Q. Reference PUB-NLH-488: Please state whether or not there is still a potential issue with high over voltages at Bottom Brook during some operating conditions and faults.

A. The installation of a 500 MW VSC converter station at Bottom Brook will provide sufficient voltage control on the west coast of Newfoundland during periods of extreme light loading. A VSC converter can provide reactive power support during scenarios where the scheme is transferring power or is blocked. The VSC can operate in STATCOM mode and mimic the capability curve of a synchronous machine to provide voltage regulation while real power transfers over the link have been curtailed.

Table 1 outlines a number of system base cases developed in PSS®E for dynamic stability study purposes. To illustrate the voltage control the Maritime Link VSC is capable of achieving on the west coast of the Island, the ML export power order has been curtailed to 0 MW. Although the real power transfer has been "tripped", the converter station at BBK is online and available to support the system voltage in STATCOM mode. This scenario represents the loss of a section of the ML overhead transmission line.

Table 1: PSS®E Base Case Scenarios - Curtail ML to 0 MW

Base Case	System Load	LIL Import (MW)	ML Export (MW) (NL to NS)
8001	Winter Peak	900	158
8003	Winter Peak	900	350
8006	Intermediate	900	500
8007	Light Load	370	337

Figures 1-12 illustrate dynamic voltages at 230 kV busses on the Island Interconnected System following curtailment of the ML. It is clear from the plots that the ML has sufficient reactive power capability to maintain acceptable voltages on the 230 kV bulk transmission system under peak, intermediate and light load conditions.

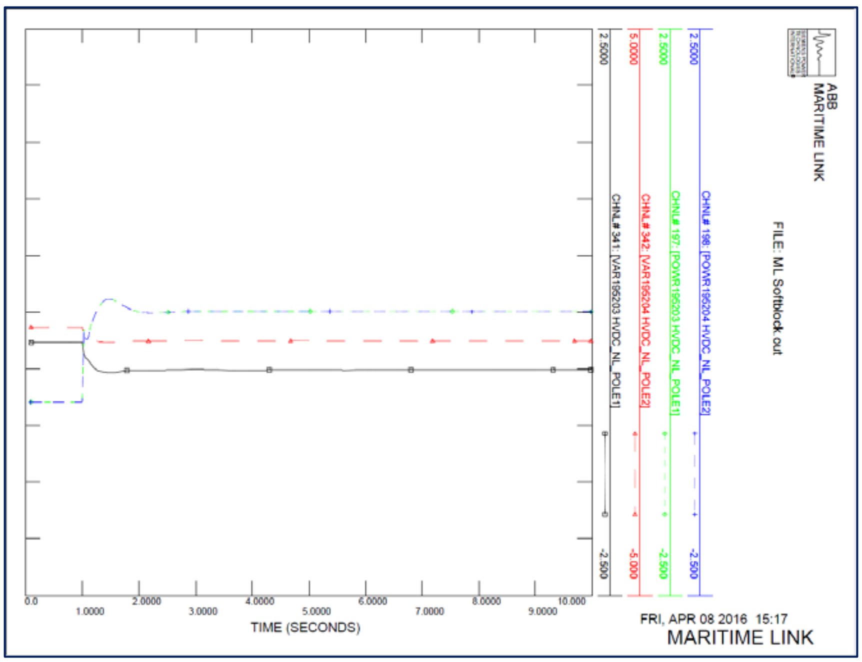

Figure 1: Base Case 8001- Maritime Link Real and Reactive Power (per pole)

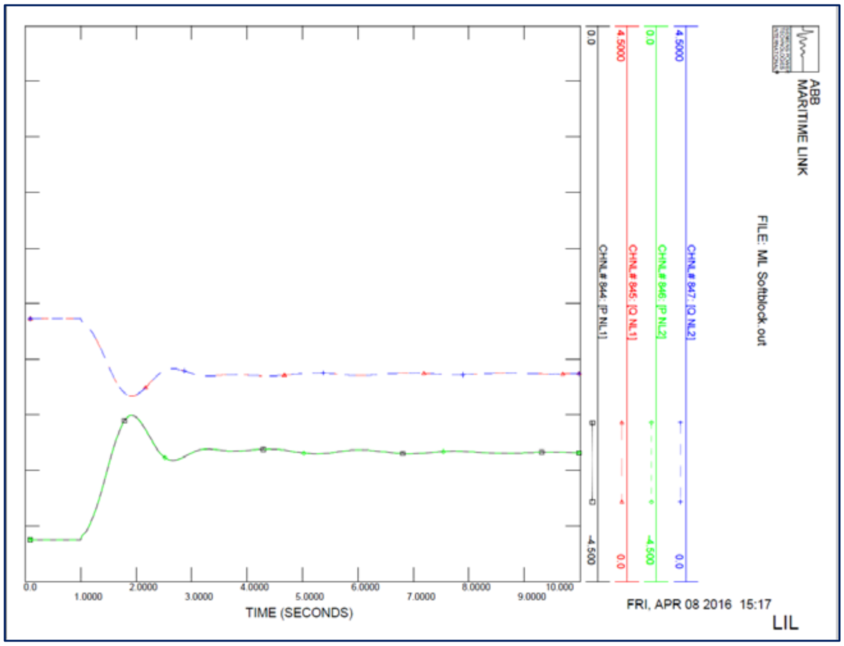

Figure 2: Base Case 8001 - Labrador Island Link Real and Reactive Power (per pole)

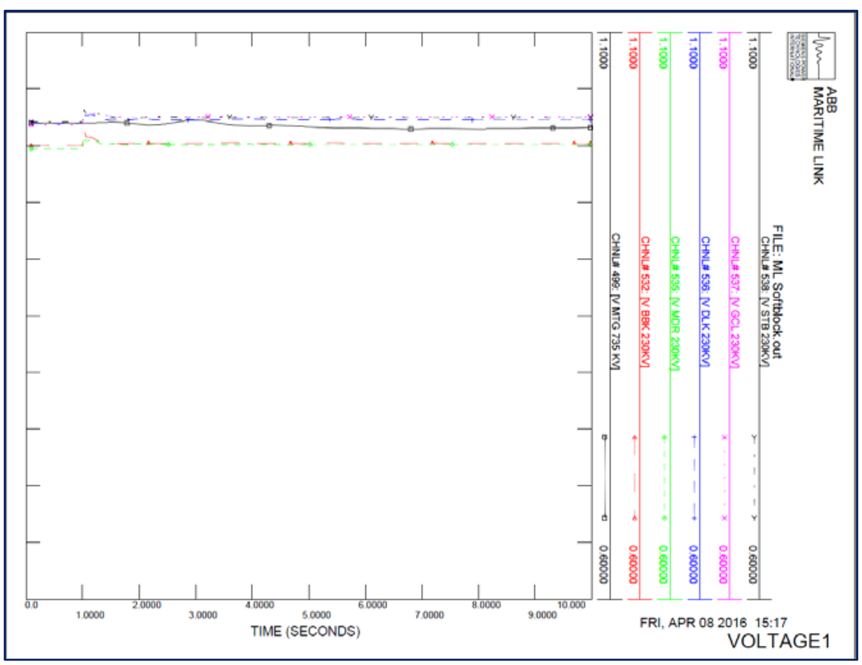

Figure 3: Base Case 8001 - 230 kV Bus Voltages at Bottom Brook, Granite Canal, Massey Drive and Deer Lake (pu)

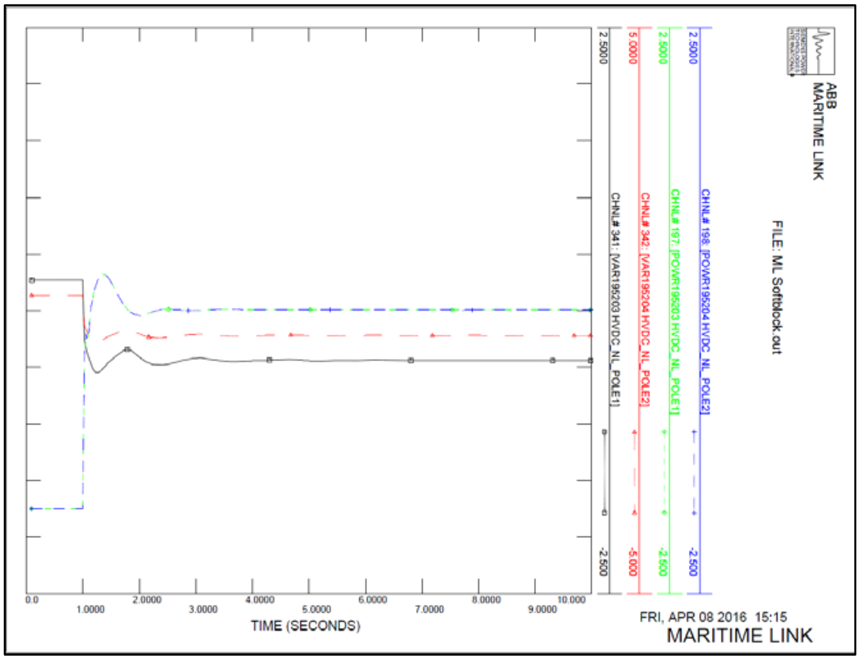

Figure 4: Base Case 8003- Maritime Link Real and Reactive Power (per pole)

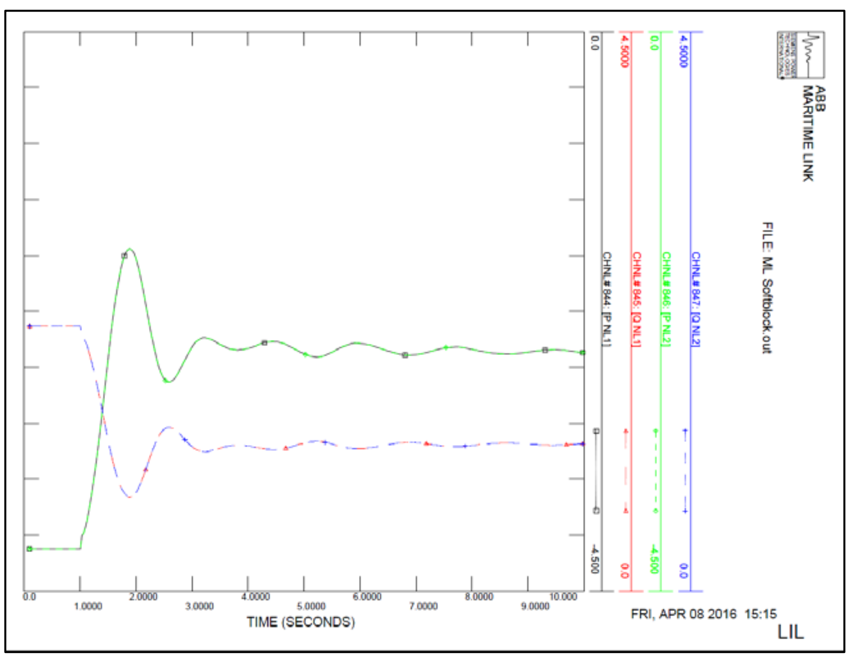

Figure 5: Base Case 8003 - Labrador Island Link Real and Reactive Power (per pole)

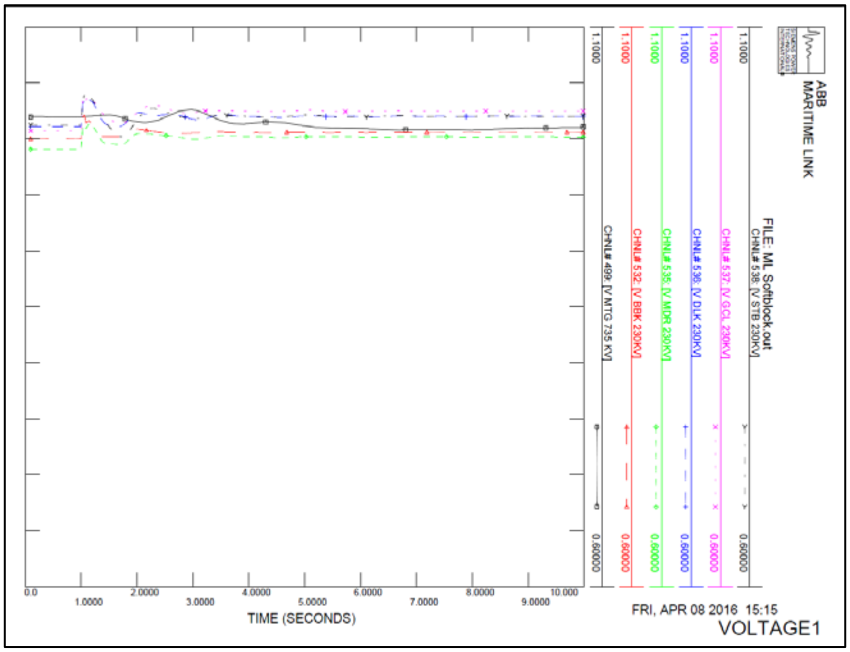

Figure 6: Base Case 8003 - 230 kV Bus Voltages at Bottom Brook, Granite Canal, Massey Drive and Deer Lake (pu)

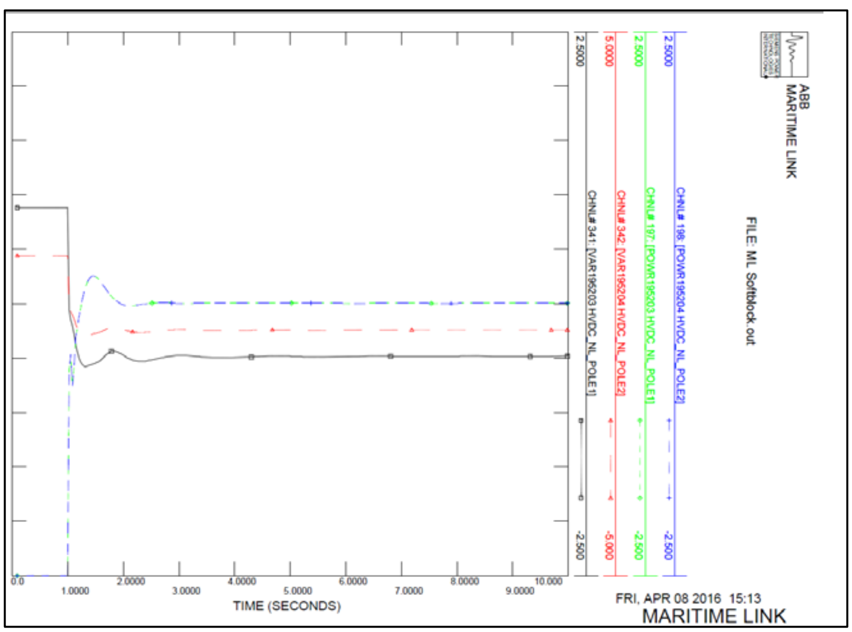

Figure 7: Base Case 8006- Maritime Link Real and Reactive Power (per pole)

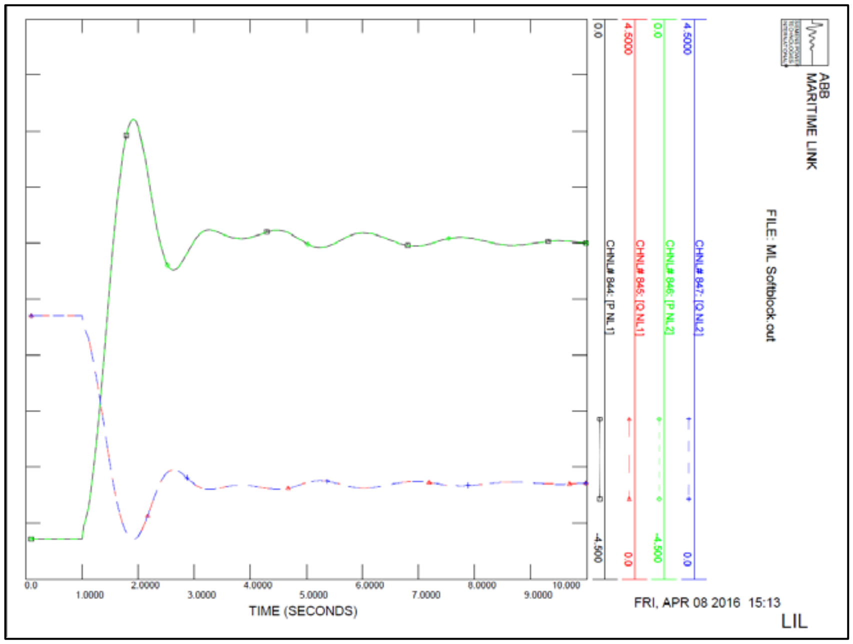

Figure 8: Base Case 8006 - Labrador Island Link Real and Reactive Power (per pole)

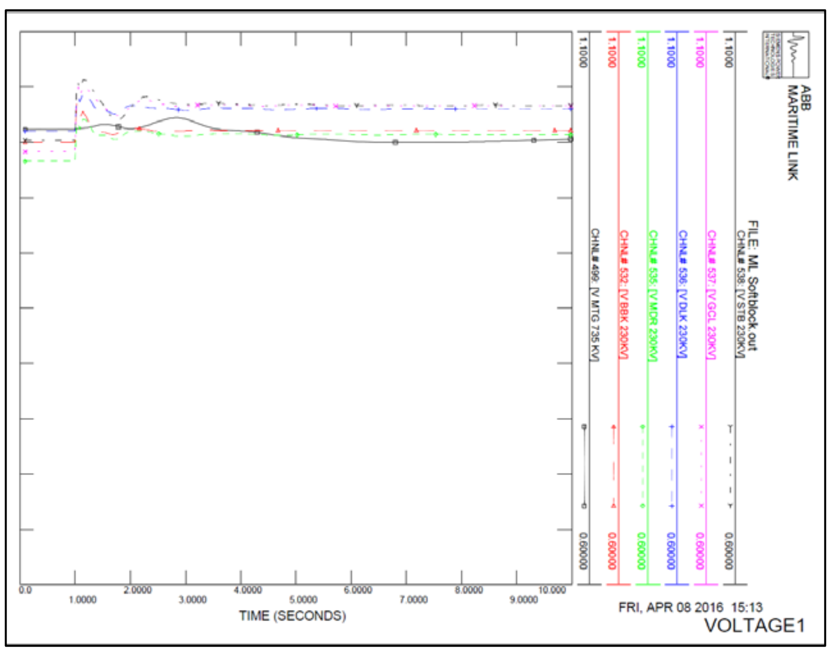

Figure 9: Base Case 8006 - 230 kV Bus Voltages at Bottom Brook, Granite Canal, Massey Drive and Deer Lake (pu)

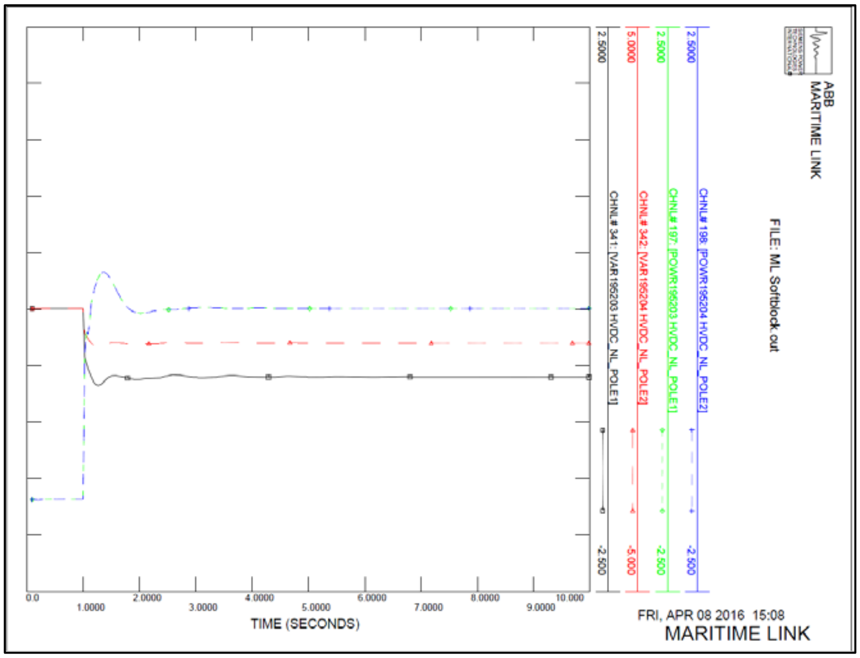

Figure 10: Base Case 8007- Maritime Link Real and Reactive Power (per pole)

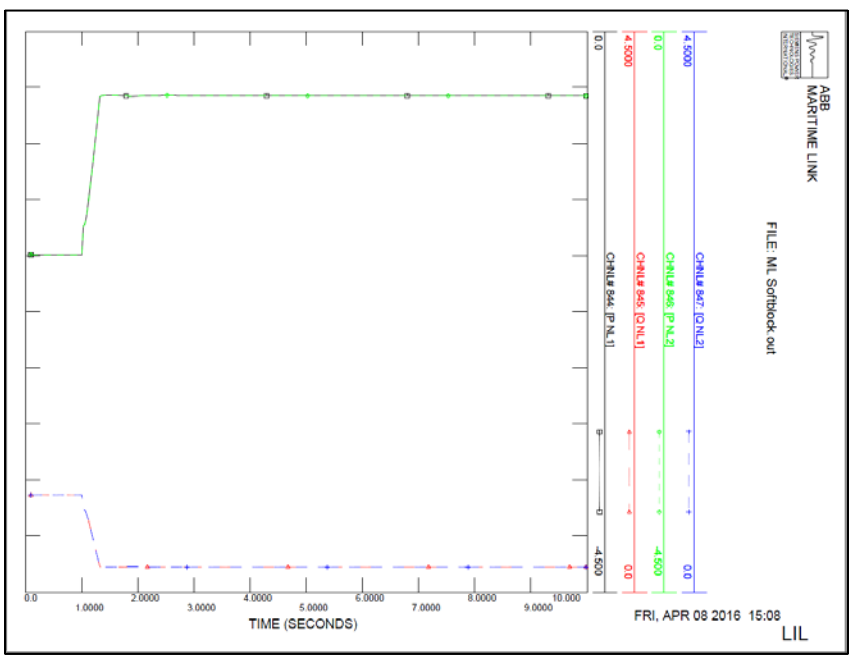

Figure 11: Base Case 8007 - Labrador Island Link Real and Reactive Power (per pole)

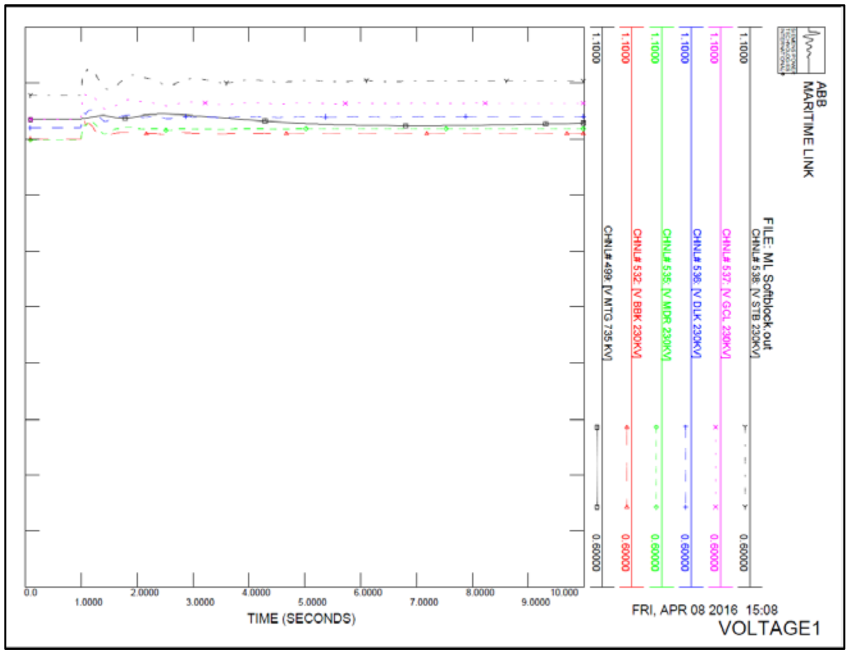

Figure 12: Base Case 8007 - 230 kV Bus Voltages at Bottom Brook, Granite Canal, Massey Drive and Deer Lake (pu)

1 Figures 13-15 provide the system response for the light load case (8007) following the loss
2 of one pole of the Maritime Link including that pole's STATCOM capability. This scenario
3 would occur in the event of a trip of the ac feed to the pole converter (i.e. loss of a
4 converter transformer).

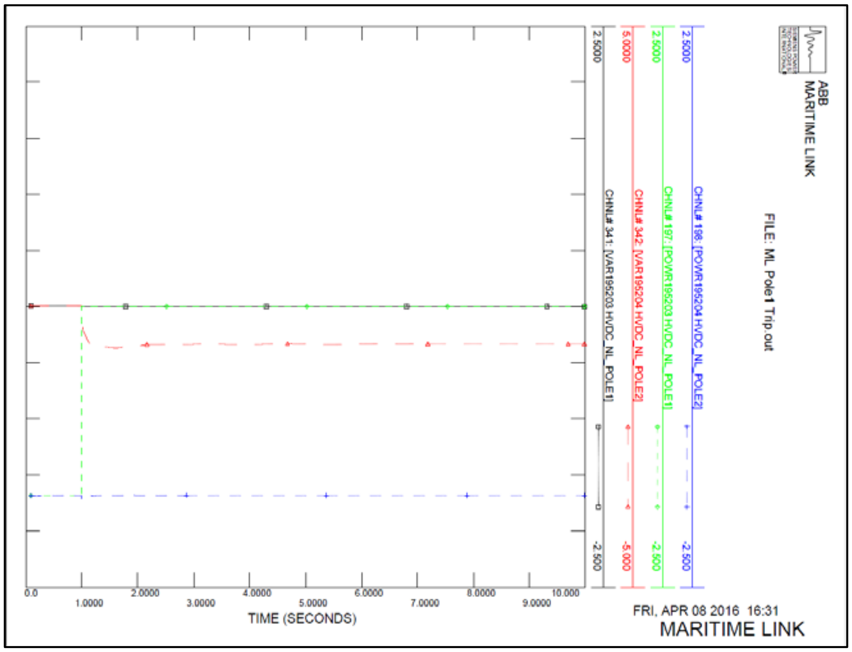

Figure 13: Base Case 8007- Maritime Link Real and Reactive Power (per pole)

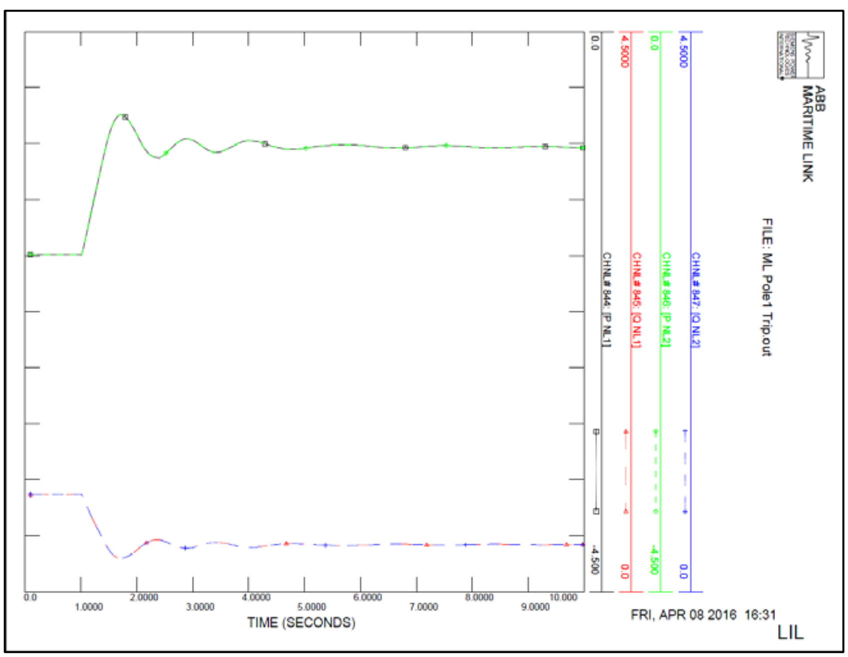

Figure 14: Base Case 8007 - Labrador Island Link Real and Reactive Power (per pole)

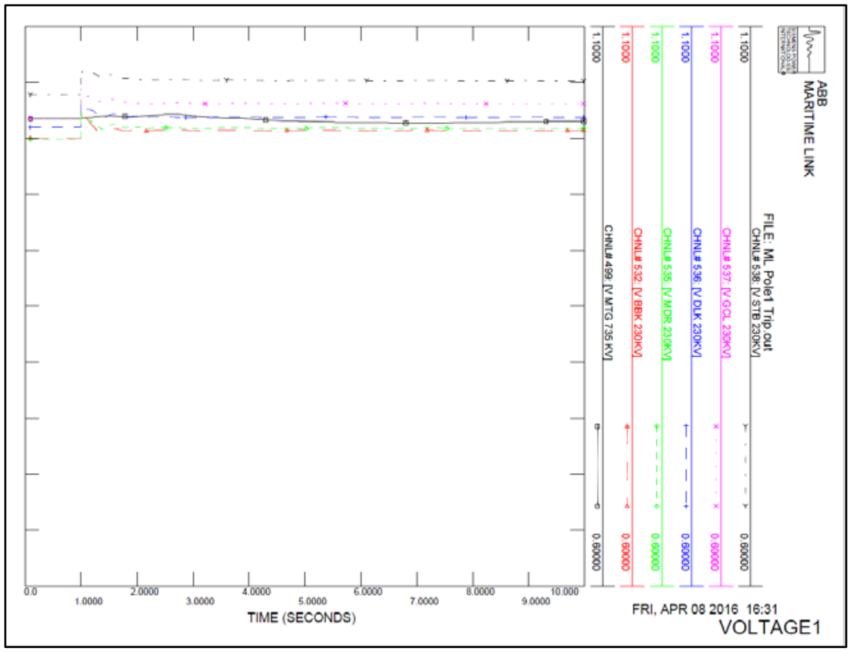

Figure 15: Base Case 8007 - 230 kV Bus Voltages at Bottom Brook, Granite Canal, Massey Drive and Deer Lake (pu)