

1     Q.     On page 12 of the Upgrade Transmission Line Corridor Report it states “As the  
2             *current power system is also unable to remain stable with a similar three phase fault*  
3             *at Holyrood, it was decided.....”* Please explain the reference to the three phase  
4             fault at Holyrood.

5

6

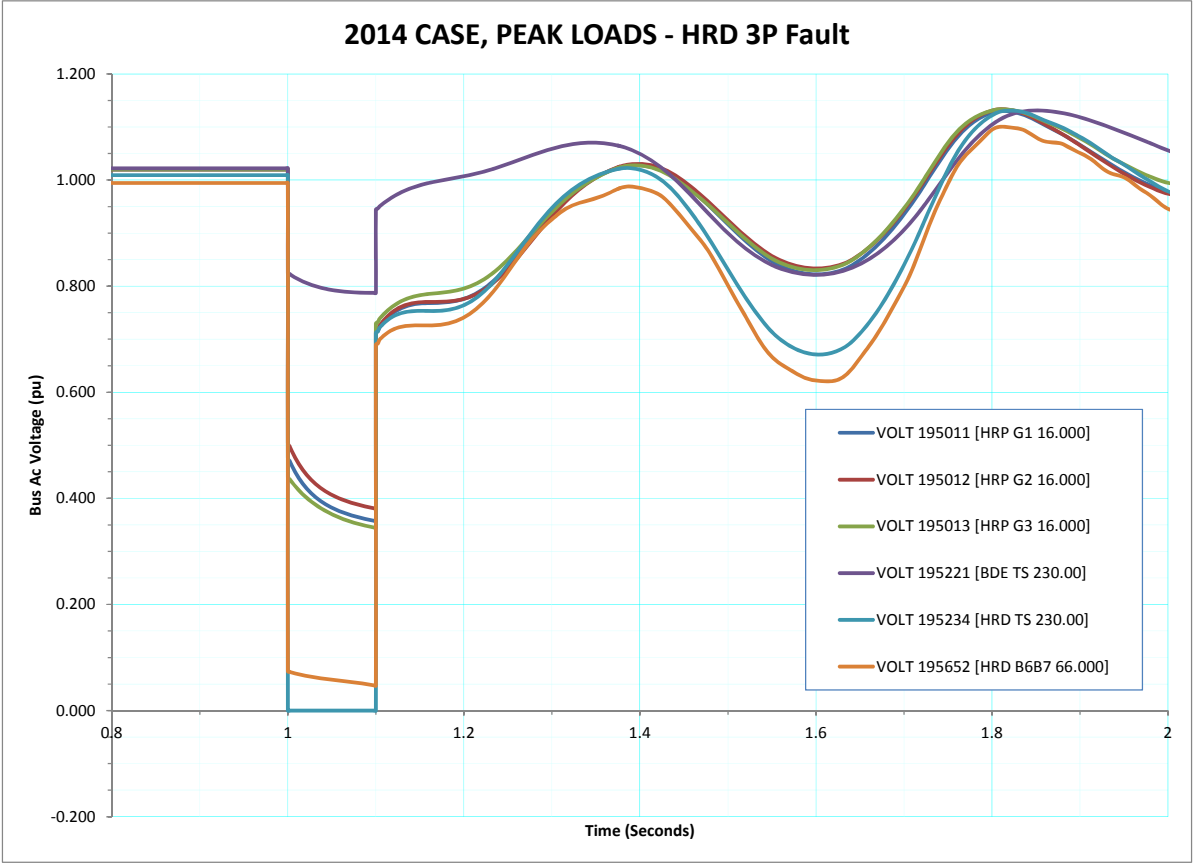
7     A.     At present, a three-phase fault at the Holyrood Thermal Generating Station results  
8             in instability under peak load conditions. As illustrated in the figure below, such a  
9             fault has the effect of suppressing generator terminal voltages, as well as station  
10            service voltages.

11

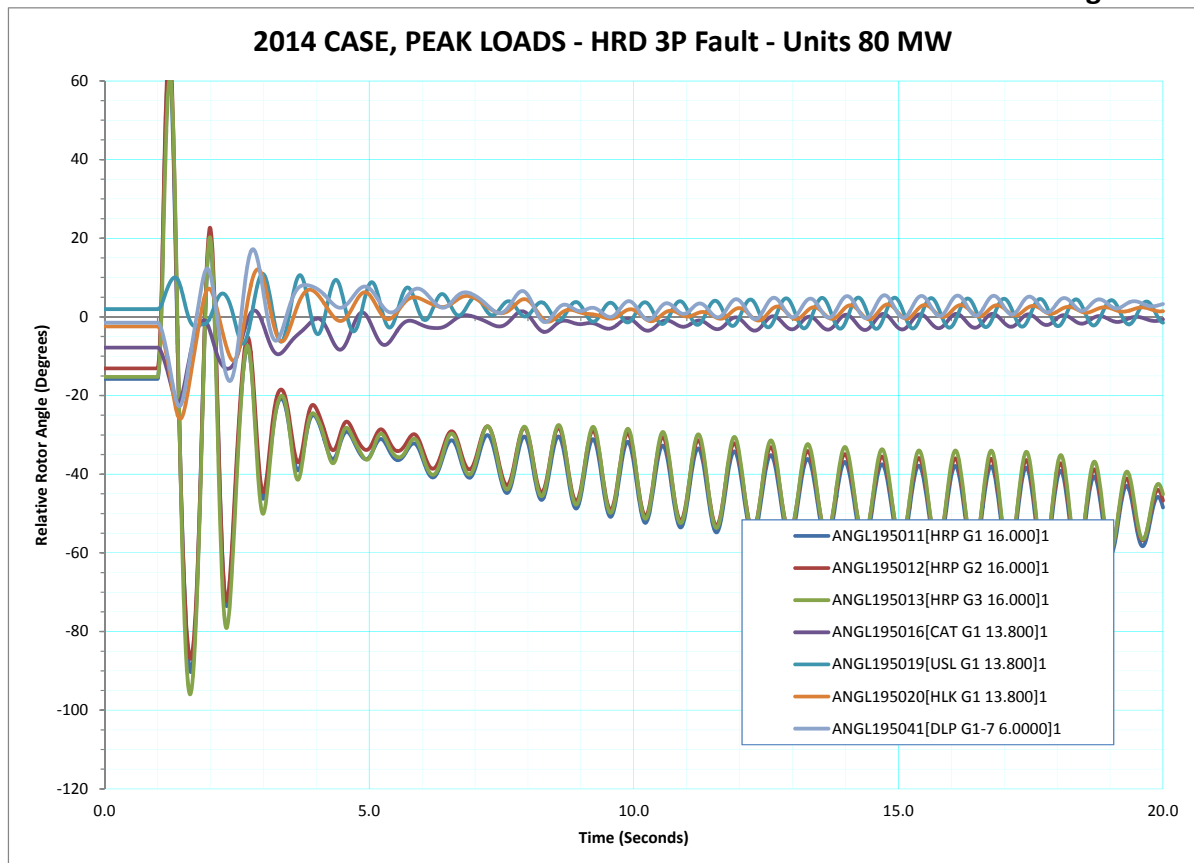
12            If a unit’s terminal voltages are suppressed below 12.4 kV (0.775 pu), a portion of  
13            the unit’s auxiliary equipment will be tripped including one boiler feed pump, one  
14            condensate extraction pump and one circulating pump. With only one boiler feed  
15            pump, one condensate extraction pump and one circulating pump remaining in  
16            service, the unit’s output is limited to approximately 80 MW. As illustrated in Figure  
17            2, a power reduction of this magnitude results in undamped oscillations.

18

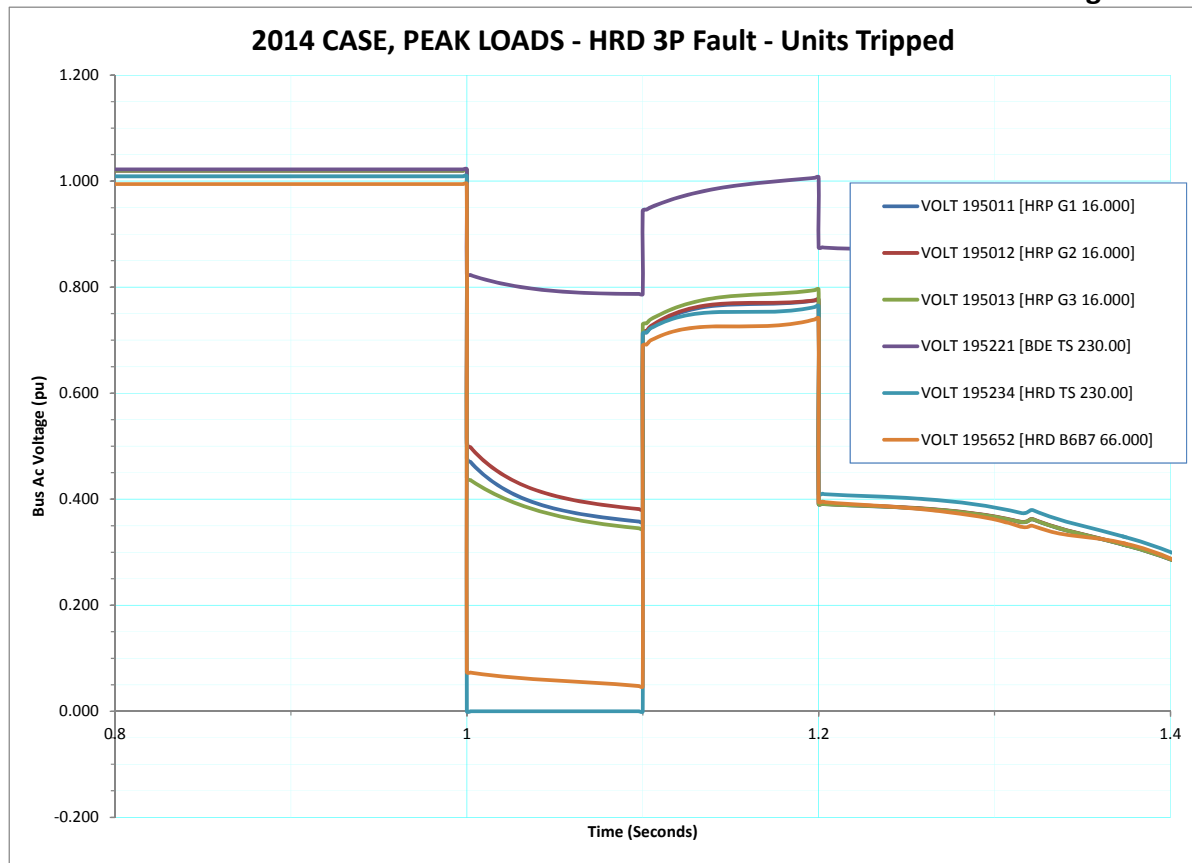
19            It should be noted that if station service bus voltages are suppressed below 12.8 kV  
20            (0.8 pu) for a period exceeding 20 cycles, the units will be tripped altogether. As  
21            illustrated in Figure 1, this limit is exceeded in the peak load case. The results of  
22            such a disturbance are that all three units at the Holyrood Thermal Generating  
23            Station are tripped and, as illustrated in Figure 3, voltages collapse on the Avalon  
24            Peninsula.



**Figure 1 - 2014 CASE, PEAK LOADS - HRD 3P Fault - Bus Ac Voltage (pu)**



**Figure 2 - 2014 CASE, PEAK LOADS - HRD 3P Fault –  
Units 80 MW – Relative Rotor Angle (Degrees)**



**Figure 3 - 2014 CASE, PEAK LOADS - HRD 3P Fault –  
Units Tripped - Bus Ac Voltage (pu)**