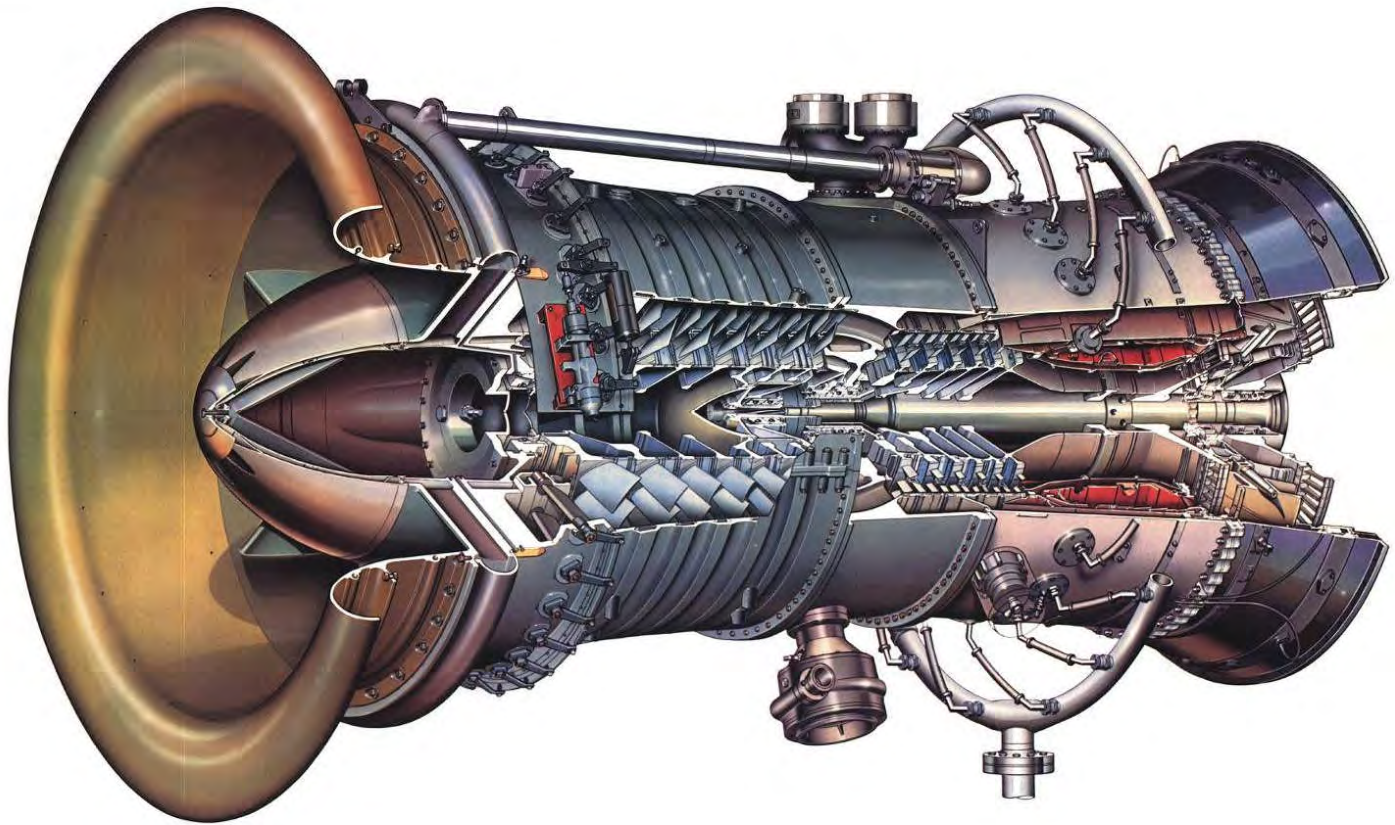
A full condition assessment, remediation and test report was generated by the Siemens approved shop, TransCanada Turbines, during the 2011 overhaul. The report is provided as Attachment 1.

A condition assessment of the damage, remediation and test report was generated by TransCanada Turbines for the early 2015 engine failure incident and subsequent repair. The report is provided as Attachment 2.



TRANSCANADA TURBINES

The Independent Alternative



**Union Gas
1700-011
CA9001362
Final Report
August 19, 2011**

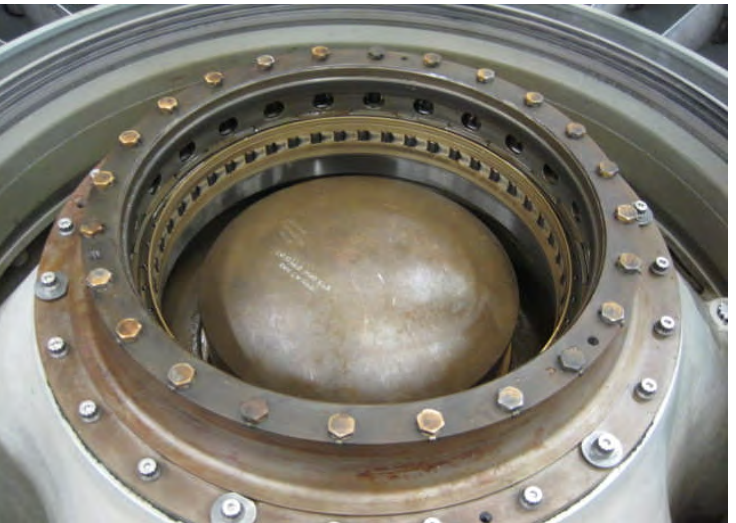
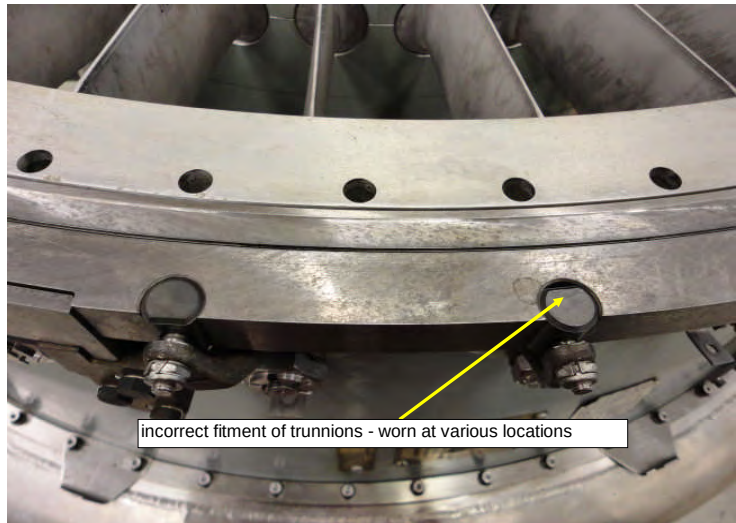
Final Report		
Customer	Union Gas	
Work description	Minor overhaul	
S/O#	CA9001362	
Engine#	1700-011	
P/O -	4500182641	
Reason for removal/Special instructions	N/A	
Project Manager	S Hayes	
Revision/date	R1/April 11	
Engine details		Comments
Engine Serial Number	1700-011	
Engine Model	RB211 - 22	
Time Since New	32612	
Time Since Overhaul	N/A	
Total Starts	1331/68 failed	
Project details	Timing	Comments
Induction date	April 18, 2011	
Bulk Strip	April 23, 2011	
Detail Strip	May 29, 2011	
Inspection Complete	May 23, 2011	
Cost Estimate Due	May 31, 2011	
Start modular Build	June 14, 2011	
Start Final Build	July 20, 2011	
Start Test	July 25, 2011	
Engine rejected on test	July 28, 2011	
Return to shop induction	August 1, 2011	
Engine strip and investigation	August 4, 2011	
Investigation review	August 5, 2011	
Rotor re-balance	August 6, 2011	
Module rebuild	August 7, 2011	
Engine rebuild	August 9, 2011	
Engine test	August 10, 2011	
Ship Date	August 17, 2011	
List of revisions	Date	Comments
R1	April 25, 2011	Amended to reflect bulk strip report findings
R2	April 27, 2011	Amended for HP5 - 6 blade removal as a result of Eddy current inspection and sealing issues on the HP/IP bearing support assembly that requires stip. IP NGV cracking noted at this time
Project details	Serial Number	Overview
Module1 - Air Intake	1701-012	Minor repairs to worn trunnions in situ. Dimensional inspection to abradable air/oil seals
Module2- IP Compressor	1702-011	Full Overhaul to IP casings due to poor condition and old mod standards. Minor insitu repairs to compressor rotor
Module3 - Intermediate Casing	1703-011	Leave mainline bearings as assemblies (undisturbed), Detail inspection to air seals and intermediate casing
Module4 - HP System	1704-011	Full overhaul for compressor abrasables and coatings. Standard overhaul to HPT and combustion sections
Module5 - IP Turbine	1705-011	Detail strip of casing due to leakage HP/IP sump leakage. IP NGVs require repairs to cracking
On receipt of Engine/Module/Assembly		
Task	Required	Comments
Take pictures of module/engine on the inbound truck (ie. Tie down straps	Accomplished	
Inspect and report condition of transportation container	Accomplished	Bag has tears and patched with duct tape - replace with new - Stand should require load test iaw SB71
Open container photograph all four sides of the engine especially engine	Accomplished	
Carry out full "booking in" inspection	Accomplished	
Any missing parts/components or other visual abnormalities should be	Accomplished	
Carry out an air flow check of the 01, 03 and 05 module oil lines and	Accomplished	
01 module results	Further disassembly required	0.5 g/sec(low)
Limit		Limit 0.56 - 0.65 g/sec
03 module results	Acceptable as is	3.79 g/sec
Limit		Limit 3.65 - 3.80 gms/sec
05 module results	Acceptable as is	1.94 g/sec
Limit		Limit MOD 946 2.40 - 2.70 g/sec (pre Mod 946, (1.8 - 2.05 g/sec)

Final Report		
Customer	Union Gas	 TRANSCANADA TURBINES The Independent Alternative.
Work description	Minor overhaul	
S/O#	CA9001362	
Engine#	1700-011	
P/O -	4500182641	
Reason for removal/Special instructions	N/A	
Project Manager	S Hayes	
Revision/date	R1/April 11	

Engine induction



01 Module	Air Intake Casing 1701-012
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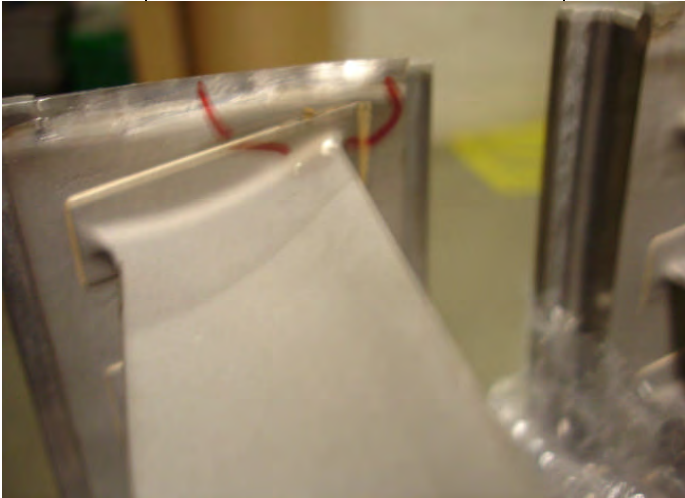
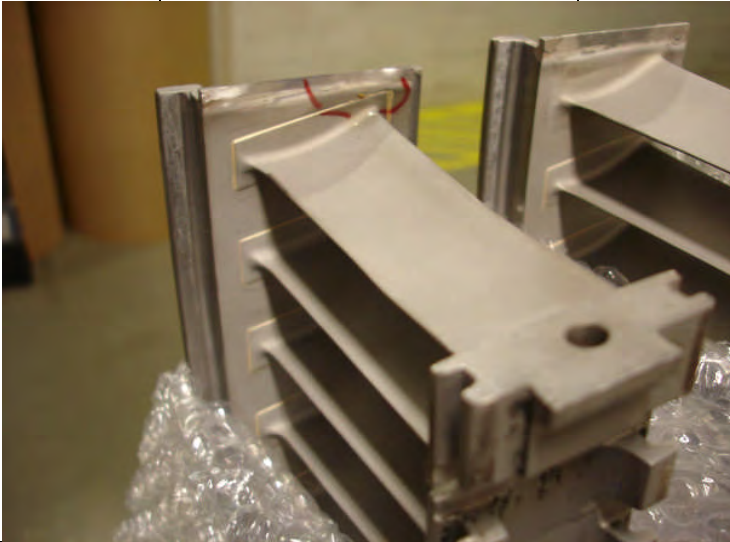
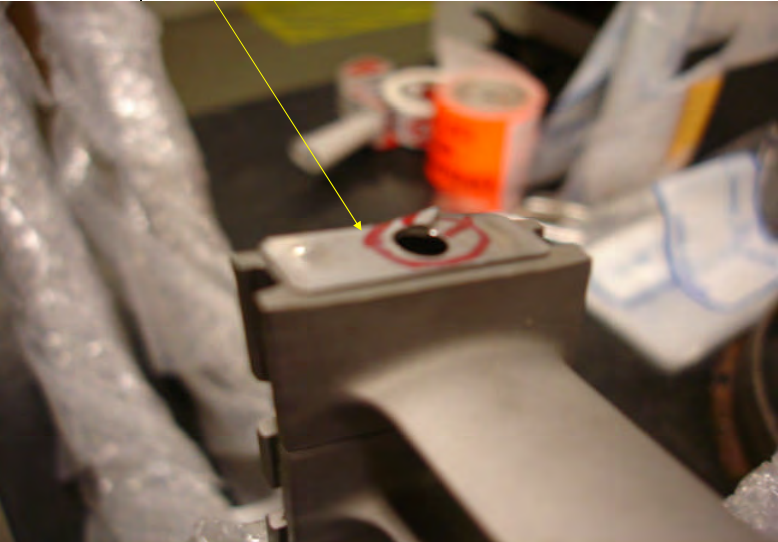


Reference	Section 1020 Air Inlet and Front Bearing Support	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
R1	Air intake casing assy	Acceptable as is	
R1	Variable Inlet Guide Vanes (VIGV's)	Clean - Do not remove coatings	
R1	Operating arm assembly	Clean - Do not remove coatings	
R1	Spigot	Acceptable as is	Will be inspected whilst replacing worn and incorrectly fitted trunnions (photo above)
R1	Actuating Ring assy	Clean - Do not remove coatings	
R1	Bottom front half housing	Acceptable as is	
R1	Bottom rear half housing	Acceptable as is	

02 Module	IP Compressor Assembly 1702-011
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Reference	Section 1665 Compressor Casing and Vanes	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
R3	Blade path abrasable linings IP1	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Blade path abrasable linings IP2	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Blade path abrasable linings IP3	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Blade path abrasable linings IP4	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Blade path abrasable linings IP5	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Blade path abrasable linings IP6	Full detail strip/inspection	All linings to be renewed - weld repair to dovetail slot cracking as well
R3	Inner shroud assemblies - IP1	Rejected	See scrap report
R3	Inner shroud assemblies - IP2	Full detail strip/inspection	Abrasable lining renewal
R3	Inner shroud assemblies - IP3	Rejected	See scrap report
R3	Inner shroud assemblies - IP4	Full detail strip/inspection	Abrasable lining renewal

Final Report			
Customer Work description S/O# Engine# P/O - Reason for removal/Special instructions Project Manager Revision/date		Union Gas Minor overhaul CA9001362 1700-011 4500182641 N/A S Hayes R1/April 11	
			
R3	Vane assemblies - IP1	Full detail strip/inspection	Issues with incorrect existing vane config - Vanes are in serviceable condition - Customer acknowledgement to refit as is
R3	Vane assemblies - IP2	Full detail strip/inspection	Wear to radial mate faces weld repairs required on 15 - an additional 22 rotatables were used on build to obtain tolerance
R3	Vane assemblies - IP3	Full detail strip/inspection	Wear to mate faces (not excessive) Ser W protection required
R3	Vane assemblies - IP4	Full detail strip/inspection	Wear to mate faces (not excessive) Ser W protection required
	Stage 5 vane assy	Full detail strip/inspection	Requires re-application of tribomet iaw MOD 1205. TCT installed customer supplied vane assembly
R3	Stage 6 vane assy	Rejected	Mod 94/Pre 604 (full width feet) - One vane distorted from disassembly (common) Assembly retired - Replacement with customer supplied MOD 1159 standard (B/NP mod class)
			
			Uncommon repair end vane repair has been accomplished that has failed. Vane replacement would be required.
			
	Stage 5 Inner shroud	Full detail strip/inspection	Mod 1205 - re-application of metco lining required
	Stage 6 Inner shroud	Full detail strip/inspection	Mod 1159 - re-application of metco lining required
Reference	Section 1666 IP Compressor- Rotor Assembly	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
R1	IPC Stubshaft inner race	Acceptable as is	
R1	IPC Stage 1 Disc	Acceptable as is	
R1	Interstage shroud	Acceptable as is	
R1	IPC Stage2-5 Disc assembly	Acceptable as is	
R1	IPC Stage 6-7 Disc assembly	Acceptable as is	No corrosion noted on inner race as per RN5023
R1	IPC Stage 7 Rotor seal assembly	Acceptable as is	
R1	Curvic Coupling	Acceptable as is	
R1	Oil Deflector	Acceptable as is	
R1	IP Compressor Rotor Blades Stage 1	Acceptable as is	
R1	IP Compressor Rotor Blades Stage 2	Acceptable as is	
R1	IP Compressor Rotor Blades Stage 3	Acceptable as is	
R1	IP Compressor Rotor Blades Stage 4	Clean - Do not remove coatings	Retainers are relaxed and require replacement with new
R1	IP Compressor Rotor Blades Stage 5	Clean - Do not remove coatings	Retainers are relaxed and require replacement with new
R1	IP Compressor Rotor Blades Stage 6	Acceptable as is	
R1	IP Compressor Rotor Blades Stage 7	Acceptable as is	
03 Module Intermediate Casing 1703-011			

Customer
Work description
S/O#
Engine#
P/O -
Reason for removal/Special instructions
Project Manager
Revision/date

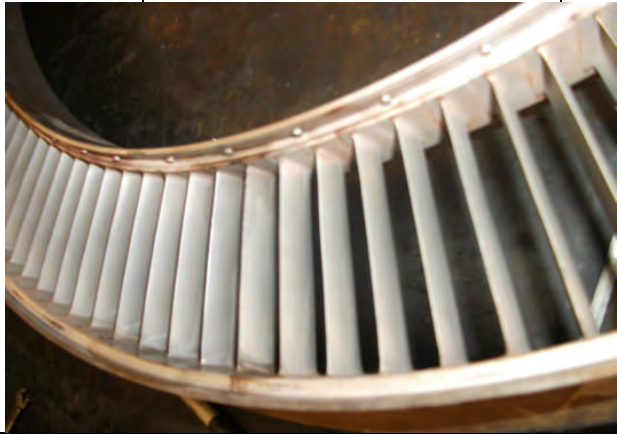
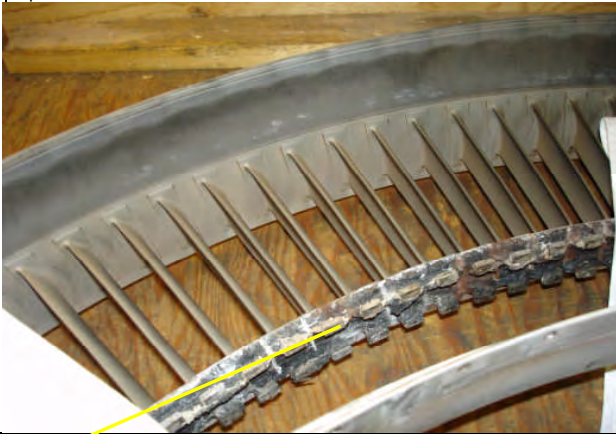
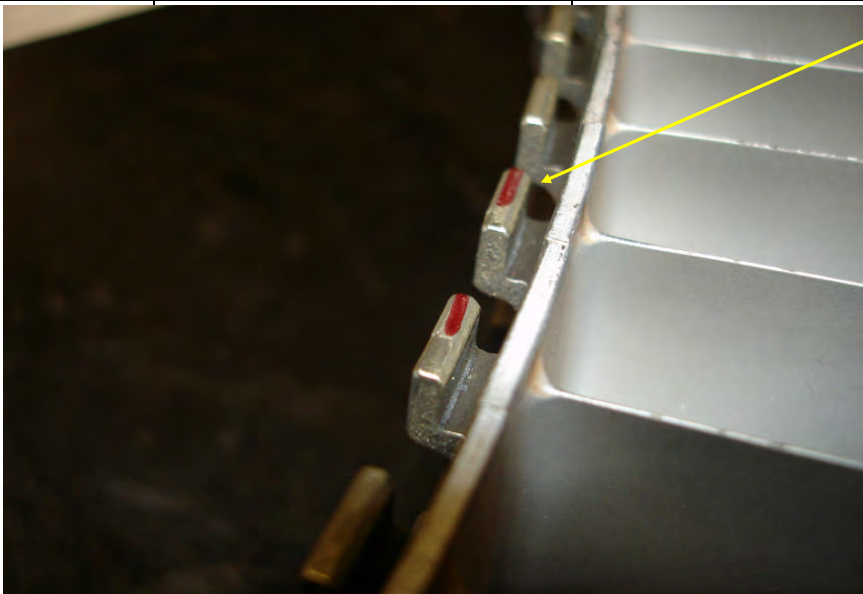
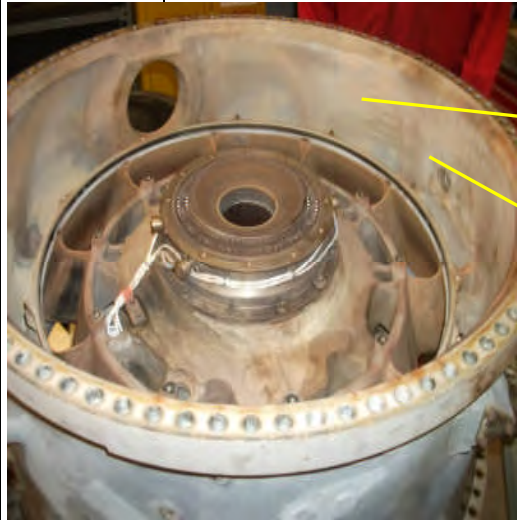
Union Gas
Minor overhaul
CA9001362
1700-011
4500182641
N/A
S Hayes
R1/April 11



Reference	Section 1010 Internal Gearbox	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
R1	HP curvic coupling assembly	Acceptable as is	Torque satis
R1	Gear assy driven bevel	Clean - Do not remove coatings	
R1	Gear bevel driving	Clean - Do not remove coatings	
	Accessory gearbox bearings	Hold - specify	
R1	Race assy driven bevel	Not Disturbed	No further work to be accomplished on minor overhaul
R1	Bearing assy	Not Disturbed	No further work to be accomplished on minor overhaul
R1	Bearing assy roller	Not Disturbed	No further work to be accomplished on minor overhaul
R1	Bearing assy ball	Not Disturbed	No further work to be accomplished on minor overhaul
	Carrier assy clutch		
	Carrier pawl	Full detail strip/inspection	
	Pawl	Full detail strip/inspection	
R3	Spring pawl	Full detail strip/inspection	All springs replaced with new
	Pin pawl pivot	Full detail strip/inspection	
	Pin pawl stop	Full detail strip/inspection	
	HP Main Location Double Ball Bearing	Not Disturbed	No further work to be accomplished on minor overhaul
R3	HP Bearing Housing	Acceptable as is	
R3	HP Stub Shaft Assy	Acceptable as is	
R3	Air Sleeve (HP Stubshaft)	Assess in situ	
Reference	Section 1045 HS Gearbox drive quill and fittings		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Quillshaft	Not Received	
R1	Seal ring	Not Received	
Reference	Section 1420 RPM Indicating system		Visual inspection, Identify mod standard, Photos, Recommendations
R1	HP speed probes	Function test	Mod 1231 47.7Ω, 46.1Ω, 46.2Ω, 47.2Ω

Final Report		
Customer	Union Gas	
Work description	Minor overhaul	
S/O#	CA9001362	
Engine#	1700-011	
P/O -	4500182641	
Reason for removal/Special instructions	N/A	
Project Manager	S Hayes	
Revision/date	R1/April 11	



Reference	Section 1661 Compressor Intermediate Case - 1700-90	Visual inspection, Identify mod standard, Photos, Recommendations
R3	OGV UNIT STAGE 7	Overhaul process
		
		Detail inspection revealed tribomet loss on dovetails at approximately 30 locations (25%). Minimum recommended requirement is to route the assembly for tribomet re-application iaw MOD 1190 and abradable lining renewal. This still leaves the assembly at a lower than RR recommended standard (non Mod 1117 post Mod 1190 non Mod 1249). There is no rework on this assembly to accomplish. Expanded repairs to the existing assembly were discontinued and Customer supplied spare was installed
R3	Shroud inner lower	Full detail strip/inspection
R3	Shroud inner upper	Full detail strip/inspection
R1	Seal assy stepped	Additional repairs required
R1	Case assy, compressor, intermediate	Overhaul process
		
		
	Ring, spacer	Full detail strip/inspection
	Ring retaining	Full detail strip/inspection
R3	Baffle air seal	Additional repairs required
R3	Seal assy labyrinth	Additional repairs required
		Weld repair to worn holes
		Nickel graphite coating renewal

Final Report		
Customer	Union Gas	
Work description	Minor overhaul	
S/O#	CA9001362	
Engine#	1700-011	
P/O -	4500182641	
Reason for removal/Special instructions	N/A	
Project Manager	S Hayes	
Revision/date	R1/April 11	

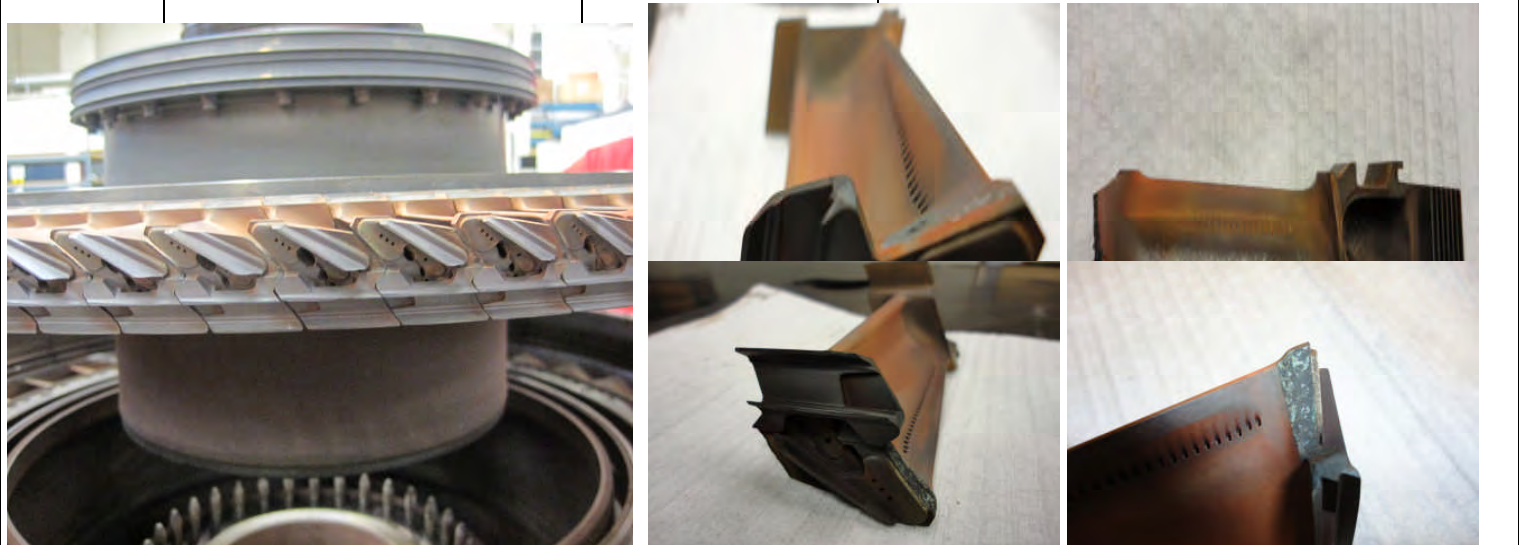


Reference	Section 1668 HP and IP compressor location bearings	Visual inspection, Identify mod standard, Photos, Recommendations
R1	IP curvic coupling assembly	Acceptable as is
R1	IP Stub Shaft Assy	Clean - Do not remove coatings
R1	IP Main Location Double Ball Bearing	Not Disturbed
	IP Bearing Housing	Assess in situ
	Diaphragm assy	Assess in situ
	Labyrinth IP shaft (Metco)	Assess in situ
		Oil stained
		Metco not visible without further strip
03 module pictures		

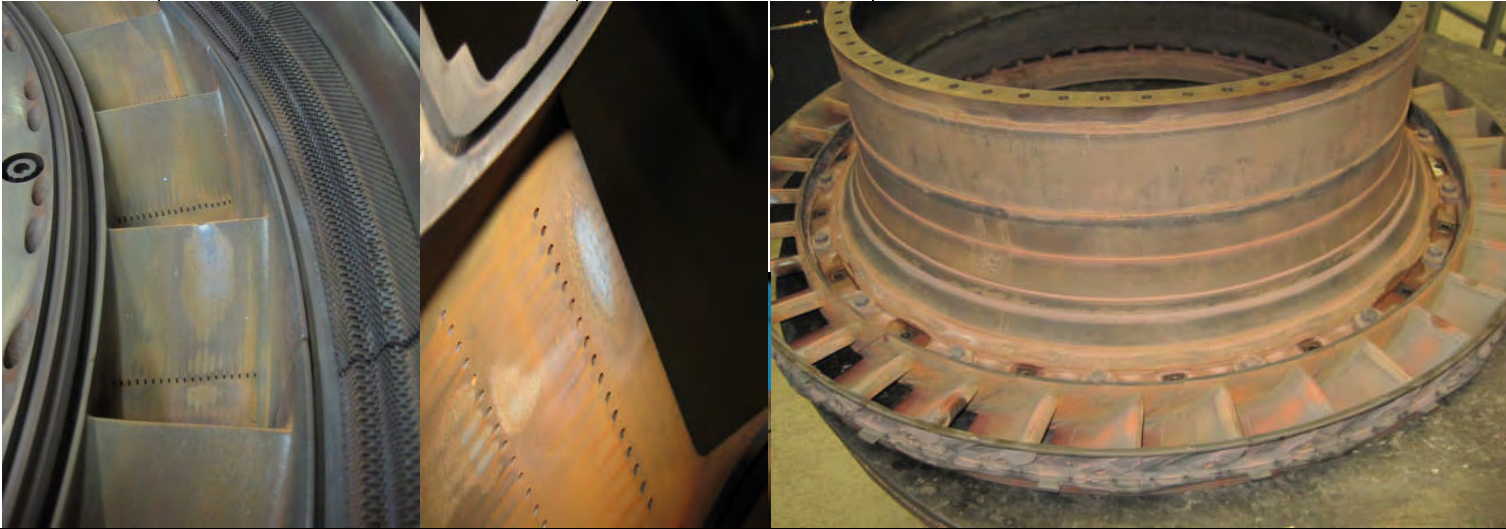


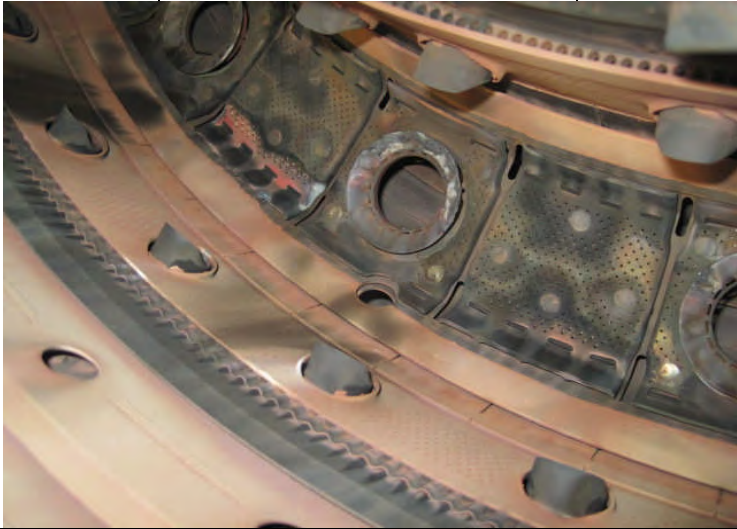
04 Module	HP System
	1704-011

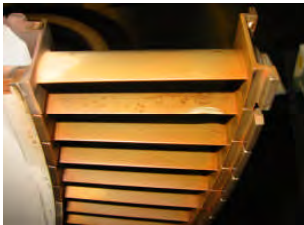
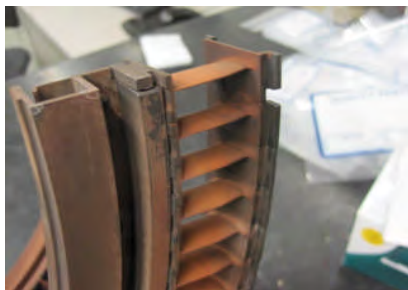
Reference	1069 Attachment Fittings HP Turbine Rotor	Visual inspection, Identify mod standard, Photos, Recommendations
Reference	1071 Turbine Rotor Discs and Shaft	Full detail strip/inspection
	HPT Blades	Overhaul process
		Life analysis top be taken on blade sample - 3 blades rejected for cracking



Final Report			
Customer	Union Gas		
Work description	Minor overhaul		
S/O#	CA9001362		
Engine#	1700-011		
P/O -	4500182641		
Reason for removal/Special instructions	N/A		
Project Manager	S Hayes		
Revision/date	R1/April 11		
	HPT Disc	Full detail strip/inspection	
	HPT Stubshaft assy	Full detail strip/inspection	
Reference	1081 Nozzle Case and Nozzle Vanes HP	Expose module/Section	Visual inspection, Identify mod standard, Photos, Recommendations
	Ring assy retaining	Full detail strip/inspection	
R3	HP Seal Segments	Overhaul process	In relative good condition - No vendor available for honeycomb renewal - NDT accomplished (no cracks) refit as is (Ser J coating only) 

Final Report			
Customer	Union Gas	 TRANSCANADA TURBINES The Independent Alternative	
Work description	Minor overhaul		
S/O#	CA9001362		
Engine#	1700-011		
P/O -	4500182641		
Reason for removal/Special instructions	N/A		
Project Manager	S Hayes		
Revision/date	R1/April 11		
	HP NGV	Overhaul process	1 TE coating damage/missing material. 2 locations of leading edge coating loss.
			
	Nozzle box seals/supports	Full detail strip/inspection	
Reference	1088 Attachment Parts and Fittings Combustion Liners	Full detail strip/inspection	Visual inspection, Identify mod standard, Photos, Recommendations
Reference	1089 Attachment Fittings Combustion Outer Case	Full detail strip/inspection	Visual inspection, Identify mod standard, Photos, Recommendations
Reference	1090(A) Attachment Fittings Combustion Outer Case	Full detail strip/inspection	Visual inspection, Identify mod standard, Photos, Recommendations
R1	Bracket support assy (Pigs Noses)	Acceptable as is	
R1	Burner Liners (18 off)	Full detail strip/inspection	Renew coatings
R1	04 Outer Case Assy	Full detail strip/inspection	Renew coatings
			
Reference	1092 Combustion Liners		Visual inspection, Identify mod standard, Photos, Recommendations
	Case assy, comb inner (nozzle box cone)	Full detail strip/inspection	
	Rear Combustion liner	Overhaul process	
			

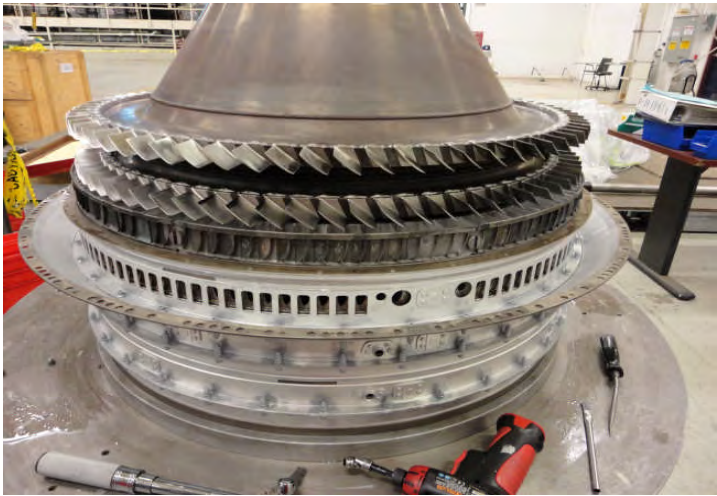
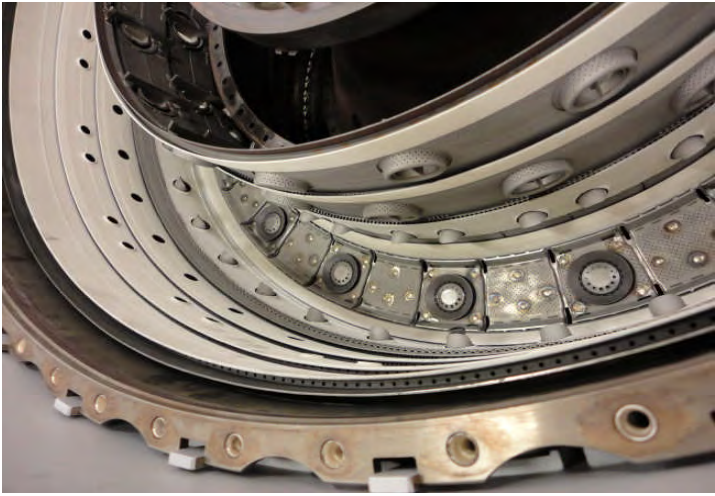
Final Report			
Customer	Union Gas	 TRANSCANADA TURBINES The Independent Alternative	
Work description	Minor overhaul		
S/O#	CA9001362		
Engine#	1700-011		
P/O -	4500182641		
Reason for removal/Special instructions	N/A		
Project Manager	S Hayes		
Revision/date	R1/April 11		
	Front Combustion Liner	Overhaul process	Relatively good condition - minor/no parent material loss on outer liner (typical damaged location of Union Gas 24C units)
			
	Rear liner assembly (22 only)	Overhaul process	
Reference	1093 Combustion Outer Case Fittings		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Sleeve P3	Full detail strip/inspection	
R1	Valve assy drain	Full detail strip/inspection	
R1	Sleeve HP6	Full detail strip/inspection	
R1	Seal assy	Clean - Do not remove coatings	
R1	Plate blanking	Not Received	
R1	Probe, P3/T3	Not Received	
Reference	1662 Compressor Casing and Vanes HP	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
Reference	HP Casings	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
R3	Outer blade path lining casings - HP1	Overhaul process	Metco porous and worn - Abrable and coating renewal required
R3	Outer blade path lining casings - HP2	Overhaul process	Metco porous and worn - Abrable and coating renewal required
			
R3	Outer blade path lining casings - HP3	Overhaul process	Metco porous and worn - Abrable and coating renewal required
R3	Outer blade path lining casings - HP4	Overhaul process	Metco porous and worn - Abrable and coating renewal required
R3	Outer blade path lining casings - HP5	Overhaul process	Metco porous and worn - Abrable and coating renewal required
R3	Outer blade path lining casings - HP6	Overhaul process	Metco porous and worn - Abrable and coating renewal required - Borescope boss replacement as well
R3	Locating cone supports	Full detail strip/inspection	Ser w reapplication
Reference	Inner shroud assemblies	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
R3	Inner shrouds - HP1	Full detail strip/inspection	Metco worn - Abrable and coating renewal required
R3	Inner shrouds - HP2	Full detail strip/inspection	Metco worn - Abrable and coating renewal required
R3	Inner shrouds - HP3	Full detail strip/inspection	Metco worn - Abrable and coating renewal required
R3	Inner shrouds - HP4	Full detail strip/inspection	Metco worn - Abrable and coating renewal required
		 	
R3	Inner shrouds - HP5	Full detail strip/inspection	Metco worn - Abrable and coating renewal required

Customer		Final Report	
Work description		Union Gas	
S/O#		Minor overhaul	
Engine#		CA9001362	
P/O -		1700-011	
Reason for removal/Special instructions		4500182641	
Project Manager		N/A	
Revision/date		S Hayes	
		R1/April 11	
			
Reference	Stator vane assemblies	Bulk strip	Visual inspection, Identify mod standard, Photos, Recommendations
R1	HP Stator Vanes HP1	Further disassembly required	Coating renewal required 
R1	HP Stator Vanes HP2	Further disassembly required	Coating renewal required
R1	HP Stator Vanes HP3	Further disassembly required 	Coating renewal required - 3 vanes rejected for damage in prohibited area - 
R1	HP Stator Vanes HP4	Further disassembly required	Coating renewal required - one vane rejected for Airfoil damage
R1	HP Stator Vanes HP5	Further disassembly required	Coating renewal required 
Reference	1664 Compressor Rotor HP	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
R1	HP Compressor Rotor Blade - HP1	Clean - Do not remove coatings	
R1	HP Compressor Rotor Blade - HP2	Clean - Do not remove coatings	
R1	HP Compressor Rotor Blade - HP3	Clean - Do not remove coatings	
R1	HP Compressor Rotor Blade - HP4	Full detail strip/inspection	Paint deteriorated 

Final Report			
Customer	Union Gas		 TRANSCANADA TURBINES The Independent Alternative
Work description	Minor overhaul		
S/O#	CA9001362		
Engine#	1700-011		
P/O -	4500182641		
Reason for removal/Special instructions	N/A		
Project Manager	S Hayes		
Revision/date	R1/April 11		

R3	HP Compressor Rotor Blade - HP5	Rejected	Eddy current inspection in situ - 13 indications - reject entire set due HCF indications
R4	HP Compressor Rotor Blade - HP6	Rejected	Eddy current inspection in situ - 9 indications -reject entire set due HCF indications
Reference	Compressor disc assemblies	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
R1	HP1/2 Disc assembly	Clean - Do not remove coatings	
R1	HP3 Disc assembly/curvic coupling	Clean - Do not remove coatings	
R1	HP4-6 Disc assembly	Clean - Do not remove coatings	
Reference	24GT disc assemblies	Acceptable as is	Visual inspection, Identify mod standard, Photos, Recommendations
	Rotor Disc HPC1-4	Action	
	Rotor Disc HP5-6	Action	
	Bolt-taper	Action	
	Curvic Coupling	Action	
	Compressor Bolt assy HPC-HPT joint	Action	

04 module build pictures



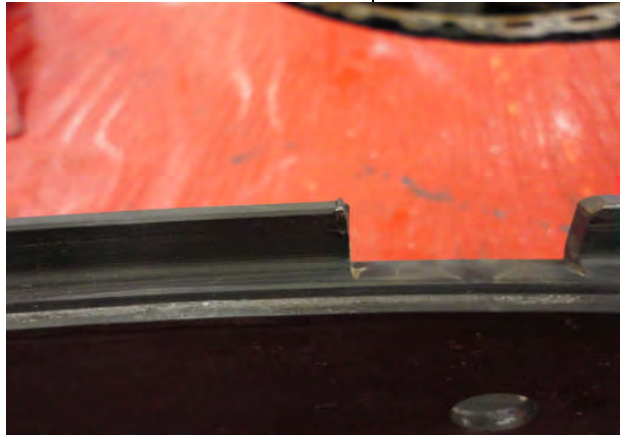
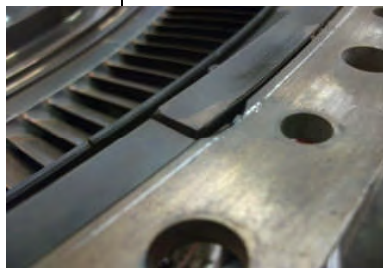
Final Report		
Customer	Union Gas	 TRANSCANADA TURBINES The Independent Alternative
Work description	Minor overhaul	
S/O#	CA9001362	
Engine#	1700-011	
P/O -	4500182641	
Reason for removal/Special instructions	N/A	
Project Manager	S Hayes	
Revision/date	R1/April 11	

05 Module	IP Turbine Assembly 1705-011
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Reference	1072 Turbine Rotor Discs and Shaft IP	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
	Blade, IP turbine	Acceptable as is	Blades are tight and in good condition - appear to be new (no weld repairs to abutment surfaces)
			
	IP turbine Disc	Acceptable as is	
	Bolt taper nominal	Acceptable as is	
R1	IPT Stub shaft assy	Overhaul process	Coked - requires removal, inspection and re-process
			

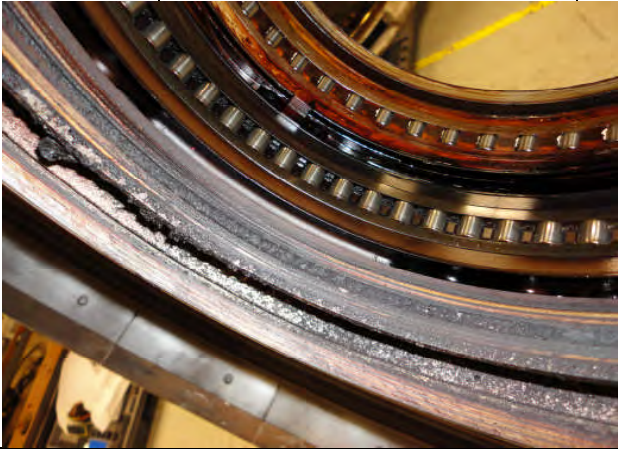
Final Report			
Customer Work description S/O# Engine# P/O - Reason for removal/Special instructions Project Manager Revision/date		Union Gas Minor overhaul CA9001362 1700-011 4500182641 N/A S Hayes R1/April 11	
			
R1	IP turbine Shaft	Overhaul process	Unusual amounts of corrosion noted, strip/NDT and assessment required.
  			
	Metering Plate	Full detail strip/inspection	
Reference	1080 Nozzle Case and Nozzle Vanes	Assess in situ	Visual inspection, Identify mod standard, Photos, Recommendations
R1	Ring, sealing, IP NGV front	Full detail strip/inspection	
R1	Plate assy brg hsg	Full detail strip/inspection	
R1	Supt seal rear outer	Full detail strip/inspection	
R1	Seal assy	Full detail strip/inspection	
R1	Accelerometer Bracket	Full detail strip/inspection	
R1	Boroscope Plug	Full detail strip/inspection	
R1	Spacer mounting	Full detail strip/inspection	
R3	IP Seal Segments	Additional repairs required	E dimension is acceptable (0.018" Average) - NDT inspection noted 2 location lug cracks that were salvaged but required 1 TCT rotatable - remainder of set routed for Ser J application
 			
R1	Seal support front	Full detail strip/inspection	
R2	IP NGV	Overhaul process	Leading edge cracking noted on 13 vanes at the radial outward position that will require repair - entire set has be routed for coating removal and inspection.
 			
R1	Ring sealing rear (NGV)	Full detail strip/inspection	
R1	Seal support rear	Full detail strip/inspection	
R1	05 Outer Case	Full detail strip/inspection	

Final Report			
Customer Work description S/O# Engine# P/O - Reason for removal/Special instructions Project Manager Revision/date		Union Gas Minor overhaul CA9001362 1700-011 4500182641 N/A S Hayes R1/April 11	
			
R1	Ring retainer IP/HP NGV (Large ring with 3 bolts)	Full detail strip/inspection	
R3	Liner Segments	Additional repairs required	E dimension is acceptable (0.018" Average) - Pre mod 1523 (UPGRADE OF SEAL SEGMENT LINER SHANK NUT AND BOLT - CR in service). Upon removal seal segment flange was worn and required weld repair to V lip/locating slot and SerJ application
			
R1	Locking Segments	Further disassembly required	Several bent - (abnormal damage) - on rejected for excessive bolt hole wear
			
	Spacer seal assy HP Bearing Retainer	Clean - Do not remove coatings Overhaul process	Metco heavily worn
			
R3	HP Roller Bearing	Overhaul process	Carbon scoring on races
R3	IP Roller Bearing	Overhaul process	Carbon scoring on races

Final Report			
Customer	Union Gas		
Work description	Minor overhaul		
S/O#	CA9001362		
Engine#	1700-011		
P/O -	4500182641		
Reason for removal/Special instructions	N/A		
Project Manager	S Hayes		
Revision/date	R1/April 11		



R3	HP/IP Bearing Support Assy (Spider)	Full detail strip/inspection	in poor condition - fails pressure test on supply line - Full detail strip required - cleaning allowed for acceptable pressurization - Ser W re protection required
			

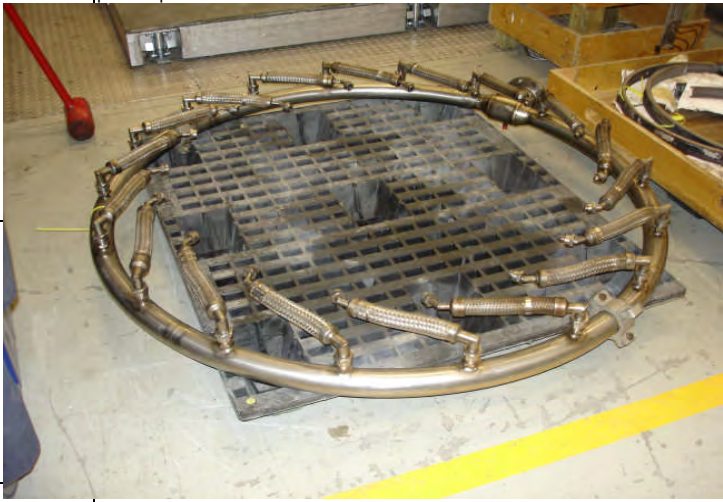
R1	IP Bearing Retainer	Overhaul process	Metco worn. Heavy coking
			

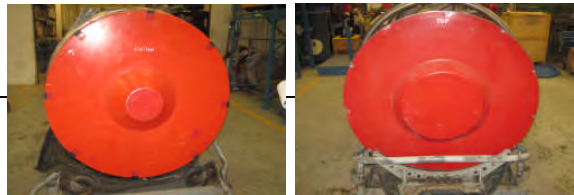
R1	Nozzle oil jet	Full detail strip/inspection	Pre mod 946 1.94g/sec (limit 1.8 - 2.05)
	Elbow outlet vent (Davis Valve)	Not Received	
	Incorporate the following MODs, OIA and RN		

05 module pictures



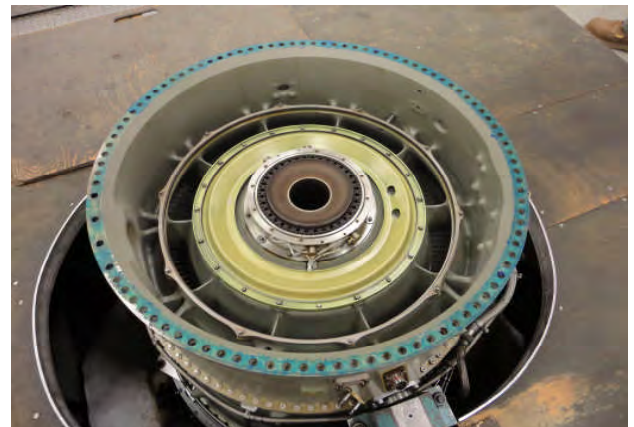
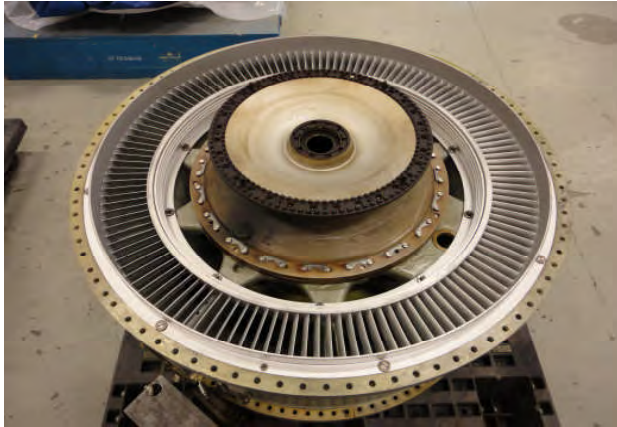
06 Module	Non-Modular Parts and Accessories		

Final Report			
Customer Work description S/O# Engine# P/O - Reason for removal/Special instructions Project Manager Revision/date		Union Gas Minor overhaul CA9001362 1700-011 4500182641 N/A S Hayes R1/April 11	
			
Reference	Section 1022 Nose Bullet		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Nose bullet assy - one piece	Full detail strip/inspection	
R1	Nose bullet assy support	Full detail strip/inspection	
Reference	Section 1096 Thermocouples and harness		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Thermocouple - T2	Not Received	Use slave for test
R1	Thermocouple, T25	Not Received	Use slave for test
R1	Thermocouple T3	Not Received	Use slave for test
R1	Thermocouple - T455	Not Received	Use slave for test
R1	Thermocouple, T6	Not Received	Use slave for test
R1	Probe P6 pressure assy	Not Received	Use slave for test
	Section 1106 Fuel spray nozzles	Full detail strip/inspection	Visual inspection, Identify mod standard, Photos, Recommendations
	Burner assemblies	Overhaul process	
			
R1	Seal Carriers	Overhaul process	Sliver plate/dry film lubricant to sealing surfaces
R1	Gas Manifold Tube Assy Right	Acceptable as is	Pre Mod Manifold, several mandatory mods to review - unknown configuration - passed pressure test
R1	Gas Manifold Tube Assy Left	Acceptable as is	
R1	Burner Gas Feed Pipes	Acceptable as is	
			
Reference	Section 1110/1376 Oil system tubes and fittings (hydraulic)/Air flow control regulator and actuator		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Block assy oil scav	Full detail strip/inspection	
R1	Chip detector assy - 01 module	Acceptable as is	Clear at induction
R1	Chip detector assy - 03 module	Acceptable as is	Clear at induction
R1	Chip detector assy - 05 module	Acceptable as is	Clear at induction
R1	Davis valve	Not Received	
R1	Oil Filter Assy	Full detail strip/inspection	
R1	Air and Oil Pipes - Various	Full detail strip/inspection	
			
Reference	Section 1229/1365 IP compressor air outlet/compressor bleed valve control IP/HP		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Cover assy outlet (IP BOV's)	Acceptable as is	
R1	IP BOV's	Overhaul process	
R1	Duct air bleed valve	Full detail strip/inspection	require weld repair on both ducts
R1	BOV controller (Pre 1169)/Filter assy	Function test	Operating within limits - adjusted to optimum specifications
R1	Starting BOV Ducts	Acceptable as is	
R1	Valve, HP3 starting	Overhaul process	
R1	Bleed valve handling	Overhaul process	UP graded piston pistons

		Final Report	
Customer		Union Gas	
Work description		Minor overhaul	
S/O#		CA9001362	
Engine#		1700-011	
P/O -		4500182641	
Reason for removal/Special instructions		N/A	
Project Manager		S Hayes	
Revision/date		R1/April 11	
R1	Handling BOV Duct assy handling	Acceptable as is	
R1	Vent valve - solenoid control	Function test	
Reference	Section 1330 Electrical harness	Full detail strip/inspection	Visual inspection, Identify mod standard, Photos, Recommendations
R1	Harness assy IP/HP probes	Full detail strip/inspection	
R1	Harness, electrical bleed Vent valve solenoid	Full detail strip/inspection	
R1	Harness, electrical VIGV MOOG valve	Not Received	
R1	Transducer- RVDT	Not Received	
R1	Harness, electrical VIGV LVDT	Not Received	
R1	Harness, t/couple box a	Not Received	
R1	Harness, t/couple box b	Not Received	
R1	Harness, t/couple box c	Not Received	
R1	Harness, t/couple pre 1221	Not Received	
R1	Harness, electrical HP3 transducer	Not Received	
Reference	Section 1492/ HE igniter plugs		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Plug assy HE igniter	Full detail strip/inspection	
Reference	Section 1175/1510 Engine mounting front/module transport blanks		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Front Intake Blank	Acceptable as is	
R1	Rear Exhaust Blank	Acceptable as is	
Reference	Section 1330 ENGINE VIBRATION INDICATOR		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Accelerometers	Full detail strip/inspection	
Reference	Section 1667 AIR INTAKE FORWARD EXTENSION		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Extension air intake	Clean - Do not remove coatings	
Reference	Section 1680 disconnect platform		Visual inspection, Identify mod standard, Photos, Recommendations
R1	Battery plate assy	Clean - Do not remove coatings	
Build pictures			

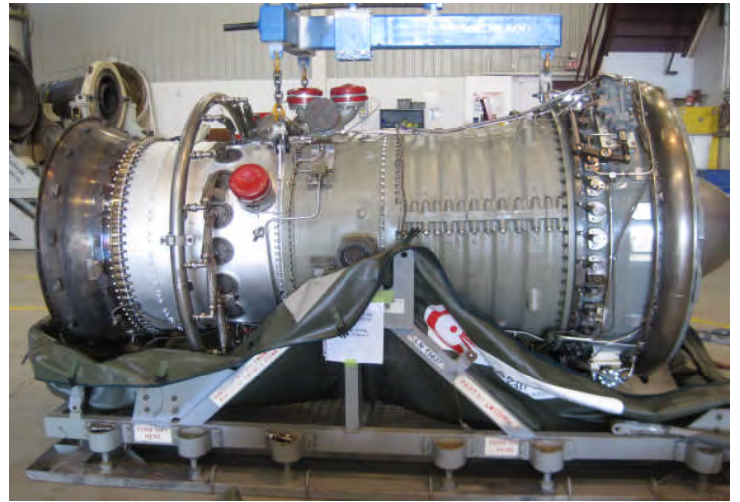
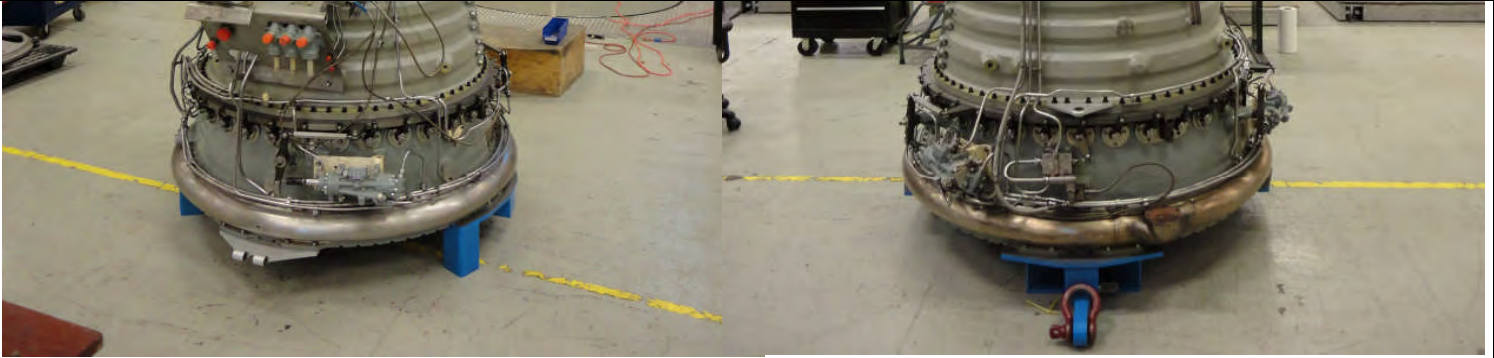
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Work description
S/O#
Engine#
P/O -
Reason for removal/Special instructions
Project Manager
Revision/date

Union Gas
Minor overhaul
CA9001362
1700-011
4500182641
N/A
S Hayes
R1/April 11



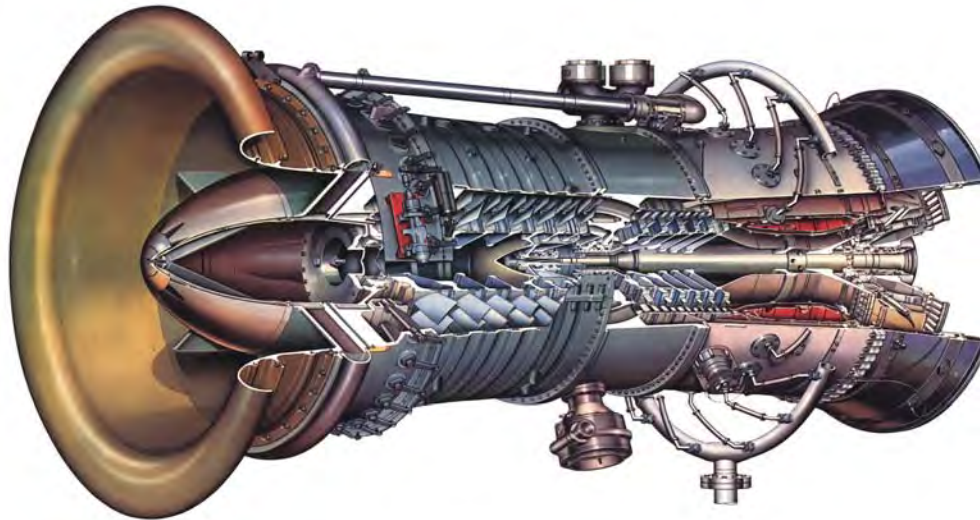
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Project Manager
Revision/date

Union Gas
Minor overhaul
CA9001362
1700-011
4500182641
N/A
S Hayes
R1/April 11



Supplemental reports

Rolls-Royce Industrial RB211 Engine Test Report



Test Details

Sales Order:	CA9001362-1	Test Schedule:	CTS5017/2
Document Reference:	CA9001362	Test Cell:	Calgary
Customer:	Union Gas	Test Operator:	J. Young
ESN:	1700011	Test Observer:	N. Donoghue
Engine Type:	RB211-22	Combustor Type:	PK1
Test Date:	2011-08-14	Oil:	MIL-L-23699
Test Standard:	OVERHAUL	Engine Inhibited:	n/a
Fuel Used:	NGAS (537.5GJ)		

Test Result:	PASS
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Report Author: J. Taylor	Report Date: 15-Aug-11	To: S. Hayes	Report Issue: 0
Circulation: Project Manager, Test cell, Customer (via Project Manager), D Lympny, S Ewen, D Simonelli, E Stitt, N Lennox, B Archer, S Tymchen, P Stuckey, C Howard Production: T Bishop, J Robertson, C Murphy Finance: B Stewart, S Donald, R Millar, V Mitchell Engineering: P Nicholas, D Bauer			



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1. Test Summary/Adjustments

Overhauled test. Engine passes all CTS5017/2 criteria. Ian Langham was present for the customer witness test on behalf of Union Gas.

No other adjustments to the data or engine were required for the test that would effect the engine performance. Operating parameters during the test were maintained within the acceptable OEM limits. MCD's checked and found to be clear.

2. Test Results

This section documents the test acceptability for the test engine against each of the test schedule requirements. Appendix A tabulates the raw and corrected data recorded during the test. Appendix B contains the performance charts for the VIGV, vibration and performance objectives.

General	Units	Value	Limit	Type	Pass/Fail
NH Roll Down Time	sec	447	300	MIN	Pass
NL Roll Down Time	sec	552	180	MIN	Pass
N1 3rd Probe Check	yes/no	yes	yes	N/A	Pass
N2 4th Probe Check	yes/no	yes	yes	N/A	Pass
MCD's Clear post test **	yes/no	yes	yes	N/A	Pass

Oil Consumption	Units	Value	Limit	Type	Pass/Fail
Oil Consumption	l/hr	0.0	0.57	MAX	Pass

Vibration Limit Check	Units	Value	Limit	Type	Pass/Fail
Front Vibration	mm/s avg	4.2	16	MAX	Pass
Center Vibration	mm/s avg	6.9	16	MAX	Pass
Rear Vibration	mm/s avg	8.4	16	MAX	Pass

EGT Spread	Units	Value	Limit	Type	Pass/Fail
Observed Maximum EGT Spread	deg. C	9.7	55	MAX	Pass
Observed Minimum EGT Spread	deg. C	-9.1	-55	MIN	Pass

Oil Scavenge Temperature	Units	Value	Limit	Type	Pass/Fail
Lube Oil Temp L2	deg. C	79.2	200	MAX	Pass
Lube Oil Temp L3	deg. C	134.3	200	MAX	Pass
Lube Oil Temp L4	deg. C	142.4	200	MAX	Pass

BOV Setting	Units	Value	Limit	Type	Pass/Fail
BOV Open	-	291.2	291	MIN	Pass
	-		343	MAX	Pass
BOV Closed	-	338.4	335	MIN	Pass
	-		349	MAX	Pass

Note:

* after Pass/Fail indicates this result was conceded, see section 1 for details.

** See Appendix D for details

For VIGV schedule, see page 15

Engine Test Rating Point

Test Parameter	Units	Acceptance Summary	
SOTC rating point:	K	1,375	
EGHPC limit at the SOTC RP:	HP	30294	
EGHPC at SOTC RP:	HP	33342	Better than nominal
Maximum BSFCC:	BTU/HP.hr	6615	
BSFCC at Nominal EGHP:	BTU/HP.hr	6476	Better than nominal

Rating Points used in the determination of the acceptance values

Parameter	Units	Point 1	Point 2	Point 3	Point 4	Point 5
Date		15/08/11	15/08/11	15/08/11	15/08/11	15/08/11
Time		15:19:14	15:24:53	15:31:21	15:36:42	15:41:19
EGHPC	HP	40270	37265	33166	29419	22660
SFCC	BTU/HP.hr	6,142	6,216	6,373	6,530	6,953
SOTC *	K	1,449	1,416	1,375	1,330	1,248
EGHPC (VIGV)	HP	-	-	-	-	-
SFCC (VIGV)	BTU/HP.hr	-	-	-	-	-
SOTC (VIGV)	K	-	-	-	-	-

* SOT is test station 41 from section 5

NOTE:

SOTC = Stator Outlet temperature (HP Turbine entry temperature) ISO Corrected

EGHPC = Engine Gas Horse Power ISO Corrected

BSFCC = Heat rate ISO Corrected

3. Test Objectives

The following test procedures are to be conducted in general accordance with ASME PTC-22 2005 (Gas turbine performance test codes), ISO 2314:1989 (Gas turbine Acceptance tests) and the listed OEM test schedule sections below:

Description	Reference	Completed
1. Engine Cranking Tests	CTS 5017 5.1	YES
2. Post Cranking Checks	CTS 5017 5.2	YES
3. Start to Idle	CTS 5017 5.3	YES
4. Initial Checks of VIGV's and Bleed Valves	CTS 5017 5.4	YES
5. Running-In Part I	CTS 5017 5.5	YES
6. Running-In Part II	CTS 5017 5.6	YES
7. Setting of VIGV's and Bleed Valves	CTS 5017 5.7	YES
8. Performance Test and Oil Consumption Check	CTS 5017 5.9, 5.10, 5.12	YES
9. Final Checks	CTS 5017 5.14	YES
10. Accel/Decel vibration survey	TCT Procedure	YES

4. Description of Equipment for Test

The following is a description of the TCT equipment rigged for the test:

- Test adaptor mounting, to support engine whilst in the test cell
- Exhaust jet pipe (TFE2346), Exhaust annulus (TFE2155) and nozzle w/ trimmers ("A" 315 SQIN P/N AB65304), to simulate back pressure from power turbine
- Bell mouth intake flare (TFE1738)
- Additional instrumentation for monitoring of gas path pressures and temperatures (Section 5)
- Fuel, oil, start air and instrument lines are connected between engine and test cell

TCT utilizes a PLC based engine control and monitoring system, which is provided by the Rolls-Royce Entronics FT-110 and Wonderware based HMI.

TCT has been officially awarded Category 1 test status by Rolls-Royce. This was achieved by successfully calibrating all test equipment against the Rolls-Royce RB211 master test facility.

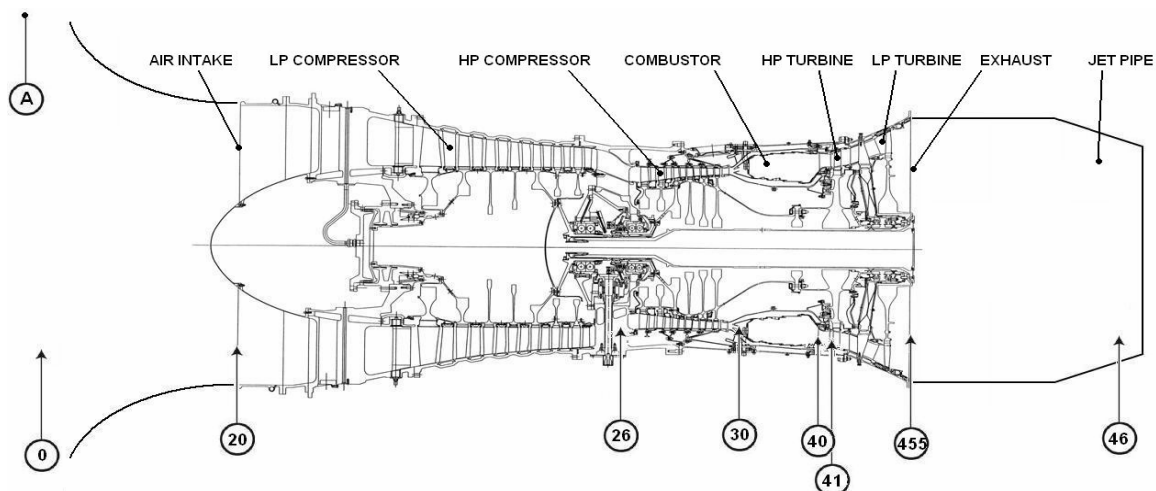
5. Test Measurement Description

Various instrumentation points along the main gas path are identified with "aerodynamic station numbers" for monitoring temperature and pressure characteristics of the main gas flow. The table below shows the station descriptions, and the figure shows the location of the RB211 test stations referred in this document.

No	Description	Measurements
A	Ambient	Ambient pressure - Barometer Relative humidity
0	Air Inlet	Temperature, T1 - 3 RTD's Cell pressure, P0 - 1 transducer
2	LP Compressor Inlet	Speed probe, LP - magnetic pickup Pressure, S1 - 12 Static flare tapings
26	LP/HP Compressor Inter-stage duct	Temperature, T26 - 1 type K thermocouple Pressure, PS26 - Static tapping
30	HP Compressor Discharge	Speed probe, HP - magnetic pickup Temperature, T3 - 4 type K thermocouples Pressure, S3 - 4 Static tapings
40	Combustor Section	Fuel flow - 1 Coriolis flow meter Fuel temperature, TFG - RTD Fuel pressure, PFG - transducer for 1 static tapping
455	Gas generator exhaust	Temperature, T455 - 8 type K thermocouples Pressure, P455 - 10 total rake tapings Pressure, S455 - 2 static tapings
46	Jet Pipe Exit	Temperature, JPT - 12 type K thermocouples Pressure, S46 - 1 static tapping

Other instrumentation included in the test not related to the gas path:

- Analysis of the gas composition from a chromatograph (for each steady-state recording)
- Temperatures for lube oil L1 to L4 measured with RTD's
- Pressures for the lube oil L01 to L07 measured with transducers
- Vibration transducers mounted on the front, center and rear
- VIGV angle - solenoid relative position to datum



6. Correction Methods

The data reduction method performed on the recorded gas path test data uses the RR Performance Analysis Program (or PAP) Version 4.2. This uses industry standard ISO correction calculations applied to the measured gas path parameters to correct to the standard conditions of ambient temperature of 15 °C (59°F) and sea level pressure of 14.696 PSIA, and 60% relative humidity. Fuel flow has an additional correction to a standard fuel heating value of 11730 BTU/Lb. The correction formulae are in the form of:

ISO Corrected Value = Recorded Value * Θ * $\Delta\delta$ * RHCORR
ISO Corrected Heat rate = $3600 * (\text{ISO Corrected Fuel flow} * \text{LCV}) / \text{EGHPC}$

Where

Θ = $288.15\text{K} / \text{Test ambient temperature}$

Δ = $14.696 \text{ PSIA} / \text{Test ambient pressure}$

RHCORR = RH * RHFACT

Θ = OEM proprietary correction exponent for temperature

δ = OEM proprietary correction exponent for pressure

RHFACT = OEM proprietary correction factor for pressure

LCV = Lower calorific value of fuel

EGHPC = ISO Corrected isentropic engine gas horse power

Engine gas horse power and calculated T455 are thermodynamic RR proprietary calculations that are output via the PAP program. All corrected data can be found in Appendix A of this report.

All test facility owned instrumentation has been fully calibrated according to TCT quality procedures.

The Data Acquisition System (DAS) 'Engine Test' version 4.2.68 was used to record the engine test data. The data was stored in the 'Engine Test' database version 1.0. For steady-state performance readings, the engine was stabilized at each test data recording for 5 minutes. An analysis of the gas composition was taken for each performance reading for the fuel flow and heat rate calculations.

7. Test Calibration

All test facility owned instrumentation used for the test has been fully calibrated according to TCT quality procedures QP R5. All instrumentation is trended on an engine-by-engine basis in accordance to the Rolls-Royce OIA052 process.

Most instrumentation is verified on a quarterly basis; the records, histories and periods of these calibrations are stored and specified in the EngineTest SQL database.

Appendix A Observed and Corrected Test Data

Points used in the determination of the Rated acceptance values

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date		15/08/11	15/08/11	15/08/11	15/08/11	15/08/11
Time		15:19:14	15:24:53	15:31:21	15:36:42	15:41:19
NL/vT1	rpm	384.1	380.3	374.4	368.4	356.2
NH_a	rpm	9601	9502	9370	9242	8985
NH_b	rpm	9601	9503	9370	9242	8985
NH_c	rpm	9601	9503	9371	9242	8984
NL_a	rpm	6463	6400	6301	6202	6000
NL_b	rpm	6463	6400	6301	6202	6000
NL_c	rpm	6463	6400	6301	6202	6000
T1_Avg	deg C	10.0	10.0	10.1	10.3	10.5
T25_Avg	deg C	205.2	199.5	193.5	187.5	175.8
T3_a	deg C	481.0	469.9	454.6	441.9	415.6
T3_b	deg C	481.0	469.9	454.6	441.9	415.6
T3_c	deg C	481.0	469.9	454.6	441.9	415.6
T3_d	deg C	481.0	469.9	454.6	441.9	415.6
T455_01	deg C	684.0	659.6	628.6	602.7	548.7
T455_02	deg C	682.4	658.2	624.9	597.7	543.9
T455_03	deg C	688.2	664.4	633.1	606.2	551.8
T455_04	deg C	678.0	654.4	626.5	600.7	540.2
T455_05	deg C	681.5	654.6	624.8	596.9	543.2
T455_06	deg C	678.8	661.7	629.4	603.5	548.5
T455_07	deg C	691.2	668.7	641.5	614.1	558.7
T455_08	deg C	692.8	667.6	636.4	607.2	554.5
T455_09	deg C	N/A	N/A	N/A	N/A	N/A
T455_10	deg C	N/A	N/A	N/A	N/A	N/A
T455_11	deg C	N/A	N/A	N/A	N/A	N/A
T455_12	deg C	N/A	N/A	N/A	N/A	N/A
T455_13	deg C	N/A	N/A	N/A	N/A	N/A
T455_14	deg C	N/A	N/A	N/A	N/A	N/A
T455_15	deg C	N/A	N/A	N/A	N/A	N/A
T455_16	deg C	N/A	N/A	N/A	N/A	N/A
T455_17	deg C	N/A	N/A	N/A	N/A	N/A
T455_Avg	deg C	686.5	662.6	631.8	604.7	549.6
T455_Avg_a	deg C	N/A	N/A	N/A	N/A	N/A
T455_Avg_b	deg C	N/A	N/A	N/A	N/A	N/A
T455 Voted Avg	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_01	deg C	-2.5	-3.0	-3.2	-2.0	-0.7
T455_Sp_02	deg C	-4.1	-4.4	-6.9	-7.0	-5.8
T455_Sp_03	deg C	1.7	1.7	1.3	1.5	2.5
T455_Sp_04	deg C	-8.5	-8.2	-5.3	-4.0	-9.1
T455_Sp_05	deg C	-5.0	-8.1	-7.0	-7.8	-6.7
T455_Sp_06	deg C	-7.7	-1.0	-2.4	-1.2	-0.7
T455_Sp_07	deg C	4.7	6.0	9.7	9.4	9.1
T455_Sp_08	deg C	6.2	5.0	4.6	2.5	4.8
T455_Sp_09	deg C	N/A	N/A	N/A	N/A	N/A

Observed data continued...

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date		15/08/11	15/08/11	15/08/11	15/08/11	15/08/11
Time		15:19:14	15:24:53	15:31:21	15:36:42	15:41:19
T455_Sp_10	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_11	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_12	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_13	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_14	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_15	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_16	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_17	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_Max	deg C	6.2	6.0	9.7	9.4	9.1
T455_Sp_Min	deg C	-8.5	-8.2	-7.0	-7.8	-9.1
JPT_01	deg C	704.2	680.3	650.3	621.6	566.0
JPT_02	deg C	700.2	676.5	647.5	617.8	563.0
JPT_03	deg C	699.1	675.9	649.5	620.1	564.8
JPT_04	deg C	705.9	681.4	651.6	622.8	566.8
JPT_05	deg C	702.6	678.7	648.9	621.2	567.2
JPT_06	deg C	703.6	680.1	650.4	622.2	566.9
JPT_07	deg C	697.7	675.0	645.8	618.0	564.1
JPT_08	deg C	697.6	674.8	645.9	619.1	564.8
JPT_09	deg C	697.9	675.1	646.0	618.0	563.0
JPT_10	deg C	701.0	677.9	648.4	620.5	565.5
JPT_11	deg C	150.2	145.9	139.8	134.8	124.1
JPT_12	deg C	705.1	681.5	651.4	622.8	567.2
t_oil_L1_c	deg C	63.2	58.8	58.3	58.1	58.3
t_oil_L2_c	deg C	75.2	78.4	79.2	78.4	77.7
t_oil_L3_c	deg C	128.9	134.3	133.9	132.1	130.5
t_oil_L4_c	deg C	142.4	141.3	135.2	130.6	126.7
t_oil_tank_c	deg C	74.3	78.3	80.6	79.1	78.9
P0_kpaa	kpaa	88.99	88.98	88.97	88.96	88.97
P1_kpaa	kpaa	88.79	88.79	88.80	88.79	88.81
PS25	kpag	334.32	325.35	310.54	294.72	264.15
HP3	kpag	741.99	718.55	683.84	644.68	579.85
P3_HP6_a	kpag	1795.25	1727.86	1618.87	1523.77	1323.10
P3_HP6_b	kpag	1789.70	1726.06	1617.39	1516.22	1321.81
P3_HP6_c	kpag	1789.70	1726.06	1617.39	1516.22	1321.81
P3_HP6_d	kpag	1791.77	1722.20	1619.02	1518.37	1323.07
P7S	kpag	186.60	175.85	160.92	146.50	117.97
p_oil_L01_kpag	kpag	635.36	645.77	618.81	598.93	554.19
p_oil_L02_kpag	kpag	75.43	70.60	68.71	61.54	57.35
p_oil_L03_kpag	kpag	252.10	234.93	225.11	213.41	187.77
p_oil_L04_kpag	kpag	236.11	230.58	221.29	205.87	182.24
p_oil_L06_kpag	kpag	554.79	559.70	537.15	513.00	474.85
p_oil_L07_kpag	kpag	289.67	282.21	268.67	254.64	229.67
p_oil_L06dL07_kpag	kpag	265.12	277.50	268.49	258.36	245.18

Observed data continued...

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date		15/08/11	15/08/11	15/08/11	15/08/11	15/08/11
Time		15:19:14	15:24:53	15:31:21	15:36:42	15:41:19
p_oil_H01_kpag	kpag	4573.0	4563.8	4549.7	4558.5	4569.0
v_front_mmmps	mm/sec	4.2	4.2	4.0	3.4	2.8
v_center_mmmps	mm/sec	6.5	5.6	5.8	6.6	6.9
v_rear_mmmps	mm/sec	8.43	7.86	7.60	6.20	4.29
x_vigv_lvdt_deg	deg	-8.45	-5.23	-1.99	1.77	9.84
z_hum_pct	%	68.16	65.51	64.65	64.50	64.37
z_gas_C1_tav_pct	%	95.64	95.63	95.59	95.59	95.59
z_gas_C2_tav_pct	%	3.48	3.49	3.52	3.52	3.53
z_gas_C3_tav_pct	%	0.09	0.09	0.09	0.09	0.09
z_gas_IC4_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C4_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_IC5_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C5_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C6_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_N2_tav_pct	%	0.71	0.71	0.71	0.71	0.71
z_gas_CO2_tav_pct	%	0.08	0.08	0.09	0.09	0.09

Corrected Test Data

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date	-	15/08/11	15/08/11	15/08/11	15/08/11	15/08/11
Time	-	15:19:14	15:24:53	15:31:21	15:36:42	15:41:19
BAROL	Bar	89.0	89.0	89.0	89.0	89.0
Relative Humidity	%	67.6	65.5	64.5	64.5	63.9
VIGV Angle	deg	-8.5	-5.2	-2.0	1.8	9.8
Gas LCV	chu/lb	11737.2	11736.5	11734.4	11734.6	11734.8
EGHPC	HP	40270.1	37264.5	33166.2	29419.3	22659.6
FFC	kg/s	3.254	3.048	2.781	2.527	2.073
BSFCC (Heat rate)	btu/hp.hr	6142.2	6216.3	6372.8	6529.6	6953.4
SFCC	%	0.291	0.294	0.302	0.309	0.329
NLC	RPM	6520.9	6456.9	6356.4	6255.5	6048.4
NHC	RPM	9687.0	9587.8	9453.9	9323.3	9057.9
T1C	K	288.2	288.2	288.2	288.2	288.2
T26C	K	485.1	479.5	473.3	467.0	454.1
T30C	K	762.0	751.1	736.4	722.3	694.6
SOTC	K	1449.3	1415.7	1374.8	1330.3	1248.3
T435C	K	1170.4	1141.7	1108.3	1071.0	1002.5
EGTC	K	975.3	951.3	920.1	891.9	835.1
T455C (Calc)	K	985.4	961.0	932.4	900.0	841.7
JPTC	K	987.0	962.9	933.1	903.6	847.1
P1C	PSIA	14.7	14.7	14.7	14.7	14.7
P26C	PSIA	75.0	73.4	70.8	68.0	62.5
P30C	PSIA	322.3	310.7	292.7	275.4	241.9
P40C	PSIA	309.0	297.8	280.4	263.6	231.1
P455C	PSIA	54.6	52.6	49.5	46.6	41.0
P455SC	PSIA	48.4	46.6	43.9	41.3	36.3
M1C	Lb/s	204.9	199.7	191.2	184.1	168.6
M26C	Lb/s	200.1	195.0	186.8	179.8	164.7
M30C	Lb/s	176.2	171.7	164.5	158.3	145.0
M40C	Lb/s	179.4	174.8	167.3	160.8	147.1
MSOTC	Lb/s	184.9	180.1	172.4	165.8	151.6
M435C	Lb/s	198.6	193.4	185.1	178.0	162.8
M455C	Lb/s	205.8	200.5	191.9	184.5	168.8
M RTP1	%	236.7	230.7	221.0	212.7	194.8
M RTP26	-	58.753	58.185	57.387	57.139	56.102
M RTP30	-	15.1	15.2	15.3	15.5	15.8
M RTP40	-	22.3	22.2	22.3	22.4	22.6
M RTP455	-	118.3	118.3	118.4	118.9	119.5
M RTSOT	-	22.8	22.8	22.8	22.9	23.2
Compressor ETA	%	0.8	0.8	0.8	0.8	0.8
Turbine ETA	%	0.8	0.8	0.8	0.8	0.9
Combustor ETA	%	1.000	1.000	1.000	0.999	0.999
HP Compressor ETA	%	0.852	0.850	0.850	0.852	0.848
LP Compressor ETA	%	0.858	0.869	0.874	0.876	0.882
Corr. Fuel Flow	BTU/s	68708	64346	58712	53360	43767
Cell Pressure	PSIA	88.8	88.8	88.8	88.8	88.8

Appendix B Performance and Mechanical Charts

Chart 1 – ISO Corrected SOT versus EGHP

All data points represent the engine at the steady-state condition

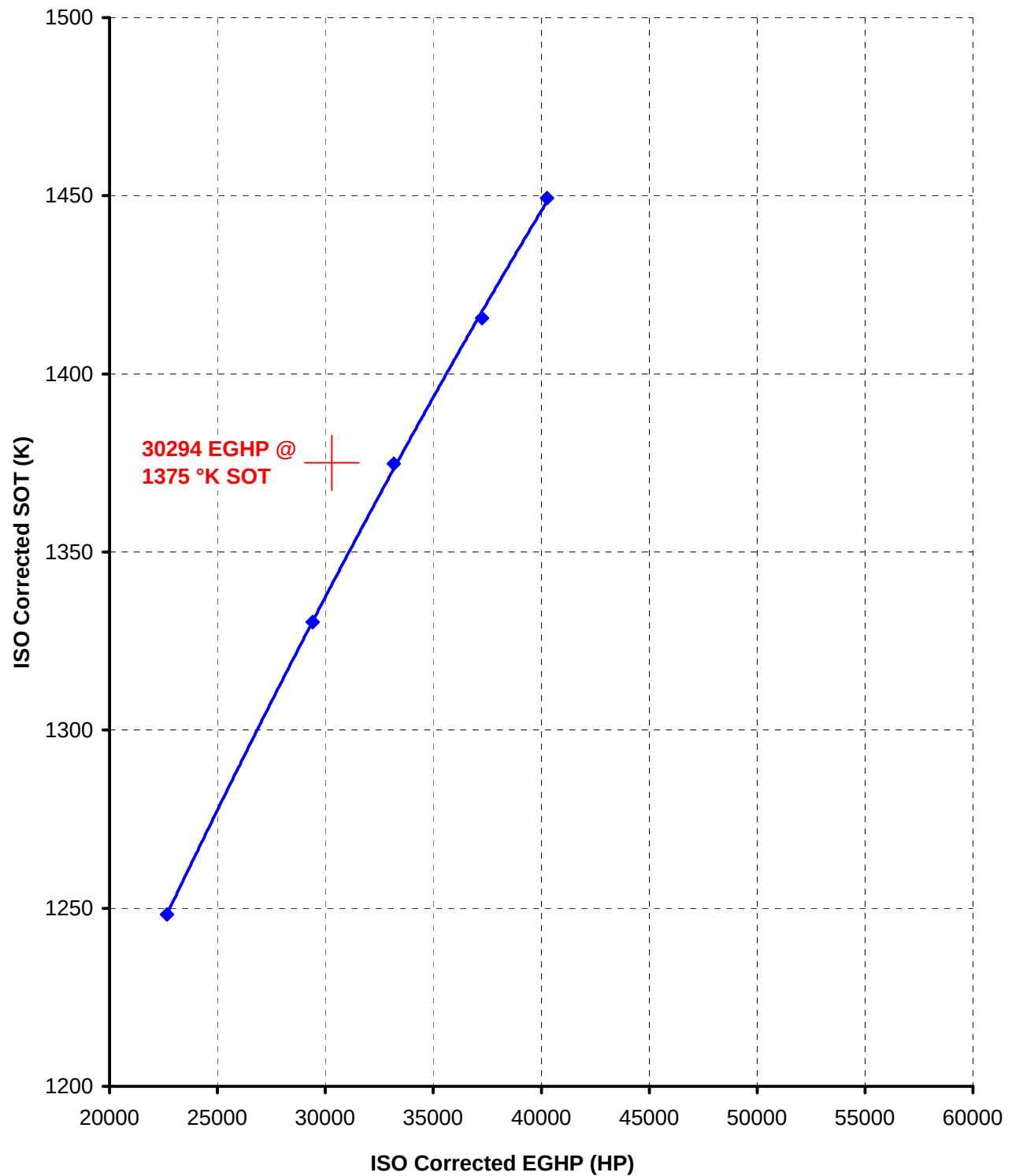


Chart 2 – ISO Corrected EGHP versus Heat Rate

All data points represent the engine at the steady-state condition

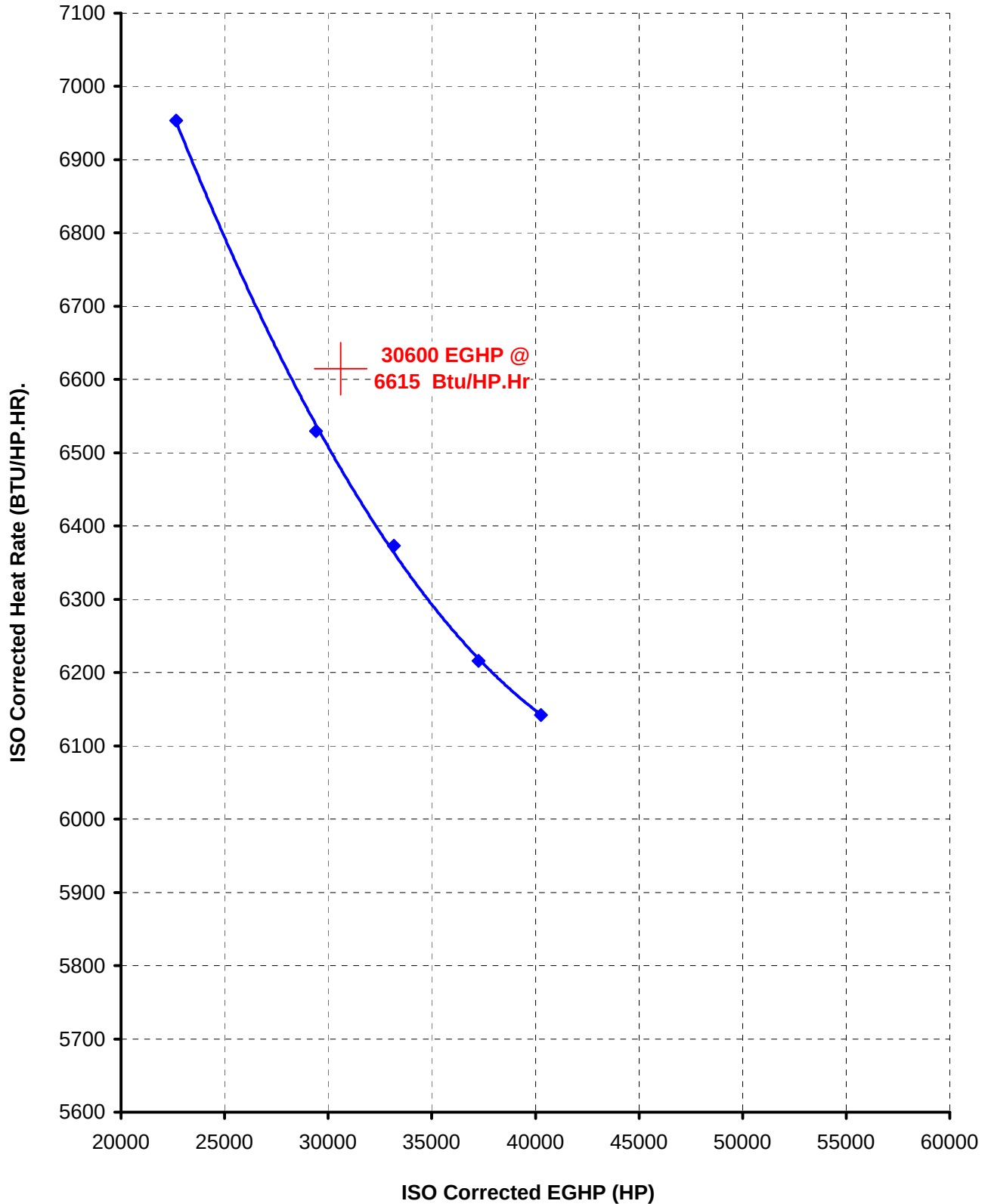
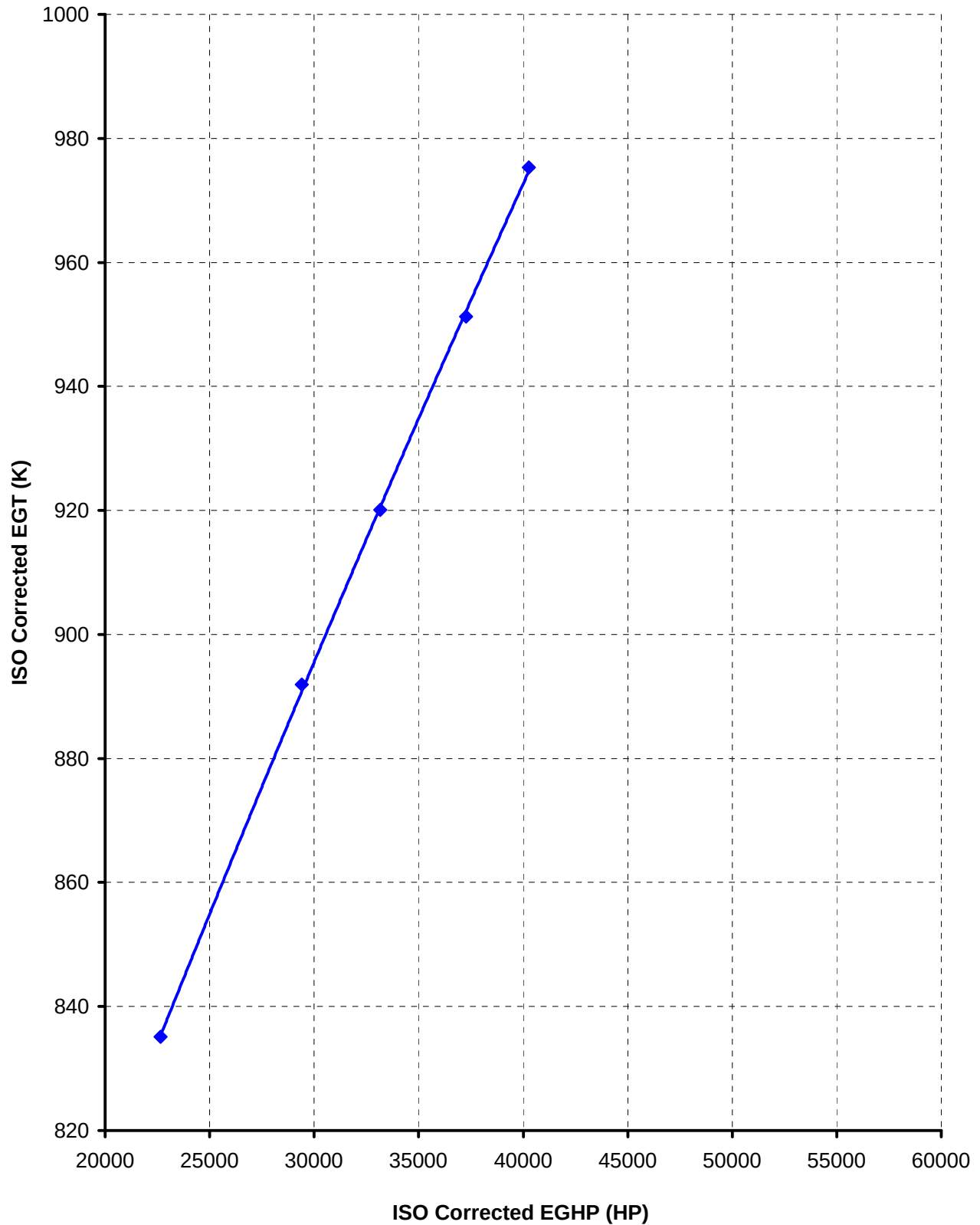
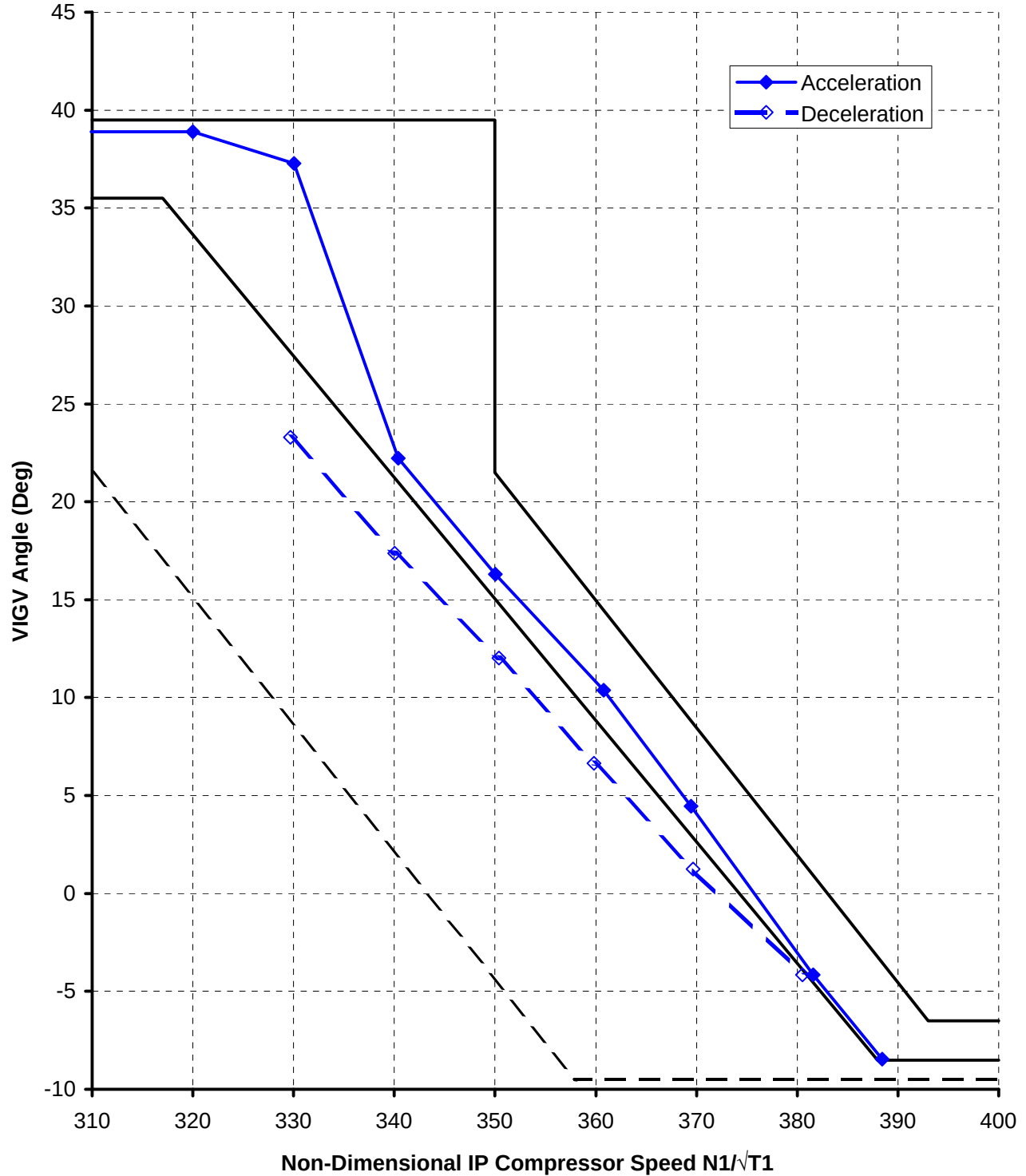


Chart 3 – ISO Corrected EGHP versus Exhaust Gas exit temperature

All data points represent the engine at the steady-state condition



CTS Figure 1 - VIGV Schedule For -22 Engines With P2 Scheduled System



The Solid Lines Indicate The Tolerance Of The VIGV Schedule For Acceleration Points Only

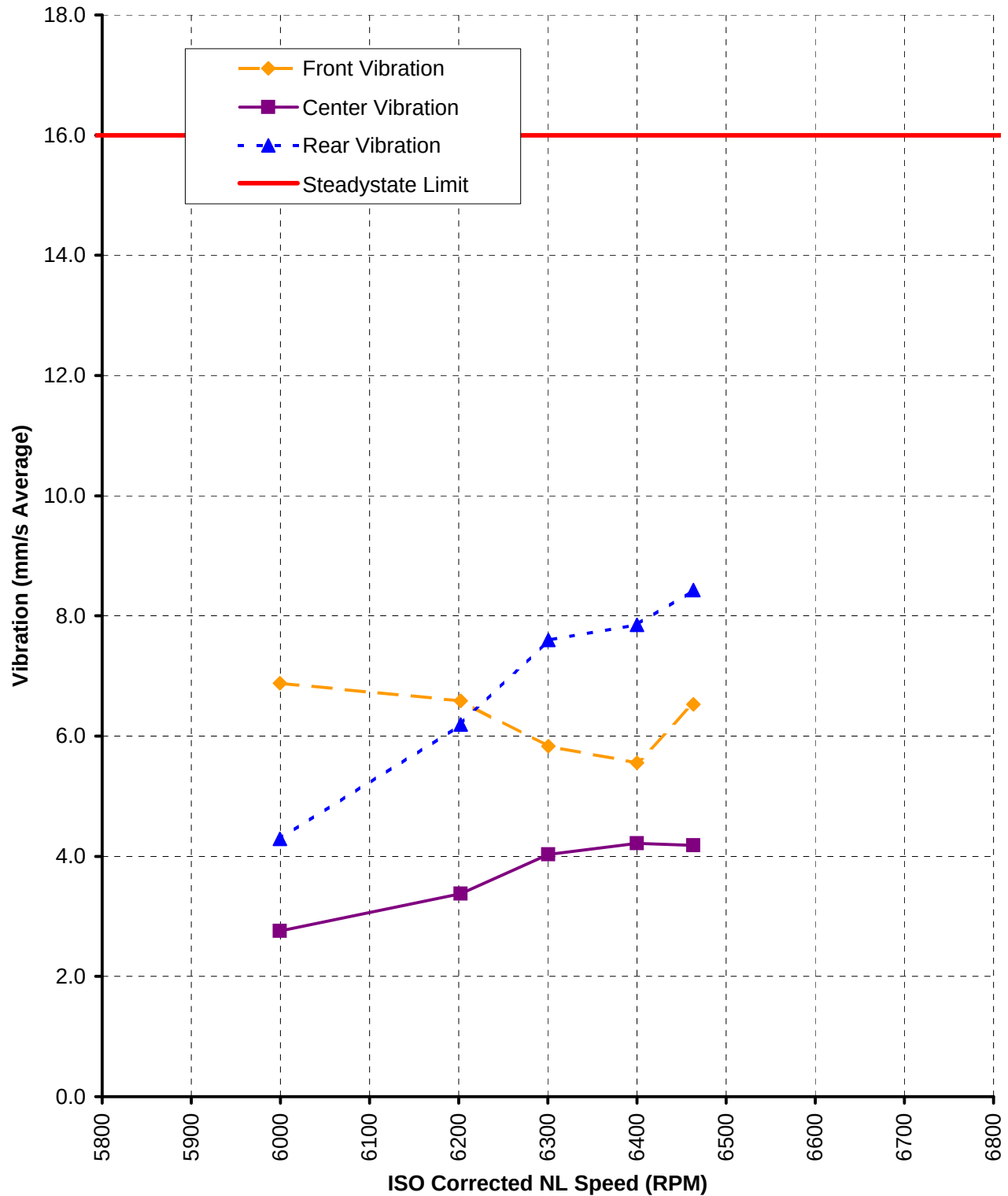
Hysteresis, Deceleration To Acceleration Points, Must Not Be Greater Than 6.25° Of VIGV Angle At Any Given $N1/\sqrt{T1}$ Value

Deceleration Points Falling Outside The Solid Lines May Be Accepted Provided That The Hysteresis Requirement Is Met

Appendix C Vibration survey

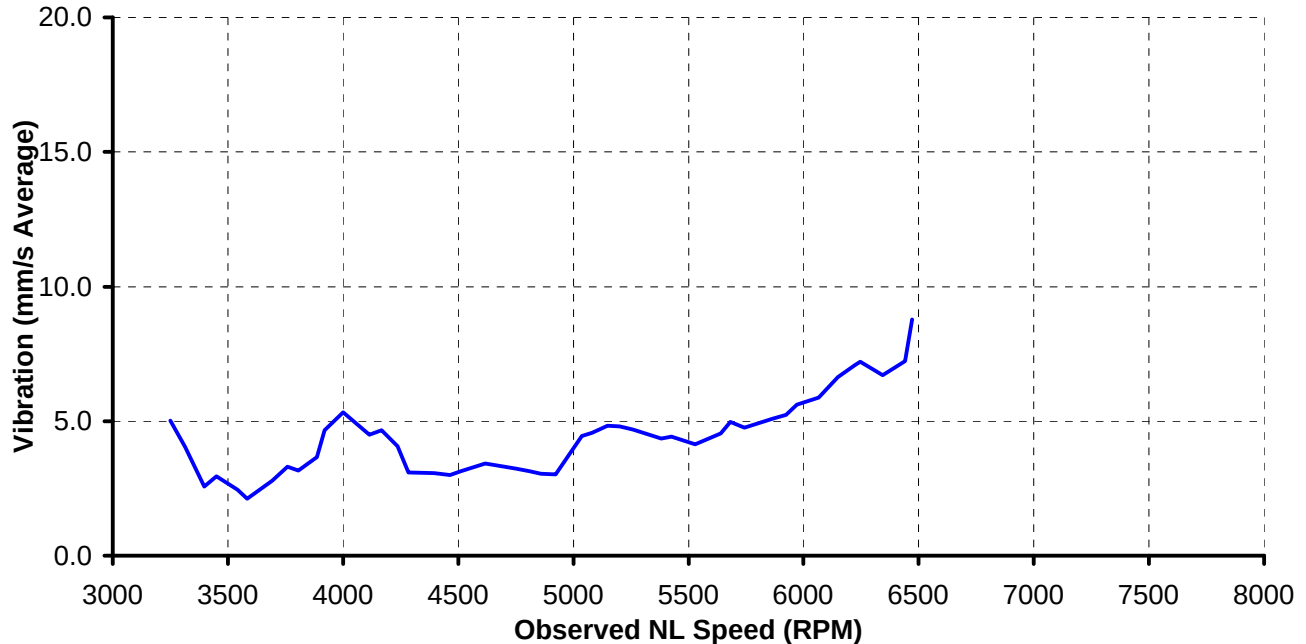
Steady-State vibration survey

All data points represent engine at steadystate condition

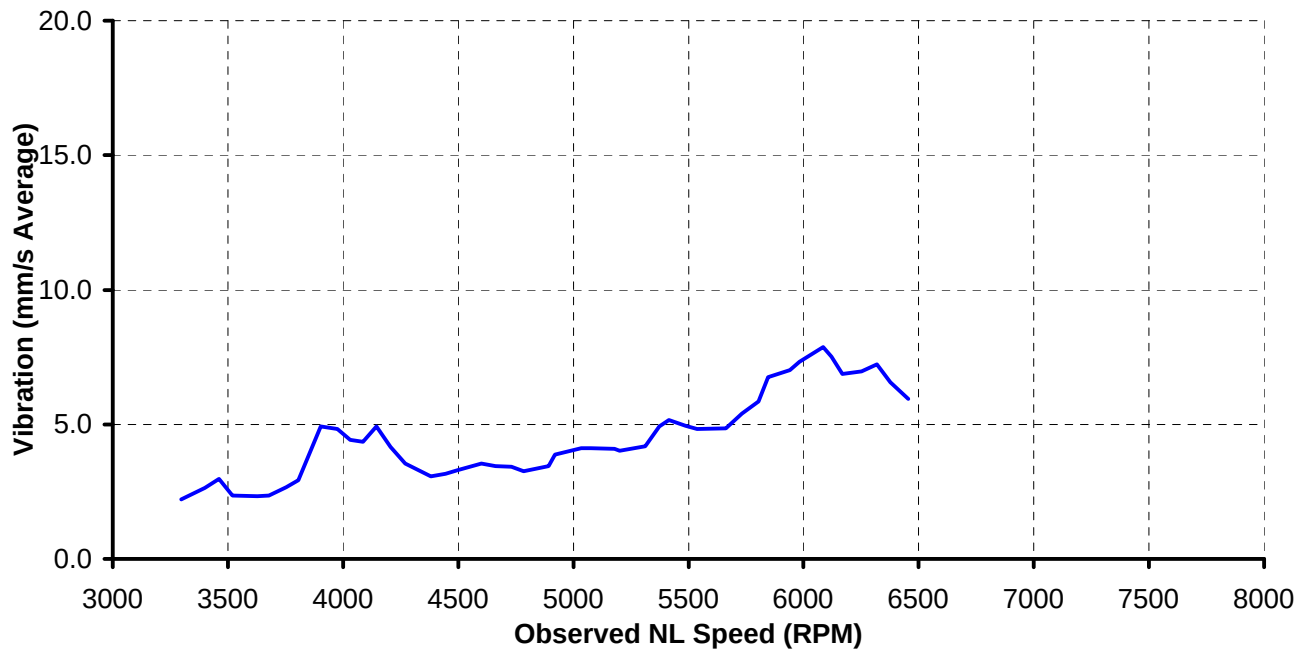


Front Vibration Surveys for Transient Acceleration and Deceleration

Acceleration trend plot from idle (NL=3250rpm) to high power.



Deceleration trend plot from high power to idle (NL=3250rpm)



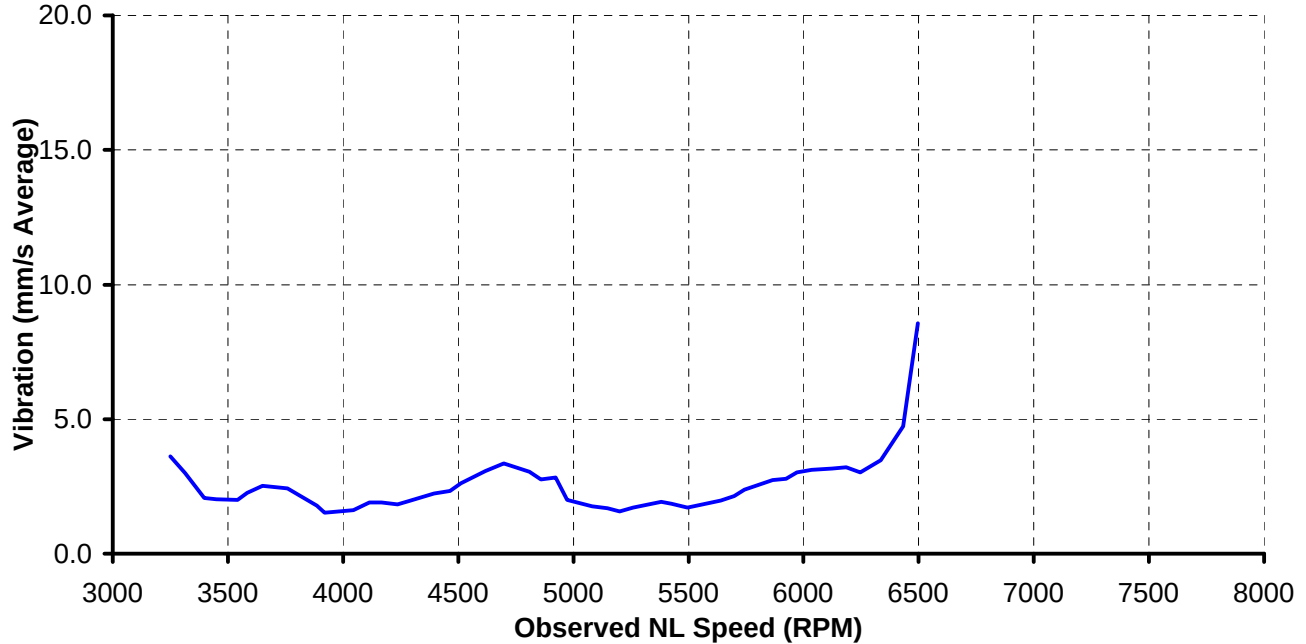
Max Transient Values

Acceleration	8.79 mm/s avg @6471 RPM
Deceleration	7.86 mm/s avg @6084 RPM

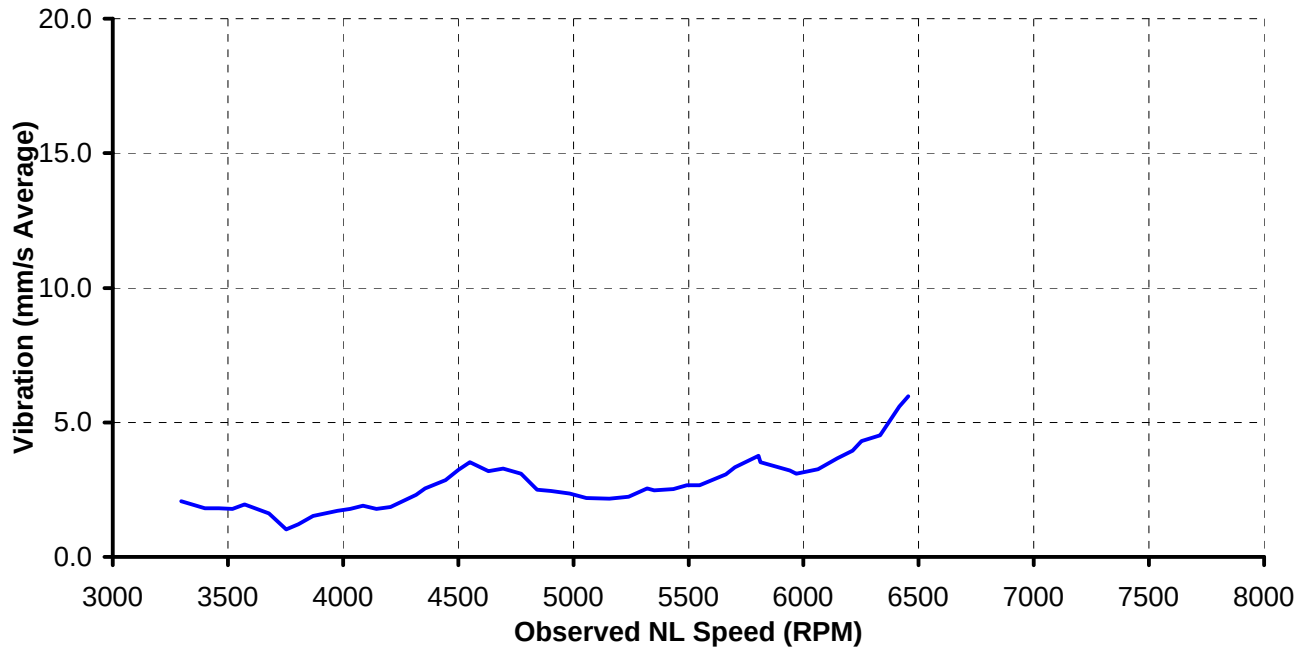
NOTE: This is not a CTS requirement, and is provided by TCT as additional data

Center Vibration Surveys for Transient Acceleration and Deceleration

Acceleration trend plot from idle (NL=3250rpm) to high power.



Deceleration trend plot from high power to idle (NL=3250rpm)



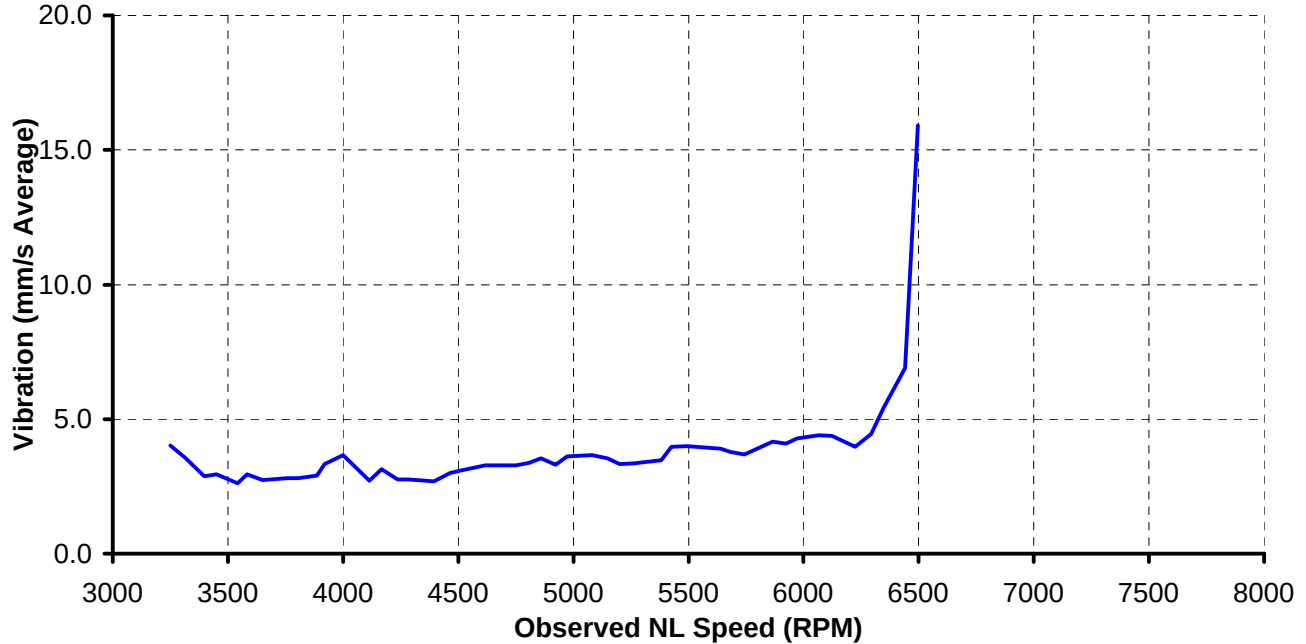
Max Transient Values

Acceleration	8.56 mm/s avg @6496 RPM
Deceleration	5.96 mm/s avg @6456 RPM

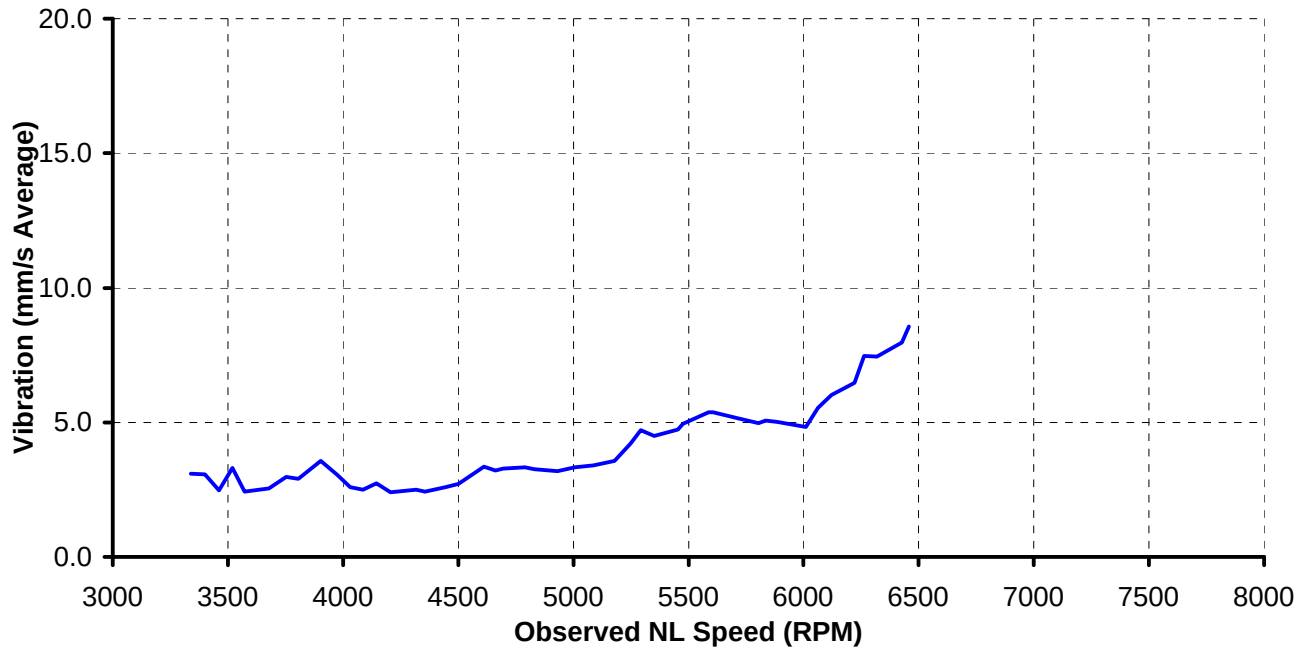
NOTE: This is not a CTS requirement, and is provided by TCT as additional data

Rear Vibration Surveys for Transient Acceleration and Deceleration

Acceleration trend plot from idle (NL=3250rpm) to high power.



Deceleration trend plot from high power to idle (NL=3250rpm)



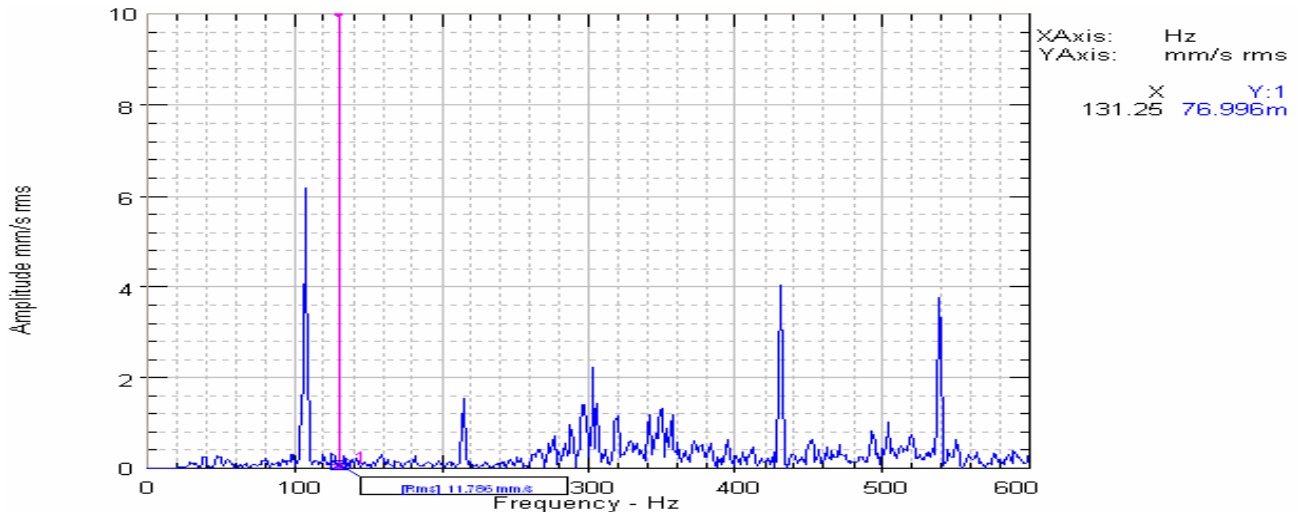
Max Transient Values

Acceleration	15.92 mm/s avg @6496 RPM
Deceleration	8.56 mm/s avg @6456 RPM

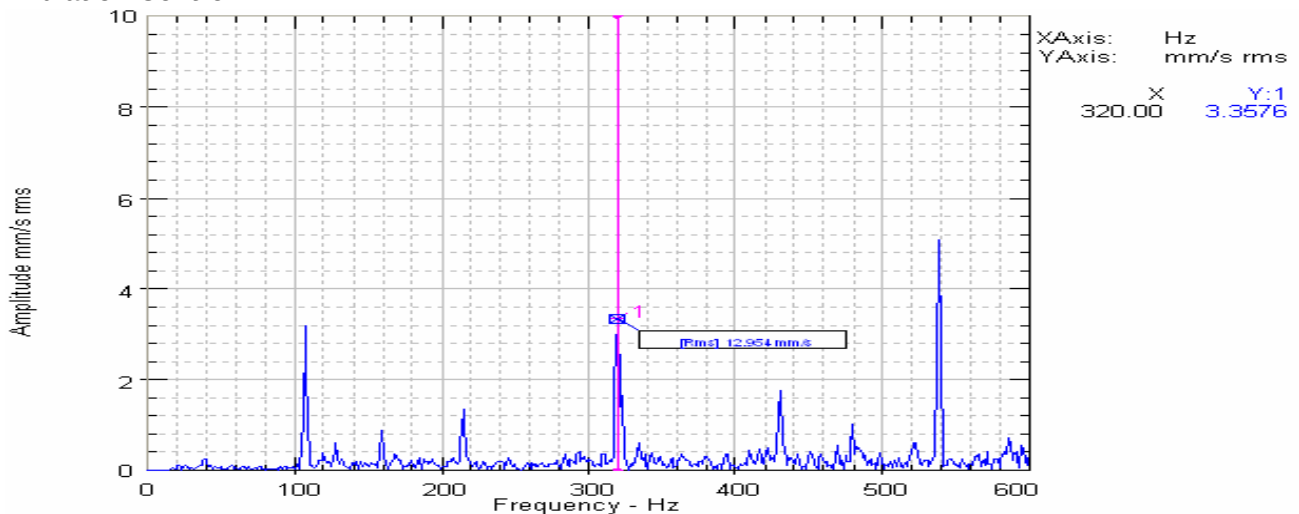
NOTE: This is not a CTS requirement, and is provided by TCT as additional data

Vibration Spectrum Plot @Baseload

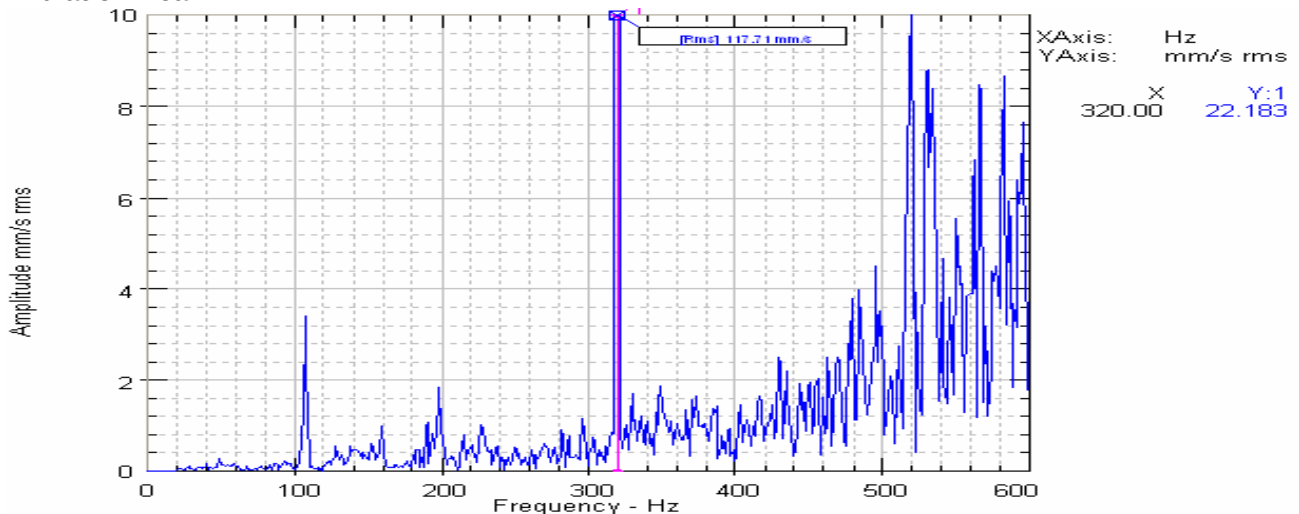
Vibration Front



Vibration Centre



Vibration Rear



NOTE: Y axis is in thousandths of a meter, 1M = 1 millimeter, 2M = 2 millimeters

Appendix D Oil Consumption and Debris Checks

On completion of the engine testing, the initial and final oil tank readings are compared to calculate the oil consumption for test.

Inputs to Calculation

[1]	Test start date	15-Aug-11	DD:MM:YYYY
[2]	Test start time	15:10:04	HH:MM:SS
[3]	Initial tank level (relative to datum centerline)	0.00	cm
[4]	Test finish date	15-Aug-11	DD:MM:YYYY
[5]	Test finish time	15:44:46	HH:MM:SS
[6]	Final tank level (relative to datum centerline)	0.01	cm

Calculation Constants

[7]	Tank internal radius	43.5	cm
[8]	Tank internal length	132.5	cm
[9]	Tank internal volume	787.7	Litres

Tank Volumes

It is necessary to correct the final tank contents for any temperature difference, using the initial volume temperature as the datum.

[10]	Height 1 = 43.5 + initial level	43.50	cm
[11]	Height 2 = 43.5 + final level	43.51	cm
[12]	Original volume of tank	393.8	Litres
[13]	Final volume of tank	394.0	Litres
[14]	Volume change	-0.1	Litres

Oil Consumption

[15]	Running time between readings = [6] - [2]	0.58	Hrs
[16]	Oil Consumption = ([15] - [18]) / [19]	-0.20	L/Hr

On completion of the engine testing, the front, centre and rear MCD's are checked for debris (as per CTS5017/2 section 5.14.1). The photographs below show each of the MCD's state post test.



Front MCD



Centre MCD



Rear MCD



LIFE ANALYSIS OF A RR RB211-22B HPT BLADE

For: TransCanada Turbines

Purchase Order: CA4017568

Report Number: LT05335

Written by: Kevin Wiens, P.Eng, Senior Engineer

Reviewed by: Paul Lowden, P. Eng, Principal Engineer

Issued: June 1, 2011



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Life Analysis of a RR RB211-22B HPT Blade

For: TransCanada Turbines

Purchase Order: CA4017568

Prepared by: _____

Kevin Wiens, P. Eng.

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Dundas, Ontario, Canada

Reviewed by: _____

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Note: The opinions provided in this report are based on information provided by the purchaser as well as analysis conducted by Liburdi Turbine Services. Any inaccurate information provided may influence the validity of the opinions. The conclusions and recommendations herein are provided for the customer's reliance only and may not be relied on by any other party in other dealings relating to the subject matter of this report. This report should not be distributed to third parties without the consent of Liburdi Turbine Services. Liburdi Turbine Services shall not be held responsible or liable for any property damage, death or bodily injury, or to pay any losses, damages, claims or demands arising out of the use of the information herein.

1.0 INTRODUCTION

On April 24, 2011, Liburdi Turbine Services (LTS) received one hundred and two (102) RB211-22B high pressure turbine (HPT) blades (P/N LK56946-C) from TransCanada Turbines for repair under purchase order CA4017568 and sales order LT05335. Following incoming inspection (including coating stripping), a metallurgical life analysis was requested in order to determine the extent of degradation of the blade set. One blade was selected for the life analysis based on the presence of a breach at the shroud non contact face, pressure side.

The blade set had operated for approximately 33,000 hours since new with no reported repairs.

2.0 EXAMINATION

2.1 Visual Examination

The visual condition of the subject blade is shown in **Figure 1**. The external coating had been removed and, as a result, the external surfaces were a uniform matte-grey color. The airfoil surfaces were relatively smooth and the cooling holes were free of visible enlargement. The most significant shroud degradation was roughening and breaching at the pressure side non-contact face. The blade markings are recorded in **Table 1**.

Table 1 – blade markings

Marking	Location
LK56946-C	Upstream Root
LT05335 – 59	Upstream Shank
7/ S7 / R	Downstream Shank
DGON 2701MM 11	Downstream Shank
8/V 22 RRG4E	Downstream Shank
DΩX81H 322	Downstream Root

The Ω-symbol indicates the blade was comprised of Nimonic 108, a nickel based superalloy forging.

2.4 Metallographic Analysis

Sections were taken through the lower, mid and upper airfoil, through the shroud and through the root and prepared for metallurgical evaluation in accordance with ASTM E3. The sectioning plan is displayed in **Figure 2**.

2.4.1 Base Alloy Microstructure

As the root was remote from the hot gas path, its operating temperature was below that at which microstructural aging would occur. Therefore, the root structure is representative of the material's pre-service condition, and is used as a benchmark to compare with hotter, deteriorated regions of the blade. Optical examination revealed the root to exhibit features typical of forged Nimonic 108. The structure consisted of gamma prime precipitates within a matrix of gamma. Carbides were observed evenly dispersed throughout the matrix and along the grain boundaries, **Figure 3**.

The γ' morphology was compared at the root and mid height of the airfoil. The root structure consisted of cuboidal primary γ' precipitates with fine spherical secondary γ' precipitates dispersed throughout, **Figure 3**.

The microstructure of the airfoil base alloy is detailed in **Figure 4**. The only significant aging at the mid airfoil height had occurred at the leading edge where the primary γ' precipitates had rounded, coarsened (~20% increase in diameter) and agglomerated. The secondary γ'

precipitates were no longer present at the leading edge. The grain boundaries exhibited an increased volume of γ' phase. Negligible aging had occurred throughout the remainder of the airfoil section.

2.4.2 Surface Condition

The surfaces of the airfoil and shroud were in the stripped condition. The external airfoil surfaces were free of oxidation damage suggesting the coating life had not been fully consumed before the end of service (refer to **Figure 5**).

The uncoated internal surfaces exhibited minor oxidation attack including alloy depletion and intergranular oxidation. The maximum penetration of intergranular oxidation was approximately 0.002-inches (refer to **Figure 5**).

Oxidation and nitriding in the vicinity of the shroud non contact face breach is shown in **Figure 6**. Oxidation and alloy depletion had penetrated to a depth of 0.005-inches at the internal surface of the breach, and tapered off towards the adjoining radial cooling passage. A large cavity was present on the inner side of the breach. The trailing edge air cap was found to be well bonded to the substrate in the examined section.

The root surfaces exhibited oxidation spiking of the grain boundaries, penetrating to a maximum extent of 0.003-inches. Oxidation spiking was present on approximately 25% of the serrations and was present on both contact and non contact surfaces. No significant alloy depletion was observed surrounding the oxide spikes (refer to **Figure 6**).

3.0 DISCUSSION

3.1 Shroud Oxidation

Breaching of the shroud non contact face, pressure side, was the result of high temperature oxidation. The cavity present on the internal side of the breach was most likely caused by a forging flaw at manufacture. The presence of the forging flaw likely increased the susceptibility to breaching by reducing the local wall thickness relative to a properly formed blade.

Reliable detection of internal forging flaws is not possible using non-destructive testing. However, further operation of the blades after repair does not pose a significant risk of blade failure. Provided the loss of material at the shroud non contact faces is restored using a weld filler alloy with oxidation resistance exceeding that of the base alloy, breaching of other blades during a service interval of similar duration is considered to be unlikely.

3.2 Airfoil Surface Condition

The internal surfaces exhibited only minor oxidation. Provided the progress of internal oxidation is comparable to that of the first service interval, it is likely that the blade set will be repairable at the next overhaul.

The external coating had performed adequately based on the lack of airfoil oxidation damage. An aluminide-type coating should be applied to the external airfoil and shroud surfaces prior to additional service.

3.1 Root Oxidation

The oxidation spiking of the subject blade did not appear to be service related for the following reasons:

- No alloy depletion surrounded the oxide spiking of the root, unlike that of the internal airfoil surfaces.
- The extent of oxidation in the root was comparable to that of the hotter internal airfoil surfaces.

Oxidation spiking of blade roots has been observed in engines of similar vintage manufactured by Rolls Royce (Avon, Spey). It is likely that these oxide spikes are associated with a masking process used for protection of the roots during the aluminide coating process.

The presence of oxide spikes is detrimental to the fatigue endurance of the component. However, given that the oxide spikes were likely present prior to service, continued service would not represent a higher risk of failure in relation to the new component. Following service, the root surface condition should be scrutinized for propagation of the defects.

3.2 Base Alloy Aging

Microstructural degradation was confined to the airfoil leading edge, in the form of coarsening of the gamma prime precipitate structure. The observed extent of microstructural degradation does not warrant restoration, provided the service life limits advised by the OEM will not be exceeded during the subsequent service interval.

4.0 CONCLUSIONS

A metallurgical life assessment was conducted on a RR RB211 22B HPT blade. Overall, the blade was found to be in a repairable condition.

The remaining blades in the set which are free of shroud non-contact face breaching are appropriate for additional service following repair including:

- weld repair of the shroud interlock including CM64 alloy (contact faces) and an oxidation resistant weld filler alloy (non-contact faces).
- application of an external silicon modified diffusion aluminide coating.

The microstructural degradation observed did not warrant restoration, provided the service life limits advised by the OEM will not be exceeded during the subsequent service interval.

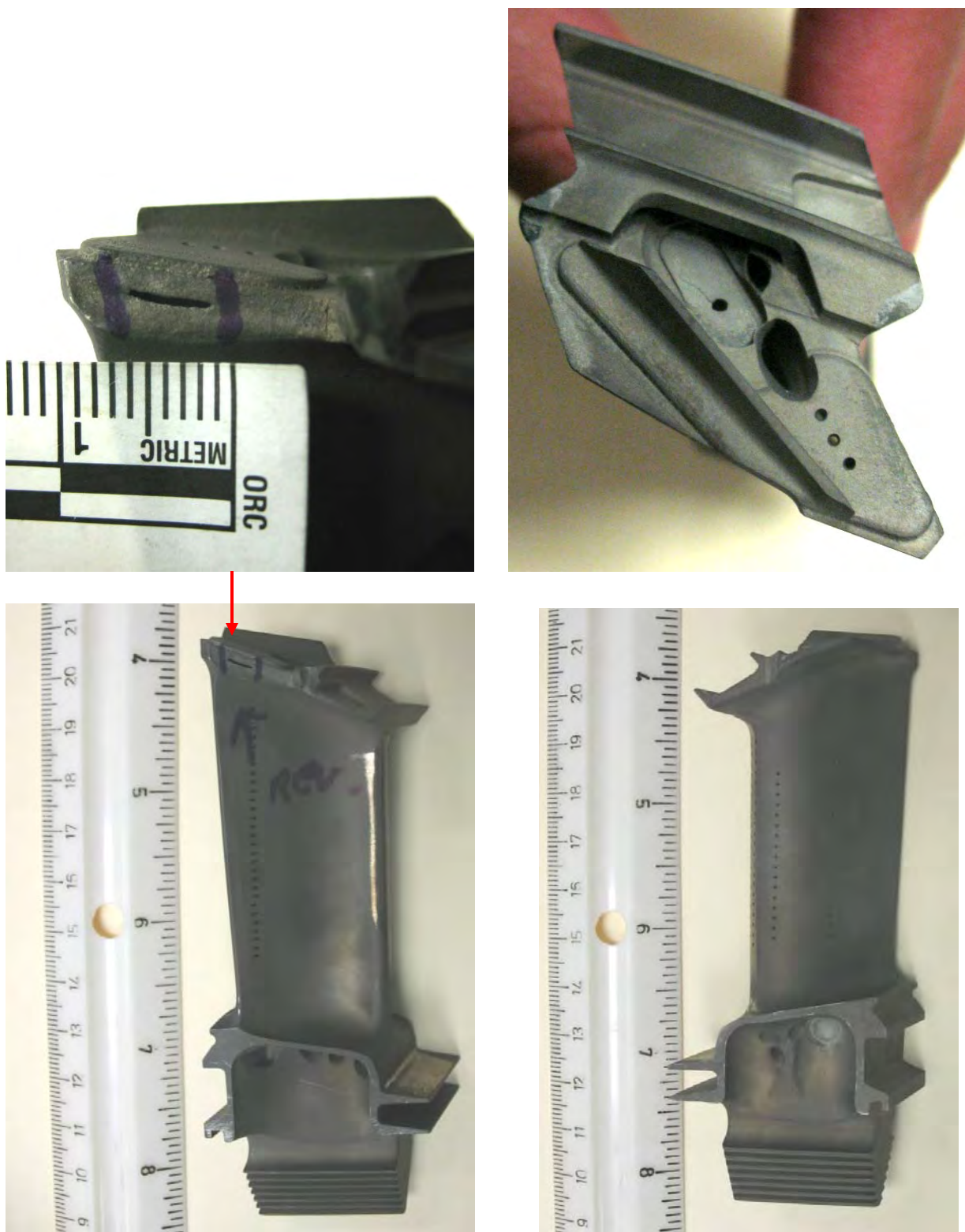


Figure 1: The visual condition of the blade following coating stripping. Note the breach of the shroud non contact face on the pressure side.

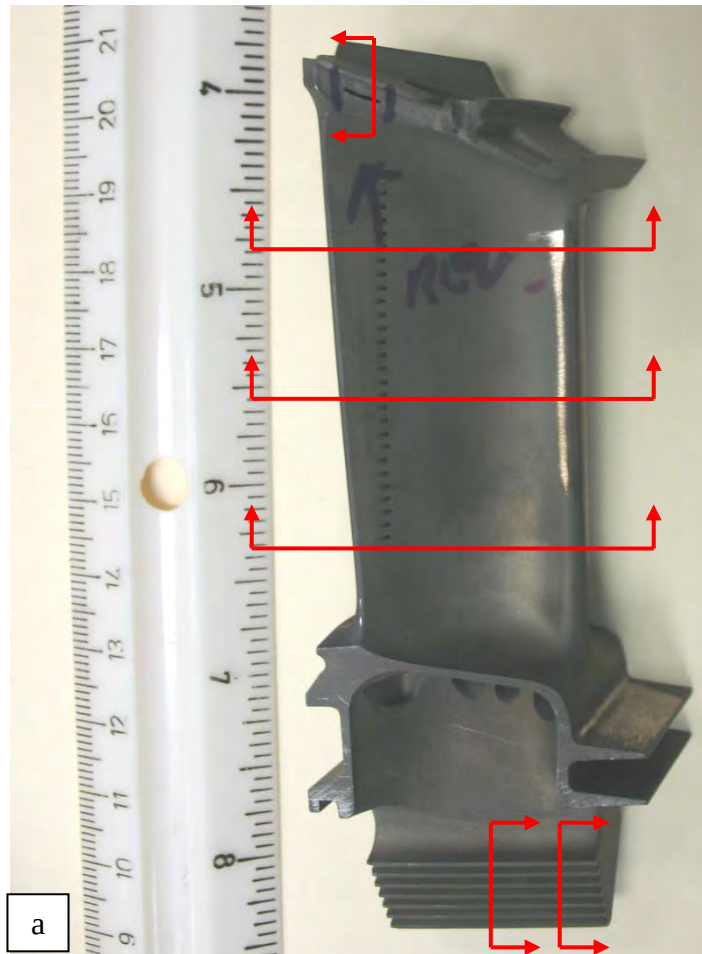
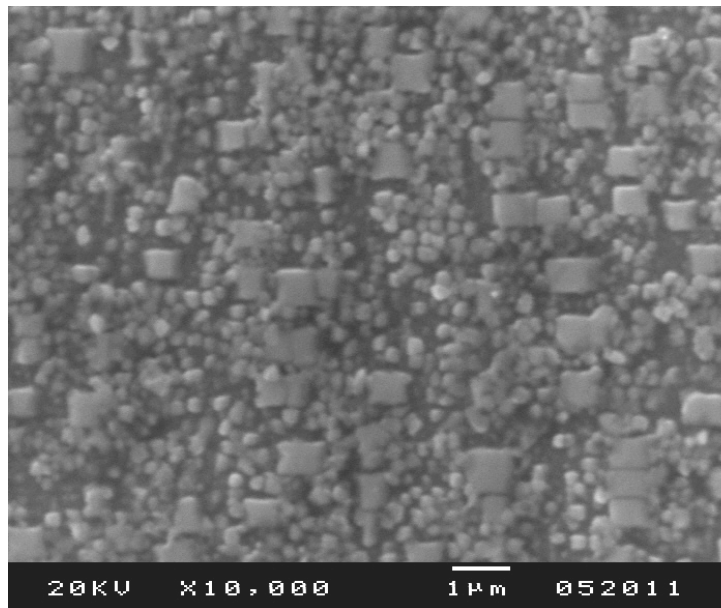


Figure 2: The sectioning schematic for metallurgical examination of the blade.

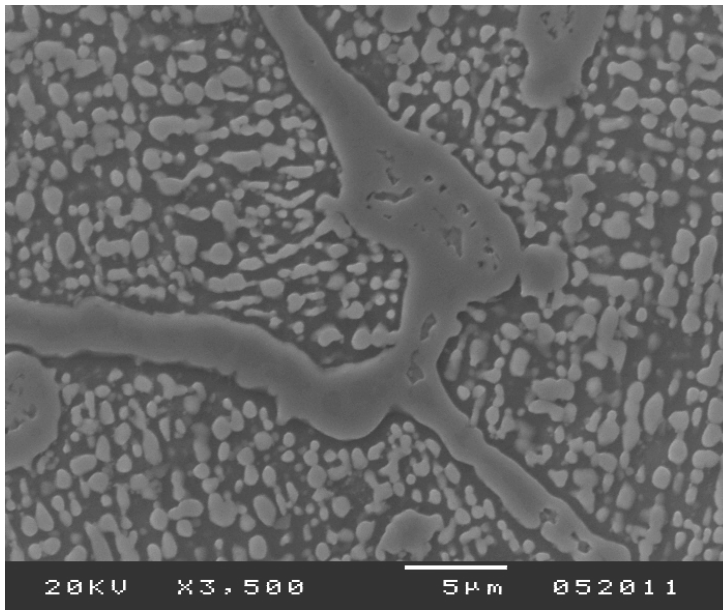


low magnification

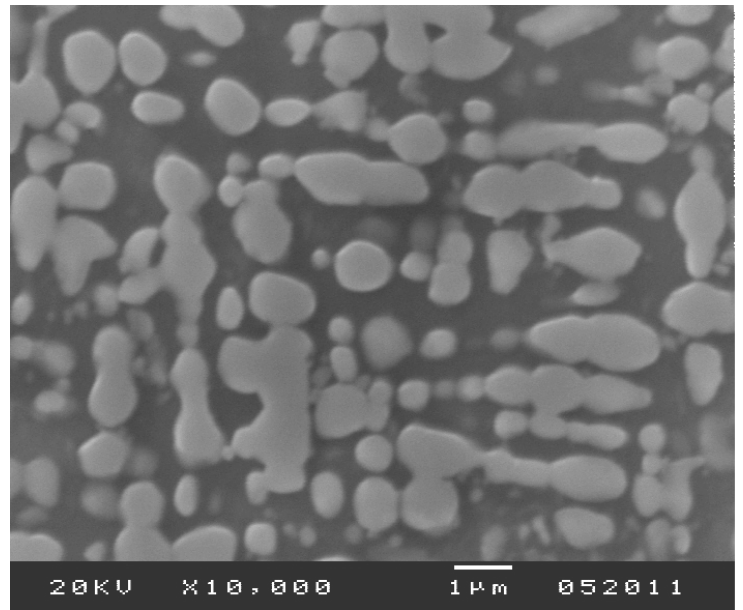


high magnification

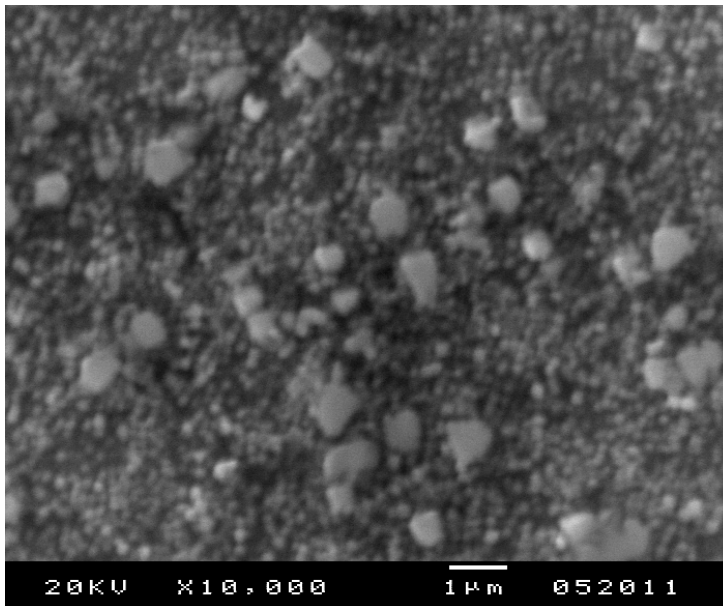
Figure 3: The base alloy microstructure of the blade root. Etchant: chromic acid electrolytic.



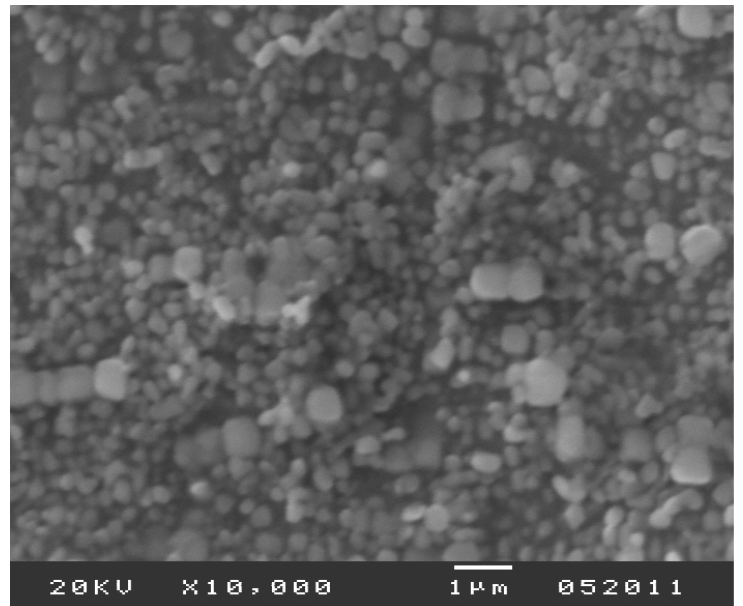
leading edge, low magnification



leading edge, high magnification

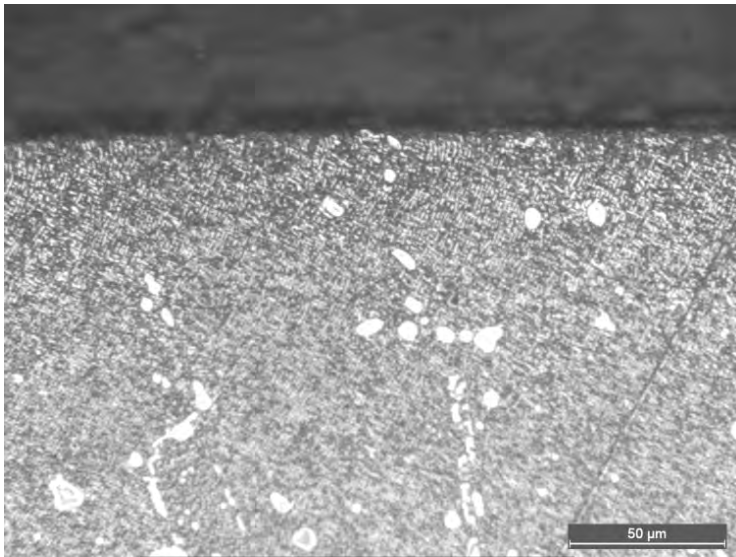


airfoil core, high magnification

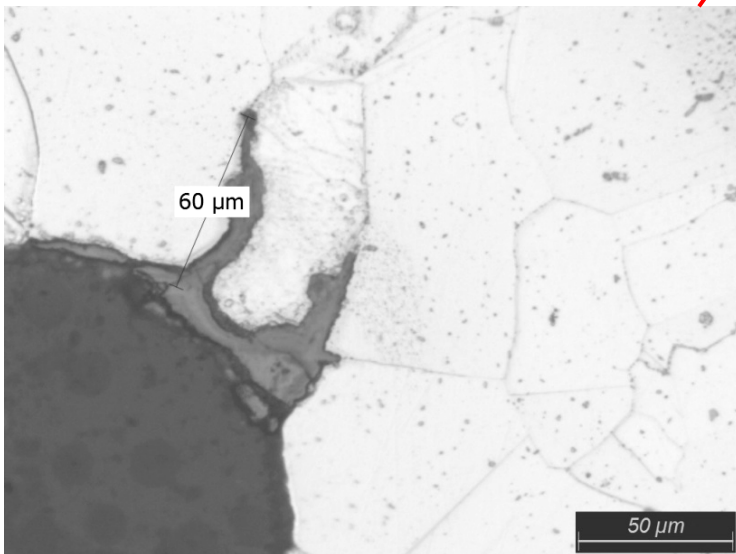
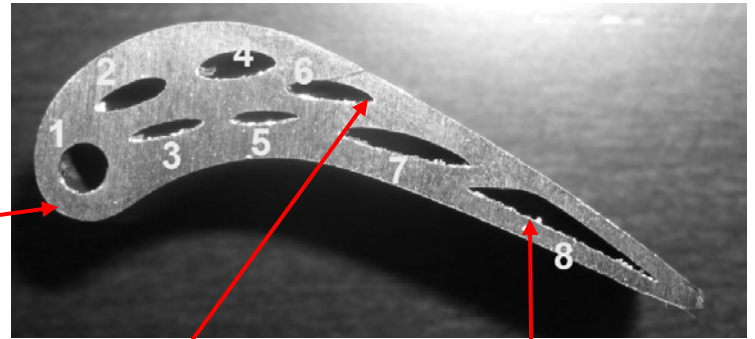


trailing edge, high magnification

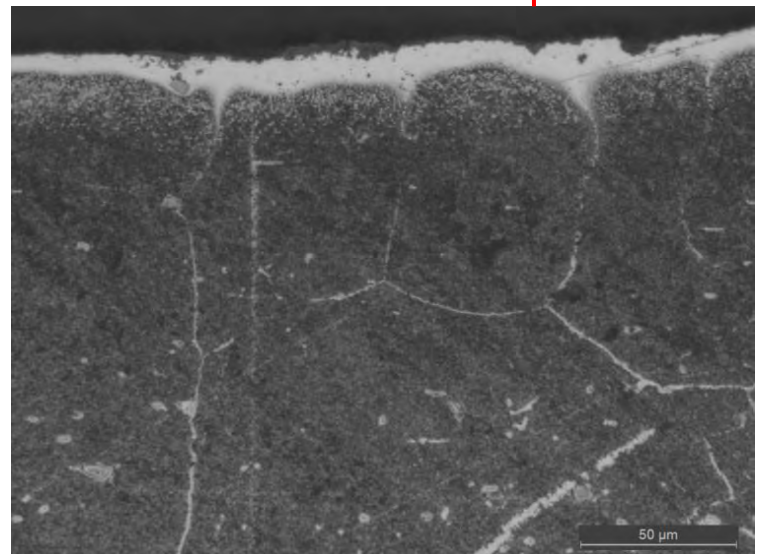
Figure 4: The base alloy microstructure of the mid airfoil height. Etchant: chromic acid electrolytic.



mid airfoil, etch: chromic acid



upper airfoil height, unetched



mid airfoil height, etch: chromic acid

Figure 5: The surface microstructure of the blade airfoil.

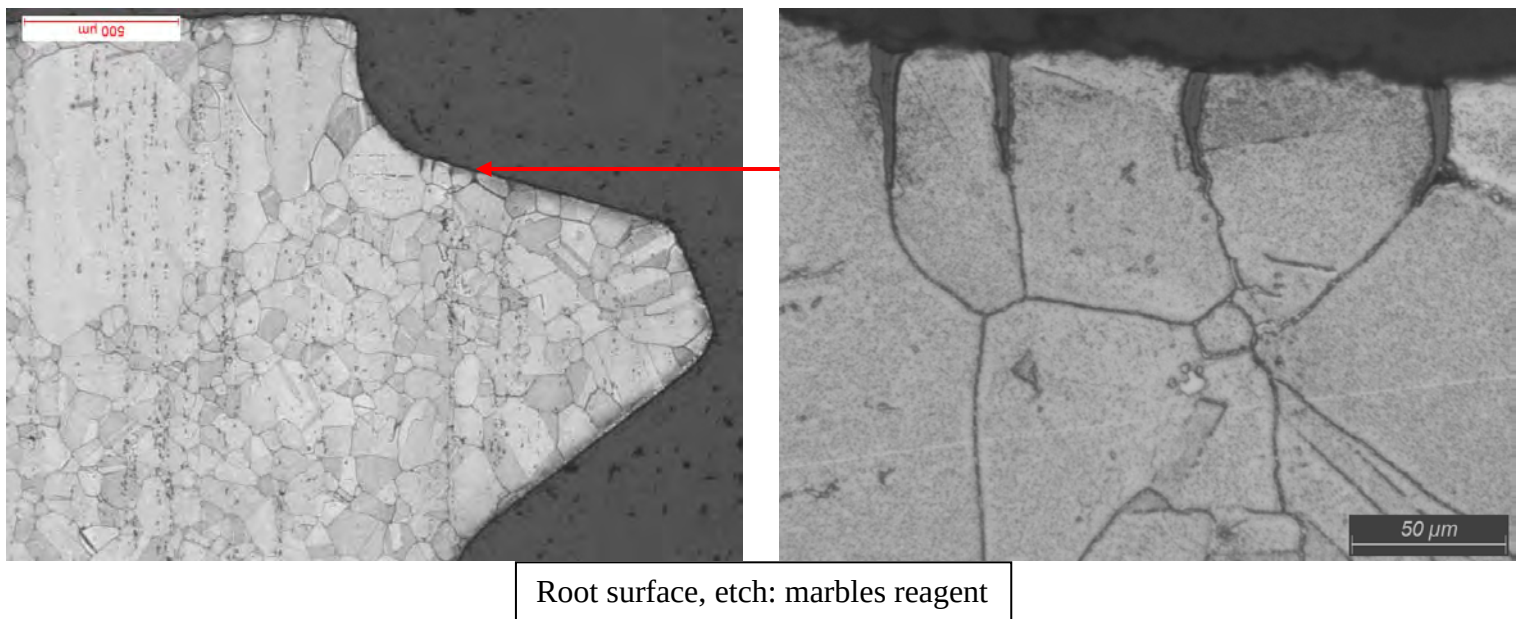
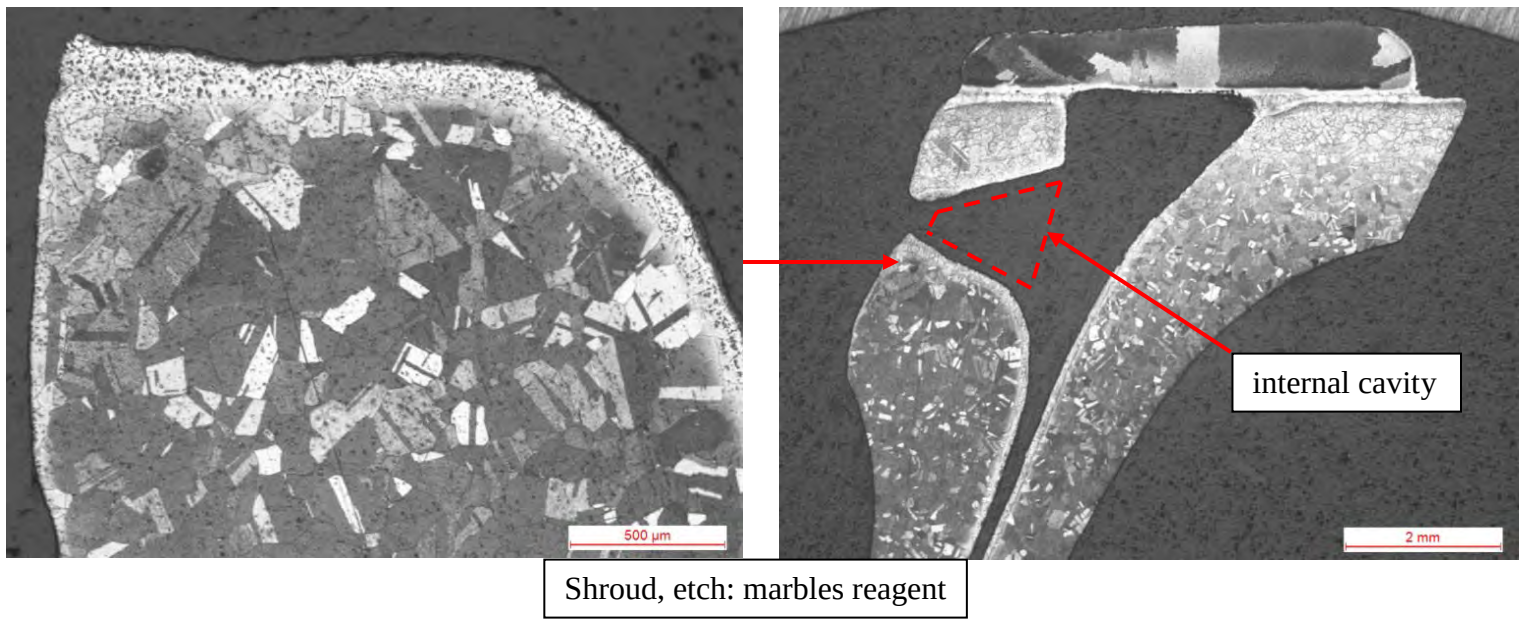
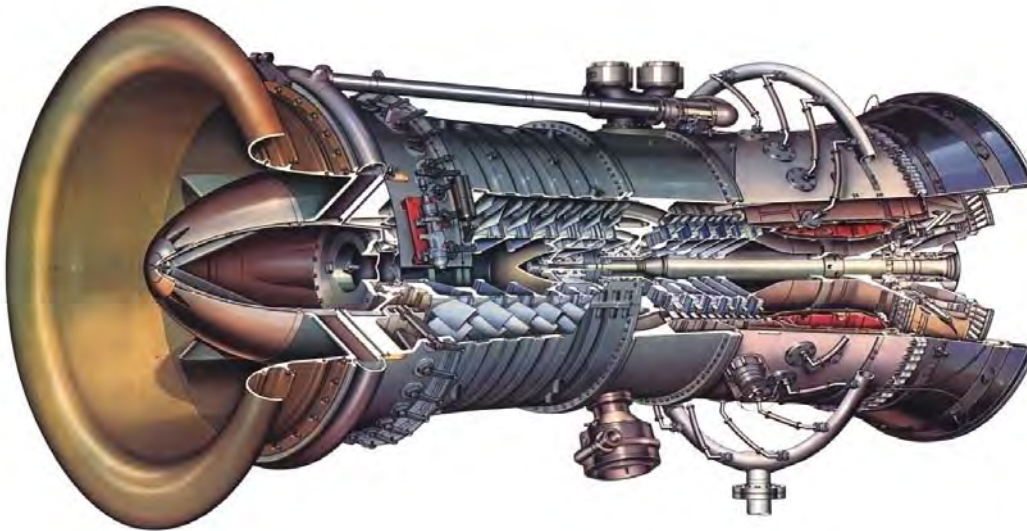


Figure 6: The surface microstructure of the blade shroud (above) and root (below).

Filed: 2015-09-22
EB-2015-0200
Exhibit B.SEC.3
Attachment 2

Rolls-Royce Industrial RB211 Engine Test Report



Test Details

Sales Order:	CA9002441	Test Schedule:	CTS5017/02
Document Reference:	CA80099189	Test Cell:	Calgary
Customer:	Union Gas	Test Operator:	S. Donohue
ESN:	1700-011	Test Observer:	K. Hoddinott
Engine Type:	RB211-22	Combustor Type:	Package 1
Test Date:	13-Aug-2015	Oil:	MIL-I-23699
Test Standard:	Repair	Engine Inhibited:	Yes
Fuel Used:	NGAS (740.4GJ)		

Test Result:	Pass
---------------------	------

Report Author: N. McQuade	Report Date: 17-Aug-15	To: C. Ramsay	Report Issue: 0
Circulation: Project Manager, Test cell, Customer (via Project Manager), D Simonelli, D Goehring, W Green E Stitt, S Stevens, B Archer, S Tymchen, C Howard, K Thawaites Production: D Lympny, C Bruce, J Robertson, C Kish Finance: K Smith, V Mitchell Engineering: P Nicholas, J Toll			



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1. Test Summary/Adjustments

Engine was tested IAW CTS 5017/2 and passes all mechanical and performance requirements.

No other adjustments to the data or engine were required for the test that would effect the engine performance.

The operating parameters during the test were maintained within the acceptable OEM limits.
MCD's were checked and found to be clear.

2. Test Results

This section documents the test acceptability for the test engine against each of the test schedule requirements. Appendix A tabulates the raw and corrected data recorded during the test. Appendix B contains the performance charts for the VIGV, vibration and performance objectives.

General	Units	Value	Limit	Type	Pass/Fail
NL Roll Down Time	sec	649	300	MIN	Pass
NH Roll Down Time	sec	467	180	MIN	Pass
N1 3rd Probe Check	Yes/No	N/A	N/A	N/A	N/A
N2 4th Probe Check	Yes/No	Yes	Yes	N/A	Pass
MCD's Clear post test **	Yes/No	Yes	Yes	N/A	Pass

Oil Consumption	Units	Value	Limit	Type	Pass/Fail
Oil Consumption	l/hr	0.2	0.57	MAX	Pass

Vibration Limit Check	Units	Value	Limit	Type	Pass/Fail
Front Vibration	mm/s avg	8.8	16	MAX	Pass
Center Vibration	mm/s avg	6.0	16	MAX	Pass
Rear Vibration	mm/s avg	10.2	16	MAX	Pass

EGT Spread	Units	Value	Limit	Type	Pass/Fail
Observed Maximum EGT Spread	deg. C	10.2	55	MAX	Pass
Observed Minimum EGT Spread	deg. C	-12.7	-55	MIN	Pass

Oil Scavenge Temperature	Units	Value	Limit	Type	Pass/Fail
Lube Oil Temp L2	deg. C	89.5	200	MAX	Pass
Lube Oil Temp L3	deg. C	140.1	200	MAX	Pass
Lube Oil Temp L4	deg. C	144.4	200	MAX	Pass

BOV Setting	Units	Value	Limit	Type	Pass/Fail
BOV Open	rpm	304.0	291	MIN	Pass
	rpm		343	MAX	Pass
BOV Closed	rpm	337.0	335	MIN	Pass
	rpm		349	MAX	Pass

Note:

* after Pass/Fail indicates this result was conceded, see section 1 for details.

** See Appendix D for details

For VIGV schedule, see page 15

Engine Test Rating Point

Test Parameter	Units	Acceptance Summary
EGHPC rating point:	HP	29,070
SOTC limit at the EGHPC RP:	K	1,375
SOTC at EGHPC RP:	K	1,315
BSFCC limit at the EGHPC RP:	BTU/HP.hr	6,806
BSFCC at EGHP RP:	BTU/HP.hr	6,536

Better than nominal

Better than nominal

Rating Points used in the determination of the acceptance values

Parameter	Units	Point 1	Point 2	Point 3	Point 4	Point 5
Date		13/08/15	13/08/15	13/08/15	13/08/15	13/08/15
Time		10:58:39	11:06:27	11:12:16	11:17:54	11:23:22
EGHPC	HP	18122	22967	25784	29208	32770
BSFCC	BTU/HP.hr	7408	6954	6733	6532	6357
SOTC*	K	1186	1250	1280	1317	1352
EGTC	K	797	840	863	890	917

* SOT is test station 41 from section 5

NOTE:

SOTC = Stator Outlet temperature (HP Turbine entry temperature) ISO Corrected

EGHPC = Engine Gas Horse Power ISO Corrected

BSFCC = Heat rate ISO Corrected

3. Test Objectives

The following test procedures are to be conducted in general accordance with the listed OEM test schedule sections below:

Description	Reference	Completed
1. Engine Cranking Tests	CTS 5017 5.1	Yes
2. Post Cranking Checks	CTS 5017 5.2	Yes
3. Start to Idle	CTS 5017 5.3	Yes
4. Data check @Idle (within TCT tramlines)	TCT Procedure	Yes
5. Initial Checks of VIGV's and Bleed Valves	CTS 5017 5.4	Yes
6. Running-In Part I	CTS 5017 5.5	Yes
7. Running-In Part II	CTS 5017 5.6	Not Req'd
8. Setting of VIGV's and Bleed Valves	CTS 5017 5.7	Yes
9. Data check @Baseload (within TCT tramlines)	TCT Procedure	Yes
10. Performance Test and Oil Consumption Check	CTS 5017 5.9, 5.10, 5.12	Yes
11. Final Checks	CTS 5017 5.4	Yes
12. Accel/Decel vibration survey	TCT Procedure	Yes

4. Description of Equipment for Test

The following is a description of the TCT equipment rigged for the test:

- Test adaptor mounting, to support engine whilst in the test cell
- Exhaust jet pipe (TFE2346), Exhaust annulus (TFE2155) and nozzle w/ trimmers (315 SQIN P/N AB65304), to simulate back pressure from power turbine
- Bell mouth intake flare (TFE1738)
- Additional instrumentation for monitoring of gas path pressures and temperatures (Section 5)
- Fuel, oil, start air and instrument lines are connected between engine and test cell

TCT utilizes a PLC based engine control and monitoring system, which is provided by the Rolls-Royce Entronics FT-110 and Wonderware based HMI.

TCT has been officially awarded Category 1 test status by Rolls-Royce. This was achieved by successfully calibrating all test equipment against the Rolls-Royce RB211 master test facility.

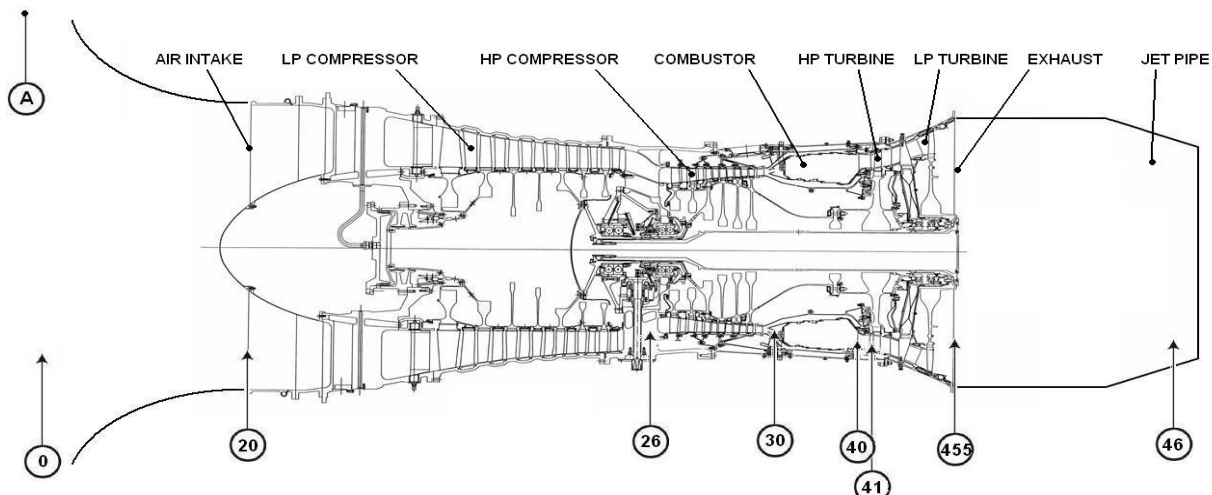
5. Test Measurement Description

Various instrumentation points along the main gas path are identified with “aerodynamic station numbers” for monitoring temperature and pressure characteristics of the main gas flow. The table below shows the station descriptions, and the figure shows the location of the RB211 test stations referred in this document.

No	Description	Measurements
A	Ambient	Ambient pressure - Barometer Relative humidity
0	Air Inlet	Temperature, T1 - 3 RTD's Cell pressure, P0 - 1 transducer
2	LP Compressor Inlet	Speed probe, LP - magnetic pickup Pressure, S1 – 12 Static flare tapings
26	LP/HP Compressor Inter-stage duct	Temperature, T26 - 1 type K thermocouple Pressure, PS26 - Static tapping
30	HP Compressor Discharge	Speed probe, HP - magnetic pickup Temperature, T3 - 4 type K thermocouples Pressure, S3 - 4 Static tapings
40	Combustor Section	Fuel flow - 1 Coriolis flow meter Fuel temperature, TFG – RTD Fuel pressure, PFG - transducer for 1 static tapping
455	Gas generator exhaust	Temperature, T455 - 8 or 17 type K thermocouples Pressure, P455 - 10 total rake tapings Pressure, S455 - 2 static tapings
46	Jet Pipe Exit	Temperature, JPT - 12 type K thermocouples Pressure, S46 - 1 static tapping

Other instrumentation included in the test not related to the gas path:

- Analysis of the gas composition from a chromatograph (for each steady-state recording)
- Temperatures for lube oil L1 to L4 measured with RTD's
- Pressures for the lube oil L01 to L07 measured with transducers
- Vibration transducers mounted on the front, center and rear
- VIGV angle – solenoid relative position to datum



6. Correction Methods

The data reduction method performed on the recorded gas path test data uses the RR Performance Analysis Program (or PAP) Version 7.0. This uses industry standard ISO correction calculations applied to the measured gas path parameters to correct to the standard conditions of ambient temperature of 15°C (59°F) and sea level pressure of 14.696 PSIA, and 60% relative humidity. Fuel flow has an additional correction to a standard fuel heating value of 11730 CHU/Lb. The correction formulae are in the form of:

ISO Corrected Value = Recorded Value * Θ^{θ} * Δ^{δ} * RHCORR

ISO Corrected Heat rate = $3600 * (\text{ISO Corrected Fuel flow} * \text{LCV}) / \text{EGHPC}$

Where

Θ = 288.15K / Test ambient temperature

Δ = 14.696 PSIA / Test ambient pressure

RHCORR = RH * RHFACT

θ = OEM proprietary correction exponent for temperature

δ = OEM proprietary correction exponent for pressure

RHFACT = OEM proprietary correction factor for pressure

LCV = Lower calorific value of fuel

EGHPC = ISO Corrected isentropic engine gas horse power

Engine gas horse power and calculated T455 are thermodynamic RR proprietary calculations that are output via the PAP program. All corrected data can be found in Appendix A of this report.

All test facility owned instrumentation has been fully calibrated according to TCT quality procedures.

The Data Acquisition System (DAS) 'Engine Test' version 5.0 was used to record the engine test data. The data was stored in the 'Engine Test' database version 1.0. For steady-state performance readings, the engine was stabilized at each test data recording for 5 minutes. An analysis of the gas composition was taken for each performance reading for the fuel flow and heat rate calculations.

7. Test Calibration

All test facility owned instrumentation used for the test has been fully calibrated according to TCT quality procedures QP R5.2.

Most instrumentation is verified on a quarterly basis; the records, histories and periods of these calibrations are stored as required.

Appendix A Observed and Corrected Test Data

Points used in the determination of the Rated acceptance values

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date	-	13/08/15	13/08/15	13/08/15	13/08/15	13/08/15
Time	-	10:58:39	11:06:27	11:12:16	11:17:54	11:23:22
NL/vT1	rpm	348.4	359.5	365.0	371.1	376.4
NH_a	rpm	8983	9211	9326	9454	9586
NH_b	rpm	8983	9210	9326	9455	9586
NH_c	rpm	8983	9209	9327	9454	9586
NL_a	rpm	6005	6201	6300	6406	6502
NL_b	rpm	6005	6201	6300	6406	6502
NL_c	rpm	N/A	N/A	N/A	N/A	N/A
T1_Avg	deg C	23.9	24.4	24.7	24.9	25.3
T25_Avg	deg C	180.2	190.3	195.1	206.6	202.4
T3_a	deg C	418.6	442.3	454.0	468.0	481.3
T3_b	deg C	418.6	442.3	454.0	468.0	481.3
T3_c	deg C	418.6	442.3	454.0	468.0	481.3
T3_d	deg C	418.6	442.3	454.0	468.0	481.3
T455_01	deg C	552.0	597.3	619.7	645.6	672.8
T455_02	deg C	542.3	586.3	611.6	638.6	666.5
T455_03	deg C	545.9	593.8	620.2	649.6	678.3
T455_04	deg C	548.1	599.1	626.2	657.2	689.4
T455_05	deg C	545.2	588.1	611.2	639.4	668.2
T455_06	deg C	547.8	596.4	620.0	650.4	680.8
T455_07	deg C	557.1	601.7	625.7	654.1	683.3
T455_08	deg C	558.9	603.5	628.0	655.5	685.3
T455_09	deg C	N/A	N/A	N/A	N/A	N/A
T455_10	deg C	N/A	N/A	N/A	N/A	N/A
T455_11	deg C	N/A	N/A	N/A	N/A	N/A
T455_12	deg C	N/A	N/A	N/A	N/A	N/A
T455_13	deg C	N/A	N/A	N/A	N/A	N/A
T455_14	deg C	N/A	N/A	N/A	N/A	N/A
T455_15	deg C	N/A	N/A	N/A	N/A	N/A
T455_16	deg C	N/A	N/A	N/A	N/A	N/A
T455_17	deg C	N/A	N/A	N/A	N/A	N/A
T455_Avg	deg C	551.1	596.7	621.0	649.4	679.2
T455_Avg_a	deg C	N/A	N/A	N/A	N/A	N/A
T455_Avg_b	deg C	N/A	N/A	N/A	N/A	N/A
T455 Voted Avg	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_01	deg C	0.9	0.6	-1.3	-3.9	-6.3
T455_Sp_02	deg C	-8.8	-10.5	-9.4	-10.9	-12.7
T455_Sp_03	deg C	-5.2	-2.9	-0.8	0.2	-0.8
T455_Sp_04	deg C	-3.0	2.4	5.2	7.8	10.2
T455_Sp_05	deg C	-5.9	-8.6	-9.8	-10.0	-11.0
T455_Sp_06	deg C	-3.2	-0.3	-1.0	1.0	1.7
T455_Sp_07	deg C	6.0	5.0	4.7	4.7	4.1
T455_Sp_08	deg C	7.8	6.8	7.0	6.0	6.2
T455_Sp_09	deg C	N/A	N/A	N/A	N/A	N/A

Observed data continued...

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date	-	13/08/15	13/08/15	13/08/15	13/08/15	13/08/15
Time	-	10:58:39	11:06:27	11:12:16	11:17:54	11:23:22
T455_Sp_10	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_11	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_12	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_13	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_14	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_15	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_16	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_17	deg C	N/A	N/A	N/A	N/A	N/A
T455_Sp_Max	deg C	7.8	6.8	7.0	7.8	10.2
T455_Sp_Min	deg C	-8.8	-10.5	-9.8	-10.9	-12.7
JPT_01	deg C	566.0	611.6	635.8	665.3	693.9
JPT_02	deg C	563.7	610.2	633.6	662.5	692.4
JPT_03	deg C	563.0	606.8	631.2	660.1	693.4
JPT_04	deg C	562.4	609.7	634.3	662.9	691.6
JPT_05	deg C	561.7	607.9	632.2	661.0	689.7
JPT_06	deg C	563.1	609.2	633.7	662.8	691.3
JPT_07	deg C	557.2	602.7	627.4	655.1	683.8
JPT_08	deg C	559.1	603.7	628.8	656.9	685.5
JPT_09	deg C	557.2	603.1	626.5	654.9	683.7
JPT_10	deg C	558.5	604.1	629.0	656.8	684.9
JPT_11	deg C	561.7	609.2	633.6	662.7	690.8
JPT_12	deg C	564.2	609.0	635.0	662.4	692.3
t_oil_L1_c	deg C	57.6	59.7	61.2	62.7	64.3
t_oil_L2_c	deg C	75.4	80.9	84.7	87.6	89.5
t_oil_L3_c	deg C	119.1	128.4	132.7	135.8	140.1
t_oil_L4_c	deg C	123.0	130.8	134.9	139.2	144.4
t_oil_tank_c	deg C	71.5	75.4	77.2	79.3	81.4
P0_kpaa	kpa	89.24	89.23	89.22	89.22	89.21
P1_kpa	kpa	89.10	89.08	89.06	89.06	89.05
PS25	kpag	241.76	266.60	280.22	295.81	310.73
HP3	kpag	518.06	576.66	610.48	641.56	675.31
P3_HP6_a	kpag	1182.61	1331.26	1414.59	1513.15	1607.21
P3_HP6_b	kpag	1183.25	1332.19	1415.94	1509.62	1605.08
P3_HP6_c	kpag	1183.25	1332.19	1415.94	1509.62	1605.08
P3_HP6_d	kpag	1184.66	1331.97	1415.49	1512.29	1612.64
P7S	kpag	99.43	120.87	132.10	146.39	161.13
p_oil_L01_kpag	kpag	528.53	565.32	578.50	598.32	614.91
p_oil_L02_kpag	kpag	44.59	52.81	60.09	59.34	65.34
p_oil_L03_kpag	kpag	173.25	192.70	206.28	215.70	226.86
p_oil_L04_kpag	kpag	157.25	177.16	189.47	202.33	212.86
p_oil_L06_kpag	kpag	458.53	490.00	503.61	521.83	541.16
p_oil_L07_kpag	kpag	206.00	227.74	242.73	252.45	265.02
p_oil_L06dL07_kpag	kpag	252.53	262.26	260.88	269.38	276.14

Observed data continued...

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date	-	13/08/15	13/08/15	13/08/15	13/08/15	13/08/15
Time	-	10:58:39	11:06:27	11:12:16	11:17:54	11:23:22
p_oil_H01_kpag	kpag	4495.5	4475.7	4474.1	4464.4	4465.9
v_front_mmmps	mm/sec	6.4	8.8	8.0	6.9	5.5
v_center_mmmps	mm/sec	4.0	6.0	6.0	4.8	4.6
v_rear_mmmps	mm/sec	5.3	8.4	10.2	8.6	9.3
x_vigv_lvdt_deg	deg	19.79	19.59	18.23	19.32	18.91
z_hum_pct	%	16.57	16.90	16.75	16.17	15.41
z_gas_C1_tav_pct	%	97.16	97.16	97.14	97.15	97.22
z_gas_C2_tav_pct	%	2.03	2.04	2.06	2.05	1.98
z_gas_C3_tav_pct	%	0.06	0.06	0.06	0.06	0.06
z_gas_IC4_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C4_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_IC5_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C5_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_C6_tav_pct	%	0.00	0.00	0.00	0.00	0.00
z_gas_N2_tav_pct	%	0.73	0.73	0.73	0.73	0.73
z_gas_CO2_tav_pct	%	0.00	0.00	0.00	0.00	0.00
Gas LCV	CHU/LB	11770.30	11770.40	11770.00	11770.00	11771.00

Corrected Test Data

Test Point	Units	Scan 1	Scan 2	Scan 3	Scan 4	Scan 5
Date	-	13/08/15	13/08/15	13/08/15	13/08/15	13/08/15
Time	-	10:58:39	11:06:27	11:12:16	11:17:54	11:23:22
NLC	RPM	5921.0	6110.3	6203.6	6304.4	6396.7
NHC	RPM	8855.0	9071.2	9180.2	9303.6	9425.7
EGHPC	HP	18122.1	22967.0	25783.6	29207.6	32769.9
BSFCC (Heat rate)	btu/hp.hr	7407.6	6953.9	6733.4	6532.0	6357.0
SOTC	K	1185.8	1250.2	1279.8	1316.9	1352.0
EGTC	K	797.1	840.4	863.0	889.8	916.6

Appendix B Performance and Mechanical Charts

Chart 1 – ISO Corrected SOT versus EGHP

All data points represent the engine at the steady-state condition

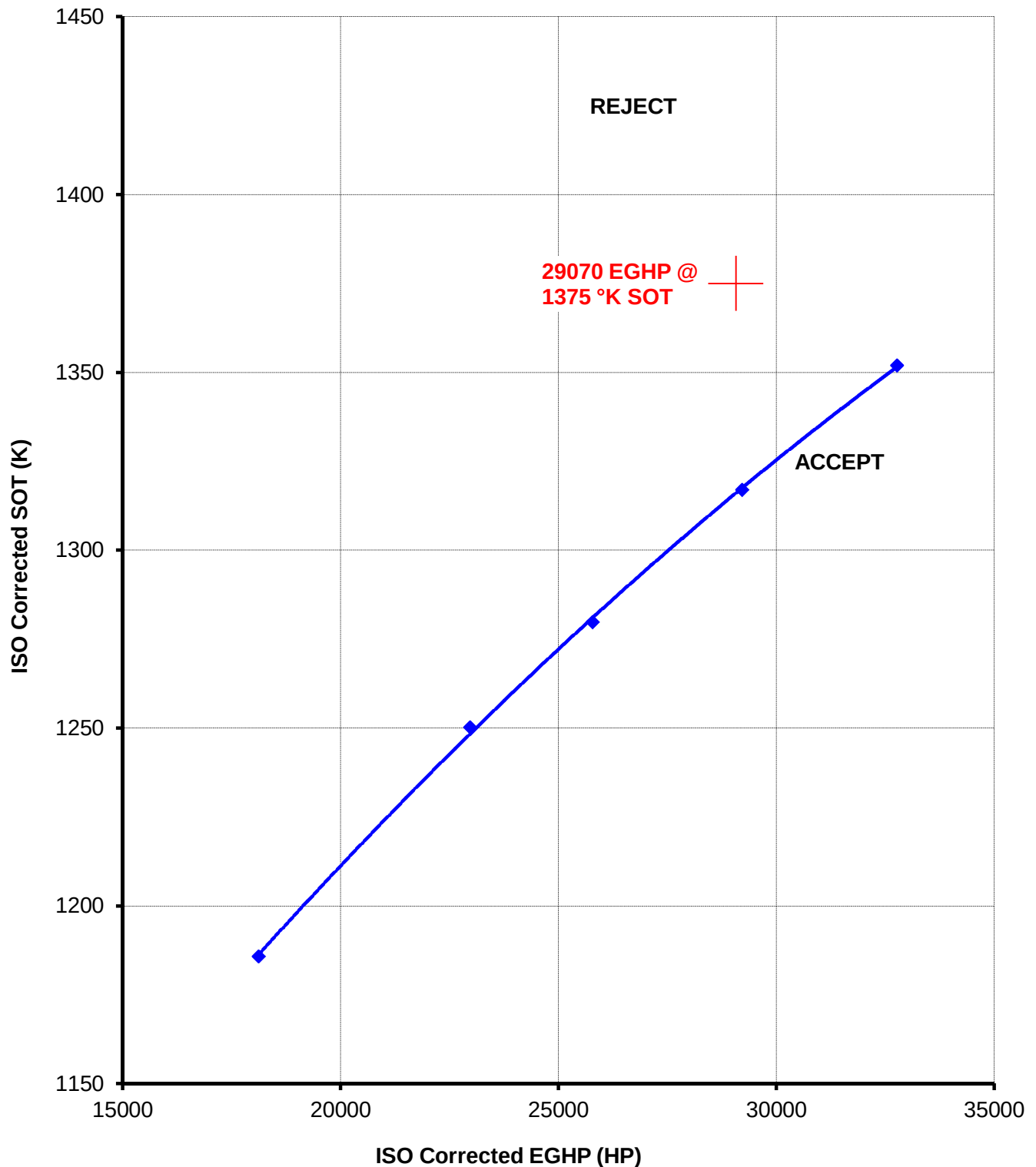


Chart 2 – ISO Corrected EGHP verses Heat Rate
All data points represent the engine at the steady-state condition

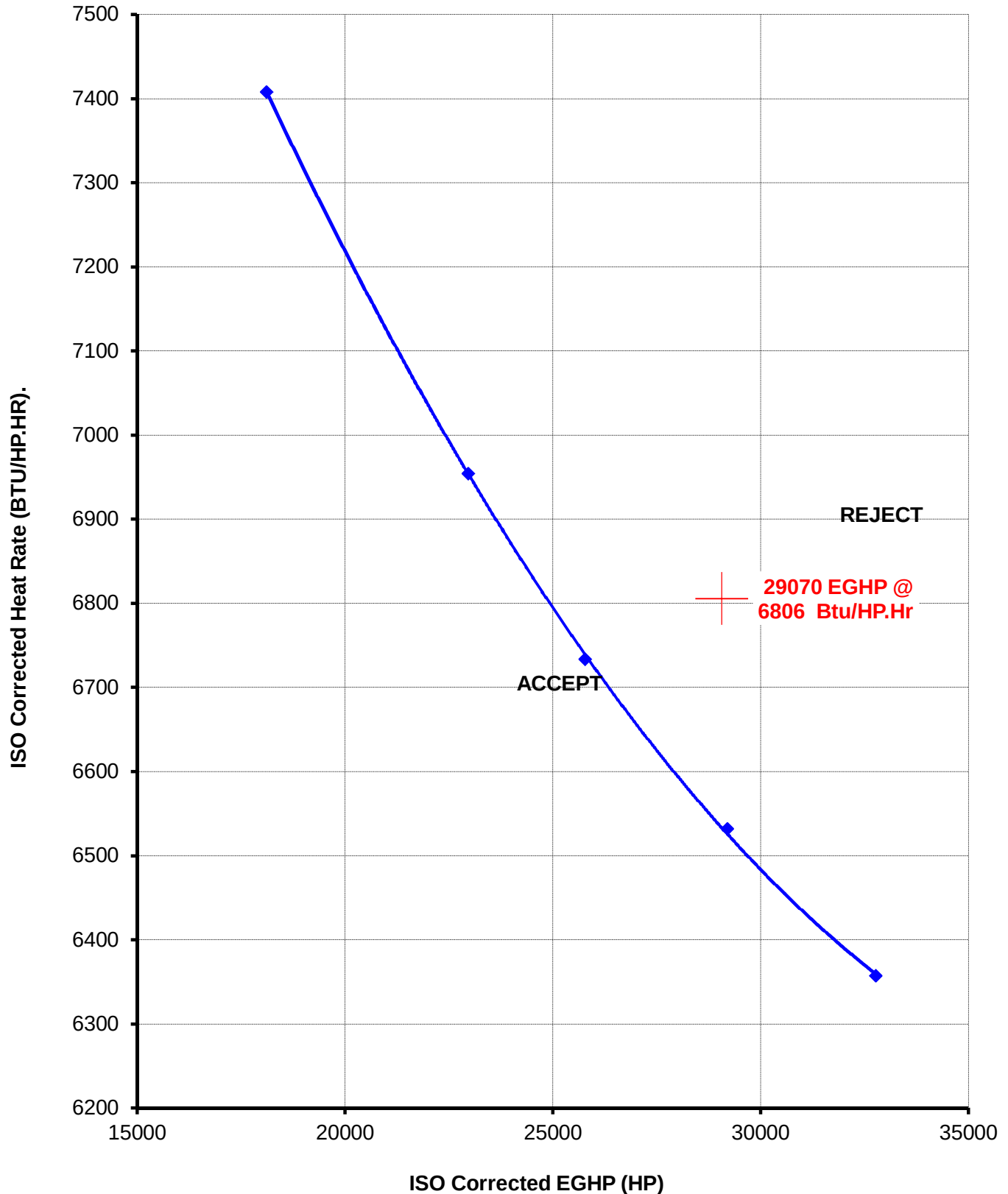
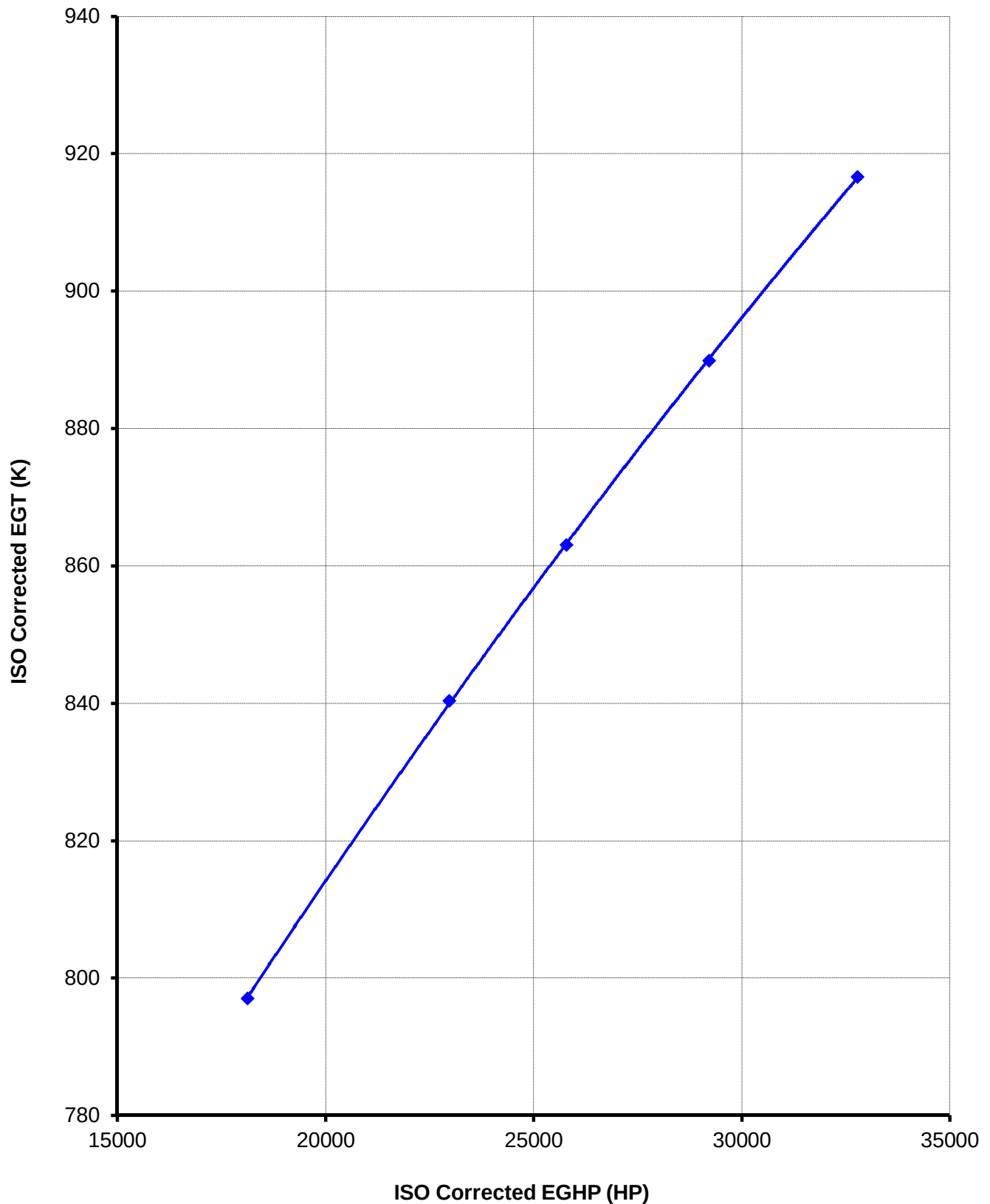
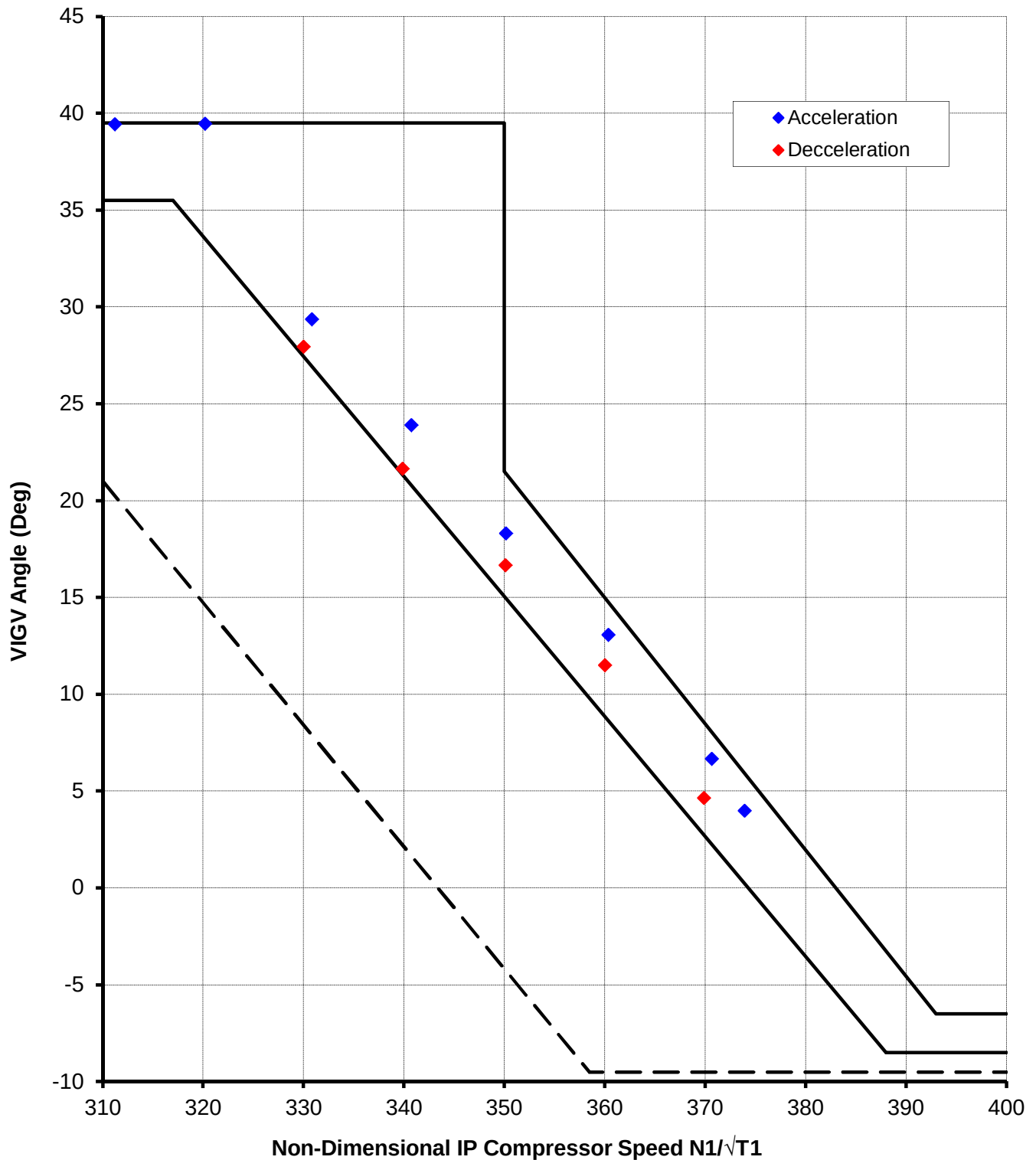


Chart 3 – ISO Corrected EGHP versus Exhaust Gas exit temperature

All data points represent the engine at the steady-state condition



VIGV Schedule for 22 Engines with P2 Schedule - Open Loop



The Solid Lines Indicate The Tolerance Of The VIGV Schedule For Acceleration Points Only

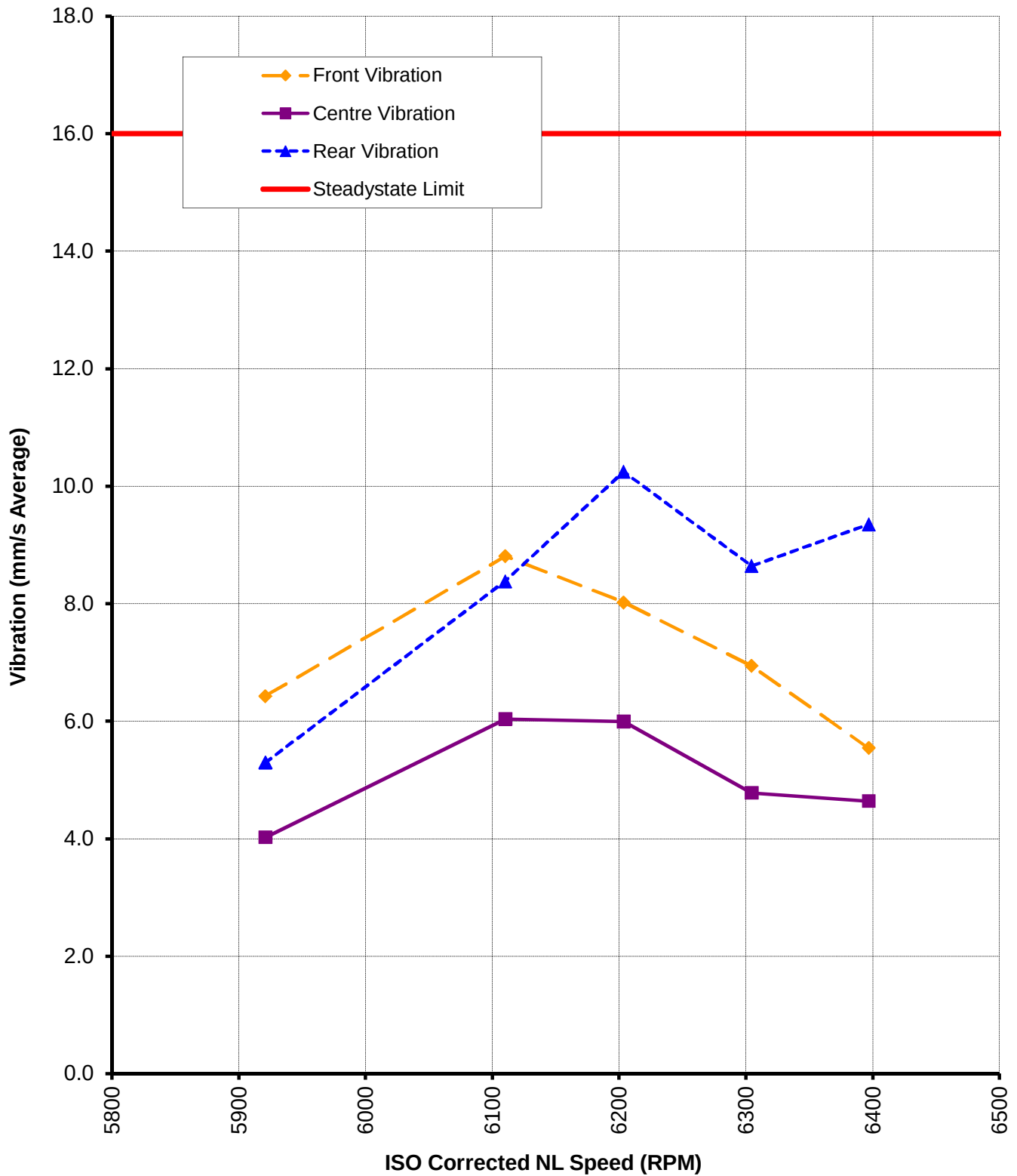
Hysteresis, Deceleration To Acceleration Points, Must Not Be Greater Than 6.25° Of VIGV Angle At Any Given $N1/\sqrt{T1}$ Value

Deceleration Points Falling Outside The Solid Lines May Be Accepted Provided That The Hysteresis Requirement Is Met

Appendix C Vibration survey

Steady-State vibration survey

All data points represent engine at steadystate condition



Appendix D Oil Consumption and Debris Checks

On completion of the engine testing, the initial and final oil tank readings are compared to calculate the oil consumption for test.

Inputs to Calculation

[1]	Test start date	13-Aug-15	DD:MM:YYYY
[2]	Test start time	16:24:19	HH:MM:SS
[3]	Initial tank level (relative to datum centerline)	14.80	cm
[4]	Test finish date	13-Aug-15	DD:MM:YYYY
[5]	Test finish time	17:02:26	HH:MM:SS
[6]	Final tank level (relative to datum centerline)	14.79	cm

Calculation Constants

[7]	Tank internal radius	43.5	cm
[8]	Tank internal length	132.5	cm
[9]	Tank internal volume	787.7	Litres

Tank Volumes

It is necessary to correct the final tank contents for any temperature difference, using the initial volume temperature as the datum.

[10]	Height 1 = 43.5 + initial level	58.30	cm
[11]	Height 2 = 43.5 + final level	58.29	cm
[12]	Original volume of tank	561.1	Litres
[13]	Final volume of tank	561.0	Litres
[14]	Volume change	0.1	Litres

Oil Consumption

[15]	Running time between readings = [6] - [2]	0.64	Hrs
[16]	Oil Consumption = ([15] - [18]) / [19]	0.17	L/Hr

On completion of the engine testing, the front, centre and rear MCD's are checked for debris (as per CTS5017/2 section 5.14.1). The photographs below show each of the MCD's state post test.



Front MCD



Centre MCD



Rear MCD

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 8, p. 4

Please provide at what amount incremental capacity, is each the proposed new compressors required.

Response:

Union has executed contracts for 453 TJ/d with 15-year terms and has proposed facilities to meet these demands.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 9, Schedules 1-3

With respect to the capital costs for the proposed compressors:

- a) Please explain step-by-step how Union forecasted the cost of each proposed compressor.
 - b) Please explain the difference in cost for each compressor.
-

Response:

- a) Union's Dawn H, Lobo C and Bright C compressor station cost estimates are based on budgetary quotations, as well as historical material and construction costs from recent projects such as Parkway C and Parkway D and Lobo C. Appropriate cost adjustments are applied as necessary depending on project specific scopes, timing requirements and market factors.

For additional detail, Attachment 1 is a copy of Exhibit I.A3.UGL.CCC.14 that was filed in EB-2012-0451/EB-2012-0433/EB-2013-0074. It details the process used by Union to develop cost estimates.

- b) Please see the response at Exhibit B.BOMA.15 a).

UNION GAS LIMITEDAnswer to Interrogatory from
Consumers Council of Canada ("CCC")

Ref: Section 11, p. 100/121 and Schedule 11.1

The evidence sets out the estimated capital cost for all of the facilities related to the Parkway West project. Please explain the process used to develop the budget. Will Union be providing an update to the budget as it was filed in January 2013? For each of the components set out in Schedule 11.1 please explain how were the contingency amounts developed?

Response:

Union Gas' Estimate/Budget development typically follow the stages below. Each revision expands, details, and refines the previous level of estimate to obtain a higher degree of accuracy and ultimately the final budget.

1. Magnitude Estimate

High-level estimate - Completed solely by Cost Estimators, with limited Subject Matter Expert input. Scope at conceptual level, with limited project parameters defined. Contingency set at 20%.

2. Feasibility Estimate

Refined magnitude estimate - Completed by Cost Estimators with Subject Matter Expert input. Scope more defined, with limited project parameters defined by in-house Design and Construction Team. Contingency set at 20%.

3. Pre-Budget Estimate

Detailed project estimate/budget - Completed by Cost Estimators with full Subject Matter Expert input. Scope fully defined, with detailed Bill of Materials available, site visits conducted and contractor/vendor quotes received. Contingency set at 15%.

4. Budget Estimate

Final project estimate/budget - Completed by Cost Estimators with full Subject Matter Expert input. Scope finalized, detailed construction Bill of Materials, final site and routes selected and final quotes/target pricing for construction and materials contractor/vendor quotes received. Contingency set at 10%.

Union is not planning to file an update to the cost estimate provided in January. However, if there are material changes to the budget or scope, Union will file an update.

The components set out in schedule 11.1 are based on a Pre-Budget level estimate, and as such were assigned a 15% contingency. The exception was the land costs with no contingency, as options had been exercised and prices are fixed.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 4, Schedule 3, pp. 1-2, Exhibit A, Tab 9

SEC seeks to understand Union's history of forecasting compressor capital costs. Please complete the attached excel spreadsheet.

Response:

Please see Attachment 1.

Interrogatory: SEC-6															
Compressor			Budget (millions)						Actual/Forecast (millions)					Variance Analysis	
	Install Date	Horsepower	Total	Materials	Construction & Labour	Contingencies	Interest During Construction	Source	Total	Materials	Construction & Labour	Contingencies	Interest During Construction	Total Variance	Explanation
Dawn F-1	2006	10,310	\$34.0	\$19.5	\$11.6	\$1.6	\$1.3	<u>1</u>	\$48.1	\$25.0	\$21.8	\$0	\$1.3	\$14.1	-Material and contractor cost increases due to design consultant scope changes - Contractor costs also impacted by weather delays
Dawn F-2	2006	10,310													
Dawn I	2008	44,100	\$69.9	\$39.5	\$24.1	\$3.6	\$2.7		\$78.1	\$37.6	\$37.7	\$0	\$2.8	\$8.2	- Material and contractor cost increases due to design consultant scope changes
Dawn J	2011	10,310	\$41.7	\$17.5	\$17.0	\$5.9	\$1.3	<u>2</u>	\$40.5	\$15.9	\$23.5	\$0	\$1.1	-\$1.2	- Cost decreases due to contractor & design efficiencies - Improved estimating processes (industry standard contingencies)
Bright A1	2008	39,600	\$57.4	\$40.2	\$13.9	\$1.1	\$2.2	<u>2</u>	\$73.3	\$38.5	\$32.5	\$0	\$2.3	\$15.9	- Increased contractor costs driven by Compressor retrofit challenges, OEM on site quality issues and design consultant scope changes
Bright A2	2008	39,600													
Parkway B	2007	42,500	\$48.4	\$29.2	\$13.1	\$4.3	\$1.8	<u>2</u>	\$70.8	\$36.2	\$32.5	\$0	\$2.1	\$22.4	-Increased material and contractor costs driven by field changes due to design issues - Contractor costs also increased due to Labour strike during construction, OEM quality issues and Brownfield site challenges
Parkway C	2015	44,500	\$219.4	\$57.6	\$134.4	\$21.6	\$5.8	<u>3</u>	\$228.5	\$60.5	\$159.7	\$3.0	\$5.3	\$9.1	- Project currently under construction - Increased costs forecasted due to station infrastructure and permitting requirements
Parkway D	2015	44,500	\$108.0	\$43.2	\$47.0	\$13.9	\$2.9	<u>4</u>	\$90.1	\$42.0	\$44.3	\$1.5	\$2.3	-\$17.9	- Project currently under construction - Decreased costs forecasted due to design & construction efficiencies for multiple compressor plants & measurement station in one location
Lobo C	2016	44,500	\$169.9	\$56.1	\$80.8	\$27.4	\$5.6	<u>5</u>	\$165.3	\$58.1	\$88.2	\$14.3	\$4.7	-\$4.6	- Project currently under construction - Increase in contractor costs forecast offset by reduced need for contingencies (Budget level estimate)

(1) Filed at EB-2005 -0201 Section 5 Schedule 4
(2) Filed at EB-2012-0451/EB-2012-0433/EB-2013-0074 at Exhibit I.A3.ULG.Staff.13
(3) Filed at EB-2012-0433 Cost UpdateAugust 23, 2013 Schedule 11-1 Updated
(4) Filed at EB-2013-0074 at Schedule 9-2
(5) Filed at EB-2014-0261 Exhibit A Tab 9 Schedule 2

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 10, Schedule 3

Please provide a bill impact table for consumption of 40,000 m³ per year.

Response:

Please see Attachment 1.

The estimated bill impact for a Rate M1 customer with an annual consumption of 40,000 m³ is a bill decrease of \$3.12 or (0.0%).

The estimated bill impact for a Rate 01 customer with an annual consumption of 40,000 m³ is a bill increase of \$14.35 or 0.1%.

UNION GAS LIMITED
2018 General Service Bill Impacts
Rate Impacts of the Lobo D, Bright C and Dawn H Compressors Project
Annual Consumption of 40,000 m³

Line No.	Rate M1 - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill (1)	EB-2015-0200 Proposed 01-Jan-18 Total Bill	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
1	Monthly Charge	252.00	252.00	-	
2	Delivery Commodity Charge	1,291.88	1,298.72	6.84	
3	Storage Services	296.64	286.68	(9.96)	
4	Total Delivery Charge	1,840.52	1,837.40	(3.12)	-0.2%
	<u>Supply Charges</u>				
5	Transportation to Union	1,407.84	1,407.84	-	
6	Commodity & Fuel	4,810.60	4,810.60	-	
7	Total Gas Supply Charge	6,218.44	6,218.44	-	
8	Total Bill (line 4 + line 7)	8,058.96	8,055.84	(3.12)	0.0%
9	Impacts for Customer Notices - Sales (line 8)			(3.12)	
10	Impacts for Customer Notices - Direct Purchase (line 4)			(3.12)	

Line No.	Rate 01 Eastern Zone - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill (1)	EB-2015-0200 Proposed 01-Jan-18 Total Bill	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
11	Monthly Charge	252.00	252.00	-	
12	Delivery Commodity Charge	3,201.36	3,148.52	(52.84)	
13	Total Delivery Charge	3,453.36	3,400.52	(52.84)	-1.5%
	<u>Supply Charges</u>				
14	Transportation to Union	3,135.12	3,137.20	2.08	
15	Storage Services	1,737.96	1,803.08	65.12	
16	Subtotal	4,873.08	4,940.28	67.20	1.4%
17	Commodity & Fuel	4,814.56	4,814.56	-	
18	Total Gas Supply Charge (line 16 + line 17)	9,687.64	9,754.84	67.20	
19	Total Bill (line 13 + line 18)	13,141.01	13,155.36	14.35	0.1%
20	Impacts for Customer Notices - Sales (line 19)			14.35	
21	Impacts for Customer Notices - Direct Purchase (line 13 + line 16)			14.35	

Note:

(1) Calculated as per Appendix A, EB-2015-0035.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 10, Schedule 3

Please provide a similar bill impact table as requested in SEC-7 that includes an impact of all approved or applied for capital projects, including but not limited to, EB-2014-0182, EB-2014-0261, EB-2013-0074).

Response:

Please see Attachment 1.

The estimated bill impact for a Rate M1 customer with an annual consumption of 40,000 m³ is an increase of \$63.60 or 0.8%.

The estimated bill impact for a Rate 01 customer with an annual consumption of 40,000 m³ is a bill increase of \$71.33 or 0.5%.

UNION GAS LIMITED
2018 General Service Bill Impacts
Rate Impacts of all approved and applied for Capital Projects
Annual Consumption of 40,000 m³

Line No.	Rate M1 - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill (1)	01-Jan-18 Total Bill (2)	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
1	Monthly Charge	252.00	252.00	-	
2	Delivery Commodity Charge	1,291.88	1,374.24	82.36	
3	Storage Services	296.64	277.88	(18.76)	
4	Total Delivery Charge	1,840.52	1,904.12	63.60	3.5%
	<u>Supply Charges</u>				
5	Transportation to Union	1,407.84	1,407.84	-	
6	Commodity & Fuel	4,810.60	4,810.60	-	
7	Total Gas Supply Charge	6,218.44	6,218.44	-	
8	Total Bill (line 4 + line 7)	8,058.96	8,122.56	63.60	0.8%
9	Impacts for Customer Notices - Sales (line 8)			63.60	
10	Impacts for Customer Notices - Direct Purchase (line 4)			63.60	

Line No.	Rate 01 Eastern Zone - Particulars	EB-2015-0035 Approved 01-Apr-15 Total Bill (1)	01-Jan-18 Total Bill (2)	Bill Impact	
		(\$) (a)	(\$) (b)	(\$) (c) = (b - a)	(%) (d) = (c / a)
	<u>Delivery Charges</u>				
11	Monthly Charge	252.00	252.00	-	
12	Delivery Commodity Charge	3,201.36	3,110.86	(90.50)	
13	Total Delivery Charge	3,453.36	3,362.86	(90.50)	-2.6%
	<u>Supply Charges</u>				
14	Transportation to Union	3,135.12	3,139.08	3.96	
15	Storage Services	1,737.96	1,895.84	157.88	
16	Subtotal	4,873.08	5,034.92	161.84	3.3%
17	Commodity & Fuel	4,814.56	4,814.56	-	
18	Total Gas Supply Charge (line 16 + line 17)	9,687.64	9,849.48	161.84	
19	Total Bill (line 13 + line 18)	13,141.01	13,212.34	71.33	0.5%
20	Impacts for Customer Notices - Sales (line 19)			71.33	
21	Impacts for Customer Notices - Direct Purchase (line 13 + line 16)			71.33	

Note:

- (1) Calculated as per Appendix A, EB-2015-0035.
- (2) Includes EB-2012-0433 & EB-2013-0074 Parkway Projects, EB-2014-0182 Burlington Oakville
Includes EB-2014-0261 Dawn Parkway 2016 System Expansion, EB-2015-0200 2017 Dawn to Parkway Project.

UNION GAS LIMITED

Answer to Interrogatory from
School Energy Coalition ("SEC")

Reference: Exhibit A, Tab 6, p. 21

Union's evidence states: "Union's five-year Term-Up Provision is consistent with TransCanada's recently approved Term Up Provision (RH-001-2014). Short haul shippers contracted on the Dawn Parkway System and the TransCanada Mainline would have the ability to match contract terms on each pipeline and manage contracting risk."

- a) Please confirm that TransCanada's approved Term-Up provision is five-year for firm transportation shippers desiring to retain renewal rights if \$20 million or more of new facilities are required.
 - b) Please confirm that the revised proposed provisions as set out in Union's Letter to the Board dated September 3 2015, which raised the threshold cost from \$20.0 million to \$50.0 million, is now not consistent with TransCanada's approved Term-Up provision.
 - c) If a) and b) are confirmed, please explain why the change in threshold cost is appropriate.
-

Response:

- a) Confirmed. In addition, the Term-Up Provision applies to firm service contracts that may impact the design of proposed facilities and that expire within five years of the expected in-service date of the proposed facilities.
- b) The principles of the Term-Up Provision remain consistent with TransCanada's approved Term-Up Provision. The threshold change from \$20 million to \$50 million reflects the facility expansion cost at which the Term-Up Provision is triggered on Union's Dawn Parkway System.
- c) Please see the response at Exhibit B.Energy Probe.9 c).

UNION GAS LIMITED

Answer to Interrogatory from
TransCanada Pipelines Limited ("TCPL")

Reference: i) Application, Exhibit A, Tab 5, p. 14 of 15, Figure 5-4

Preamble: In Reference i), Union provides a summary of Dawn Parkway System transportation contracts and system demands. TransCanada requests additional contracting information.

For the following requests, please provide all pertinent data including contracted quantity, receipt point, delivery point, and contract start and end dates. Please provide this information in PDF and Excel format, with the contracts sorted by expiry date and by customer.

- a) Please provide updated details on all M12, M12-X and C1 contracts in effect as of November 1, 2014 on the Dawn Parkway System that have a term of one year or longer.
- b) Please provide the same information with respect to all M12, M12-X and C1 contracts that Union believes will be in effect as of November 1, 2015, November 1, 2016, and November 1, 2017.

Response:

a) and b) Please see Attachment 1. This attachment shows Union's contracts effective November 1, 2014 as well as those that are expected to start in November 1, 2015, November 1, 2016 and November 1, 2017. Contracts are listed by primary contract holder.

Dawn to Parkway System Contracts effective November 1, 2014

Customer	Contract #	Path	Start Date	Expiry Date	Nov-14	Nov-15	Nov-16	Nov-17
York Energy Centre LP	C10102	Dawn to Parkway	1-Apr-12	30-Sep-15	11,654			
TransCanada Pipelines Limited	M12086	Dawn to Parkway	1-Nov-06	1-Oct-15	83,915			
BP Canada Energy Company	M12087	Dawn to Parkway	1-Nov-06	31-Oct-15	20,000			
Dynegy Gas Imports	M12170	Dawn to Kirkwall	1-Nov-08	31-Oct-15	38,306			
GreenField Specialty Alcohols	M12156	Dawn to Parkway	1-Nov-08	31-Oct-15	1,917			
KeySpan Gas East Corporation	M12116	Dawn to Kirkwall	1-Nov-07	31-Oct-15	138,600			
National Fuel Gas Distribution	M12196	Dawn to Kirkwall	1-Nov-10	31-Oct-15	10,791			
National Fuel Gas Distribution	M12211	Dawn to Kirkwall	1-Nov-10	31-Oct-15	15,904			
TransCanada Pipelines Limited	M12012	Dawn to Kirkwall	1-Nov-94	31-Oct-15	62,602			
TransAlta Cogeneration, LP	M12081	Dawn to Parkway	1-Nov-06	30-Nov-16	7,636	7,636	7,636	
1425445 Ontario Limited o/a Utilities Kingston	M12127	Dawn to Parkway	1-Nov-08	31-Oct-17	2,113	2,113	2,113	2,113
Bay State Gas Company	M12204	Dawn to Parkway	1-Nov-10	31-Oct-17	27,803	27,803	27,803	27,803
Brooklyn Union Gas Company d/b/a National Grid NY	M12193	Dawn to Parkway	1-Nov-10	31-Oct-17	12,953	12,953	12,953	12,953
Brooklyn Union Gas Company d/b/a National Grid NY	M12165	Dawn to Parkway	1-Nov-11	31-Oct-17	44,019	44,019	44,019	44,019
Central Hudson Gas & Electric Corporation (a subsidiary of	M12195	Dawn to Parkway	1-Nov-10	31-Oct-17	10,792	10,792	10,792	10,792
Central Hudson Gas & Electric Corporation (a subsidiary of	M12182	Dawn to Parkway	1-Nov-11	31-Oct-17	5,467	5,467	5,467	5,467
Colonial Gas Company d/b/a National Grid	M12198	Dawn to Parkway	1-Nov-10	31-Oct-17	6,475	6,475	6,475	6,475
Connecticut Natural Gas Corporation	M12201	Dawn to Parkway	1-Nov-10	31-Oct-17	18,077	18,077	18,077	18,077
Connecticut Natural Gas Corporation	M12166	Dawn to Parkway	1-Nov-11	31-Oct-17	6,410	6,410	6,410	6,410
Consolidated Edison Company of New York, Inc. and Orange	M12162	Dawn to Kirkwall	1-Nov-11	31-Oct-17	31,746	31,746	31,746	31,746
Enbridge Gas Distribution	M12125	Dawn to Parkway	1-Nov-08	31-Oct-17	10,692	10,692	10,692	10,692
Enbridge Gas Distribution	M12175	Dawn to Kirkwall	1-Nov-10	31-Oct-17	35,806	35,806	35,806	35,806
Enbridge Gas Distribution	M12188	Dawn to Parkway	1-Nov-11	31-Oct-17	18,703	18,703	18,703	18,703
Enbridge Gas Distribution	M12079A	Dawn to Kirkwall	1-Apr-14	31-Oct-17	32,123	32,123	32,123	32,123
Essex Gas Company (Boston Gas Company d/b/a National Grid	M12197	Dawn to Parkway	1-Nov-10	31-Oct-17	9,282	9,282	9,282	9,282
Essex Gas Company (Boston Gas Company d/b/a National Grid	M12199	Dawn to Parkway	1-Nov-10	31-Oct-17	2,158	2,158	2,158	2,158
Gaz Metro Limited Partnership	M12007	Dawn to Parkway	1-Nov-06	31-Oct-17	21,021	21,021	21,021	21,021
Gaz Metro Limited Partnership	M12092	Dawn to Parkway	1-Nov-06	31-Oct-17	35,000	35,000	35,000	35,000
KeySpan Gas East Corporation	M12194	Dawn to Parkway	1-Nov-10	31-Oct-17	17,162	17,162	17,162	17,162
KeySpan Gas East Corporation	M12163	Dawn to Parkway	1-Nov-11	31-Oct-17	43,837	43,837	43,837	43,837
Liberty Utilities (EnergyNorth Natural Gas, Inc. d/b/a National	M12200	Dawn to Parkway	1-Nov-10	31-Oct-17	4,317	4,317	4,317	4,317
Niagara Mohawk Power Corporation d/b/a National Grid	M12186	Dawn to Parkway	1-Nov-11	31-Oct-17	55,123	55,123	55,123	55,123
Northern Utilities, Inc.	M12205	Dawn to Parkway	1-Nov-10	31-Oct-17	6,333	6,333	6,333	6,333
St. Lawrence Gas Company	M12126	Dawn to Parkway	1-Nov-08	31-Oct-17	10,785	10,785	10,785	10,785
Suncor Energy Products Partnership Produits Suncor Energie	M12217	Dawn to Parkway	1-Nov-11	31-Oct-17	9,585	9,585	9,585	9,585
The Corporation of the City of Kitchener	M12090	Dawn to Parkway	1-Nov-06	31-Oct-17	2,600	2,600	2,600	2,600
The Narragansett Electric Company d/b/a National Grid	M12164	Dawn to Parkway	1-Nov-11	31-Oct-17	1,081	1,081	1,081	1,081
The Southern Connecticut Gas Company	M12202	Dawn to Parkway	1-Nov-10	31-Oct-17	34,950	34,950	34,950	34,950
TransCanada Pipelines Limited	M12123	Dawn to Kirkwall	1-Nov-08	31-Oct-17	134,077	71,838	59,778	59,778
Yankee Gas Services Company	M12203	Dawn to Parkway	1-Nov-10	31-Oct-17	43,116	43,116	43,116	43,116
1425445 Ontario Limited o/a Utilities Kingston	M12077	Dawn to Parkway	1-Apr-04	31-Mar-18	6,322	6,322	6,322	6,322
Enbridge Gas Distribution Inc.	C10059	Parkway to Dawn	1-Nov-12	31-Mar-18	236,586	236,586	236,586	236,586
Gaz Metro Limited Partnership	M12132	Dawn to Parkway	1-Apr-09	31-Mar-18	52,343	52,343	52,343	52,343
Gaz Metro Limited Partnership	M12172	Dawn to Parkway	1-Apr-10	31-Mar-18	22,908	22,908	22,908	22,908
Gaz Metro Limited Partnership	M12176	Dawn to Parkway	1-Apr-11	31-Mar-18	88,728	88,728	88,728	88,728
Gaz Metro Limited Partnership	C10087	Parkway to Dawn	1-Apr-13	31-Mar-18	100,000	100,000	100,000	100,000
St. Lawrence Gas Company, Inc.	C10076	Parkway to Dawn	1-Apr-07	31-Mar-18	10,785	10,785	10,785	10,785
Brooklyn Union Gas Company d/b/a National Grid NY	M12208	Dawn to Parkway	1-Nov-10	31-Oct-18	30,217	30,217	30,217	30,217
Connecticut Natural Gas Corporation	M12206	Dawn to Parkway	1-Nov-10	31-Oct-18	9,170	9,170	9,170	9,170
Consolidated Edison Company of New York, Inc. and Orange	M12171	Dawn to Parkway	1-Nov-11	31-Oct-18	21,825	21,825	21,825	21,825
Enbridge Gas Distribution	M12080	Dawn to Parkway	1-Nov-06	31-Oct-18	106,000	106,000	106,000	106,000
Greater Toronto Airports Authority	M12120	Dawn to Parkway	1-Nov-07	31-Oct-18	7,500	7,500	7,500	7,500
KeySpan Gas East Corporation	M12209	Dawn to Parkway	1-Nov-10	31-Oct-18	22,772	22,772	22,772	22,772
The Southern Connecticut Gas Company	M12207	Dawn to Parkway	1-Nov-10	31-Oct-18	13,970	13,970	13,970	13,970
TransCanada Power formerly TransCanada Energy Ltd.	M12131	Dawn to Parkway	1-Nov-09	31-Oct-18	84,348	84,348	84,348	84,348
US Steel Canada Inc	M12085	Dawn to Parkway	1-Nov-06	31-Oct-18	11,087	11,087	11,087	11,087
Vermont Gas Systems, Inc.	M12119	Dawn to Parkway	1-Nov-07	31-Oct-18	20,000	20,000	20,000	20,000
Yankee Gas Services Company	M12210	Dawn to Parkway	1-Nov-10	31-Oct-18	20,560	20,560	20,560	20,560
Connecticut Natural Gas Corporation	M12214	Dawn to Parkway	1-Nov-10	31-Oct-19	6,489	6,489	6,489	6,489
Enbridge Gas Distribution	M12108	Dawn to Parkway	1-Nov-07	31-Oct-19	57,100	57,100	57,100	57,100
The Southern Connecticut Gas Company	M12213	Dawn to Parkway	1-Nov-10	31-Oct-19	9,735	9,735	9,735	9,735
Yankee Gas Services Company	M12212	Dawn to Parkway	1-Nov-10	31-Oct-19	5,380	5,380	5,380	5,380
Ag Energy Co-operative Ltd	M12151	Dawn to Parkway	1-Nov-08	31-Oct-20	1,363	1,363	1,363	1,363
Vermont Gas Systems, Inc.	M12190	Dawn to Parkway	1-Nov-10	31-Oct-20	500	500	500	500
TransCanada Pipelines Limited	M12X004	Dawn to Parkway	1-Sep-11	31-Aug-21	50,000	50,000	50,000	50,000
TransCanada Pipelines Limited	M12X005	Dawn to Parkway	1-Sep-11	31-Aug-21	78,316	78,316	78,316	78,316
Ag Energy Co-operative Ltd	M12167	Dawn to Parkway	1-Nov-11	31-Oct-21	1,900	1,900	1,900	1,900
York Energy Centre LP	M12184	Dawn to Parkway	1-May-12	1-Oct-22	76,000	76,000	76,000	76,000
Emera Energy Incorporated	M12221	Kirkwall to Parkway	1-Nov-12	31-Oct-22		36,751	36,751	36,751
Enbridge Gas Distribution	M12X006	Dawn to Parkway	1-Nov-12	31-Oct-22	200,000	200,000	200,000	200,000
Enbridge Gas Distribution	M12079B	Dawn to Parkway	1-Apr-14	31-Oct-22	1,627,393	1,627,393	1,627,393	1,627,393
Enbridge Gas Distribution	M12079B	Dawn to Parkway	1-Apr-14	31-Oct-22	137,285	137,285	137,285	137,285
TransCanada Pipelines Limited	M12219	Kirkwall to Parkway	1-Nov-12	31-Oct-22		88,497	88,497	88,497
TransCanada Pipelines Limited	M12X013	Dawn to Parkway	1-Nov-12	31-Oct-23	62,695	62,695	62,695	62,695
TransCanada Pipelines Limited	M12220	Kirkwall to Parkway	1-Nov-13	31-Oct-23		174,752	174,752	174,752
1425445 Ontario Limited o/a Utilities Kingston	M12X015	Dawn to Parkway	1-Apr-14	31-Mar-24	5,000	5,000	5,000	5,000
Vermont Gas Systems, Inc.	M12224	Dawn to Parkway	1-Nov-14	31-Oct-24	8,100	8,100	8,100	8,100
Gaz Metro Limited Partnership	M12109	Dawn to Parkway	1-Nov-07	31-Oct-27	65,000	65,000	65,000	65,000
Portlands Energy Centre LP	M12130	Dawn to Parkway	13-Jan-09	31-Oct-28	100,000	100,000	100,000	100,000
Sithe Global Power Goreway	M12110	Dawn to Parkway	1-Nov-07	31-Oct-28	140,000	140,000	140,000	140,000
Thorold Cogen LP	M12129	Dawn to Kirkwall	1-Sep-09	31-Aug-29	49,500	49,500	49,500	49,500
					4,631,807	4,485,879	4,473,819	4,466,183

Dawn to Parkway System Contracts effective November 1, 2015, November 1, 2016 and November 1, 2017

Customer	Contract #	Path	Start Date	Expiry Date	Nov-14	Nov-15	Nov-16	Nov-17
DTE	C10110	Kirkwall to Dawn	1-Nov-15	31-Oct-17		73,000	73,000	
Emera Energy Incorporated	C10107	Kirkwall to Dawn	1-Nov-15	31-Oct-17		73,745	73,745	73,745
TransCanada Pipelines Limited	M12258	Dawn to Parkway	1-Oct-15	31-Mar-19		83,915	83,915	83,915

Emera Energy Incorporated	C10108	Kirkwall to Dawn	1-Apr-15	31-Mar-20		26,335	26,335	26,335
Mercuria Commodities Canada Corporation	C10111	Parkway to Dawn	1-Apr-15	31-Mar-20		42,202	42,202	42,202
Seneca Resources Corporation	C10109	Kirkwall to Dawn	1-Nov-16	31-Mar-23			388,261	388,261
Enbridge Gas Distribution (1)	M12225	Dawn to Parkway	1-Dec-15	31-Oct-25		200,000	400,000	400,000
Gaz Metro Limited Partnership	M12222	Dawn to Parkway	1-Nov-15	31-Oct-25		257,784	257,784	257,784
DTE Energy Company	M12255	Kirkwall to Parkway	1-Nov-17	31-Oct-31				73,854
Enbridge Gas Distribution	M12234	Dawn to Parkway	1-Nov-16	31-Oct-31			170,000	170,000
Gaz Metro Limited Partnership	M12232	Dawn to Parkway	1-Nov-16	31-Oct-31			39,507	39,507
Gaz Metro Limited Partnership	M12233	Dawn to Parkway	1-Nov-16	31-Oct-31			19,754	19,754
Gaz Metro Limited Partnership	M12237	Dawn to Parkway	1-Nov-16	31-Oct-31			85,680	85,680
TransCanada Pipelines Limited	M12230	Kirkwall to Parkway	1-Nov-16	31-Oct-31			36,301	36,301
1425445 Ontario Limited o/a Utilities Kingston	M12251	Dawn to Parkway	1-Nov-17	31-Oct-32				5,000
1425445 Ontario Limited o/a Utilities Kingston	M12252	Kirkwall to Parkway	1-Nov-17	31-Oct-32				1,000
Enbridge Gas Distribution	M12250	Dawn to Parkway	1-Nov-17	31-Oct-32				190,000
Gaz Metro Limited Partnership	M12244	Dawn to Parkway	1-Nov-17	31-Oct-32				36,670
Northern Utilities, Inc.	M12256	Dawn to Parkway	1-Nov-17	31-Oct-32				6,440
St. Lawrence Gas Company	M12249	Dawn to Parkway	1-Nov-17	31-Oct-32				10,412
The Corporation of the City of Kitchener	M12253	Kirkwall to Parkway	1-Nov-17	31-Oct-32				10,000
TransCanada Energy	M12246	Dawn to Parkway	1-Nov-17	31-Oct-32				120,000
						-	756,981	1,696,484
								2,076,860

(1) Enbridge Gas Distribution contract starts December 1, 2015 at 200,000 GJ/d and increase to 400,000 GJ/d January 1, 2016

UNION GAS LIMITED

Answer to Interrogatory from
TransCanada Pipelines Limited ("TCPL")

Reference: i) Application, Exhibit A, Tab 8, p. 11 of 12, Table 8-3
ii) EB-2007-0606/EB-2007-0615, Exhibit JTA.24, Undertaking of Union Gas (Attachment 1)
iii) Application, Exhibit A, Tab 8, Schedules 1 &2

Preamble: In Reference i), Union provides a table showing the relative economics of facility alternatives. In Reference ii), Union provided analysis of Dawn Parkway facilities expansions. TransCanada requires information to compare these figures with recent Union expansions.

In Reference iii), Union provides analysis of the Dawn Parkway System, including design day demand and system capacity.

- a) Please provide an update to Exhibit JTA.24 (included as Attachment 1), including all expansions from 2014 onwards, and including the expansion facilities proposed in this proceeding.
- b) Please provide an analysis of Union's Dawn Parkway System for Winter 2014/2015 and Winter 2015/2016 using the same format as the analysis in Reference iii).
- c) What heat rate does Union assume for its calculations in Reference iii)?
- d) Please explain what specific services or other measures Union will use to manage the 66,382 GJ/d system capacity shortfall as forecast for Winter 2016/2017 in Reference iii).
- e) Please confirm that the proposed 2017 facilities expansion is forecast to create 30,393 GJ/d of capacity in excess of shipper requests effective November 1, 2017, as shown in Reference iii). If not confirmed, please provide the correct figure and explain.
- f) Please explain how Union markets the excess capacity created through an expansion open season. Is excess capacity from an expansion posted publicly on Union's website so that all shippers are aware that it is for sale? Under what terms does Union sell excess capacity from an expansion open season? Does Union hold open seasons for shippers to bid into as a way to allocate this capacity to shippers, or is capacity allocated at Union's discretion under varying contractual arrangements? If so, please explain.
- g) Please explain how Union allocates available excess capacity that is not from an expansion open season. Is excess capacity posted publicly on Union's website so that all shippers are aware that it is for sale? Under what terms does Union sell excess capacity? Does Union

hold open seasons for shippers to bid into as a way to allocate this capacity to shippers or is capacity allocated at Union's discretion under varying contractual arrangements? If so, please explain.

Response:

- a) Please see Attachment 1.
- b) Winter 14/15 can be found in EB-2013-0074, Exhibit A, Tab 8, Schedule 1 and Winter 15/16 can be found in EB-2014-0261, Exhibit A, Tab 8, Schedule 1
- c) The heat rate assumed in EB-2015-0200 is $38.29 \text{ GJ}/10^3 \text{ m}^3$ for demands transported on the Dawn Parkway System.
- d) The shortfall of 66,382 GJ/d for Winter 2016/2017 will be managed similarly to Dawn Parkway System shortfalls in previous years. For example, Union may consider purchasing a short-term service from a third party to manage the shortfall.
- e) Confirmed. The shortfall is shown in Exhibit A, Tab 8, p. 9, Table 8-2.
- f) New capacity through facilities expansions is marketed in accordance with the Storage and Transportation Access Rule (STAR). That is, new capacity is publicly posted and marketed via an open season. Contracted capacity is reported through the monthly Index of Customers for transportation, showing the sale of firm transportation contracts with terms of one month or greater.

The surplus following the completion of the 2017 expansion will be marketed on a 15-year commitment basis until the time that the proposed 2017 Dawn Parkway Project is placed into service. In addition, Union will include the surplus capacity in any new capacity open seasons conducted prior to the 2017 Dawn Parkway Project being placed into service, including the new capacity open season for service commencing November 1, 2018 planned for fall of 2015.

Once the 2017 Dawn Parkway Project is placed into service, any of the 2017 surplus capacity will be marketed for the term that remains available (monthly, seasonally or annually). This may include surplus capacity that was allocated through a new capacity open season conducted prior to the 2017 Dawn Parkway Project in-service date but the transportation service has not commenced (i.e. surplus capacity can be marketed on a short term basis in winter 2017/2018 that was allocated to commence service November 1, 2018). However, if some or all of the surplus capacity is not needed to meet demand in new capacity open seasons held prior to the 2017 Dawn Parkway Project in-service date, then that capacity will be marketed as existing capacity.

- g) Existing capacity is sold at Union's discretion under varying contractual arrangements, which may or may not include an open season. In accordance with STAR, Union posts publicly on its website Operationally Available Transportation Capacity for a given gas day. In addition, contracted capacity is reported through the monthly Index of Customers.

Transmission Facilities Expansion Program

Long Term Expansion Plan for the Dawn - Parkway System

	Original Estimate			Actual		
	Design Day Capacity Added (GJ/d)	Facility Capital Costs (\$000's)	Capital Cost per Unit Capacity Added (\$/GJ/d)	Design Day Capacity Added (GJ/d)	Facility Capital Costs (\$000's)	Capital Cost per Unit Capacity Added (\$/GJ/d)
Existing Dawn - Parkway Facilities Net Plant Source: EB-2011-0210, Updated as per EB-2013-0365	6802651	923912	135.8			
2008 Projects Bright A1 and A2 Compressor Upgrade	342454	57400	168	335587	73244	218
2011 Projects Dawn J plant Compression to replace retired Dawn A Plant	0	41719	-	0	40555	-
2015 Projects Parkway D and Brantford to Kirkwall 2 Parkway C LCU Compressor 1	433000 0	204000 219430	471 -			
2016 Projects Lobo C and Hamilton to Milton 3	442770	415700	939			
2017 Projects Lobo C, Bright C and Dawn H 4	456647	623000	1364			

- 1 Parkway C estimate from EB2013-0433 - Revised Capital Cost
2 Parkway D and Brantford to Kirkwall as per EB-2013-0074
3 Lobo C and Hamilton Milton as per EB-2014-0261
4 Lobo D, Bright C and Dawn H as per EB-2015-0200

UNION GAS LIMITED

Answer to Interrogatory from
TransCanada Pipelines Limited ("TCPL")

Reference: i) Application, Exhibit A, Tab 10, Schedule 7, p. 39 of 68
ii) EB-2015-0200, Union letter regarding Term-Up Provision, September 3, 2015
iii) Application, Exhibit A, Tab 6, p. 20 of 23, lines 18-19

Preamble: In Reference i) Union states that it will provide a Term-Up Notice to eligible shippers if Union reasonably determines that "Expansion Facilities are required to increase the capacity or capabilities of flow on Union's pipeline system...", so long as the cost of those facilities exceeds \$20 million.

In Reference ii), Union revised its proposal to increase the threshold cost for Term-Up from \$20 million to \$50 million.

In Reference iii), Union states that its "five-year Term-Up Provision is consistent with TransCanada's recently approved Term-Up Provision (RH-001-2014)."

- a) Would a facilities expansion in excess of \$50 million to serve in-franchise incremental demand trigger the Term-Up clause for ex-franchise shippers?
- b) Please confirm that in-franchise customers do not sign formal gas transportation contracts for the use of Union's facilities, and are thus exempt from any Term-Up provisions. If not confirmed, please explain.
- c) Please define and explain the difference between "capacity" and "capabilities and flow" as used in Reference i).
- d) For an expansion with the same in-service date, is Union Gas willing to coordinate and align its Term-Up Provision notice to customers with TransCanada's notice to customers, so that shippers on both the Union Gas system and the TransCanada Mainline have the same 60 days to determine if they will Term-Up their contracts? If not, please explain why.

Response:

- a) The Term-Up Provision trigger applies to in-franchise or ex-franchise driven expansions on the Dawn Parkway System. In the M12 and C1 proposed General Terms and Conditions, Section XVI, Item 2 it states;

"Union will provide a Term-Up Notice to Shipper if Union determines Shipper's Contract, which contains a right of renewal pursuant to Section 1 immediately above, may impact the

design of the Expansion Facilities.” (Exhibit A, Tab 10, Schedule 7, p. 16 of 68)

- b) In general, in-franchise customers do not sign M12 or C1 transportation contracts and are not subject to the Term-Up Provision. However, Union continues to reserve required capacity on the Dawn Parkway System to serve forecasted in-franchise customers. As well, there are some in-franchise customers who do contract for M12 or C1 transportation services on the Dawn Parkway System with renewal rights who could be subject to the Term-Up Provision. These in-franchise customers may also have M12 turnback opportunities as a result of future reductions to the Parkway Delivery Obligation.
- c) “Capacity” identifies the volume that can flow through assets (pipeline(s) and/or compressor(s)) under a certain set of conditions (such as winter 2017/2018 design day). “Capabilities of flow” is a reflection of potential and identifies the volume that can flow through assets under a different set of conditions (such as with the addition of compression). Capacity is the commonly used term when considering design of facilities.
- d) Yes. To the extent practical, Union is willing to coordinate its Term-Up Provision notice with TransCanada’s Term-Up Provision notice for facility expansions with common in-service dates. The timing of Union’s Term-Up Provision notice will be driven by the facility expansion schedule which could be different for Union and TransCanada. Please see the response at Exhibit B.APPrO.1 d).

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 3 and Tab 7

- a) Please explain why it is necessary to replace the Plant B compressor when Union was able to operate without this unit for the last year.
- b) Please explain the difference between a new compressor and the LCU.
- c) Please provide the spending since 2010 on the current Plant B (RB211-22 engine).
- d) Prior to 2011 when the engine was overhauled how many outages occurred due to equipment failure?
- e) Since the overhaul suggested by Siemens appears to have been wholly unsuccessful, and in the event, detrimental to the ongoing operation of the existing unit, what compensation has Union sought from Siemens?

Response:

- a) Union was able to operate without Dawn Plant B during winter 2014/15 as design conditions did not occur and Union had adequate storage inventory and compression available at Dawn to meet the demands. Union South experienced a 43.1 (Celsius) heating degree day on February 15, 2015. Union was able to manage the demand on this day without Plant B in service because:
 - Union had 0.8 PJ/d of excess capacity at Dawn during the winter 2014/2015 (This capacity does not exist by November 1, 2016 as the 2015 and 2016 Dawn Parkway System expansion utilizes all of the excess Dawn capacity).
 - Demand into the Dawn Parkway System and Panhandle System was lower than design, primarily because February 15, 2015 occurred on the Sunday of the Family Day weekend.
 - Storage inventory levels were above forecasted design day levels and therefore less compression was required.

Under design day conditions, Union would have utilized its Loss of Critical Unit ("LCU") at Dawn to meet firm commitments on the Dawn Parkway System by backstopping volumes that would otherwise flow through Plant B.

- b) A new compressor is required when the volume of gas needed to be compressed exceeds the capability of the existing compressor units.

LCU compressor(s) are included on the Dawn Parkway System to ensure that all firm demands are met in the event of an unplanned compressor outage, or a planned outage for maintenance of the critical compressor unit at the Lobo, Bright, Dawn or Parkway compressor stations.

There is currently LCU protection on the Dawn Parkway System to provide reserve horsepower that protects the flow of natural gas to meet firm demand from an outage at either Lobo or Bright (the LCU is Lobo B and will transition to Lobo C in 2016). There is LCU protection at Dawn to provide reserve horsepower that protects the flow of natural gas at Dawn (the LCU is Dawn G). The LCU protection at Parkway is under construction and will be in service Winter 2015/16 to provide reserve horsepower that protects the flow of natural gas to TransCanada and Enbridge at Parkway (the LCU is Parkway C).

Please see EB-2012-0433, Section 5, pp. 50-53 for a fulsome discussion regarding the LCU protection on the Dawn Parkway System. As noted in evidence at Exhibit A, Tab 7, p 1, the intent of LCU strategy is to accommodate shorter term outages. LCU is not intended to accommodate compressor reliability issues that result in long-term compression outages and is not intended to substitute for prudent long term asset planning.

- c) Maintenance and repair spends on the current Plant B RB211-11 engine since 2010 totals approximately \$3.0 million.
- d) & e) The overhaul in 2011 was pre-emptive measure driven by availability of spare parts to extend the life of the asset by minimizing engine failure. The overhaul performed by the Siemens approved shop was successful. Costs associated with a recall the following year to replace a suspect part were covered under warranty by the Siemens approved shop. The engine failure in early 2015 was attributed to systems that support the engine and not the engine itself. A simultaneous controls communication and lube oil skid failure resulted in damage to the engine due to lack of oil supply.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 5, Schedule 1, p. 14

- a) What is the impact on this application if the Board does not approve the current NEXUS contract pre-approvals for Enbridge and Union Gas?
 - b) Please explain how the expected volumes from the Marcellus/Utica basin would be delivered to Dawn in the absence of the NEXUS pipeline.
-

Response:

- a) There is no impact on the 2017 Dawn Parkway Project if the Board does not approve the NEXUS pre-approval application. Union would continue to develop the proposed 2017 Dawn Parkway Project for November 1, 2017 in-service. Please see the response at Exhibit B.Staff.4.
- b) How volumes from the Marcellus/Utica would be delivered to Dawn in the absence of the NEXUS Pipeline is not relevant to this application (EB-2015-0200). Other than the proposed NEXUS and Rover Pipelines, Union is not aware of any other pipelines that are proposed that would directly connect the Utica/Marcellus to Dawn. Other alternatives would require transportation on multiple pipeline systems from the Marcellus/Utica to Dawn. ICF International provides a summary of potential Marcellus and Utica pipeline expansions to the U.S. Midwest and Ontario at Exhibit A, Tab 5, Schedule 1, p. 33, Exhibit 4-8.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 5, Schedule 1

- a) What impact would the full reversal of the Iroquois Pipeline have on this application?
- b) What impact would full reversal have on the 489 TJ/d Dawn to Parkway transportation contracted for by U.S. Northeast utilities?

Response:

- a) Union does not believe that a reversal of the Iroquois Gas Transmission system will have significant impact on the 2017 Dawn Parkway Project. Shippers supporting the proposed 2017 Dawn Parkway Project have executed M12 transportation service contracts with 15 year initial terms. ICF International does not forecast the reversal of the Iroquois Gas Transmission system in its analysis at Exhibit A, Tab 5, Schedule 1. Please see the responses at Exhibit B.ANE.5 c) i) and Exhibit B.FRPO.9.
- b) The reversal of the Iroquois Gas Transmission system would not have an immediate impact on the 489 TJ/d contracted by the U.S Northeast utilities. As noted in Exhibit B.BOMA.34, U.S. Northeast shippers on the Dawn Parkway System termed up their downstream TransCanada contracts to 2022. Please see the response at Exhibit B.BOMA.34 and Exhibit B.ANE.5.c) i).

As well, at Exhibit A, Tab 5, Schedule 1, p. 42, ICF International noted that “...*the advantages of holding pipeline capacity back to Dawn are expected to continue to provide incentives for the current customers in the U.S. Northeast to continue to hold capacity back to Dawn. The access to storage, the diversity of supply available at Dawn, and the difficulty in building new or expanded pipeline capacity into certain U.S. Northeast markets provide sound reasons for U.S. Northeast utilities to continue to hold capacity on the Union Dawn Parkway System.*” The ICF International view on U.S. Northeast utilities contracting on the Dawn Parkway System is further discussed in the response to Exhibit B.ANE.5 c) i).

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 6, p. 3

- a) Has Union Gas received any requests for new transportation services on either M12-X or M12 for Is M12C for 2018 onward?
 - b) If no incremental volumes are contracted for how would this affect the current project?
-

Response:

- a) Union has not executed any new Dawn Parkway System transportation contracts for service commencing in 2018, but has received general interest (non binding) of 55,000 GJ/d of Dawn to Parkway capacity commencing November 1, 2018. Union is planning to hold an open season in the fall of 2015 for service commencing November 1, 2018.
- b) There would be no impact to the proposed 2017 Dawn Parkway Project if no incremental Dawn Parkway System capacity was contracted for service commencing in 2018.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 6, p. 11

- a) When does Union expect to file its application for the Firm North Transportation Service?
 - b) If this service is not approved by the Board, what impact, if any, would this have on the current proposal?
-

Response:

- a) Union filed its Dawn Reference Price and North T-Service application and evidence (EB-2015-0181) on July 15, 2015.
- b) If the North Transportation Service is not approved, 35,090 GJ/d (North T-Service Dawn Parkway capacity contracted consisting of 29,115 GJ/d in 2016 and 5,975 GJ/d in 2017) of Dawn to Parkway capacity would become available increasing the surplus capacity from 30,393 GJ/d to 65,483 GJ/d. If one of the proposed compressors along the Dawn Parkway System was not constructed (Bright C) and the Firm North Transportation Service volumes do not flow on the Dawn Parkway System, the Dawn Parkway System shortfall would then be approximately 243 TJ/d, a shortfall too large to manage through third party contracted services. Therefore, if the Ontario Energy Board did not approve the Firm North Transportation Service there would be no impact on the proposed 2017 Dawn Parkway Project. However, it should be noted that if the Ontario Energy Board does not approve the new Firm North Transportation Service, the customers that have executed contracts for this service would be accountable for cancellation costs on TransCanada and Union (EB-2015-0181, Exhibit A, Tab 3, p. 4).

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 6, p. 13

- a) What is the impact on the 2017 Dawn Parkway project if the Vaughn Mainline Expansion is not approved?
-

Response:

- a) Please see the response at Exhibit B.BOMA.30. It is highly unlikely that TransCanada will not receive approval for further expansion in the Parkway to Maple corridor when: i) expansion is supported by long term contracts; and, ii) similar approvals have been provided by the National Energy Board for expansions in 2012, 2013 and 2015. Two of those expansions in the Parkway to Maple corridor involved new pipeline (Eastern Mainline Expansion and King’s North Connector Pipeline) similar to that proposed in the Vaughan Mainline Expansion.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 6, p. 13 and Tab 11, pp. 7-8

- a) Union states that it will be required to order compressors in early July 2015 in order to meet the November 1, 2017 in-service date. Has Union now ordered these compressors? If yes, please provide the actual costs.
 - b) If no, please provide a table showing the revised timelines of these projects (i.e. amended Tab 11/Schedule 1).
 - c) At A/T11/pg.7 Union states that it has already placed orders for certain components of this project. Please provide the costs to-date that Union has incurred on this project. Please differentiate the costs by Materials and Construction & Labour.
-

Response:

- a) Please see the response at Exhibit B.Energy Probe.11.
- b) N/A
- c) As of August 31, 2015, Union has incurred a total cost of \$15.6 million. The breakdown of costs is \$11.7 million for materials and \$3.9 million for construction & labour. The construction and labour costs include company labour and charges incurred by the design and environmental consultants. As per Exhibit B.LPMA.4, construction has not started at any of the three sites.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 8, pp. 4-5

- a) Please explain the difference in the increase in Dawn Parkway System Demand shown in Table 8.1 of 410,864 GJ/d (7,874,027-7,463,163) and the description of the increase at line 14, pg. 5 of 446,936 GJ/d.

Response:

The design day demand for the Dawn Parkway System increases by 410,864 GJ/d as shown in in Exhibit A, Tab 8, Table 8-1. The 410,864 GJ/d is the net increase in demand and is the difference between the demand contracted in the open season (M12, plus Union’s 5,975 GJ/d) for Firm North Transportation Service and forecast turnback.

The 446,936 GJ/d noted in Exhibit A, Tab 8, p. 5 lines 14–15 is the sum of the M12 volume contracted in the new capacity open season. The demands are noted in Table 8-1 as Dawn to Parkway (362,082 GJ/d) and Kirkwall to Parkway (84,854 GJ/d).

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 9, Schedule 4

- a) Please explain the derivation of the discount rate of 5.10%.
- b) Please explain the derivation of the 30-year period used for the life of the project.

Response:

The question references Exhibit A, Tab 9, Schedule 4. Union's assumption is that the reference was intended to be to Exhibit A, Tab 9, Schedule 5, and has answered according to that assumption.

- a) The discount rate of 5.10% is Union's estimated incremental weighted average after tax cost of capital (ATWACC). ATWACC is the discount rate to be used with EBO 134. The table below illustrates its derivation. The weighting of 36% common equity is based on Union's OEB approved equity thickness, and the balance is long-term debt. The 4.00% long-term debt rate is Union's estimated incremental cost of long-term borrowing. The 8.93% common equity rate is Union's OEB approved return on common equity.

		(a)	(b)	(c)= (a)*(b)	(d)	(e)
Line	Component	Weight	Rate	WACC	Pre-Tax WACC	After Tax WACC
1	Long-term debt	64.00%	4.00%	2.56%	2.56%	1.88%
2	Common Equity	36.00%	8.93%	3.21%	4.37%	3.21%
3		100.00%		5.77%	6.93%	5.10%

Weighting Proof

OK

Column (d) Line 1 = (c)

Column (d) Line 2 = (c)/(1-Tax Rate)

Column (e) Line 1 = (c)*(1-Tax Rate)

Column (e) Line 2 = (c)

Tax Rate

26.5%

- b) A term of 30 years is the typical period used for prior Dawn to Parkway transmission facilities. This is a conservative assumption given that Union maintains its assets for periods much longer than 30 years.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 9, Schedule 4

- a) Please provide the DCF results based on a 25 and 20 year project life.
b) Please provide the DCF results based on a 4.00% discount rate (30 year life).

Response:

a) and b) The results are shown in the table below. The DCF analyses was run as requested based on the parameters provided, however the project life parameters of 25 and 20 years is inconsistent with transmission facilities which are typically based on at least 30-year project life for DCF analyses.

The discount rate required by the EBO 134 decision is the incremental weighted average after tax cost of capital (5.10 % in this application). The DCF was run based on 4% as requested; however, using 4% is incompatible with EBO 134 requirements.

	As Filed	Updated (1)	Scenario 1	Scenario 2	Scenario 3
Project Life (Years)	30	30	25	20	30
Discount Rate (After Tax Weighted Average Cost of Capital)	5.10%	5.10%	5.10%	5.10%	4.00%
Net Present Value (\$000's)	(344,236)	(343,066)	(356,276)	(373,482)	(321,612)
Profitability Index	0.43	0.43	0.41	0.38	0.47

Notes:

- (1) Updated refers to an adjustment to the tax calculation for the abandonment costs of Dawn Plant B in 2018. A revised DCF will be included with Updated evidence.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 9, Schedule 4

a) Please provide the DCF analysis for the Alternatives shown in Table 8-3 (Exhibit A/T8/pg.11).

Response:

As part of the evaluation of the alternatives, a DCF analysis was not done for lines 2 and 3 of the Table. The screening criterion is the cost per unit of capacity (column 3 of the Table).

As indicated in Table 8-3, line 2 is 34% higher than the proposal (\$1832/1364); and line 3 is 62% higher (\$2207/1364). To respond to this question, Union has used the estimated capital costs from the time the facility alternatives were evaluated and such data has not been updated. As well, O&M expenses and municipal taxes for these alternatives are based on high level estimates that did not go through the same rigour as the estimates for the proposed Project.

The capital cost for alternatives 2 and 3 are at a preliminary high level of estimate and the DCF figures below can at best be considered directional given the level of information for the DCF.

	As Filed - Updated (1)	Alternative 1	Alternative 2
	a	b	c
Net Present Value (\$000's)	(343,066)	(372,779)	(430,481)
Profitability Index	0.43	0.40	0.35

Notes:

- Alternative 1 includes NPS 48 Dawn to Enniskillen Pipeline, Dawn H and Bright C Compressors.
- Alternative 2 includes NPS 48 Kirkwall to Hamilton and Milton to Parkway Pipelines, Dawn H and Lobo D Compressors.

(1) Updated refers to an adjustment to the tax calculation for the abandonment costs of Plant B in 2018. A revised DCF will be provided for the Updated evidence to be filed shortly.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 8, pp. 4-5

- a) Please explain the difference in the increase in Dawn Parkway System Demand shown in Table 8.1 of 410,864 GJ/d (7,874,027-7,463,163) and the description of the increase at line 14, pg. 5 of 446,936 GJ/d.

Response:

Please see the response at Exhibit B.VECC.8.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition ("VECC")

Reference: Exhibit A, Tab 10, p. 4

- a) Union explains that the allocation of Dawn Station transmission costs is to allocate these costs between in-franchise and ex-franchise rate classes using Dawn Parkway System easterly design day demands requiring Dawn compression. Does this mean that had Union chosen as an alternative to the proposed project which included NPS 48 pipeline build (see Table 8-3 Exhibit A/T8/pg. 11) that proportionally more costs would have been allocated to in-franchise customers?
- b) Would a different alternative have changed the Dawn Compression Factor? If yes please provide a revised Table 10-2 for each of the alternatives.
- c) Has Union calculated the allocated costs and rate impacts for the next most feasible project which eliminated one compressor (i.e. NPS Dawn to Enniskillen)? If yes, please provide this calculation.

Response:

- a) No. All of the alternatives presented in Table 8-3 include Dawn H and all would have the same Dawn H costs allocated to Dawn Station. The Dawn Station costs are allocated in proportion to design day demands requiring Dawn Compression, as provided at Table 10-2.

For all facility alternatives, project costs other than Dawn H would be classified as Dawn-Parkway transmission costs and allocated in proportion to distance weighted design day demands, as provided at Table 10-1.

- b) No, the Dawn Compression allocation factor would not change as a result of alternate facilities assuming those facilities provided sufficient capacity to meet the Project demands. The change in the Dawn Compression allocation factor is driven by the increase in demands requiring Dawn compression, not the proposed facilities.
- c) No.

UNION GAS LIMITED

Answer to Interrogatory from
Vulnerable Energy Consumers Coalition (“VECC”)

Reference: Exhibit A, Tab 10, p.12

- a) Union proposes a deferral account to track the variance between the forecast and actual revenue requirement impact of the proposal. What mechanisms or incentives has Union implemented or plan to implement in order to ensure the project is completed at, or below the current project budget?

Response:

Union is proposing a deferral account to track variances between the revenue requirement built in rates for the Project and the actual revenue requirement of the Project. The balance in this deferral account will be subject to a prudence review during Union’s annual non-commodity deferral account disposition process. There is no other incentive or mechanism required.