

1 Q. Reference: Teshmont Report - Section 4.3.3 – 230 KV Transmission Lines (pg 16):
2 ***“Outages due to ac terminal station equipment such as circuit breaker failures***
3 ***or misoperations are not included in this analysis.”***

4 Hydro provided Teshmont with detailed outage data for the transmission lines.
5 Please provide the outage data (failure frequency, failure rate and average outage
6 duration) for the terminal stations for the same five-year period as the transmission
7 lines.

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10 A. It is noted that the 230 kV transmission line outage statistics provided to Teshmont
11 included outages caused by all CEA subcomponent classifications including those
12 caused by the line itself, those caused by control and protection systems, and those
13 caused by terminal station equipment associated with the transmission line (i.e.
14 dedicated disconnect switches, lightning arrestors, etc.).

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16 In addition to the above, Hydro maintains forced outage data by voltage class for
17 major terminal station equipment such as transformers and circuit breakers. Hydro
18 maintains terminal station equipment performance data on average forced outage
19 frequency per annum and average forced outage duration per annum. Detailed
20 outage data for the terminal station equipment for the same five-year period
21 provided to Teshmont is provided in CA-NLH-154 Attachment 1.

Date/Time	Outage ID	Hydro ID	Outage Duration (Hours)	CEA Primary Cause	CEA Subcompent Failure	Notes
Feb 04, 2009 08:12	5303	OPDC1	8.1	Defective Equipment	Control and Protection Equipment	Blown Fuse on capacitors
May 10, 2009 20:47	5340	BDEB10B11	0.0	Human Element - Incorrect Construction, Installation		
May 13, 2009 06:46	5346	OPDC1	30.6	or Maintenance	Control and Protection Equipment	Breaker opening during lightning storm
Aug 20, 2009 07:16	5471	HRDB1L17	7.7	System Conditions	Control and Protection Equipment	Undetermined cause
Sep 04, 2009 08:13	5487	BBKL11L33	9.9	Defective Equipment	Control and Protection Equipment	High Resistive Trip coil contact
Sep 06, 2009 08:21	5495	OPDC1	6.1	Defective Equipment	Auxiliary Equipment	Burnt out close coil
Oct 07, 2009 10:18	5517	STAB1C2	0.1	Defective Equipment	Control and Protection Equipment	Blown Fuse on capacitors
Oct 07, 2009 10:18	5517	STAB1C3	0.1	System Conditions	Control and Protection Equipment	Undervoltage Condition
Oct 07, 2009 10:19	5515	PPTL41R2	7.4	System Conditions	Control and Protection Equipment	Undervoltage Condition
Oct 14, 2009 19:05	5506	OPDC2	5.4	Defective Equipment	Interrupting Medium	Low Gas Pressure
Oct 14, 2009 19:34	5507	OPDC1	0.7	Adverse Weather - Freezing Rain	Control and Protection Equipment	Blown Fuse on capacitors
Oct 15, 2009 08:43	5508	LHRC1	5.0	Adverse Weather - Freezing Rain	Control and Protection Equipment	Blown Fuse on capacitors
Oct 25, 2009 19:15	5512	SSDL06L07	0.0	Adverse Weather - Freezing Rain	Control and Protection Equipment	Blown Fuse on capacitors
Nov 21, 2009 09:05	5526	STAC2	57.5	Human Element - Incorrect Use of Equipment	Control and Protection Equipment	Inadvertant trip
Nov 26, 2009 22:42	5527	WAVB1L17	0.0	Defective Equipment	Auxiliary Equipment	Inadvertant trip
Nov 27, 2009 11:38	5529	BDEB4B5	1.3	Defective Equipment	Control and Protection Equipment	Mosisture in control caninet
Dec 02, 2009 00:34	5532	DLKT1	11.8	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Breaker failure protection in error due to wrong timing relay setting.
Dec 03, 2009 19:58	5544	LHRC1	39.2	Defective Equipment	Insulation System	Broken Insulator on capacitor bank
Jan 02, 2010 09:49	5553	STAC2	5.8	Defective Equipment	Control and Protection Equipment	Fuse blown fuses on capacitor bank
Feb 03, 2010 14:30	5571	DLST1	117.4	Defective Equipment	On-Load Tap Changer	Broken gear in tap changer motor
Mar 11, 2010 16:17	5628	BBKB3L50	N/A	Defective Equipment	Operating Mechanisms	Circuit Breaker failed and was replaced
Mar 18, 2010 12:56	5598	BUCL05L33	1.1	Unknown	Other	Inadvertant opening of breaker
Mar 24, 2010 23:33	5599	OPDC1	6.7	System Conditions	Control and Protection Equipment	Protection alarm removed from service
Apr 14, 2010 09:03	5603	PPTB1L41	0.1	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	New line protection relay tripped breaker due to incorrect setting
May 02, 2010 14:00	5605	HRDB8L39	1.5	Defective Equipment	Interruptors	Breaker contacts were stuck
May 14, 2010 22:03	5609	HVYT2	16.6	Defective Equipment	Surge arrester	Failed lightning arrester
Jun 04, 2010 07:04	5618	STAB1C1	0.0	Defective Equipment	Operating Mechanisms	Broken linkage in operating mechanism
Jun 11, 2010 20:45	5625	HRDB1B11	328.8	Defective Equipment	Bushings	Current transformer failed on breaker
Jun 18, 2010 06:22	5627	SVLT3	5.0	Defective Equipment	On-Load Tap Changer	Operating linkage to the motor drive was stuck in the tapchanger control cabinet
Aug 04, 2010 07:01	5671	BDEB4B5	71.6	Defective Equipment	Disconnect	Air leak caused by broken insualtor stack on disconnect switch
Aug 26, 2010 11:43	5688	HRDT3	0.1	Human Element - Testing	Terminal Set - Other	Transformer lockout switch opearted duraing testing in error.
Sep 14, 2010 00:03	5701	BCXT1	3.0	Defective Equipment	Auxiliary Equipment	Voltage Regultor damaged during switching
Oct 12, 2010 16:53	5731	DLKT2	1.6	Defective Equipment	Surge arrester	Failed lighting arrester
Oct 31, 2010 17:01	5732	BHLB1L59	0.0	Human Element	Terminal Set - Other	Inadvertant opening of breaker
Nov 21, 2010 14:39	5742	DLKT2	23.6	Defective Equipment	Control and Protection Equipment	Faulty load tap changer oil level gauge
Jan 08, 2011 15:04	5763	BDET10	4.4	Defective Equipment	Control and Protection Equipment	Faulty gas pressure relay
Jan 22, 2011 02:23	5771	BHLT1	4.2	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Incorrect protection setting on transformer protection relay
Mar 22, 2011 13:13	5800	BDET10	3.9	Defective Equipment	Cooling Equipment	Oil leak in radinater
May 19, 2011 18:20	5832	HRDT7	19.8	Defective Equipment	On-Load Tap Changer	Corroded contacts in diverter swithc on load tap changer
Jul 12, 2011 01:13	5853	BBKT1	15.0	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Lightning strike and transformer protection opearted due to incorrect protection setting
Oct 27, 2011 00:04	5920	USLT1	0.0	Defective Equipment	Control and Protection Equipment	Faulty temperature relay on transformer
Nov 07, 2011 17:36	5938	HRDB12L17	15.0	Defective Equipment	Interrupting Medium	Faulty air valve
Dec 08, 2011 17:44	5957	CBCC1	0.2	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Protection setting error
Dec 08, 2011 17:44	5957	CBCC2	0.2	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Protection setting error
Jan 04, 2012 10:55	6000	HWDC1	5.8	System Conditions	Control and Protection Equipment	Blown Fuse on capacitors
Jan 10, 2012 18:31	6002	CBCC1	5.1	Human Elment - Incorrect Protection Setting	Control and Protection Equipment	Protection setting error

Jan 10, 2012 18:31	6002	CBCC2	5.1	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Protection setting error
Mar 27, 2012 07:50	6009	DLKB1L45	0.2	Defective Equipment	Control and Protection Equipment	Faulty disagreement timer on breaker
May 25, 2012 19:00	6021	BDEB10B11	11.9	Defective Equipment	Operating Mechanisms	Breaker contact stuck during open attempt
Jun 05, 2012 09:11	6034	BBKB1L09	7.4	Defective Equipment	Interrupting Medium	Air leak on breaker
Jul 06, 2012 13:27	6071	BBKLO9L33	30.0	Defective Equipment	Interrupting Medium	Air leak on breaker
Jul 12, 2012 13:00	6064	HRDB1L17	485.6	Defective Equipment	Resistors or grading capacitors	Oil leak on capacitor on breaker
Jul 19, 2012 17:16	6074	HRDB8L39	0.0	System Conditions - Switching Transient	Operating Mechanisms	Breaker contact stuck
Aug 14, 2012 06:41	6082	BDEB2T3	11.2	Defective Equipment	Interrupting Medium	Air leak on breaker
Aug 21, 2012 10:00	6091	BWTT1	1.7	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Incorrect protection setting on transformer protection relay
Aug 21, 2012 11:55	6092	BWTT1	1.1	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Incorrect protection setting on transformer protection relay
Aug 22, 2012 07:48	6093	BDEB4B5	0.6	Human Element - Incorrect Use of Equipment	Control and Protection Equipment	Inadvertent opening due to ground loop in PLC controls
Oct 01, 2012 17:22	6132	BDEB10B11	0.0	Unknown	Other	Undetermined cause
Oct 12, 2012 12:43	6124	OPDT1	1.3	Human Element - Incorrect Circuit Labelling	Terminal Set - Other	Faulty gas relay on GT1 - shared alarm
Jan 10, 2013 11:47	6157	STBB3L130	0.0	Human Element - Testing	Control and Protection Equipment	Inadvertent trip during testing
Jan 11, 2013 06:42	6158	HRDB1L17	75.0	Defective Equipment	Insulation System	Breaker flashed over on outside on support insulator
Jan 11, 2013 06:42	6158	CBCC1	0.1	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:42	6158	CBCC2	0.1	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:42	6158	CBCC3	0.1	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:42	6158	CBCC4	0.1	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:48	6158	CBCC2	0.3	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:48	6158	CBCC1	0.4	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:48	6158	CBCC3	0.4	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 11, 2013 06:48	6158	CBCC4	0.4	System Conditions	Control and Protection Equipment	Severe Winter Storm
Jan 13, 2013 02:19	6163	OPDC1	3.9	Defective Equipment	Control and Protection Equipment	Blown Fuse on capacitors
Jan 23, 2013 12:19	6160	CBCEB1B2	0.0	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Related to protection design and settings
Feb 04, 2013 16:54	6175	CBCC2	53.0	Adverse Environment - Flying Debris	Bushings	Plastic wrap on support insulators
Feb 04, 2013 16:54	6175	CBCC3	53.0	Adverse Environment - Flying Debris	Bushings	Plastic wrap on support insulators
Feb 07, 2013 15:23	6185	CBCC1	30.2	Adverse Environment - Industrial Pollution	Bushings	Dirt and smoke from NARL on insulators
Feb 17, 2013 16:07	6186	BHLT1	14.8	Defective Equipment	Control and Protection Equipment	Protection relay issues
Feb 18, 2013 13:16	6182	BHLT1	52.8	Defective Equipment	Control and Protection Equipment	Protection relay issues
Feb 21, 2013 00:55	6184	DHRT2	3.6	Adverse Environment - Salt Spray	Bushings	Salt built up on bushings
Mar 06, 2013 08:17	6202	OPDC1	11.9	Defective Equipment	Control and Protection Equipment	Blown Fuse on capacitors
Mar 30, 2013 10:30	6200	VBNT1	3.1	Human Element - Switch Error	Terminal Set - Other	Vale switching problem
Aug 06, 2013 01:35	6258	DLKT1	4.8	Adverse Weather - Lightning	Terminal Set - Other	Lightning strike in station
Aug 06, 2013 12:11	6254	STAB1T1	0.1	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Incorrect protection setting on transformer protection relay
Aug 10, 2013 09:43	6262	SSDB1L03	8.3	Defective Equipment	Control and Protection Equipment	Breaker failed to close due to auxiliary relay failure
Nov 28, 2013 04:57	6294	BHLT1	7.4	Human Element - Incorrect Protection Setting	Control and Protection Equipment	Incorrect protection setting on transformer protection relay