

1 Q. **System Design**

2 Further to the response to PUB-NLH-176 which indicates that Hydro does not
3 employ “*emergency*” load limitations to its transmission and distribution line
4 ratings, does this mean that Hydro or Newfoundland Power will need to shed load
5 (if no local generation is available) when a transmission line becomes “*overloaded*”
6 because a parallel line is out of service, even when conductor sag clearances are not
7 exceeded?

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10 A. PUB-NLH-316 Attachment 1 is Hydro’s Operations Standard Instruction -
11 Transmission Line Thermal Ratings. As outlined in the instruction, if the
12 transmission line flow is greater than the maximum thermal rating of the line or
13 appears that it will exceed the rating of the line in the shorter term, the Energy
14 Control Centre operator will initiate immediate actions to relieve the overload or
15 possible overload. In the event that line loadings are not reduced to the thermal
16 rating of the line within 30 minutes then customer load shedding would be
17 initiated.



SYSTEM OPERATING INSTRUCTION

STATION: Energy Control Centre	Inst. No T-092
TITLE: Transmission Line Thermal Ratings	Page 1 of 2

The following table provides the thermal ratings for all transmission lines on the NLH system. These limits represent the capacity or maximum real power flow (MVA) that can be supported by a line for a given temperature (°C).

The thermal ratings are given for 5 different temperatures. The 7 °C ratings have been interpolated between the 0 °C and 15 °C values. Under normal circumstances the lines should always be operated within these limits as determined by the ambient air temperature. For other temperatures, the rating may be obtained by interpolating between the values given in the table. We do not extrapolate outside of our 0-degree or 30-degree ratings. For example, at -10 °C we use the 0 °C rating. At 40 °C we use the 30 °C rating.

The transmission line MVA value is calculated from the instantaneous MW and MVAR values as:

$$MVA = \sqrt{MW^2 + MVar^2}$$

It should be noted that for most lines the calculated MVA indications are not available in SCADA or on single line displays. The ECC operators should manually monitor the line MWs and MVars and ensure that the MVA limit is not violated for the current temperature.

Overload Conditions:

The Energy Control Center will monitor the flows on transmission lines and endeavour to operate the system in such a way that transmission lines are within acceptable limits on both the sending end and the receiving end, in both the real time case and in the event of the worst case contingency.

Equipment outage planning should take into account the expected loading condition on in service equipment and take into account worst case contingencies in order to prevent overloads on lines. However, this is not always possible when forced outages occur or when system constraints prevent the worst case contingency from being covered off. If a violation occurs, the ECC shall take actions to reduce the line flow to the applicable thermal rating or lower.

If the flow is greater than the maximum thermal rating or appears that it will exceed the rating in the shorter term, then the ECC should initiate immediate actions to relieve the overload or possible overload. Possible actions may include placing additional generation on line or increasing the output of units already on-line, system reconfiguration, supply bus voltage reduction, returning outaged equipment to service, curtailing customer owned generation, etc.



SYSTEM OPERATING INSTRUCTION

STATION: Energy Control Centre	Inst. No. T-092
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Overload Conditions: (cont'd.)

In the event that line loadings are not reduced to the thermal rating of the line within thirty (30) minutes then customer load shedding should be initiated. Thirty minutes is considered an appropriate amount of time to place additional hydro or standby generation on-line or to re-dispatch existing on-line generation in order to alleviate the transmission line overload.

Refer to the following instructions regarding possible actions:

- T-001 Generation Loading Sequence And Generation Shortages**
- A-022 Customer Communications During Unscheduled Interruptions**

Change Management:

Whenever there is a line upgrade, reconfiguration or addition, the parameters in the table will be updated as per the official System Planning Transmission Line Data book.

The System Operations - Power System Application Engineer will ensure that the change is propagated into all EMS software applications such as State Estimator, Contingency Analysis, power flow application and SCADA. The change will also be made on the various platforms: PDS, OTS, Backup Control Centre and the Production System.

REVISION HISTORY

<u>Version Number</u>	<u>Date</u>	<u>Description of Change</u>
0	2013-09-17	Original Issue

PREPARED: D. Hartley	APPROVED:
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LINE ID	FROM	TO	LENGTH (km)	VOLT (kV)	YEAR BUILT	CONSTRUCTION TYPE	MVA Rating for Ambient of				
							30 °C	25 °C	15 °C	7 °C	0 °C
201	Western Avalon	Hardwoods	80.678	230	1966	H-Frame Wood	175.5	207.7	260.2	289.1	322.2
202	Bay d'Espoir	Sunnyside	141.758	230	1966	Guyed V Steel	199.3	236.9	297.7	331.2	369.5
203	Western Avalon	Sunnyside	44.534	230	1965	H-Frame Wood	261.7	276.2	307.8	326.1	347
204	Bay d'Espoir	Stoney Brook	105.021	230	1966	Guyed V Steel	248.6	297.9	376.9	420.2	469.6
205	Stoney Brook	Buchans	83.937	230	1967	Guyed V Steel	175.5	207.7	260.2	289.1	322.2
206	Bay d'Espoir	Sunnyside	141.927	230	1968	Guyed V Steel	199.3	236.9	297.7	331.2	369.5
207	Sunnyside	Come-By-Chance	6.671	230	1968	Guyed V Steel	355.8	375.5	411.5	433.9	459.6
208	Western Avalon	Voisey's Bay Nickel	14.711	230	1968	Guyed V Steel	199.3	236.9	297.7	331.2	369.5
209	Stephenville	Bottom Brook	21.056	230	1971	H-Frame Wood	199.3	236.9	297.7	331.2	369.5
210	Stoney Brook	Glenwood	61.406	138	1969	H-Frame Wood/Steel T	80	156.6	116.8	129.5	144.1
210	Glenwood	Cobb's Pond	23.984	138	1969	H-Frame Wood/Steel T	80	156.6	116.8	129.5	144.1
211	Massey Drive	Bottom Brook	55.68	230	1967	Guyed V Steel	175.5	207.7	260.2	289.1	322.2
212	Sunnyside	Monkstown	57.7059	138	1966	Guyed Y/H Frame Wood	63.3	73.9	91.4	101.2	112.4
212	Monkstown	Bay L'Argent	48.0727	138	1966	Guyed Y/H Frame Wood	63.3	73.9	91.4	101.2	112.4
212	Bay L'Argent	Linton Lake	32.877	138	1966	Guyed Y/H Frame Wood	63.3	73.9	91.4	101.2	112.4
214	Doyles	Bottom Brook	118.272	138	1968	Guyed Y Aluminum	63.3	73.9	91.4	101.2	112.4
215	Doyles	Grand Bay	27.263	66	1969	Single Wood Pole	25.5	28.6	37.3	41.4	46
217	Western Avalon	Holyrood	76.663	230	1970	Guyed V Steel	199.3	236.9	297.7	331.2	369.5
218	Holyrood	Oxen Pond	37.294	230	1970	Steel/Wood	199.3	236.9	297.7	331.2	369.5
219	Sunnyside	Salt Pond	155.093	138	1990	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
220	Bay d'Espoir	Barachois	63.039	69	1970	H-Frame Wood	31.6	36.9	45.7	50.6	56.2
221	Peter's Barren	Hawke's Bay	53.237	66	1970	Single Pole Wood	30.3	35.3	43.7	48.4	53.8
222	Stoney Brook	South Brook Tap	79.697	138	1967	H-Frame Wood	63.3	73.9	91.4	101.2	112.4
222	South Brook Tap	Springdale	18.37	138	1967	H-Frame Wood	63.3	73.9	91.4	101.2	112.4
223	Springdale	Indian River	29.664	138	1966	H-Frame Wood	52.2	60.9	75.4	83.5	92.7
224	Howley	Indian River	57.506	138	1968	H-Frame Wood	52.2	60.9	75.4	83.5	92.7
225	Deer Lake Hydro	Deer Lake NP	1.404	66	1970	H-Frame Wood	30.3	35.3	43.7	48.4	53.8
225	Deer Lake NP	Deer Lake Power	1.576	66	1970	H-Frame Wood	30.3	35.3	43.7	48.4	53.8
226	Deer Lake	Berry Hill	71.384	66	1970	Single Wood Pole	30.3	35.3	43.7	48.4	53.8
227	Berry Hill	Daniel's Harbour	81.405	66	1970	Single Wood Pole	30.3	35.3	43.7	48.4	53.8
228	Buchans	Massey Drive	84.77	230	1967	Guyed V Steel	153.7	181.9	227.9	253.3	282.3
229	Wiltondale	Glenburnie	34.62	66	1976	Single Wood Pole	30.1	35.1	43.4	48.1	53.4
231	Bay d'Espoir	Stoney Brook	105.31	230	1976	Guyed V Steel	248.6	297.9	376.9	420.2	469.6
232	Stoney Brook	Buchans	84.247	230	1981	H-Frame Wood	248.6	297.9	376.9	420.2	469.6
233	Buchans	Bottom Brook	135.847	230	1973	H-Frame Wood	199.3	236.9	297.7	331.2	369.5
234	Upper Salmon	Bay d'Espoir	51.538	230	1981	H-Frame Wood	248.6	297.9	376.9	420.2	469.6
235	Stoney Brook	Grand Falls Freq	0.62	230	1966	Steel Tower	175.5	207.7	260.2	289.1	322.2

LINE ID	FROM	TO	LENGTH (km)	VOLT (kV)	YEAR BUILT	CONSTRUCTION TYPE	MVA Rating for Ambient of				
							30 °C	25 °C	15 °C	7 °C	0 °C
236	Hardwoods	Oxen Pond	10.338	230	1966	H-Frame Wood	355.8	375.5	411.5	433.9	459.6
**237	Western Avalon	Come-By-Chance	44.95	230	1968	Guyed V Steel	355.8	375.5	411.5	433.9	459.6
238	SVL Gas Turbine	Abitibi Price	0.862	230	1976	Steel Tower	199.3	236.9	297.7	331.2	369.5
239	Deer Lake	Berry Hill	70.799	138	1982	Single Wood Pole	89.1	104.9	130.8	145.2	161.7
240	Churchill Falls	Goose Bay	269.261	138	1976	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
241	Peter's Barren	Plum Point	109.487	138	1995	H-Frame Wood	88.7	104.9	130.2	144.5	160.8
242	Holyrood	Hardwoods	27.029	230	1983	H-Frame Wood	355.8	375.5	411.5	433.9	459.6
243	Hinds Lake	Howley	14.971	138	1978	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
244	Plum Point	Bear Cove	29.959	138	1983	H-Frame Wood	63.3	74	91.5	101.3	112.6
245	Deer Lake	Howley	26.116	138	1969	H-Frame Wood	63.3	73.9	91.4	101.2	112.4
246	South Brook Tap	Robert's Arm	22.128	69	1981	Single Wood Pole	31.6	36.9	45.7	50.6	56.2
247	Cat Arm	Deer Lake	122.909	230	1984	Guyed V Steel	246.8	295.8	374.4	417.4	466.6
248	Massey Drive	Deer Lake	55.119	230	1983	Guyed V Steel	246.8	295.8	374.4	417.4	466.6
250	Bottom Brook	Grandy Brook	123.231	138	1987	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
251	Howley	Hampton	47.61	69	1981	Single Wood Pole	31.6	36.9	45.7	50.6	56.2
252	TL252 Tap	Jackson's Arm	53.19	69	1981	Single Wood Pole	31.6	36.9	45.7	50.6	56.2
253	Jackson's Arm	Coney Arm	12.096	69	1982	Single Wood Pole	31.6	36.9	45.7	50.6	56.2
254	Boyd's Cove	Farewell Head	18.868	66	1988	H-Frame Wood	44.5	50.1	65.4	72.6	80.8
255	Grandy Brook	Hope Brook	33.014	138	1987	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
256	Bear Cove	St. Anthony A/P	51.05	138	1995	H-Frame Wood	88.7	104.4	130.2	144.5	160.8
257	St. Anthony A/P	Roddickton	63.395	69	1989	H-Frame Wood	31.6	36.9	45.7	50.6	56.2
258	Monkstown	Paradise River	17.2	25	1989	Single Wood Pole	16.1	18.9	23.7	26.3	29.3
259	Berry Hill	Peter's Barren	86.625	138	1990	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
260	Seal Cove	Bottom Waters	36	138	1990	H-Frame Wood	89.1	104.9	130.8	145.2	161.7
261	St. Anthony A/P	St. Anthony	47.822	69	1996	H-Frame Wood	42.4	52.2	62.3	69.1	76.9
262	Peter's Barren	Daniel's Harbour	3.928	69	1970	Single Wood Pole	30.3	35.3	43.7	48.4	53.8
263	Granite Canal	Upper Salmon	74.761	230	2003	H-Frame Wood	199.3	236.9	297.7	331.2	369.5
264	Duck Pond	Buchans	45	66	2005	Single Wood Pole	30.3	35.3	43.7	48.4	53.8
280	Star Lake	Buchans	44.816	66	1998	H-Frame Wood	30.3	35.3	43.7	48.4	53.8

** Slack span on TL237 at WAV terminal station has 636 MCM conductor and not 804 MCM conductor like reminder of the transmission line. To limit risk of damage and/or ground clearance, the transmission line needs to be derated as follows:

**237	Western Avalon	Come-By-Chance	44.95	230	1968	Guyed V Steel	296.5	315.1	348.8	371.8	393.4
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