
Stability Plots

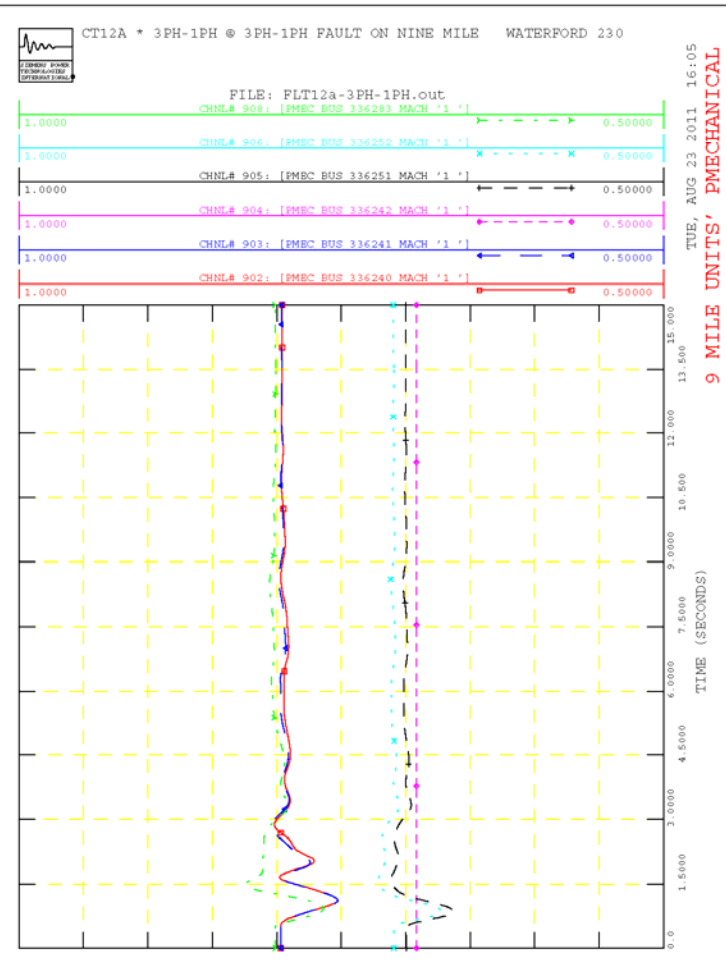
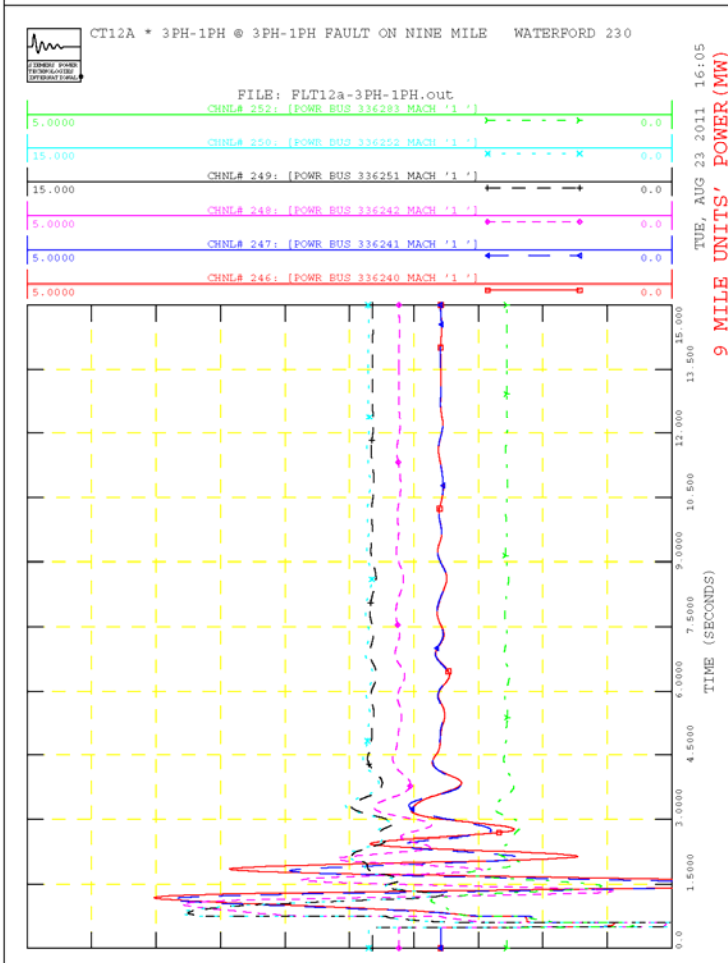
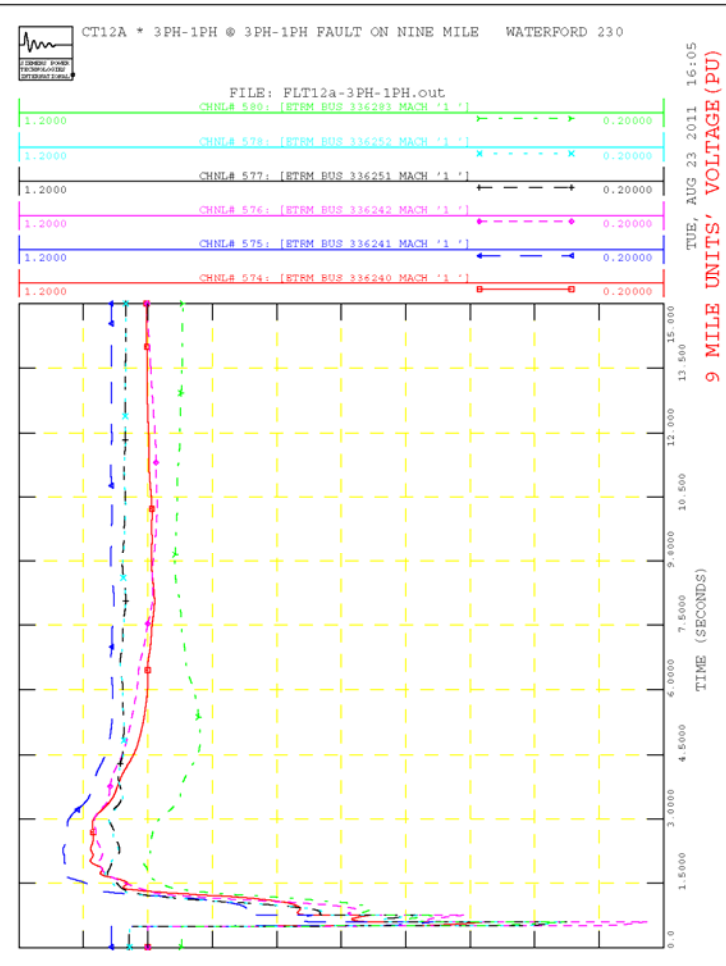
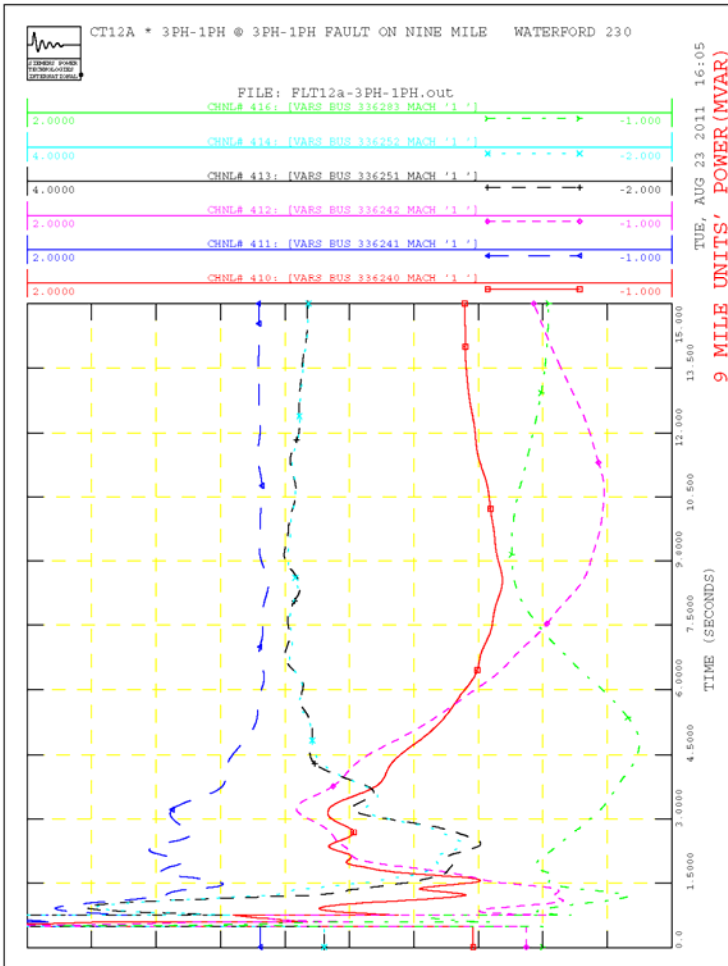
The stability plots for the evaluated contingencies are shown in this appendix. There are 4 plots per page, which include the following channels:

- Bus Voltages.
- PID 222 Project Mechanical Power and Speed Deviation.
- PID 222 P & Q output.
- Rotor Angles for the Synchronous Machines in the Study Area

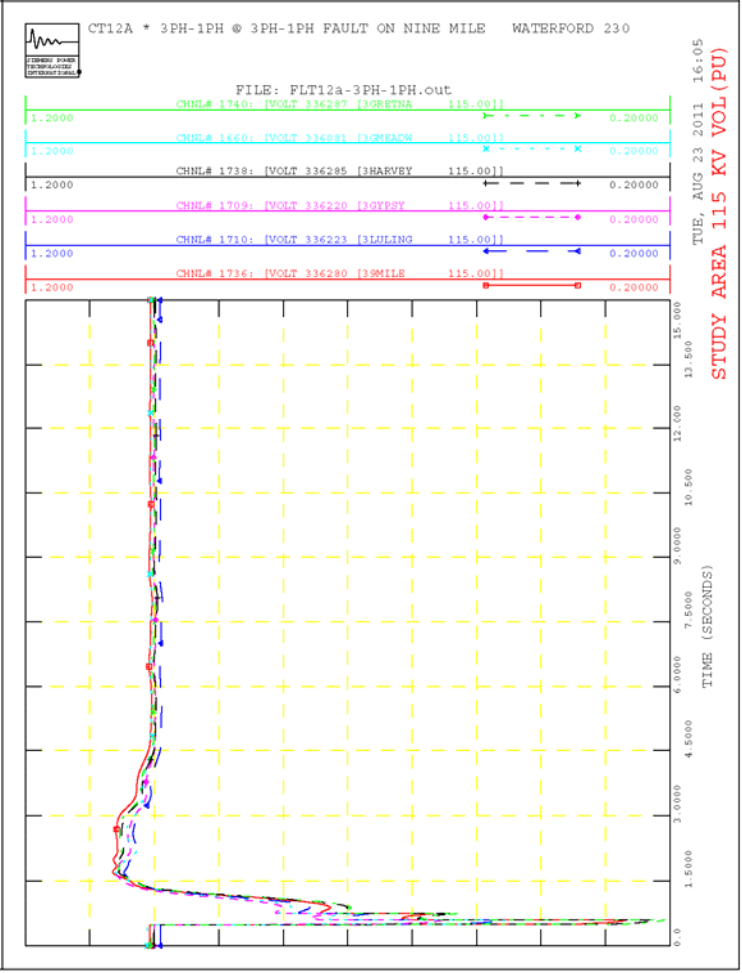
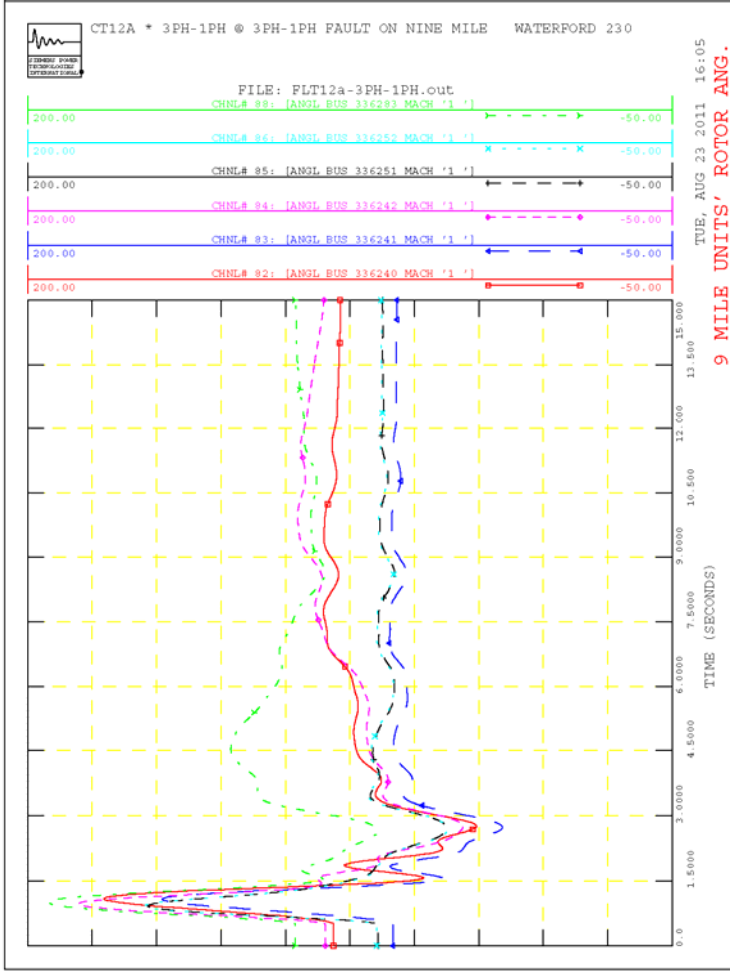
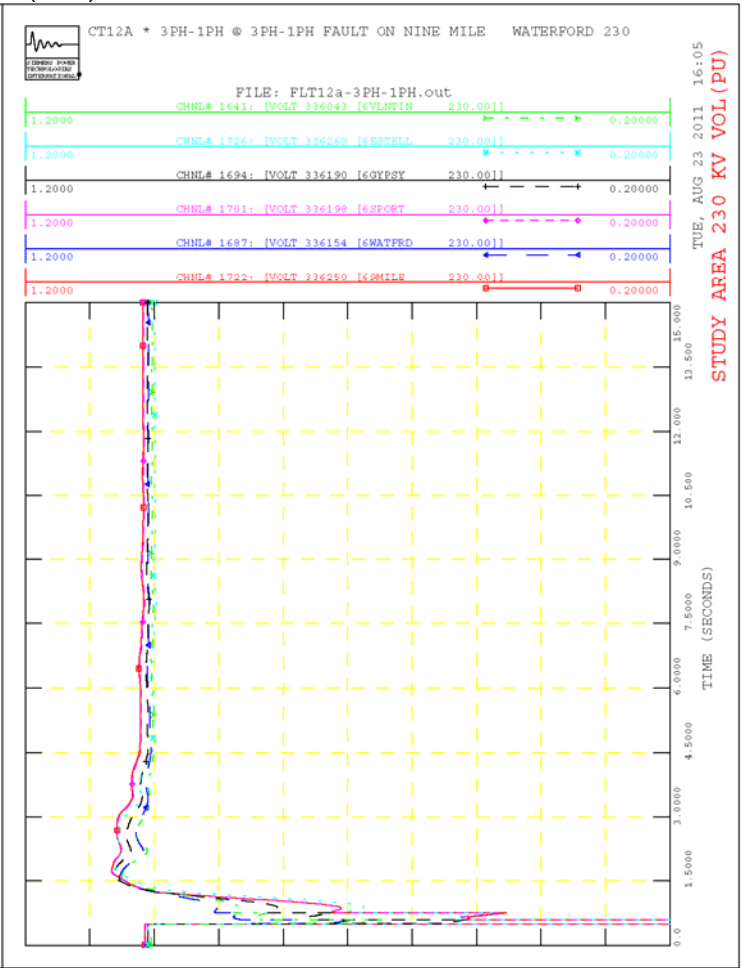
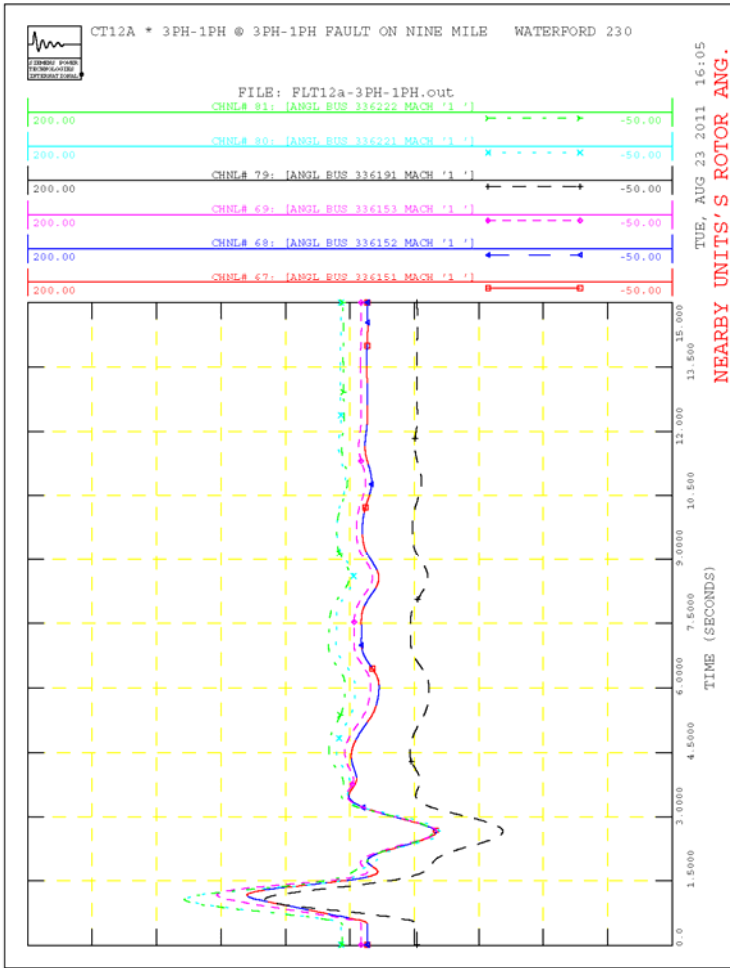
C.1 Phase 1– Original Load Flow Model (2015 Summer Peak)

C.1.1 Three Phase Faults with Stuck Breaker

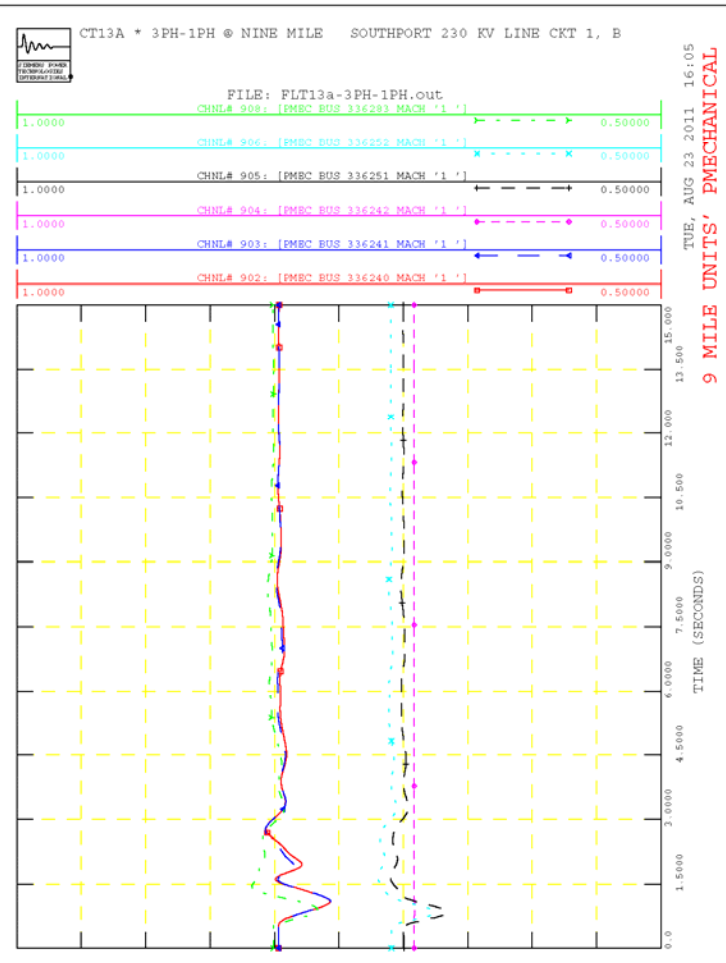
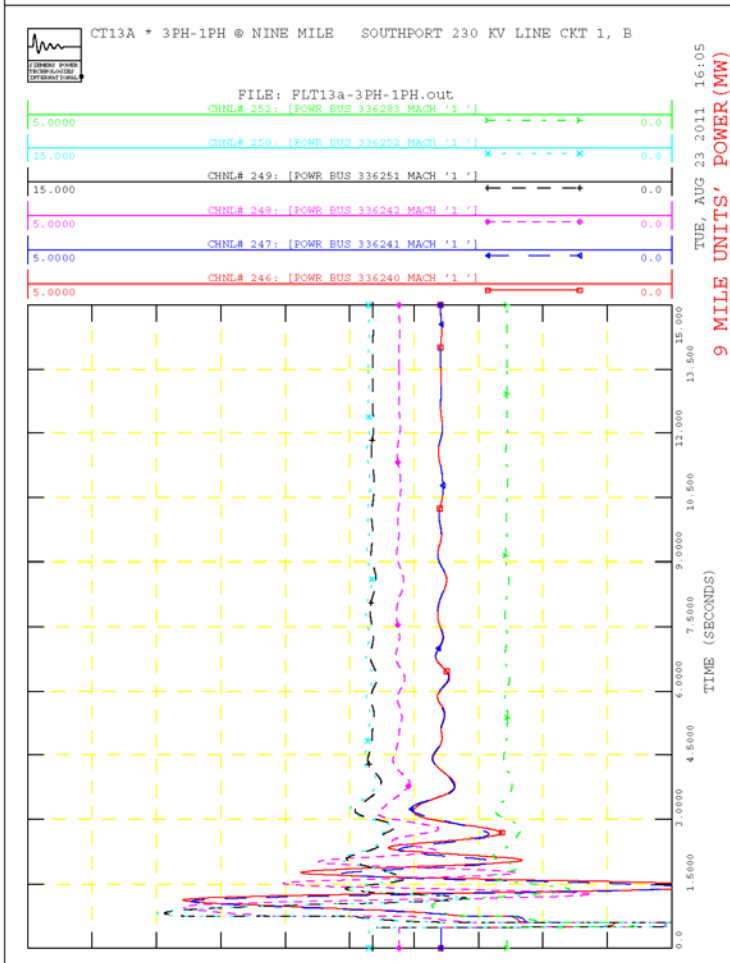
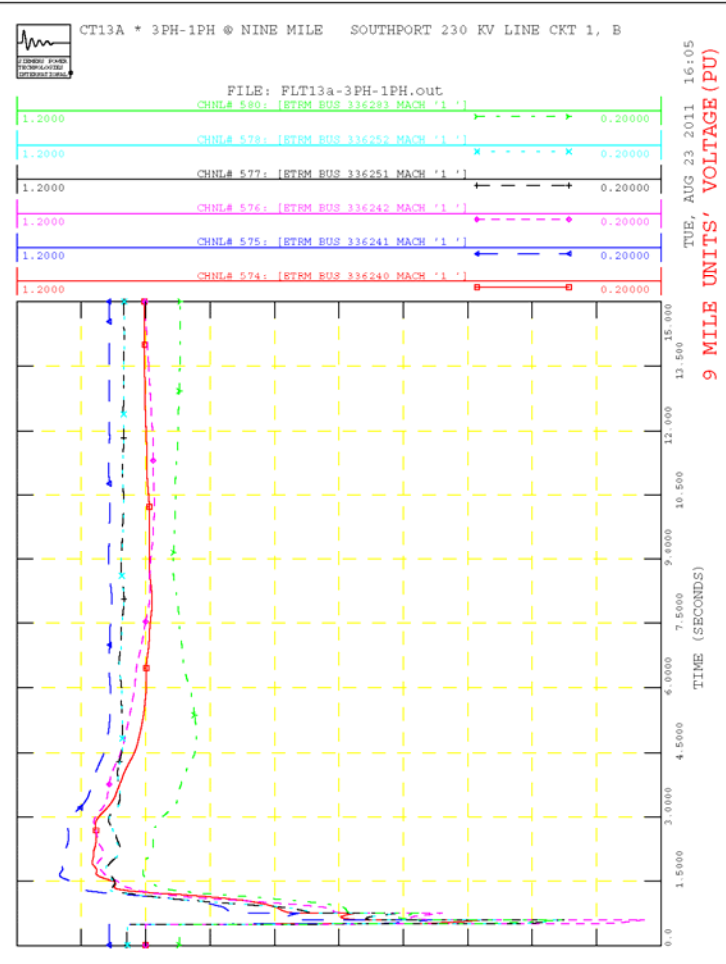
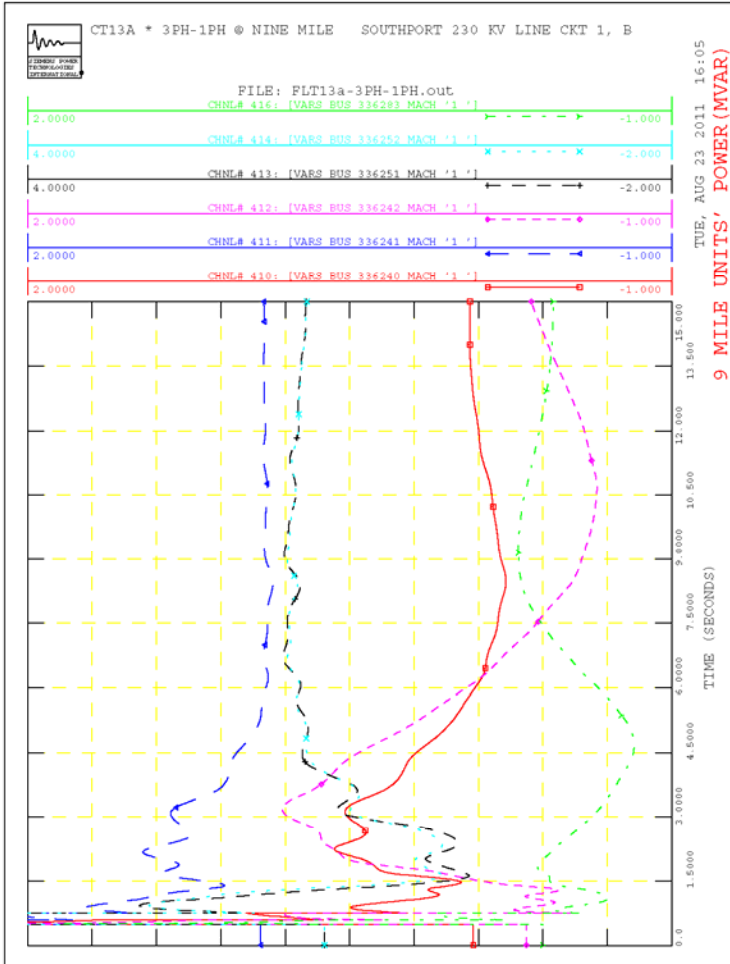
Fault 12a



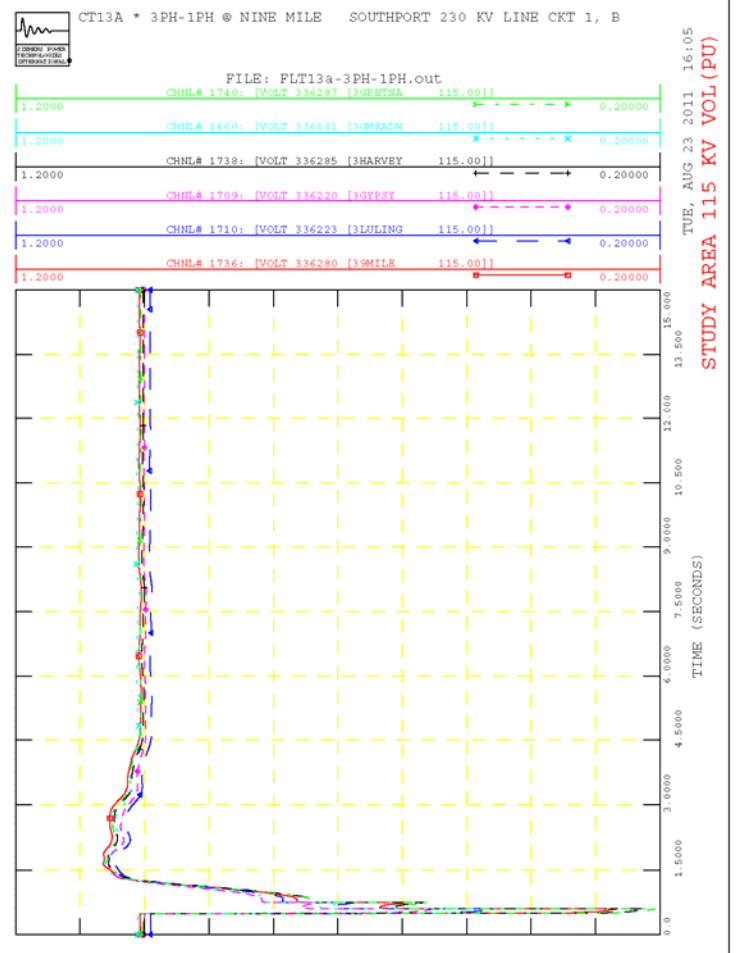
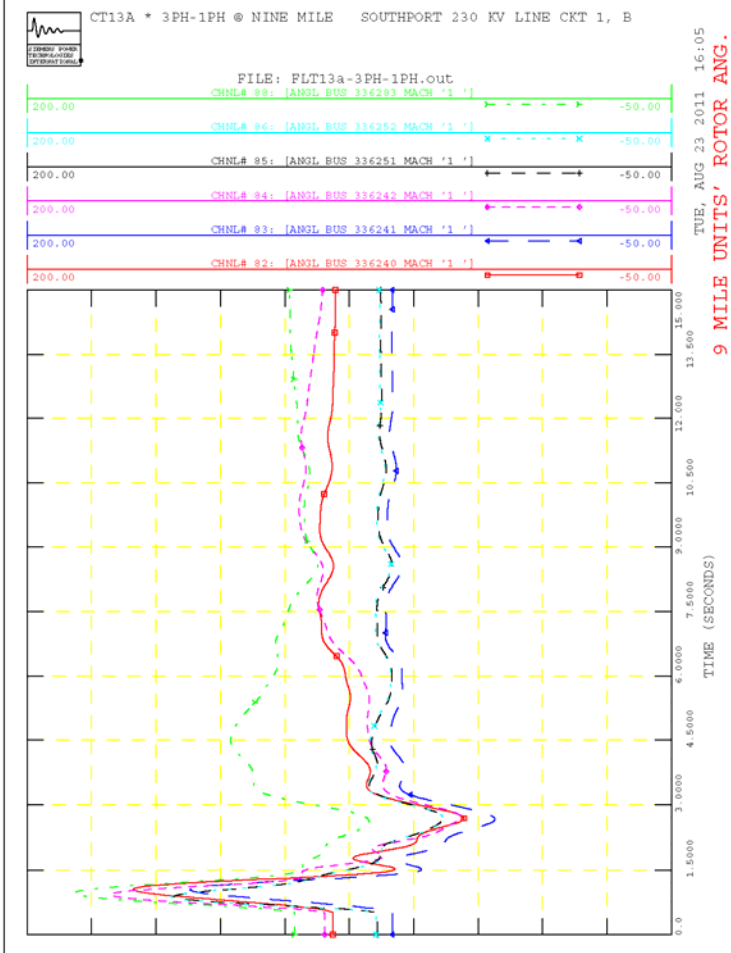
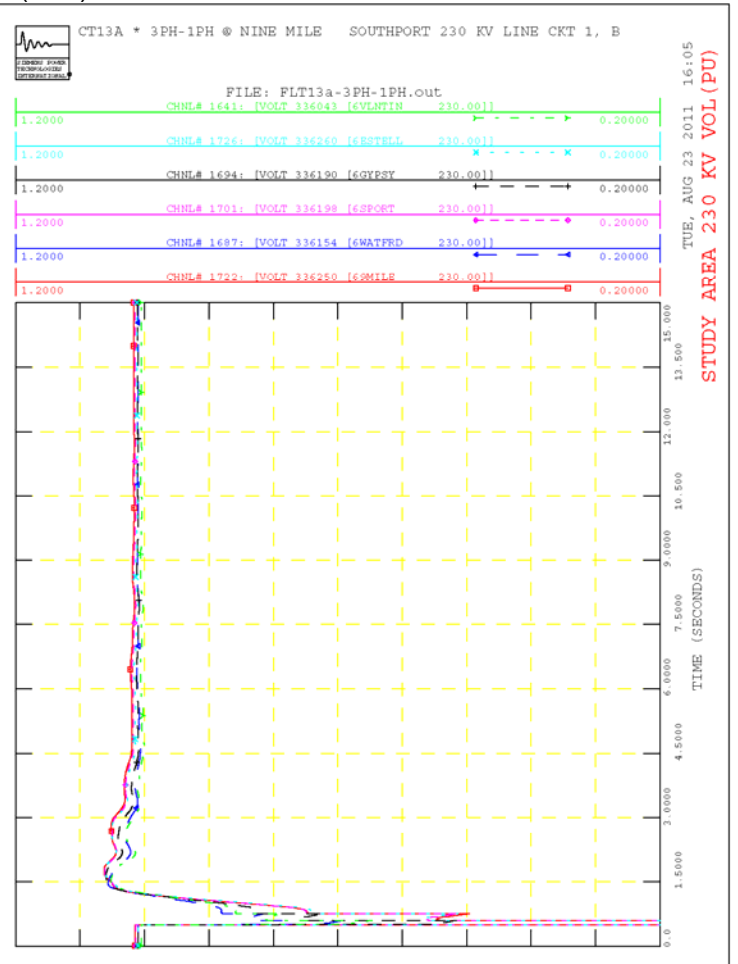
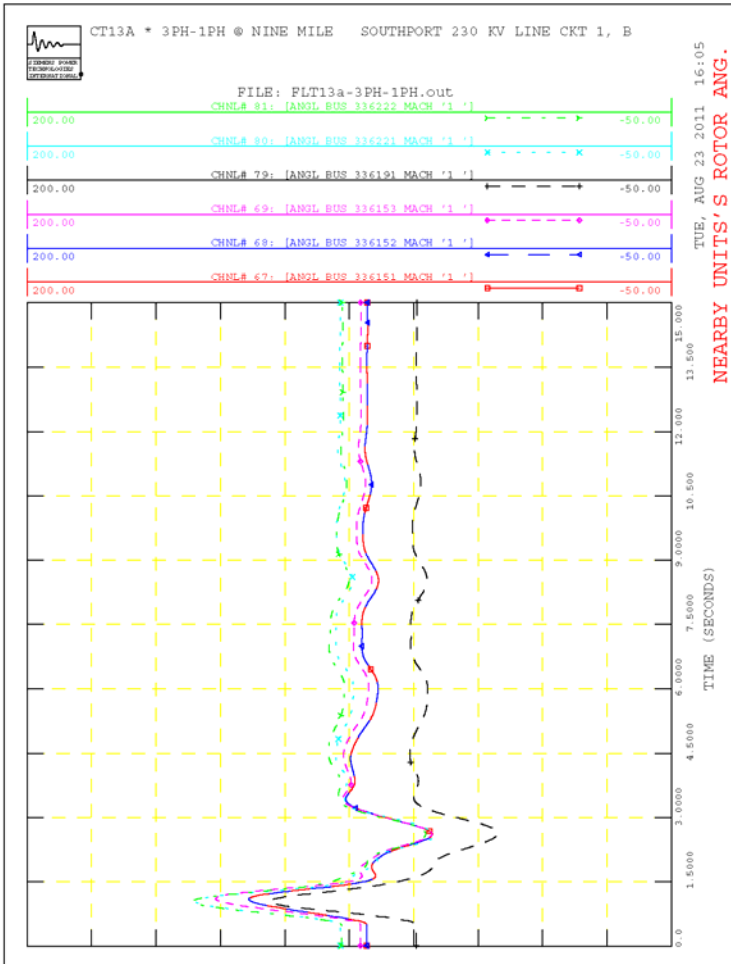
Fault 12a (cont)



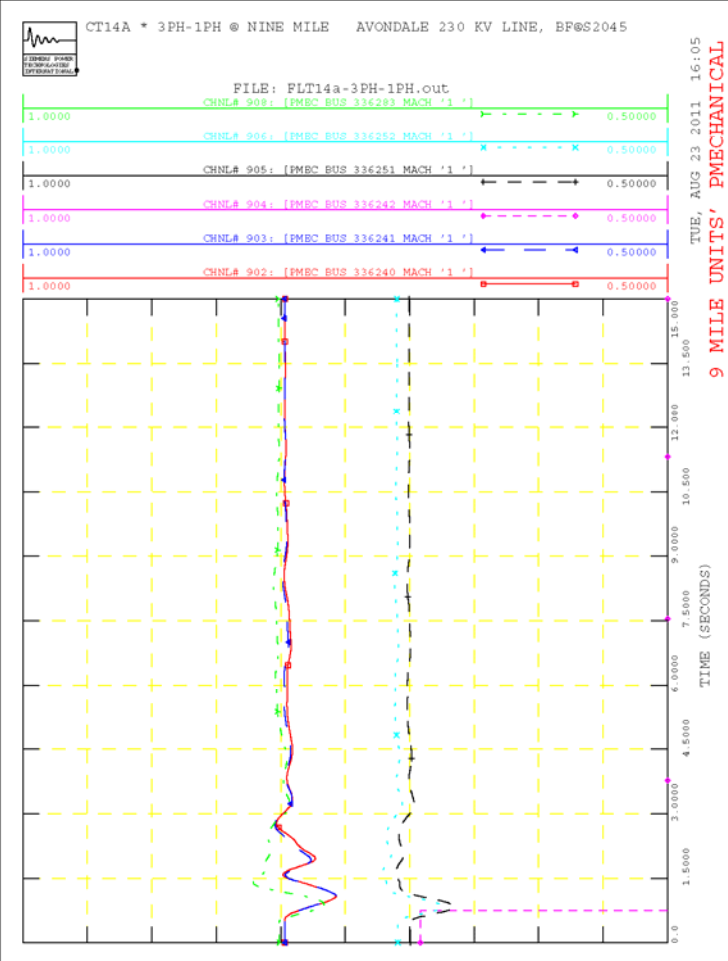
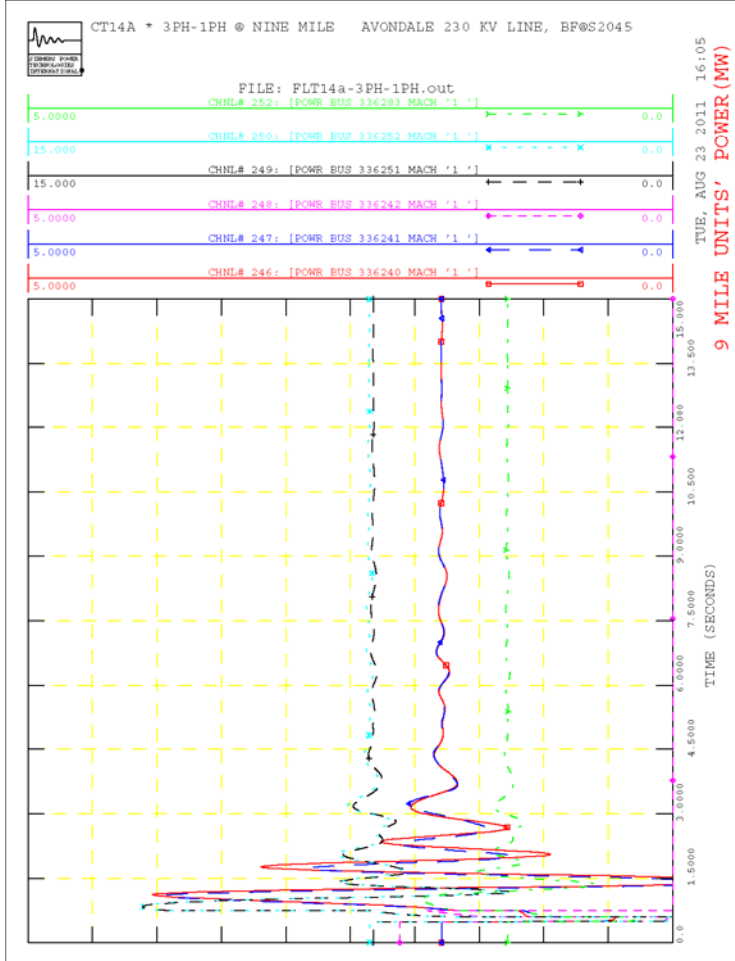
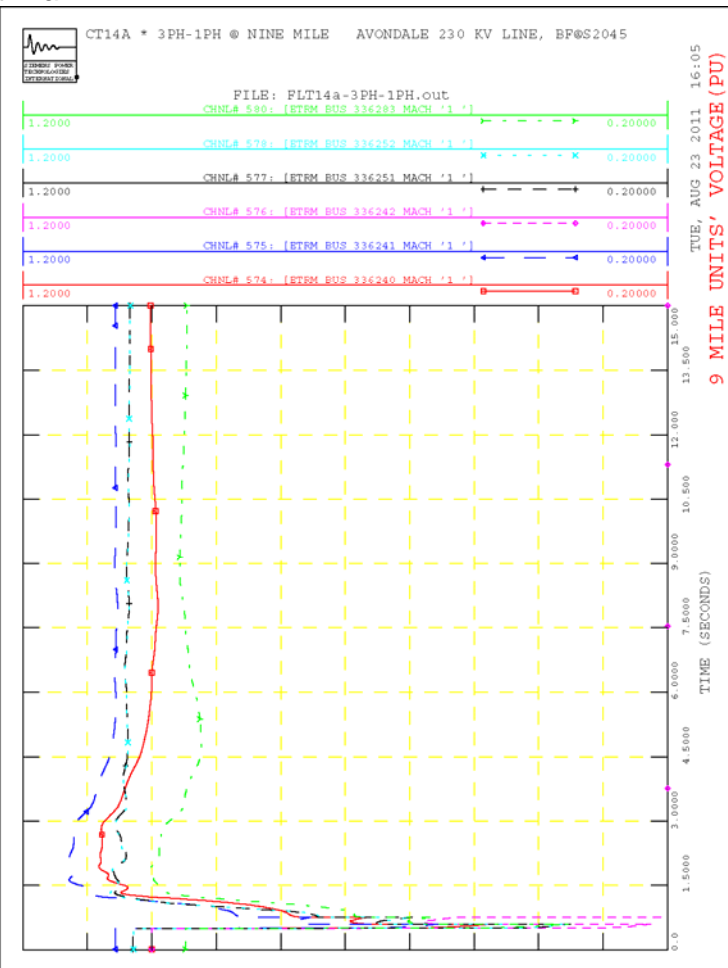
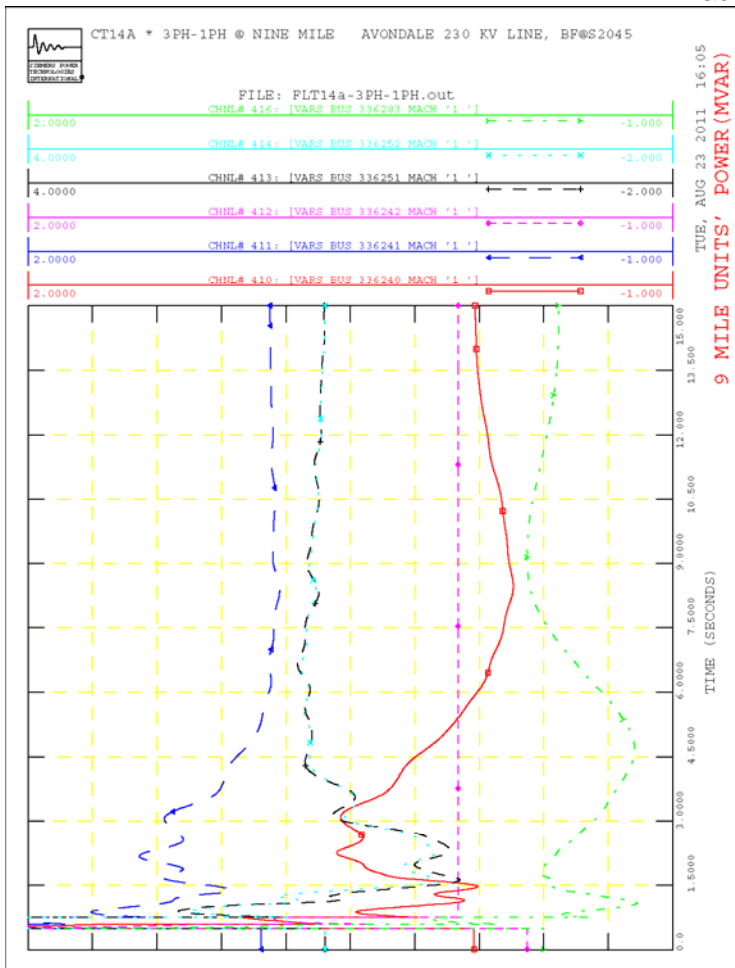
Fault 13a



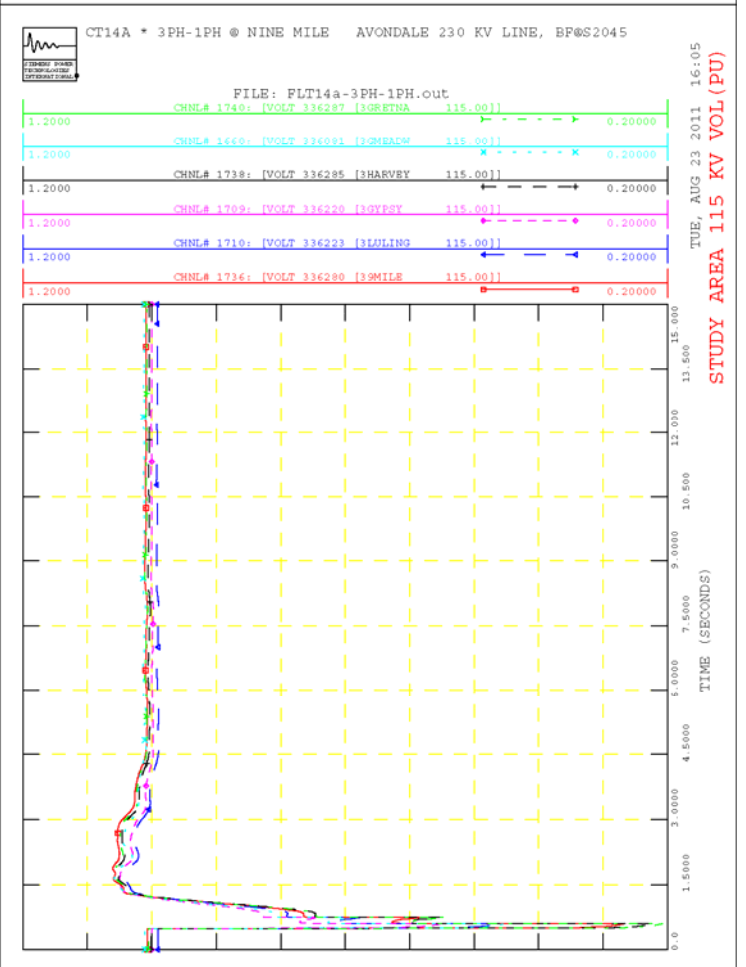
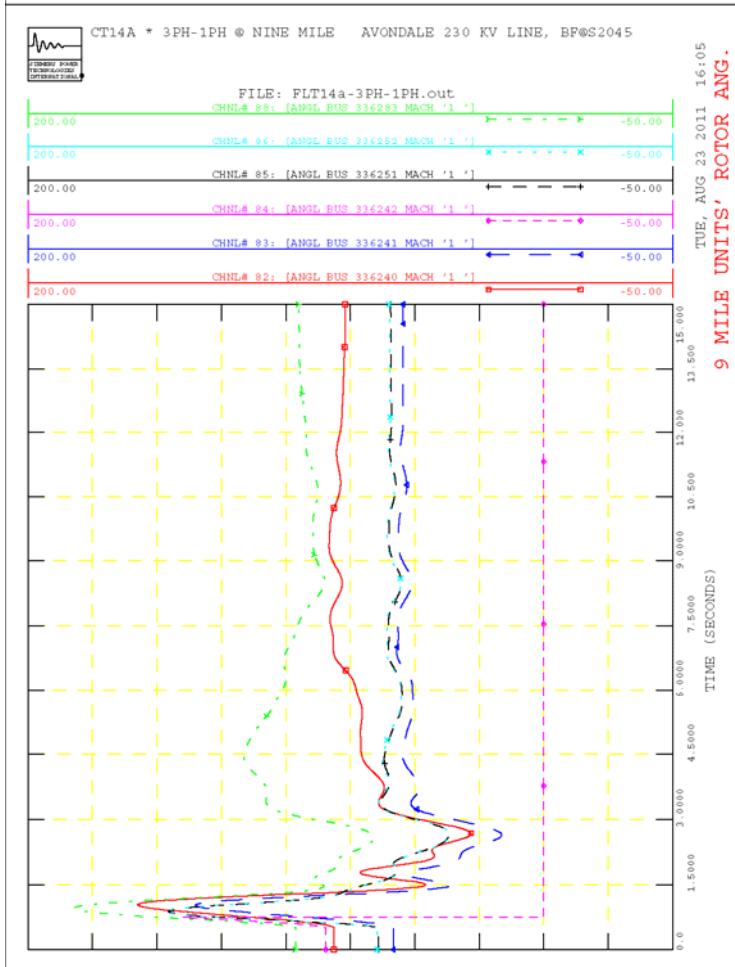
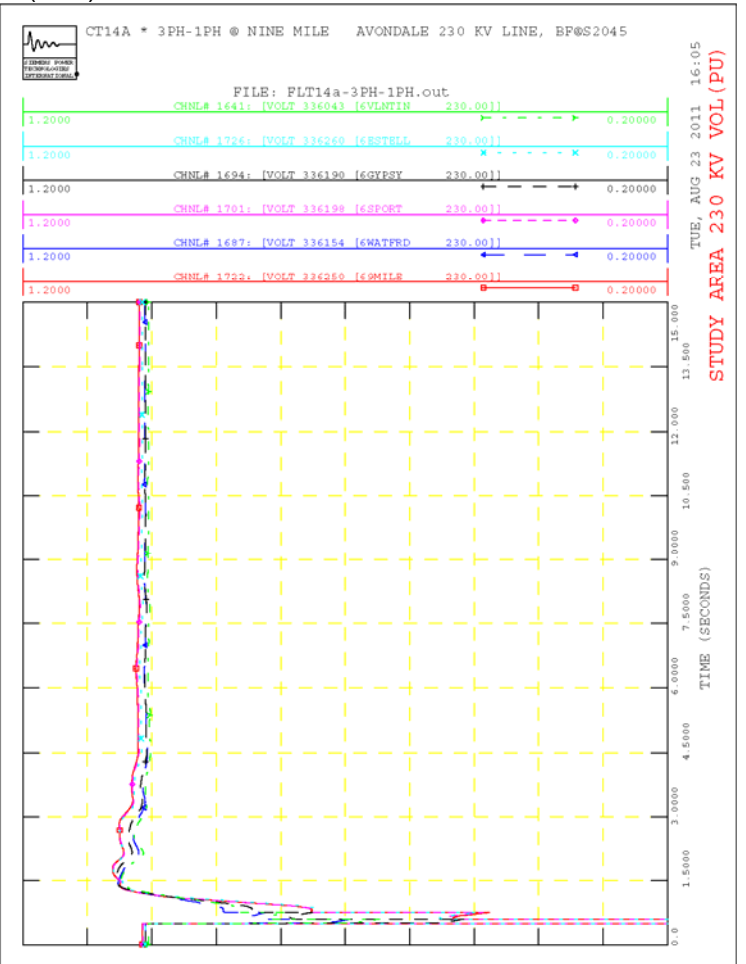
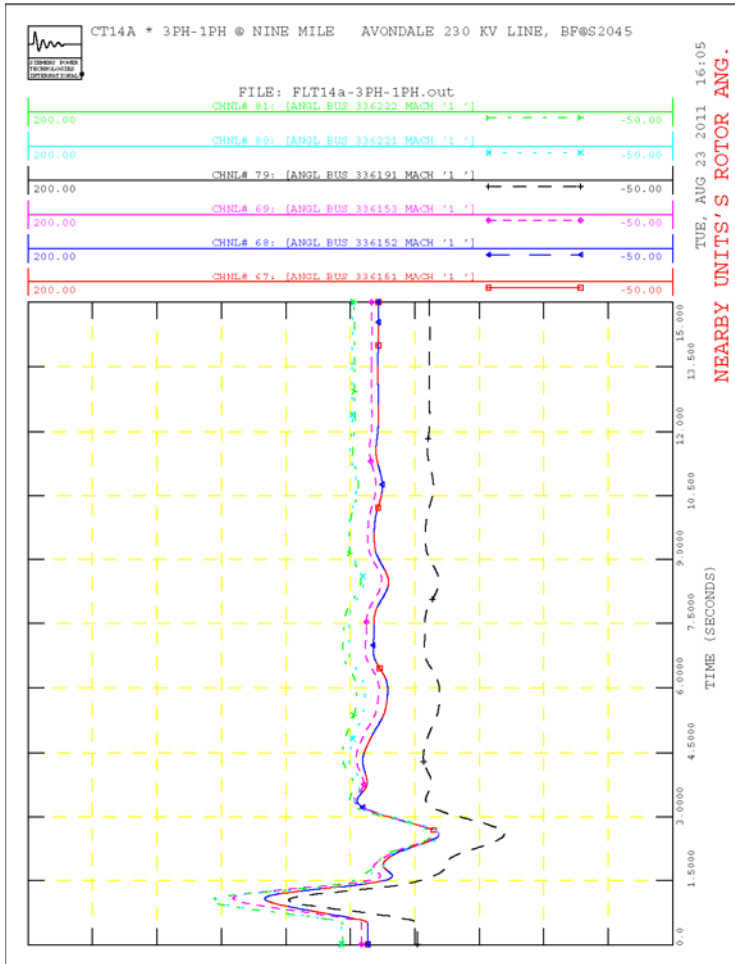
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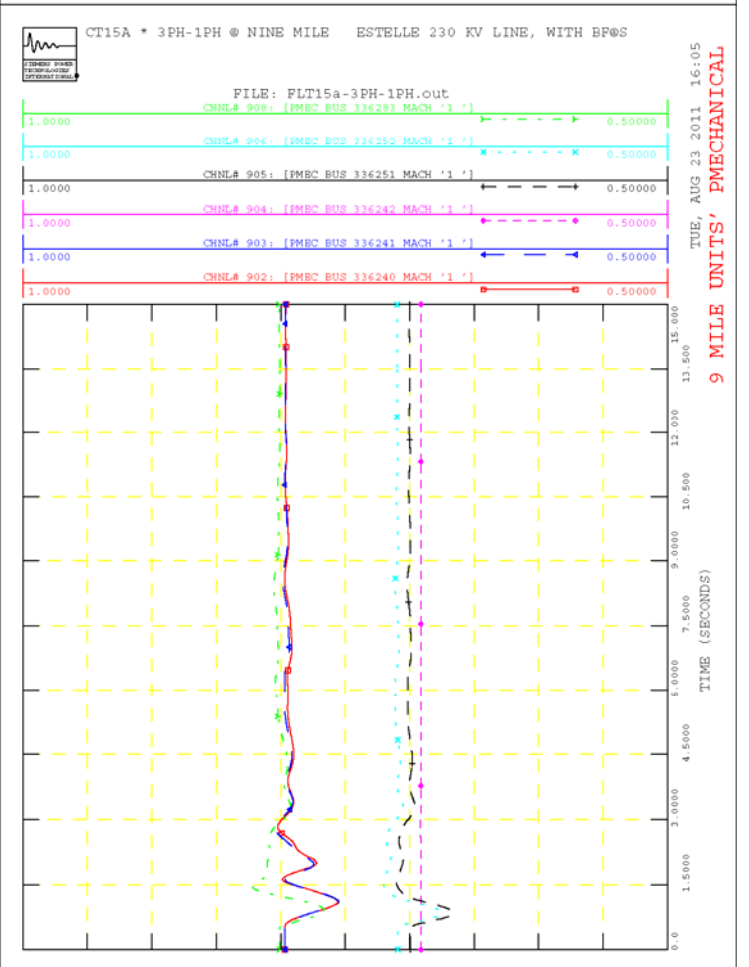
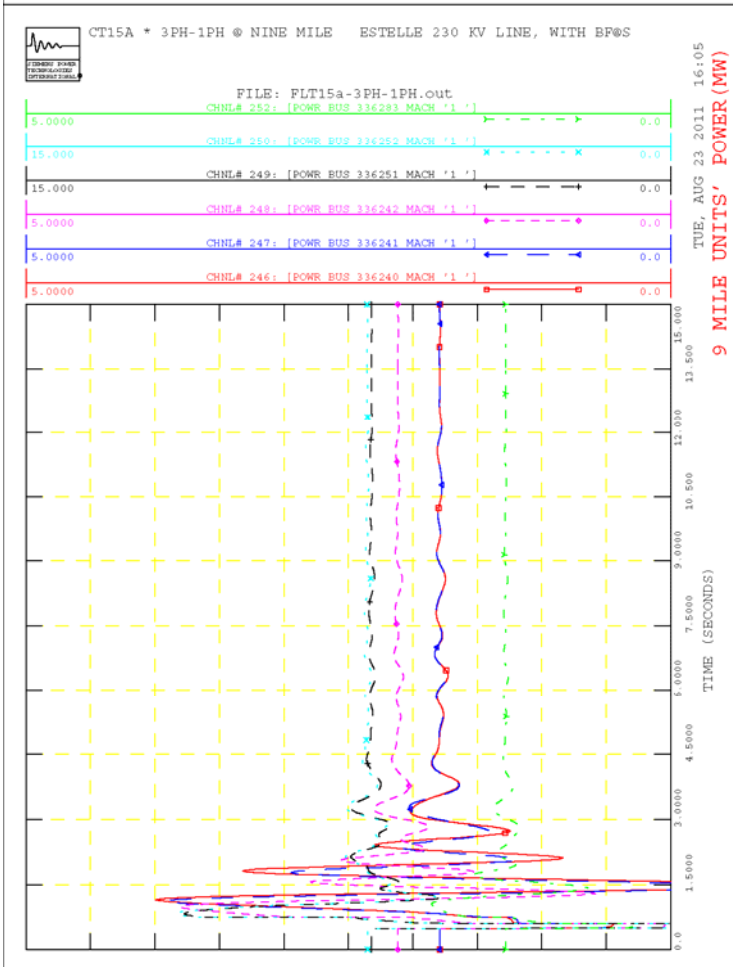
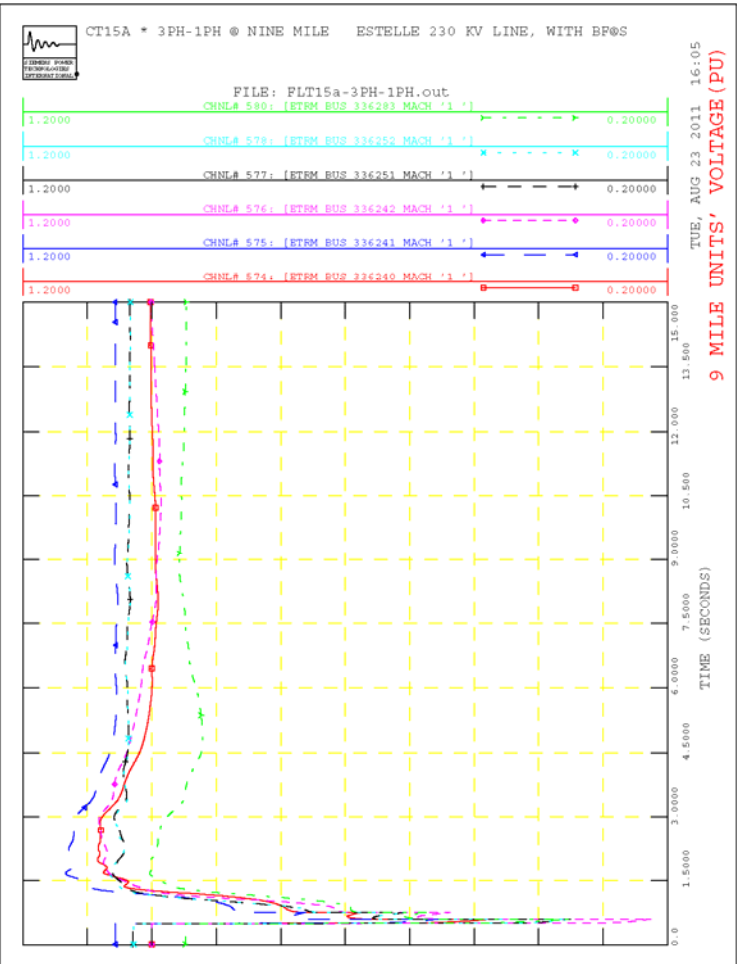
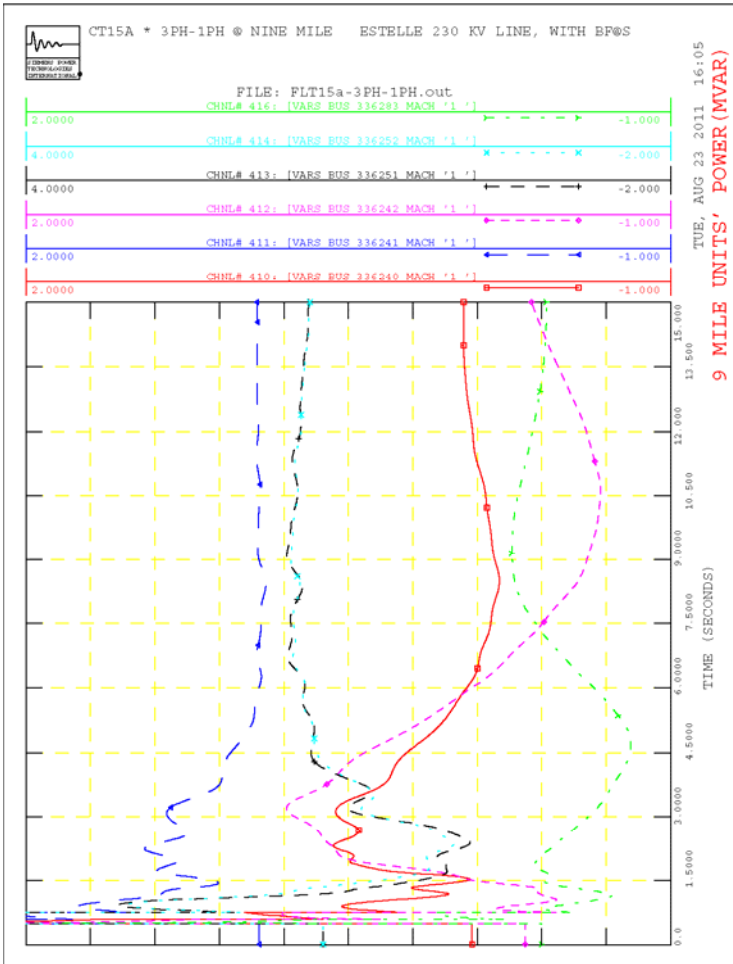
Fault 14a



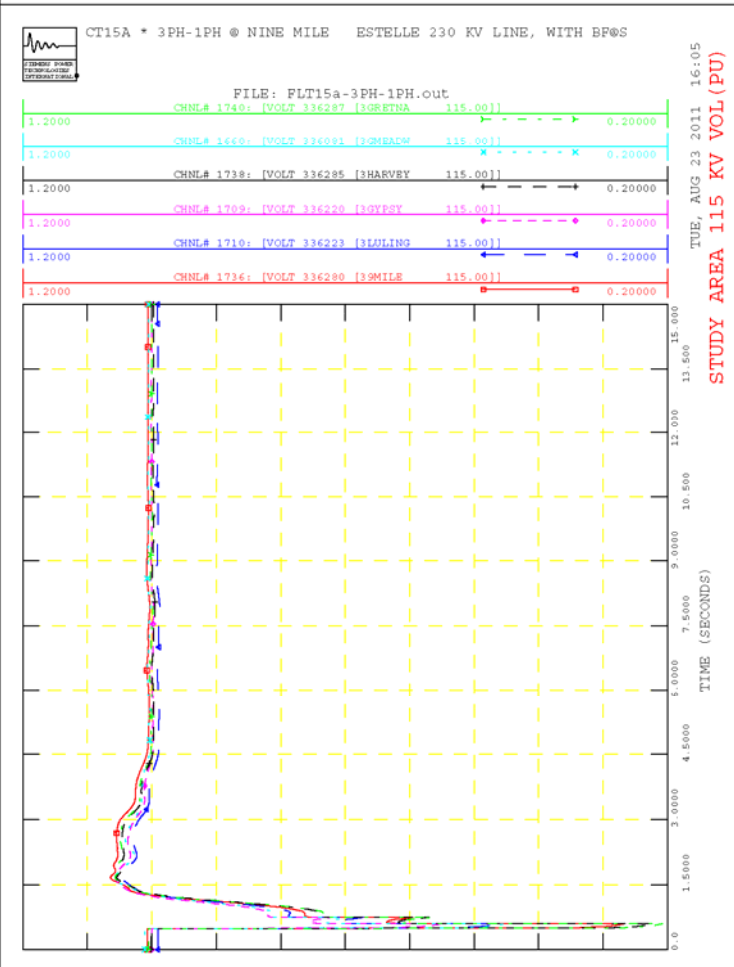
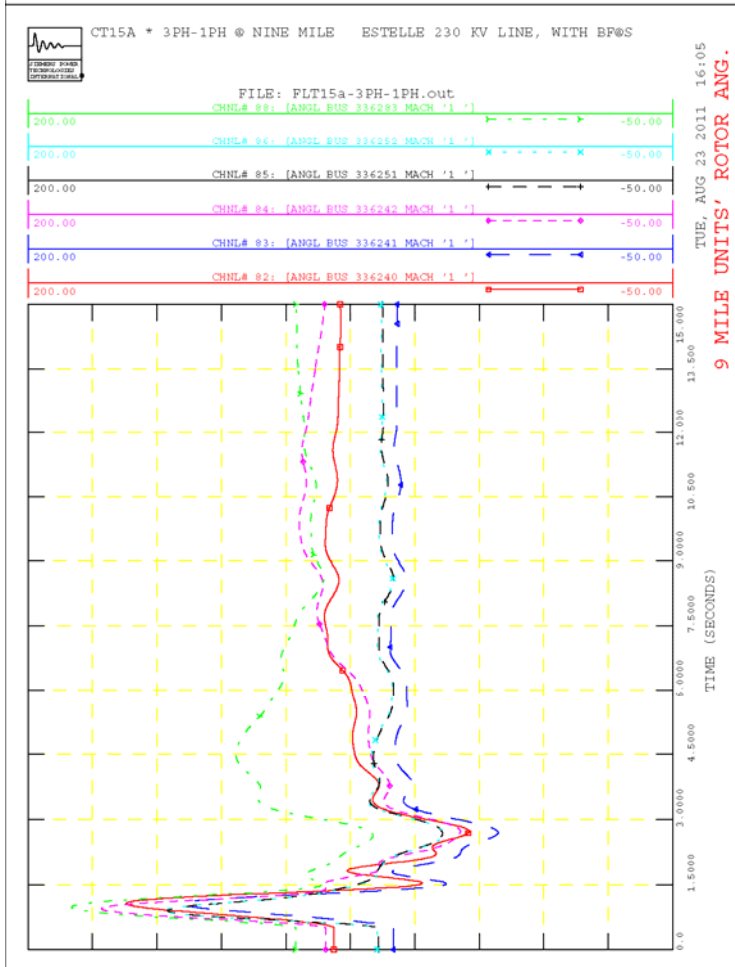
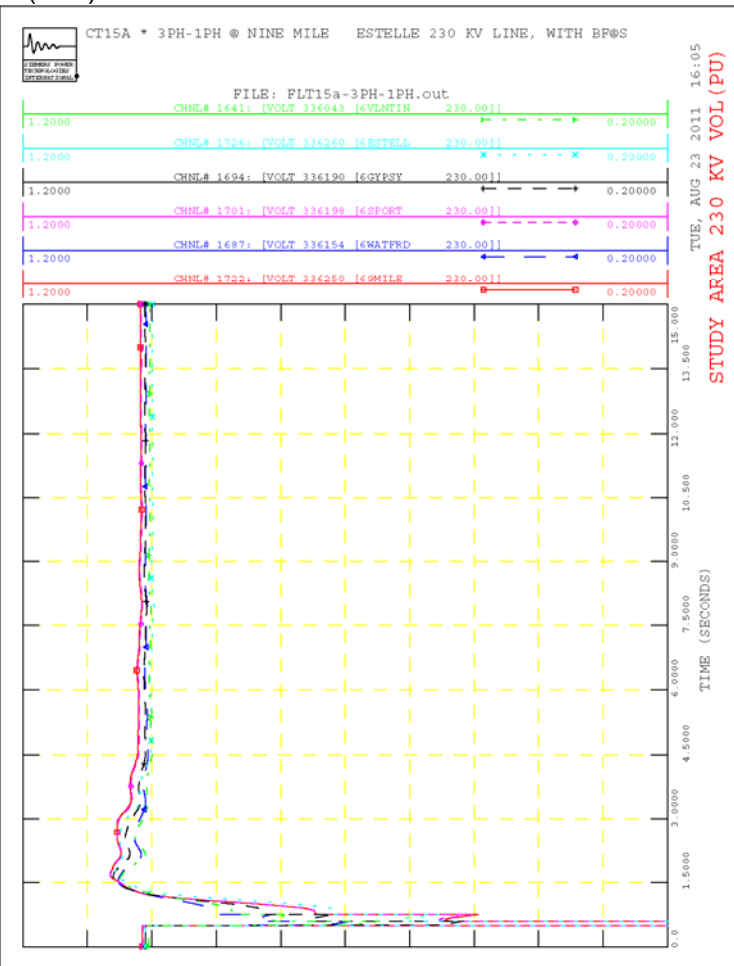
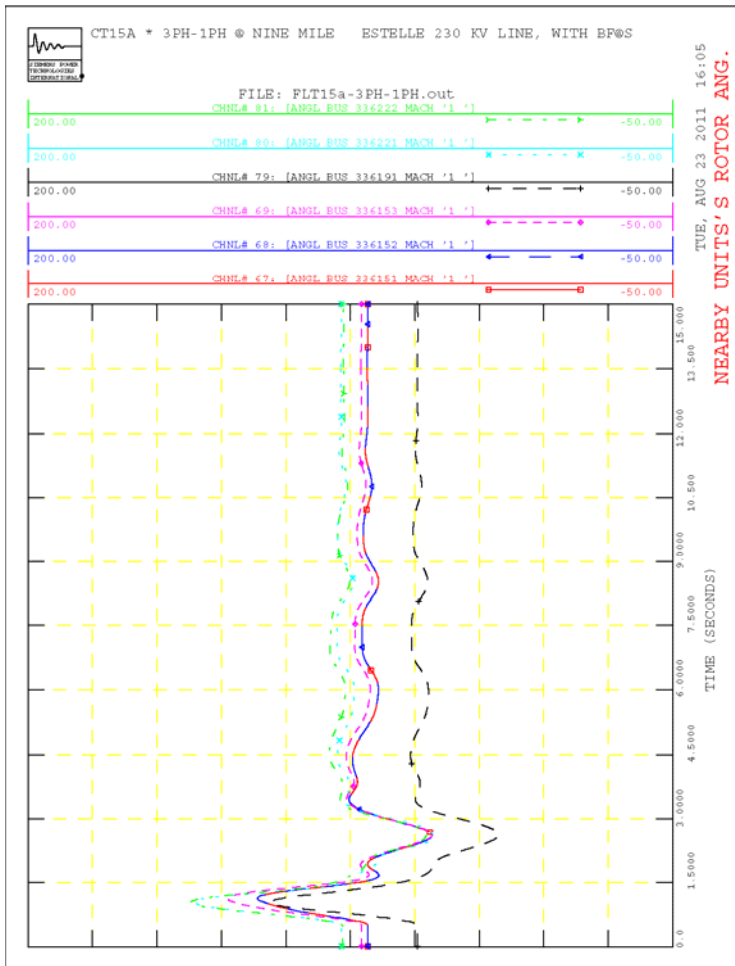
Fault 14a (cont)



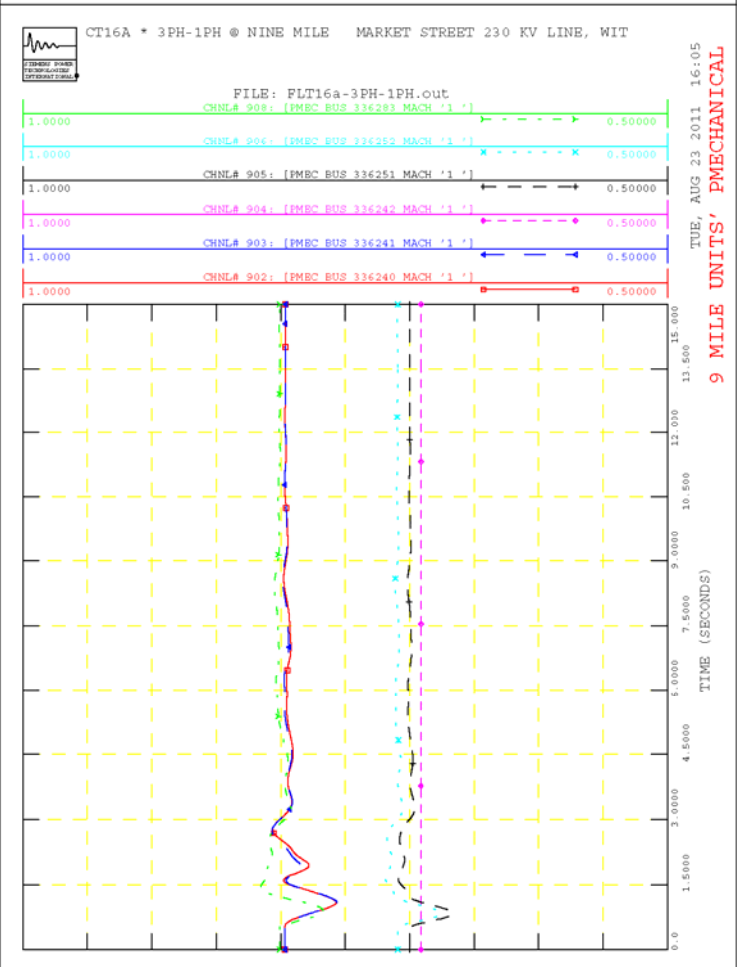
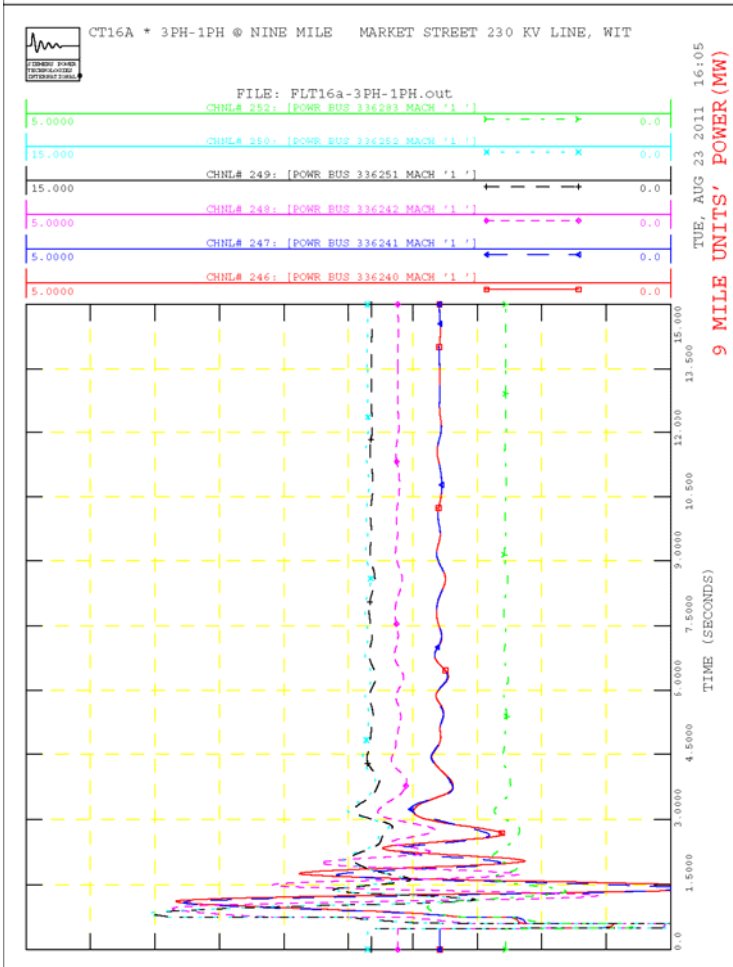
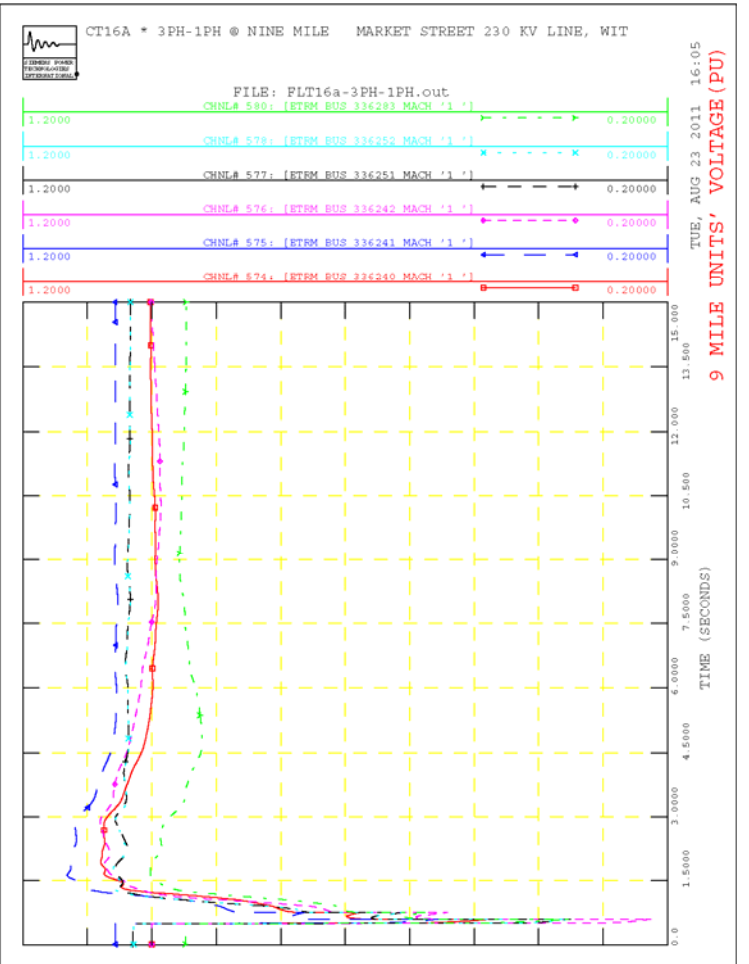
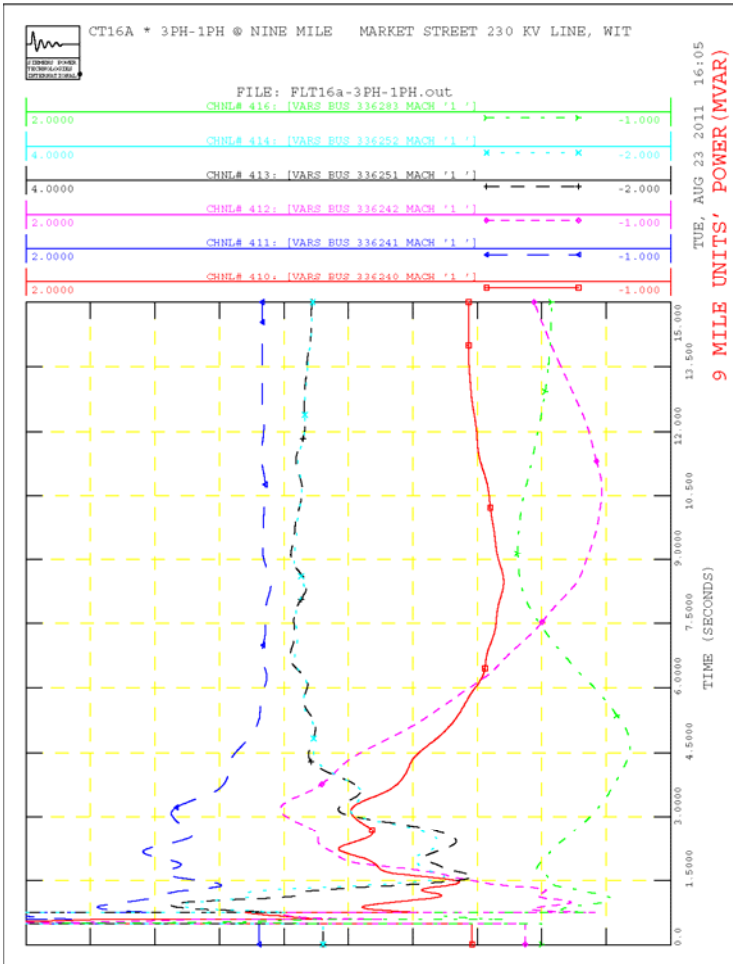
Fault 15a



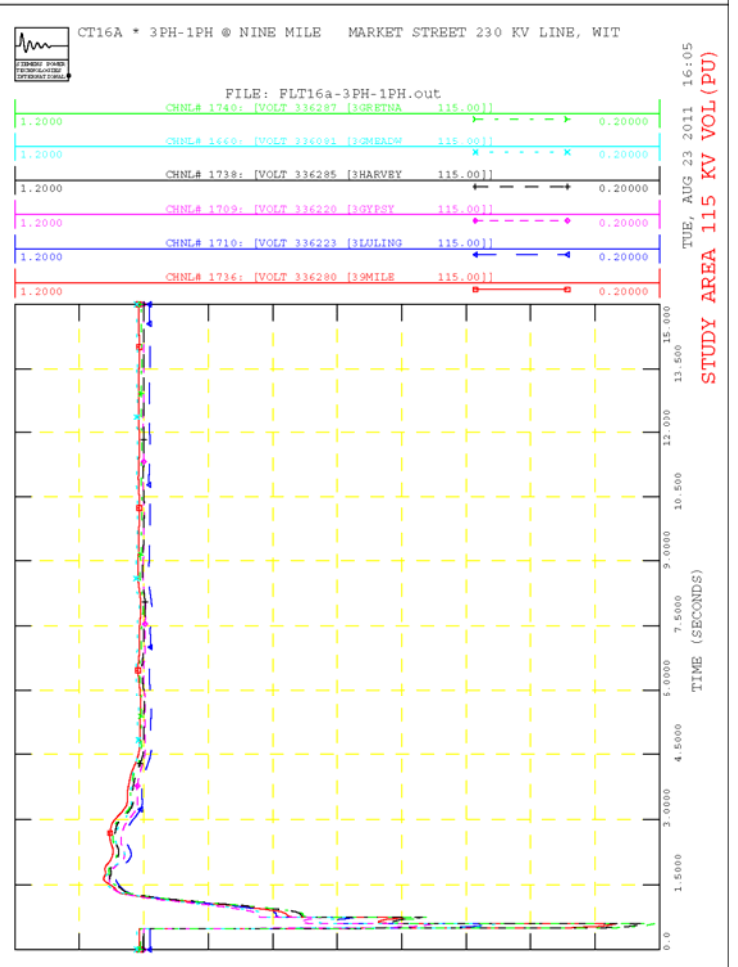
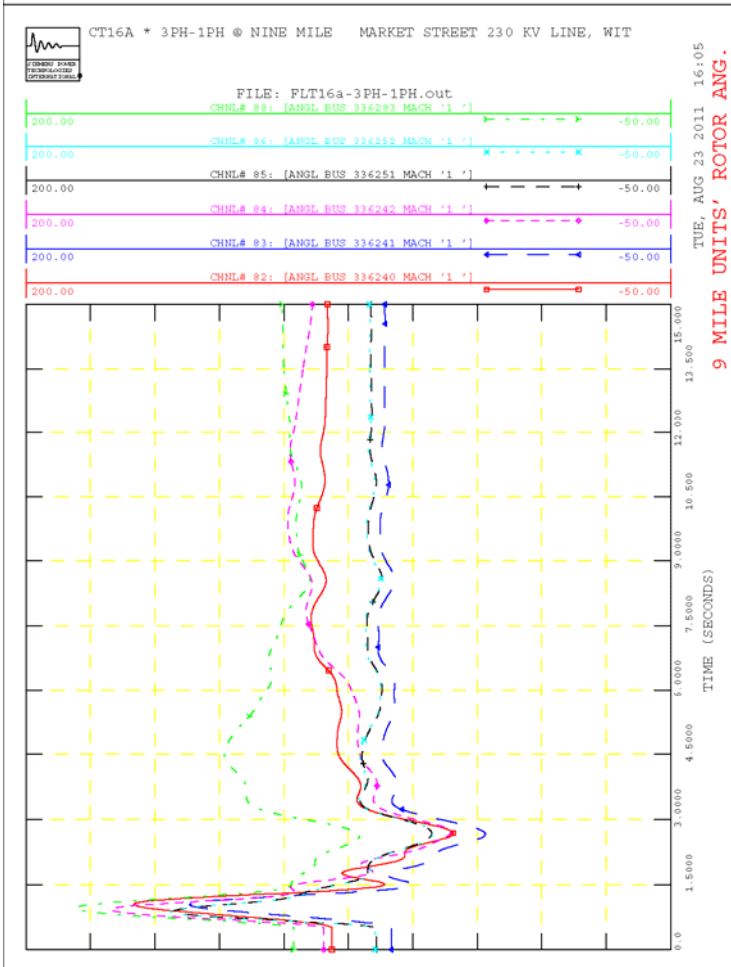
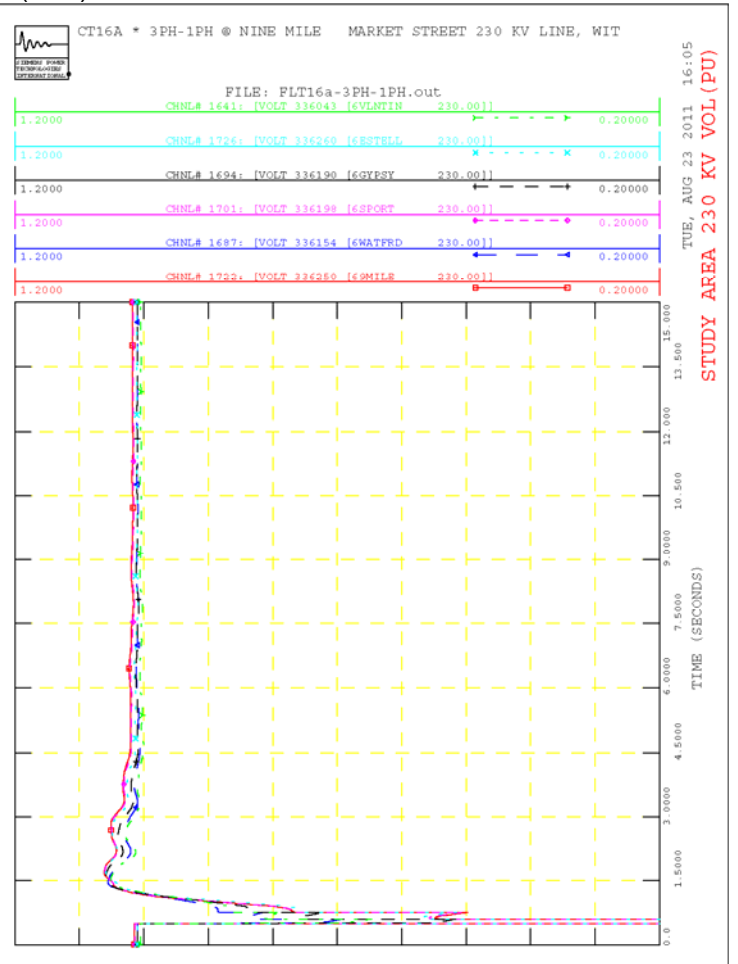
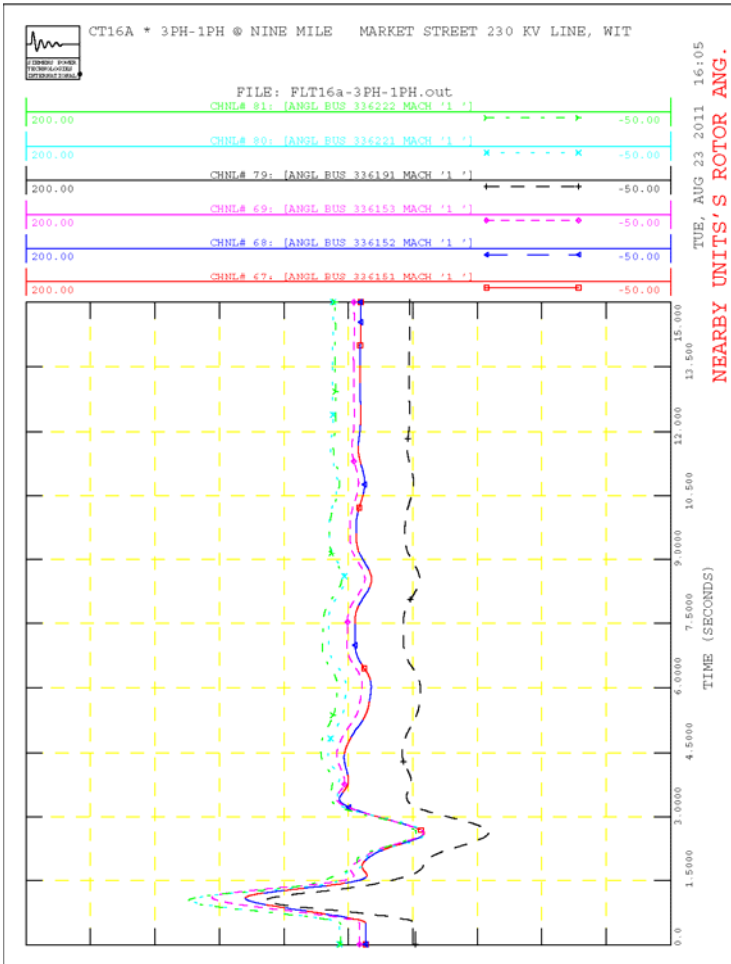
Fault 15a (cont)



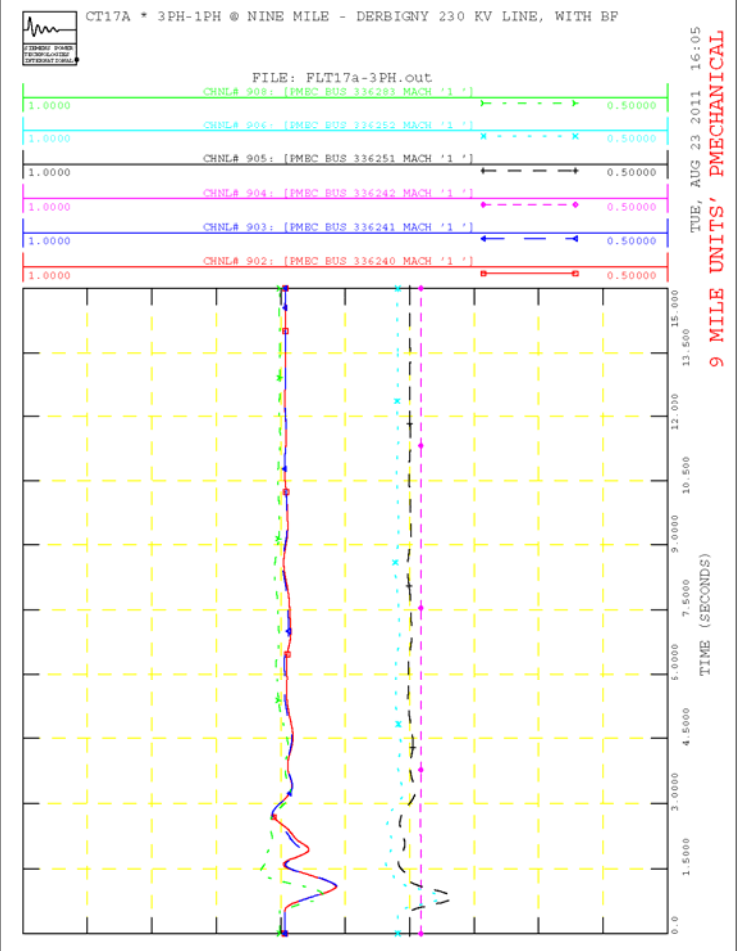
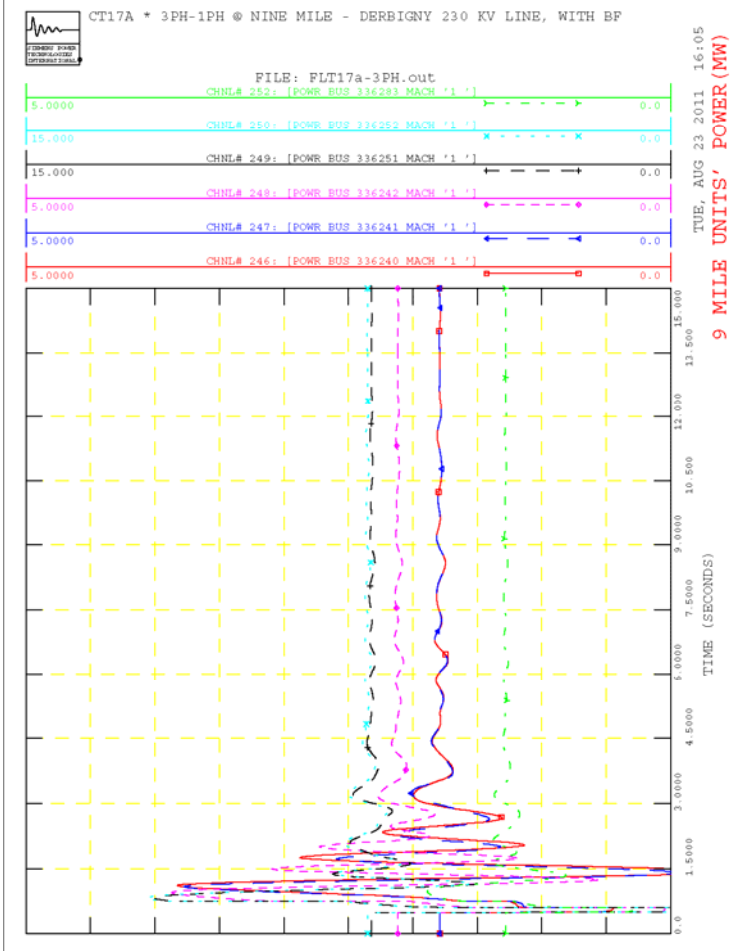
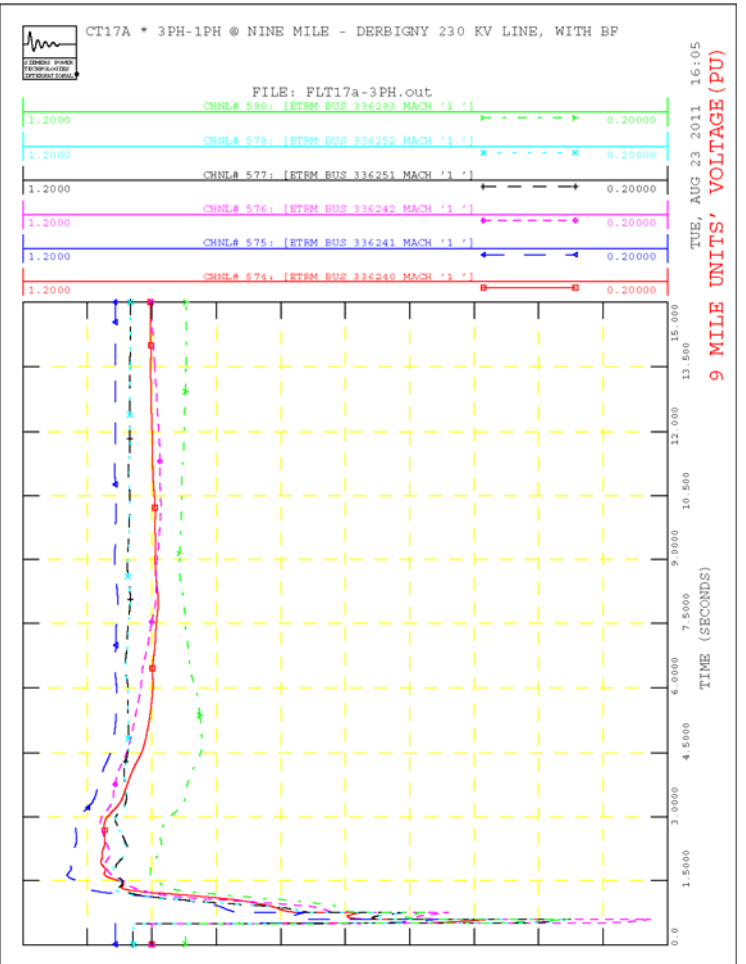
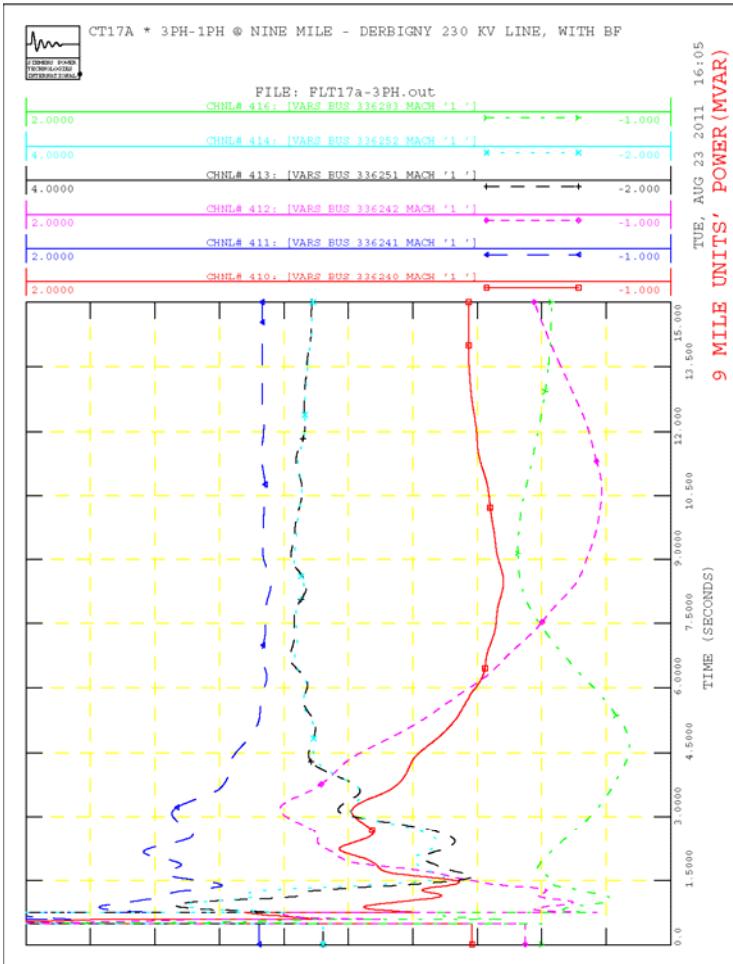
Fault 16a



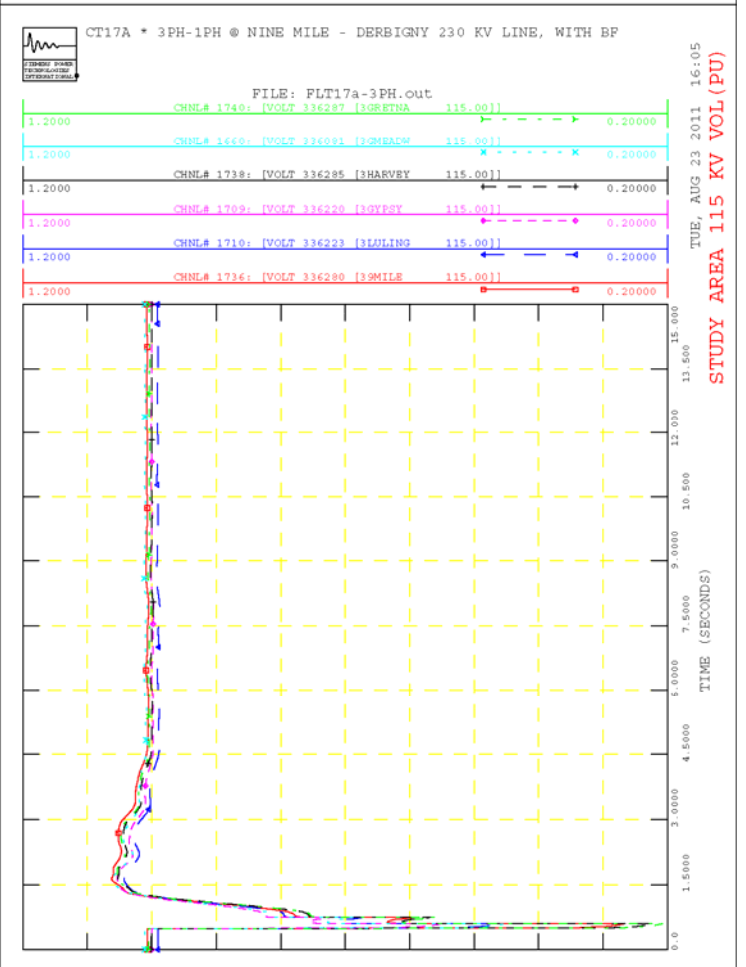
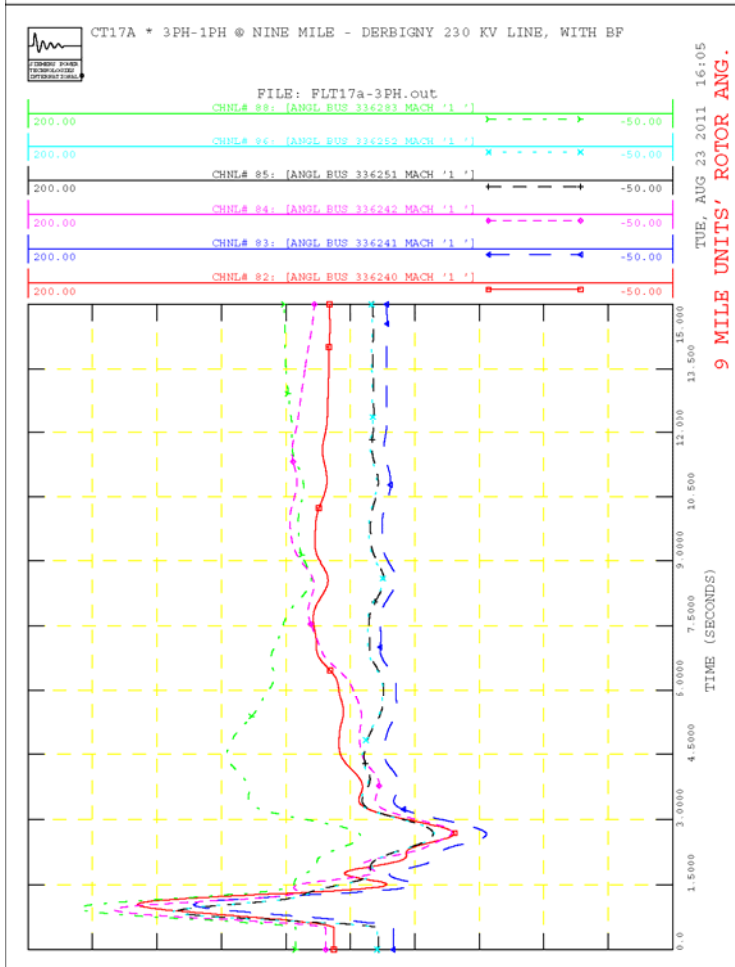
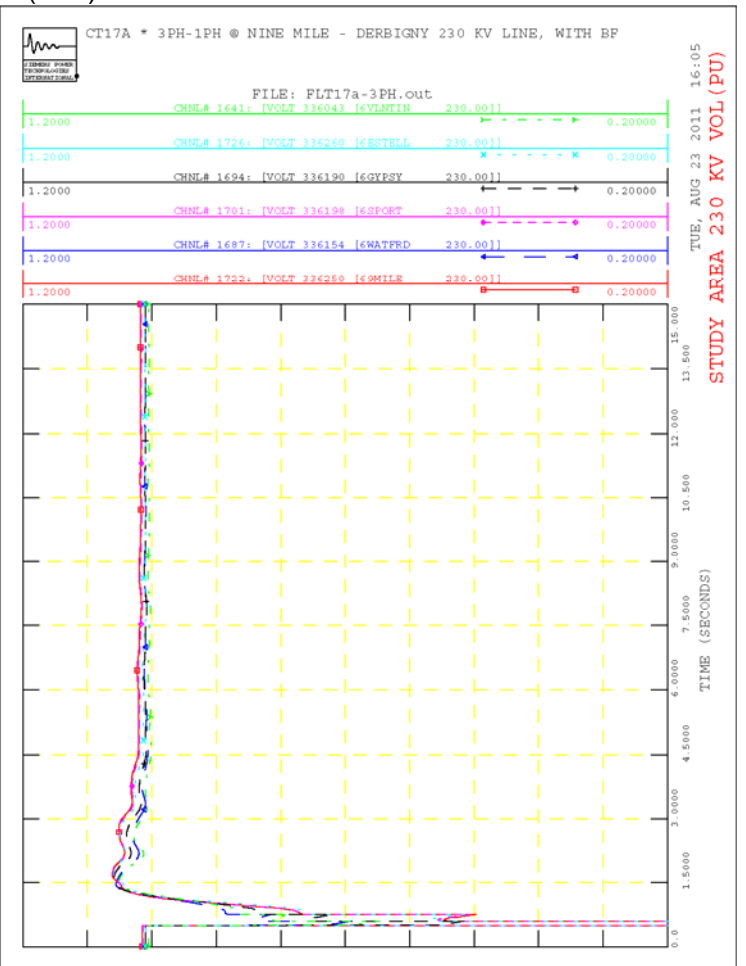
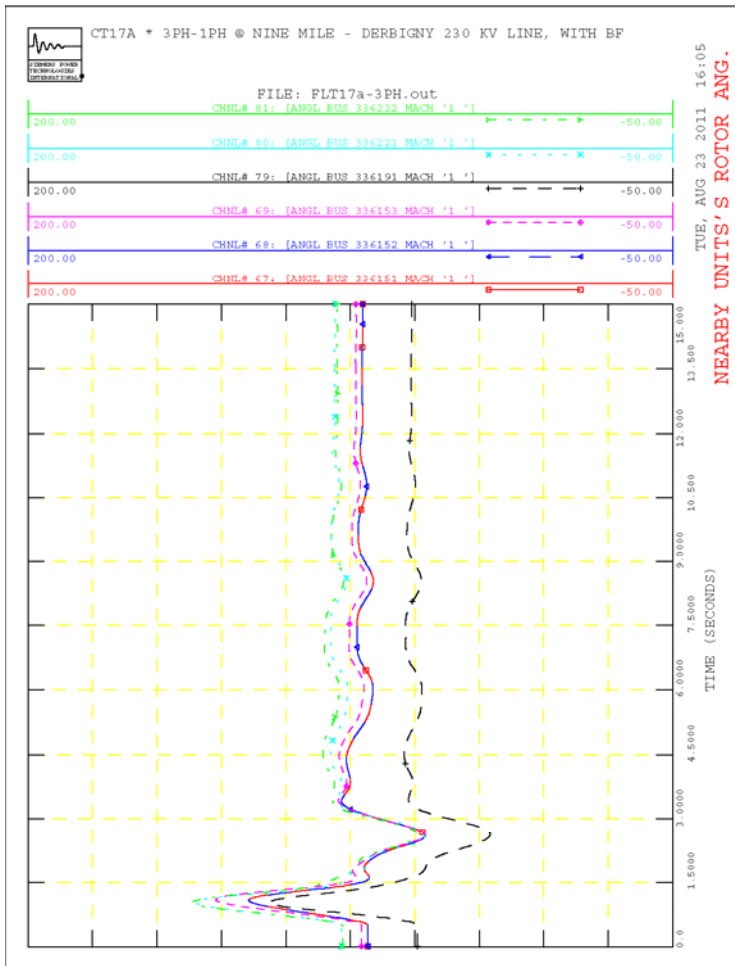
Fault 16a (cont)



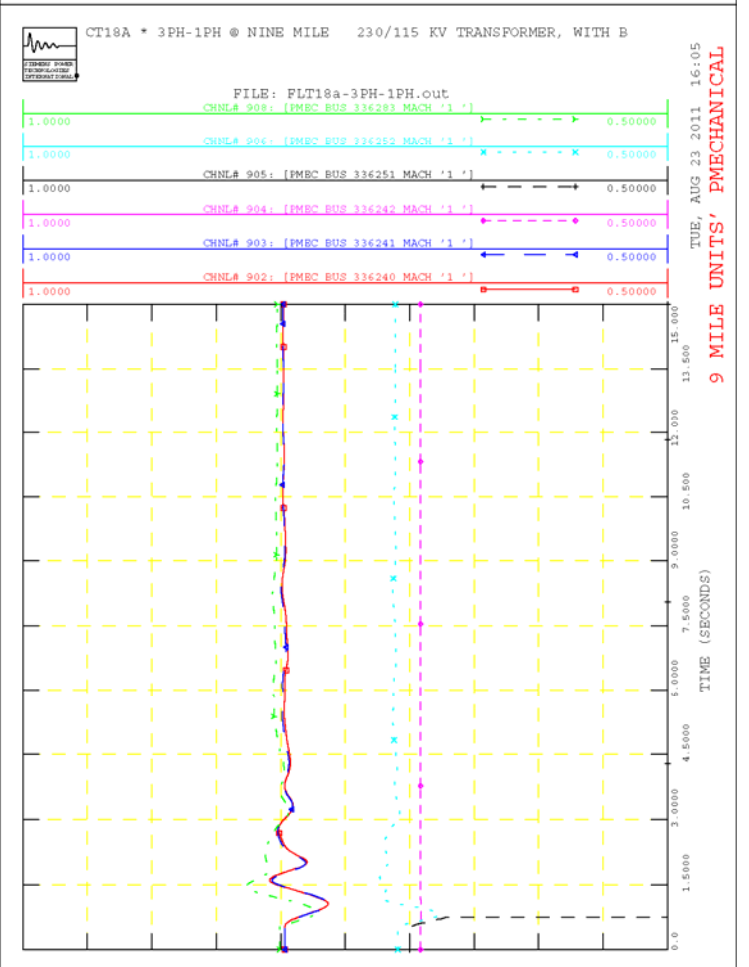
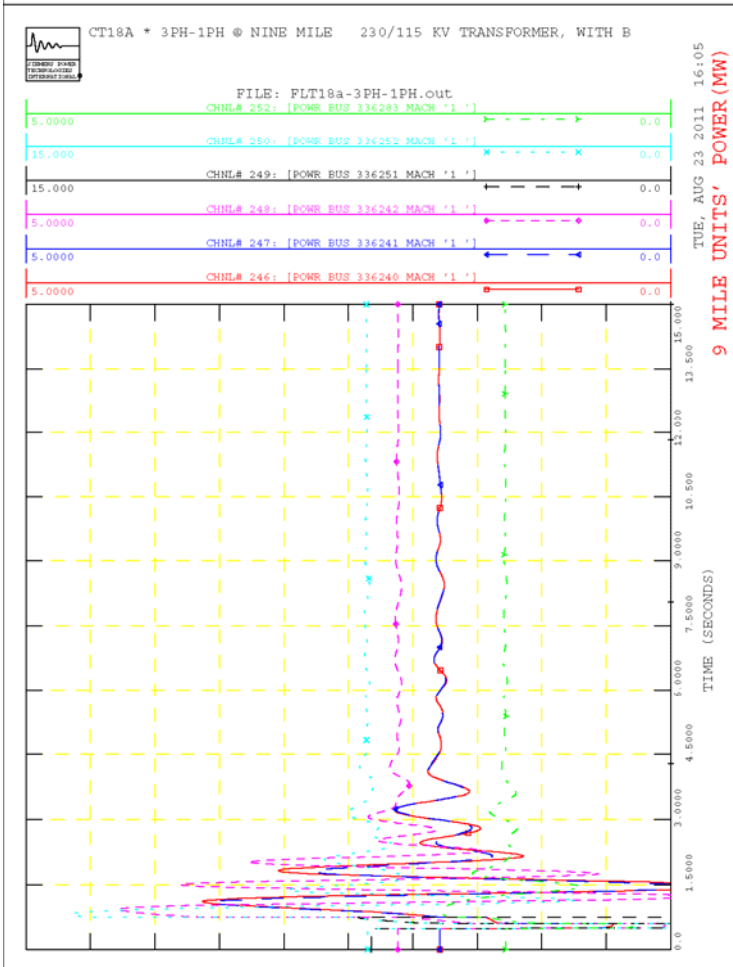
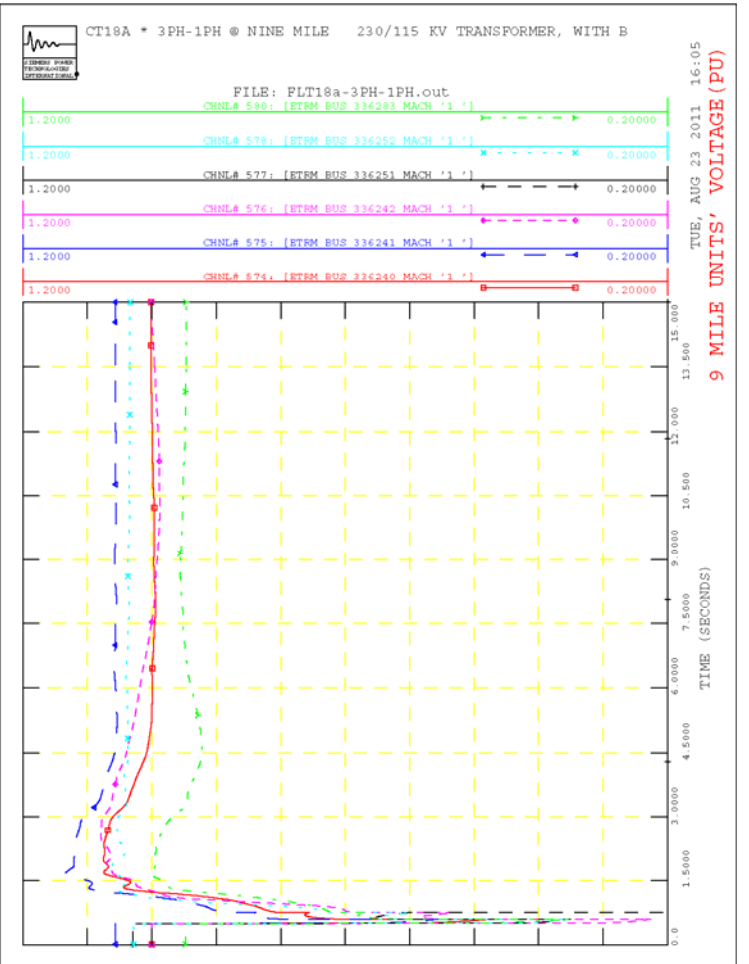
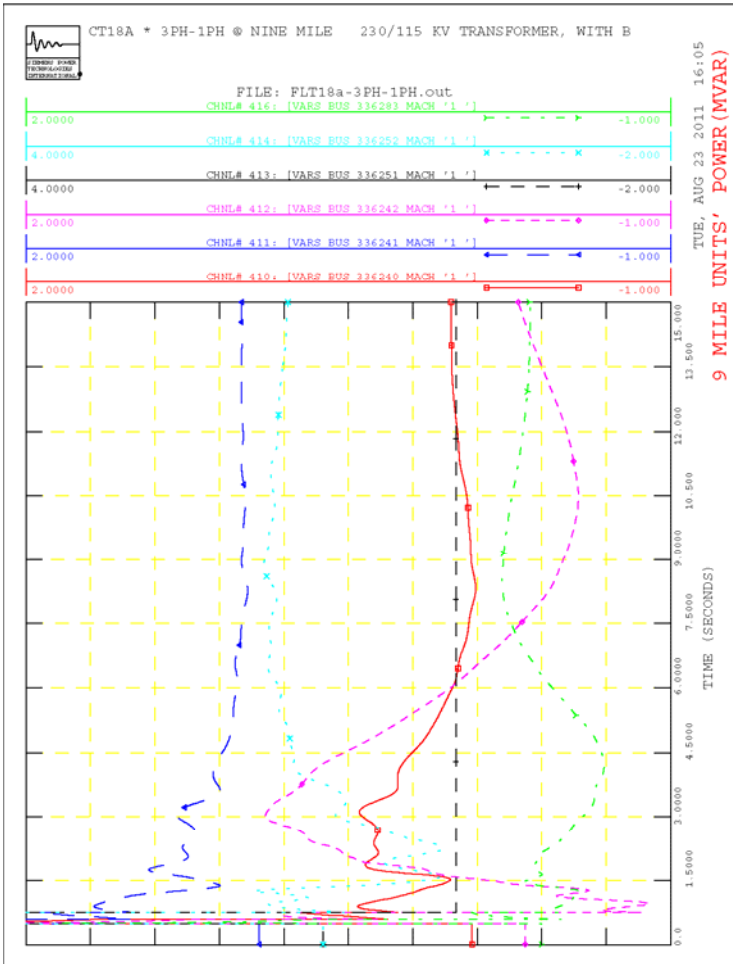
Fault 17a



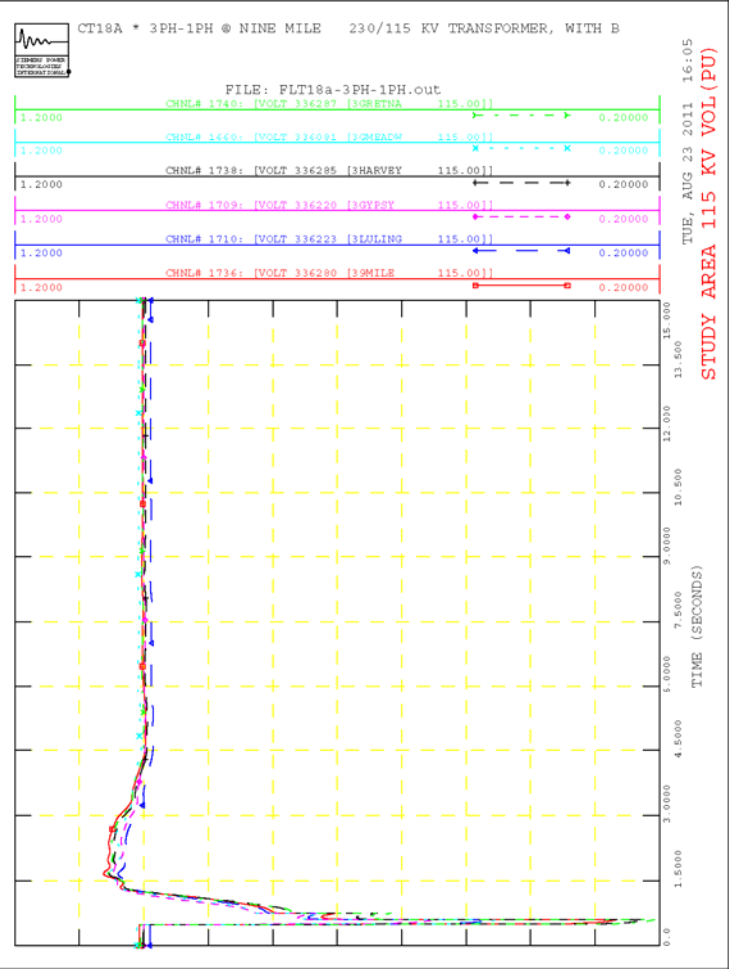
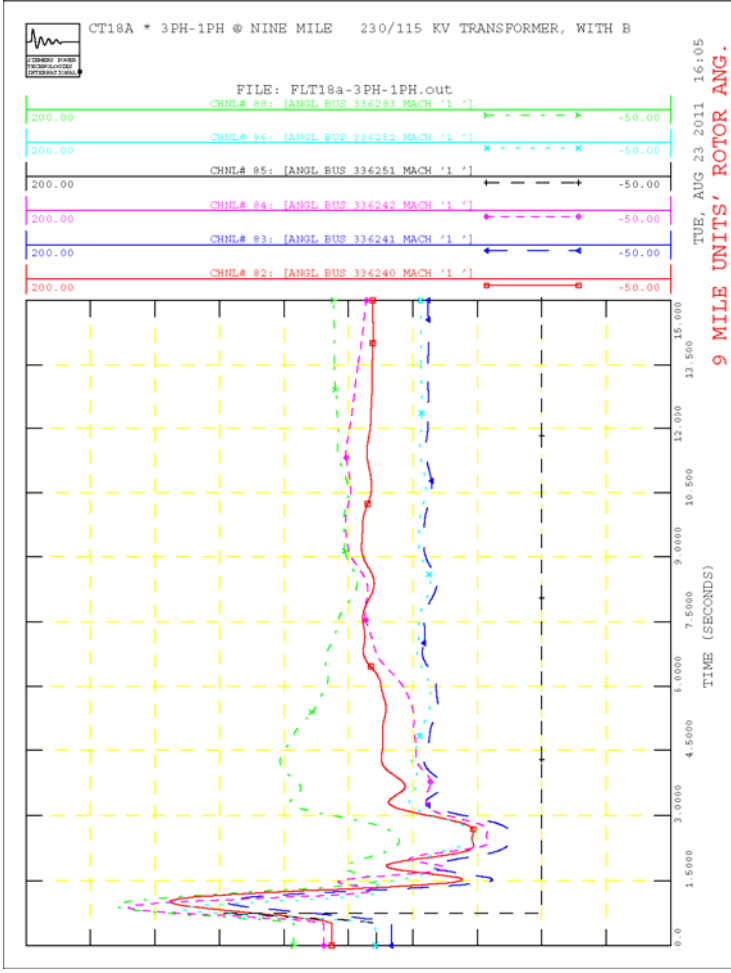
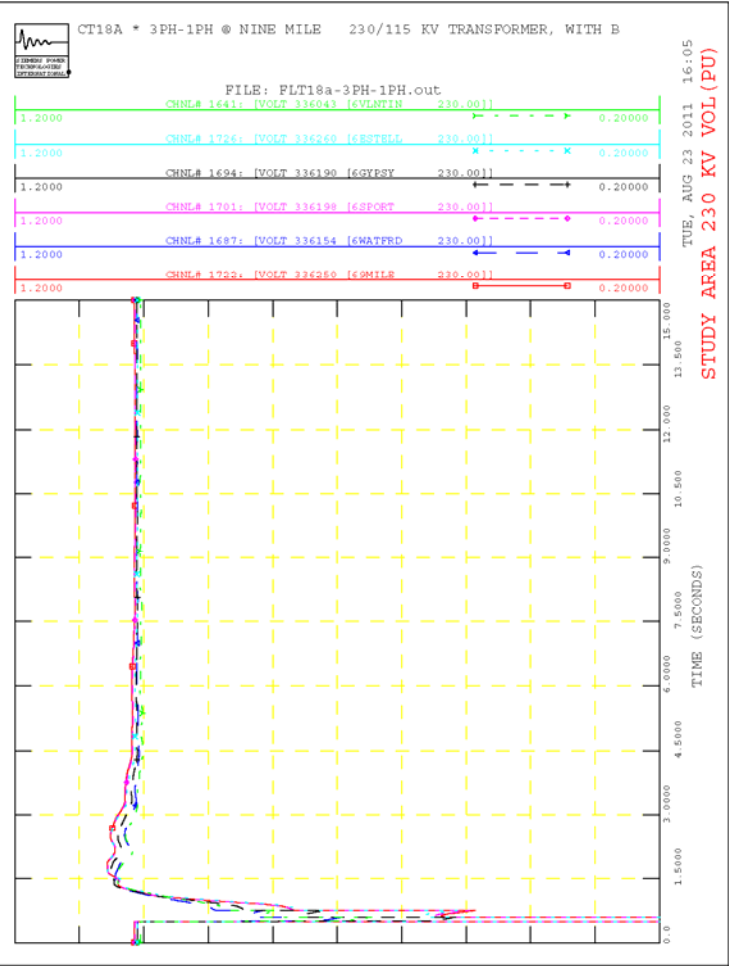
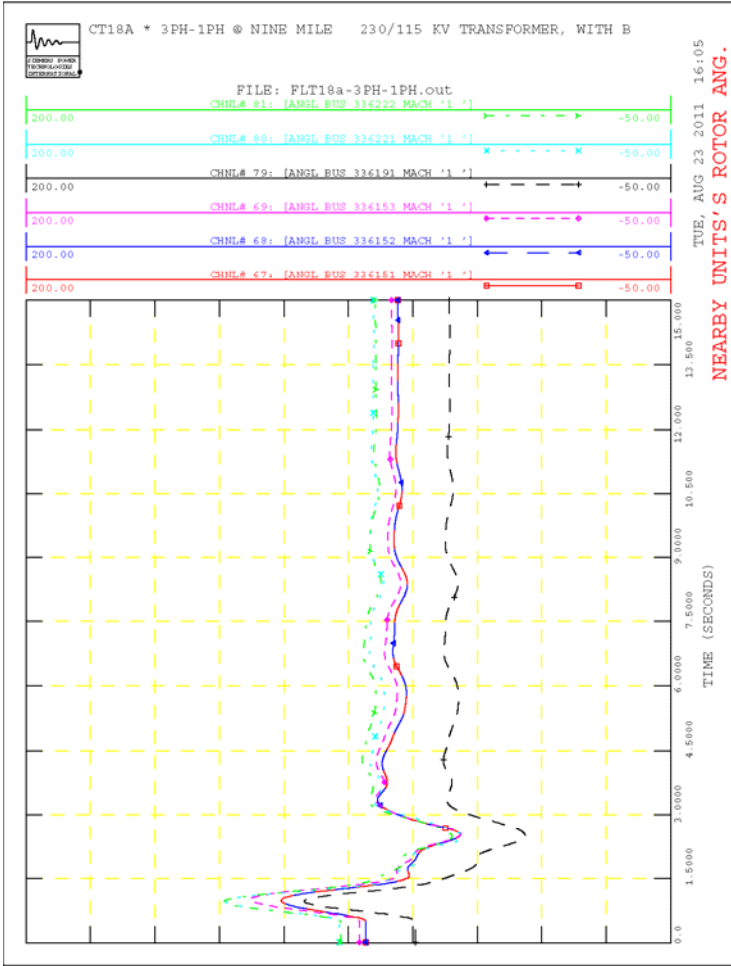
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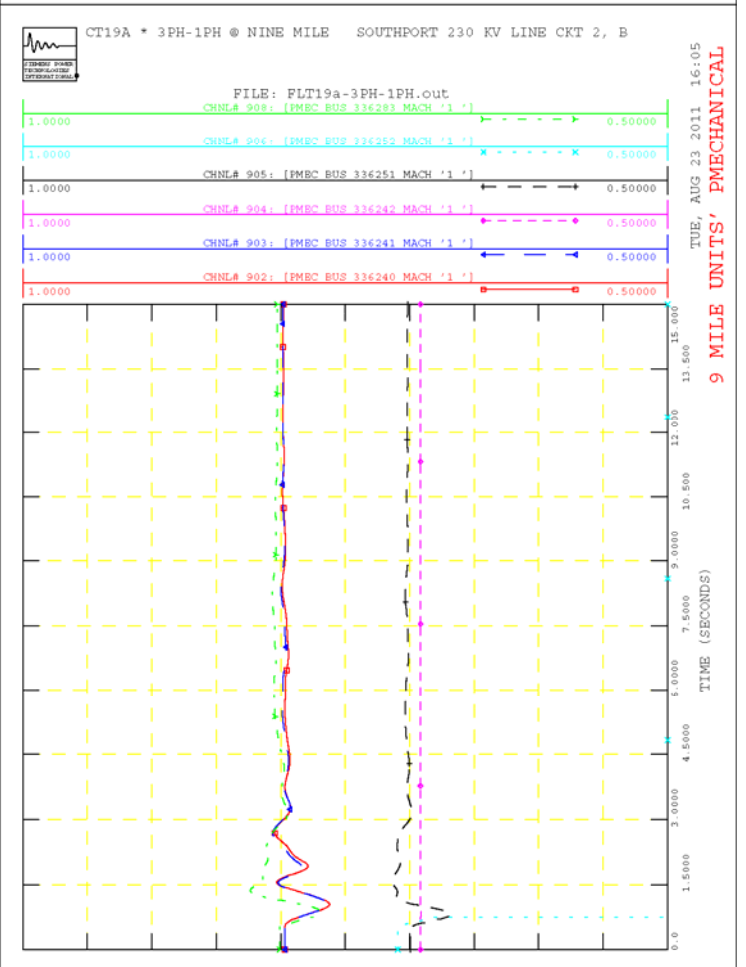
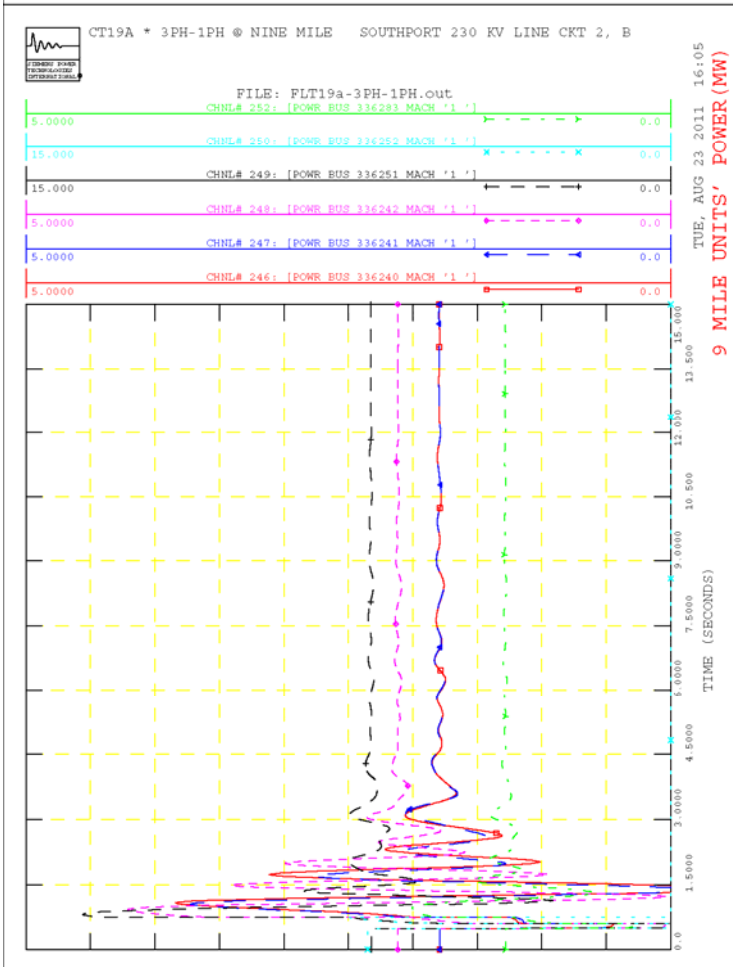
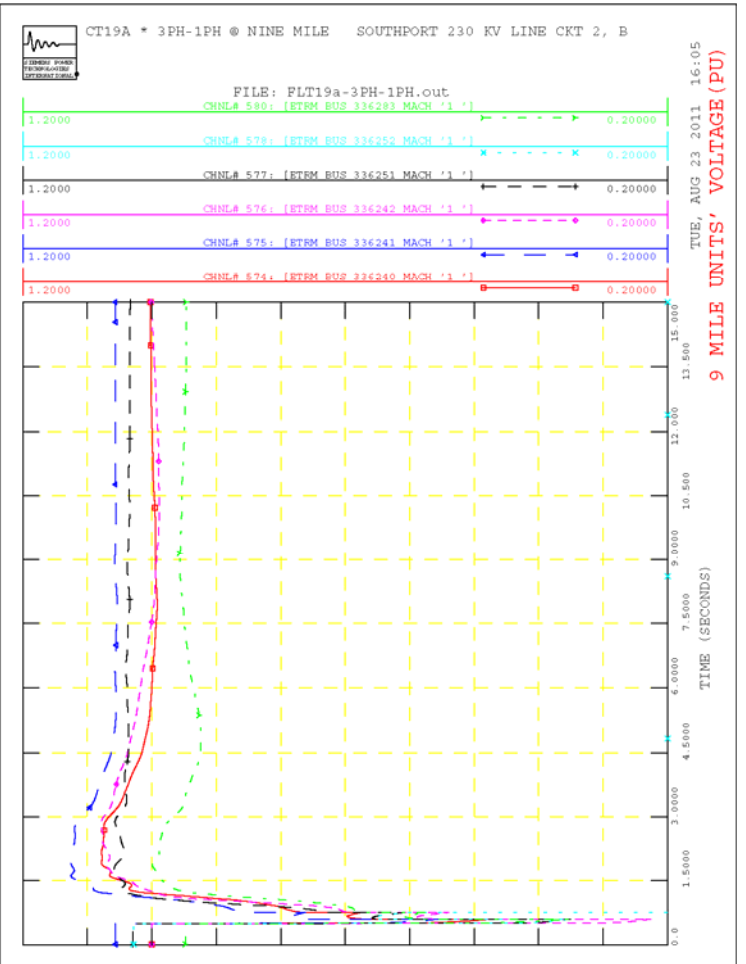
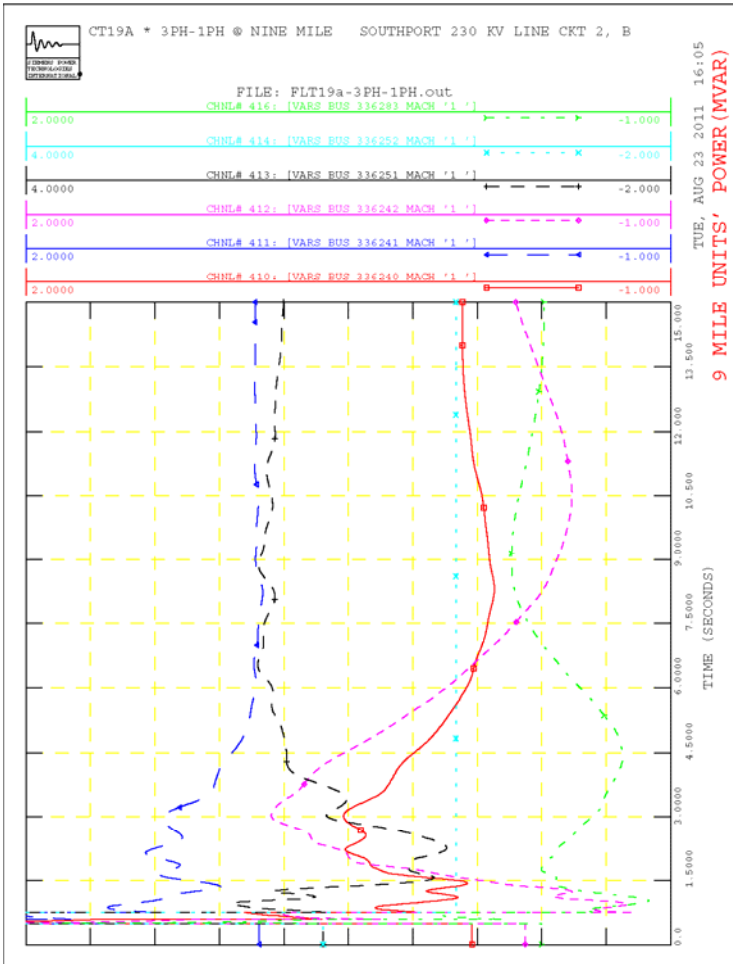
Fault 18a



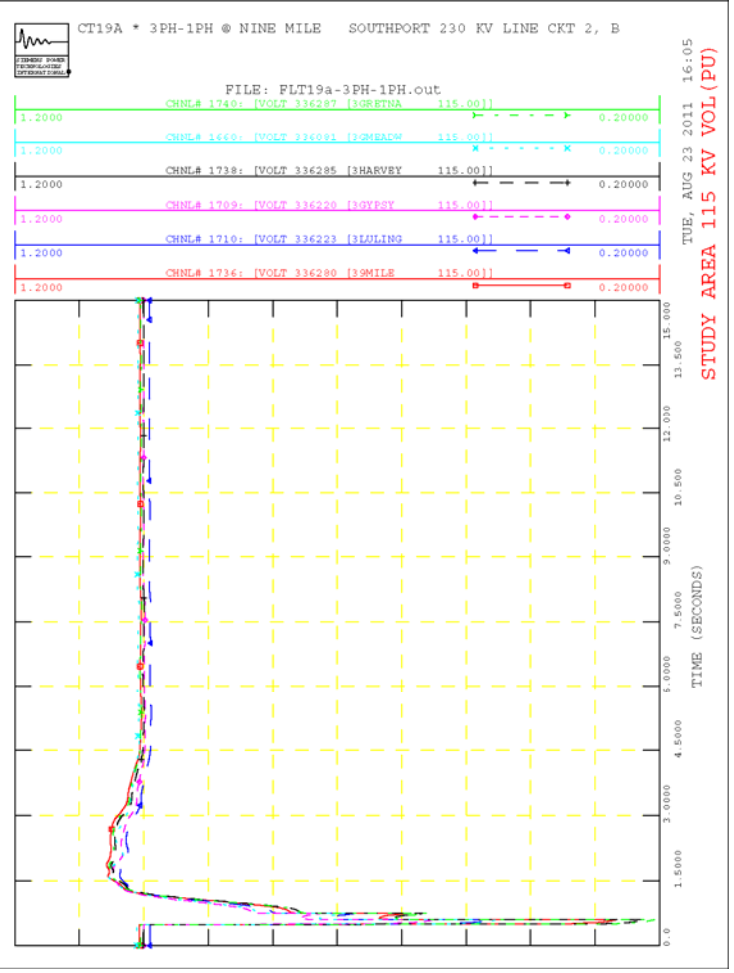
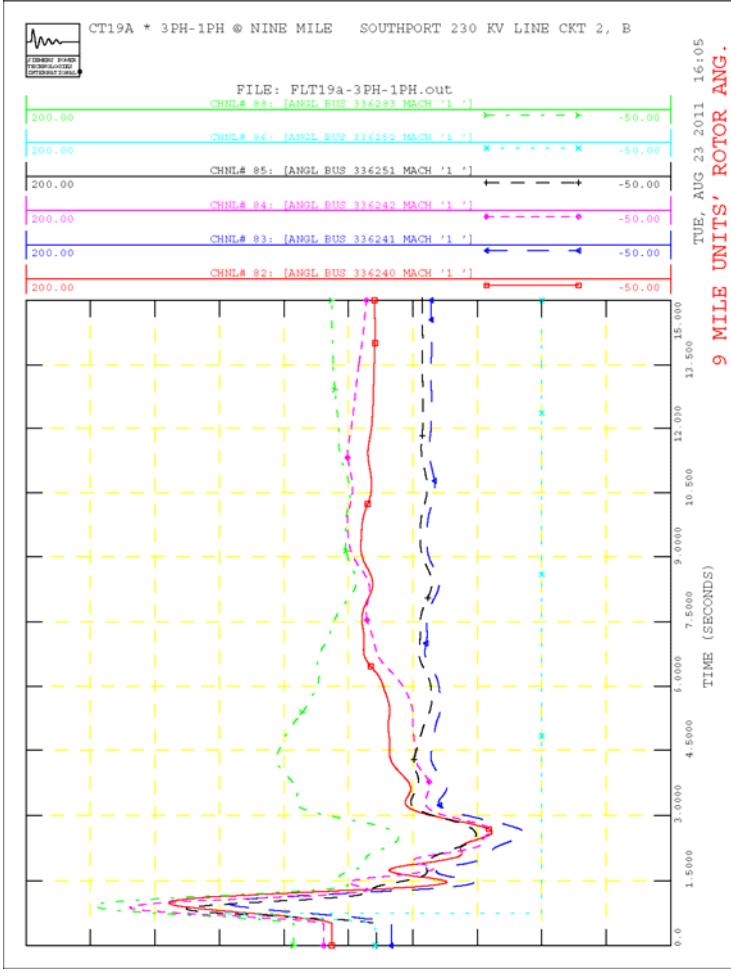
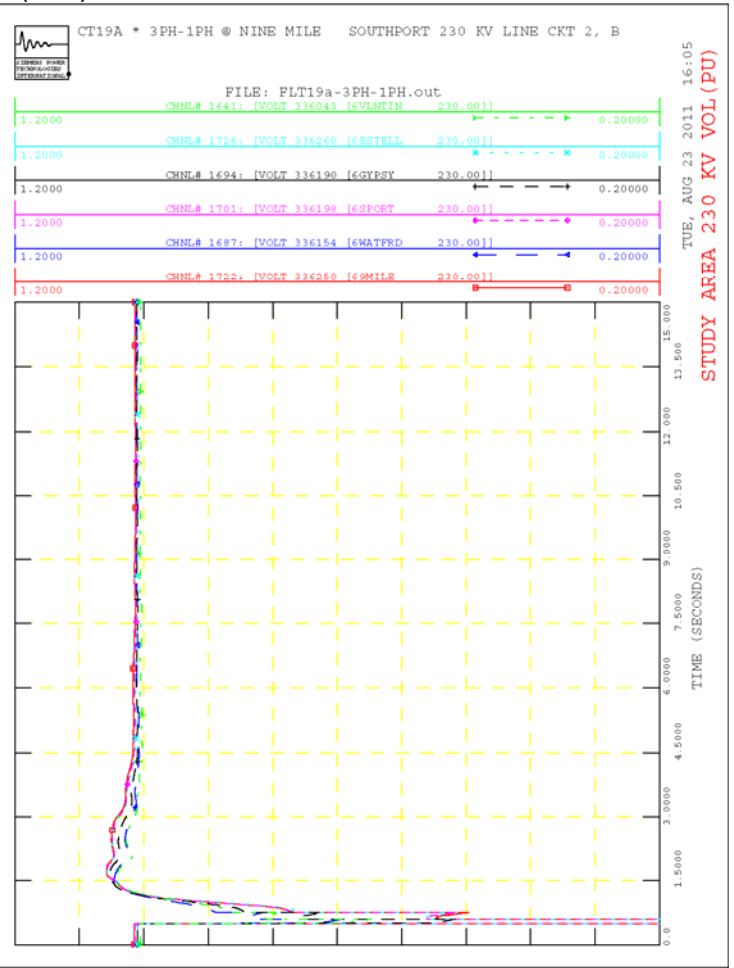
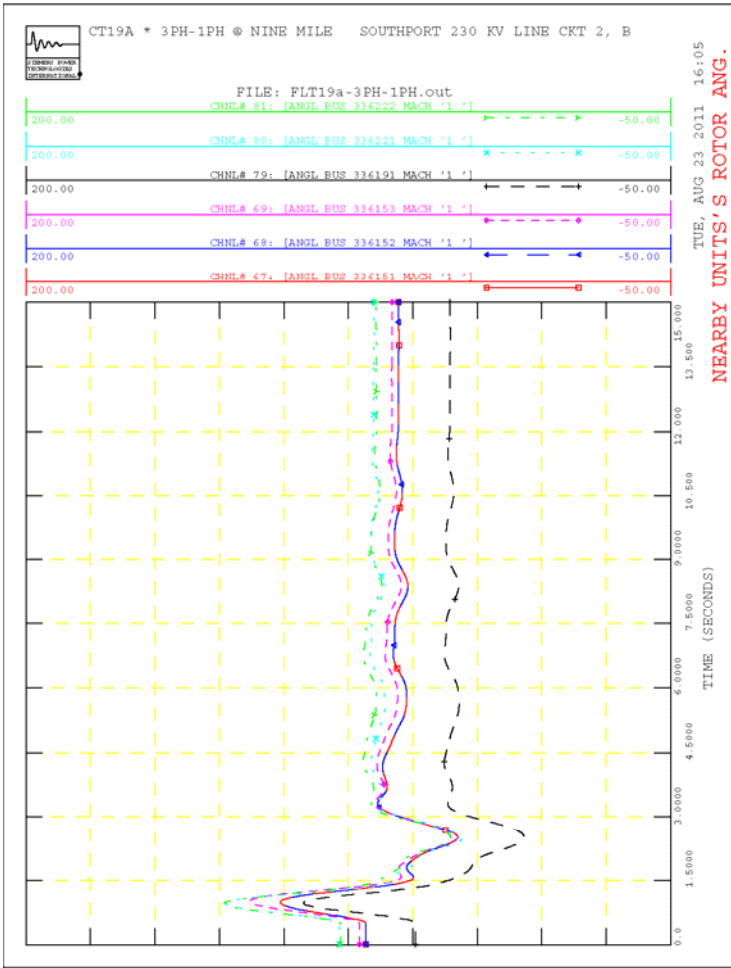
Fault 18a (cont)



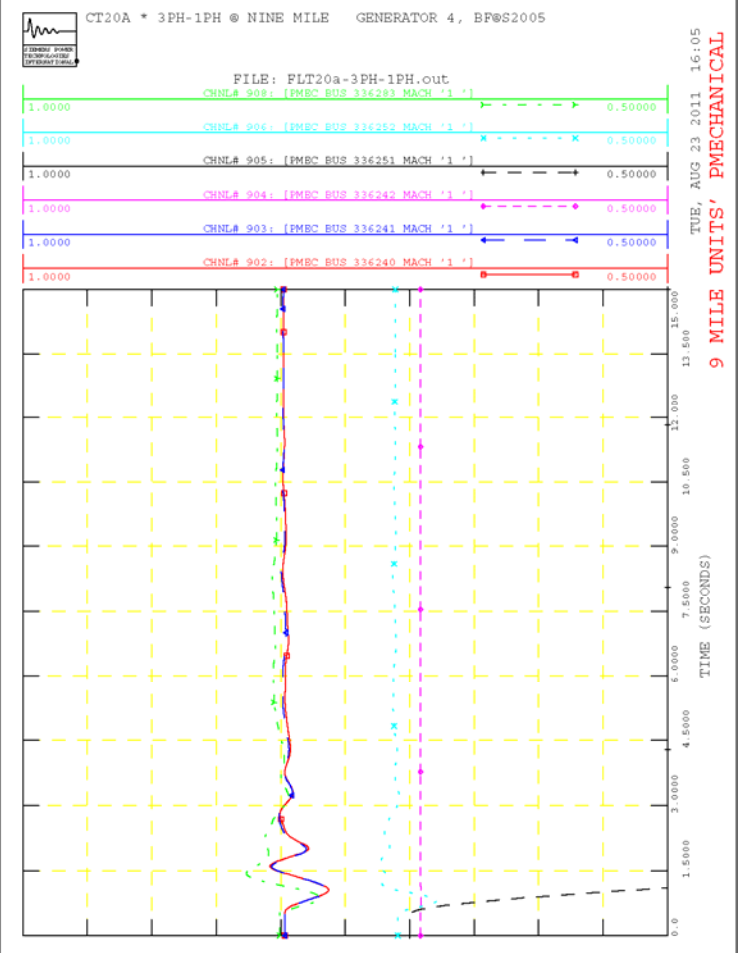
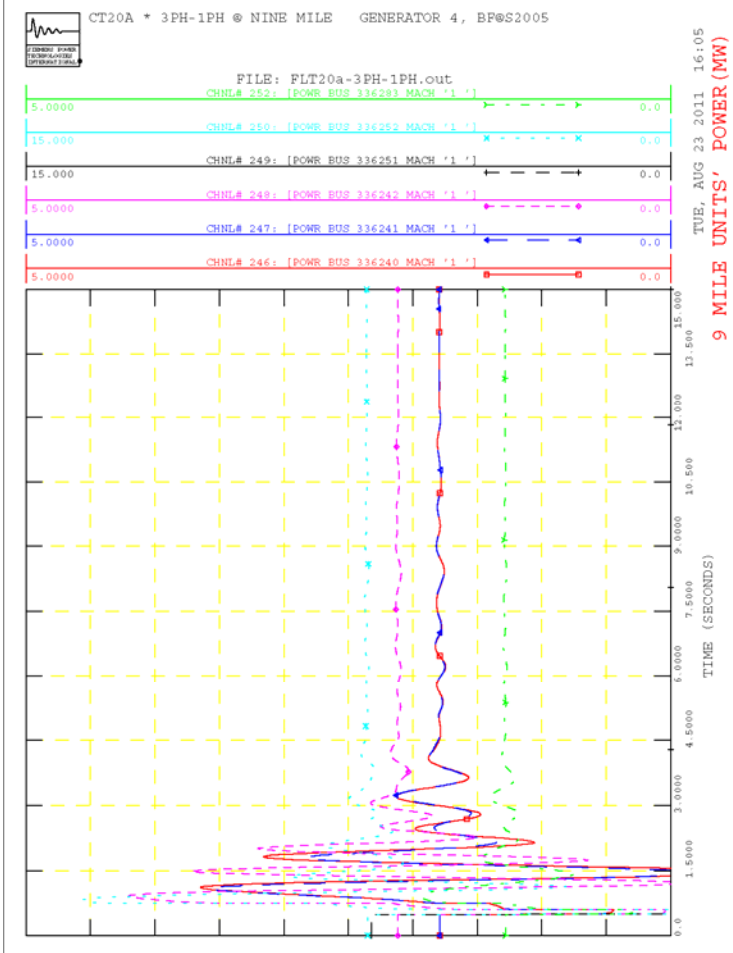
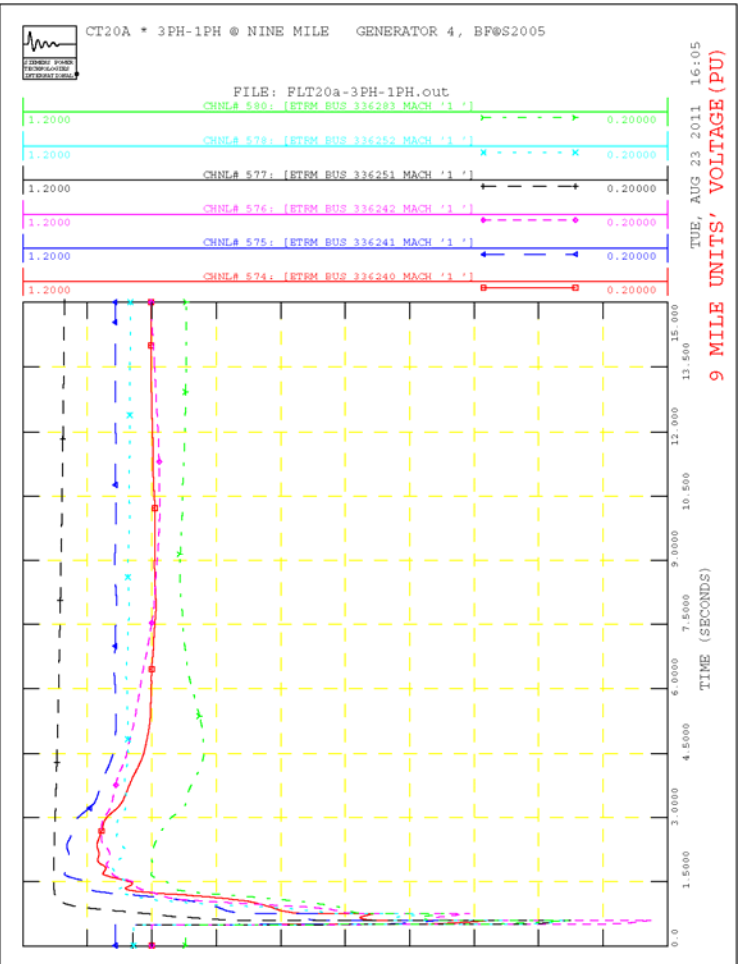
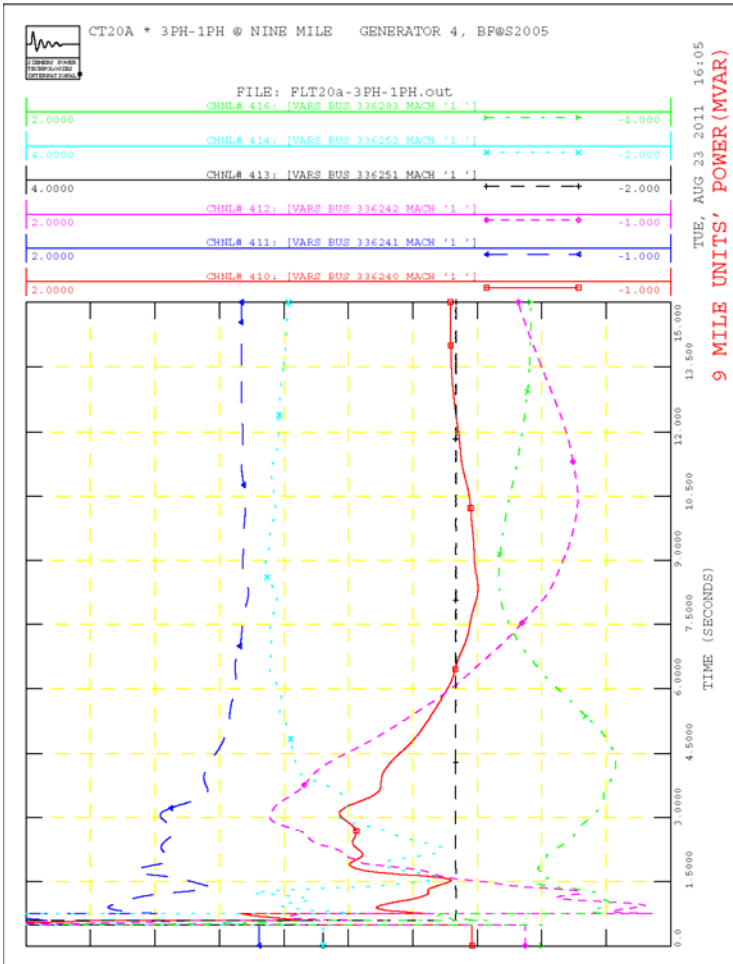
Fault 19a



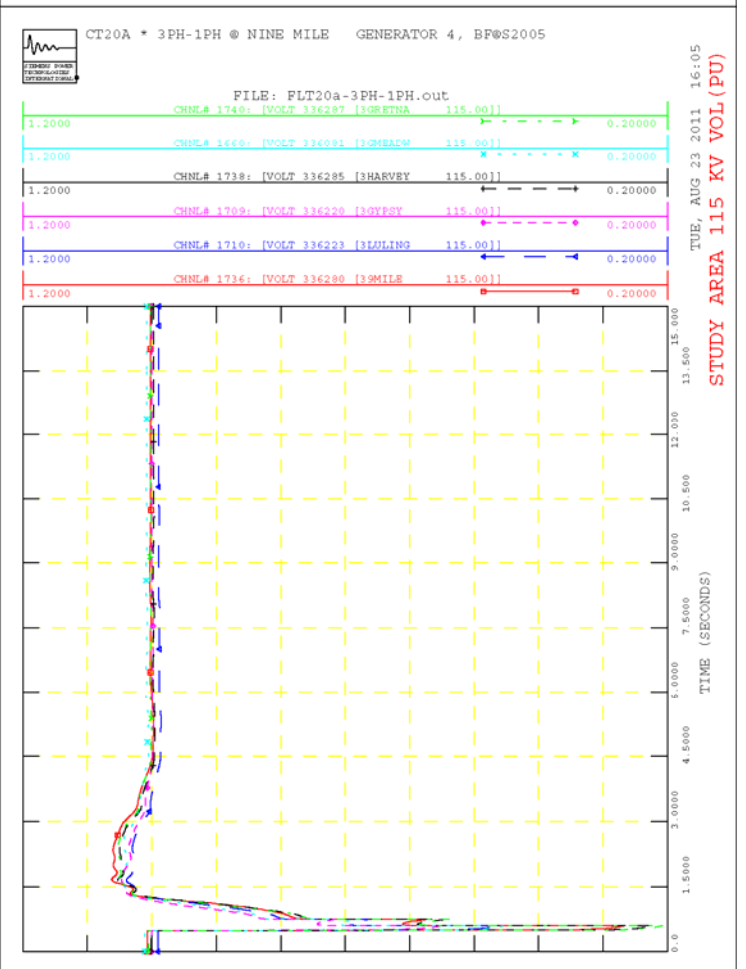
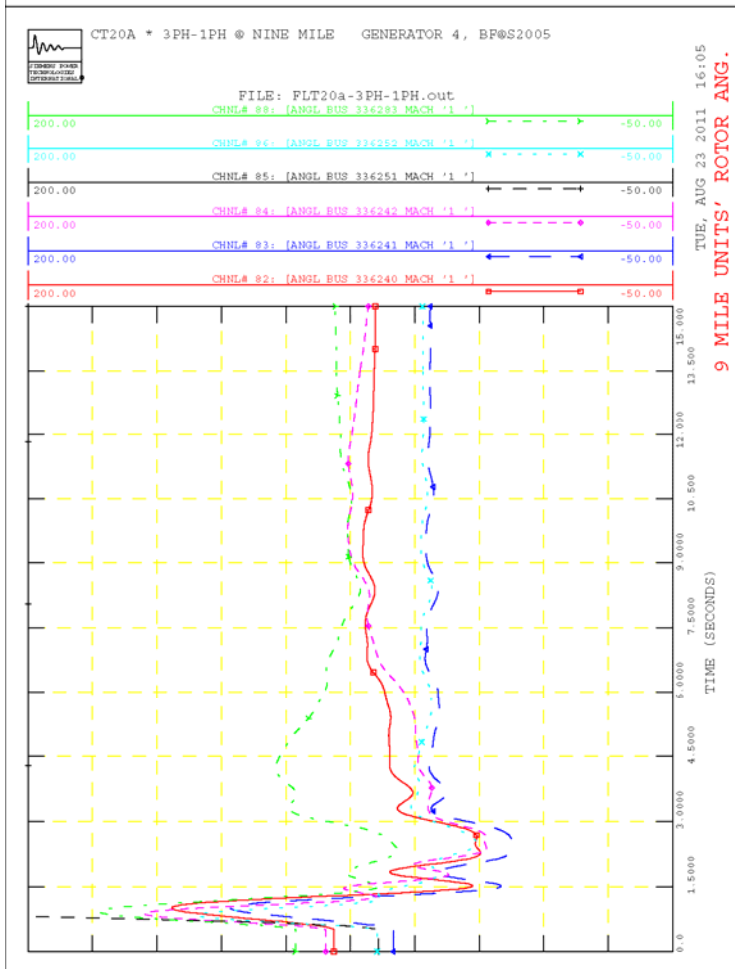
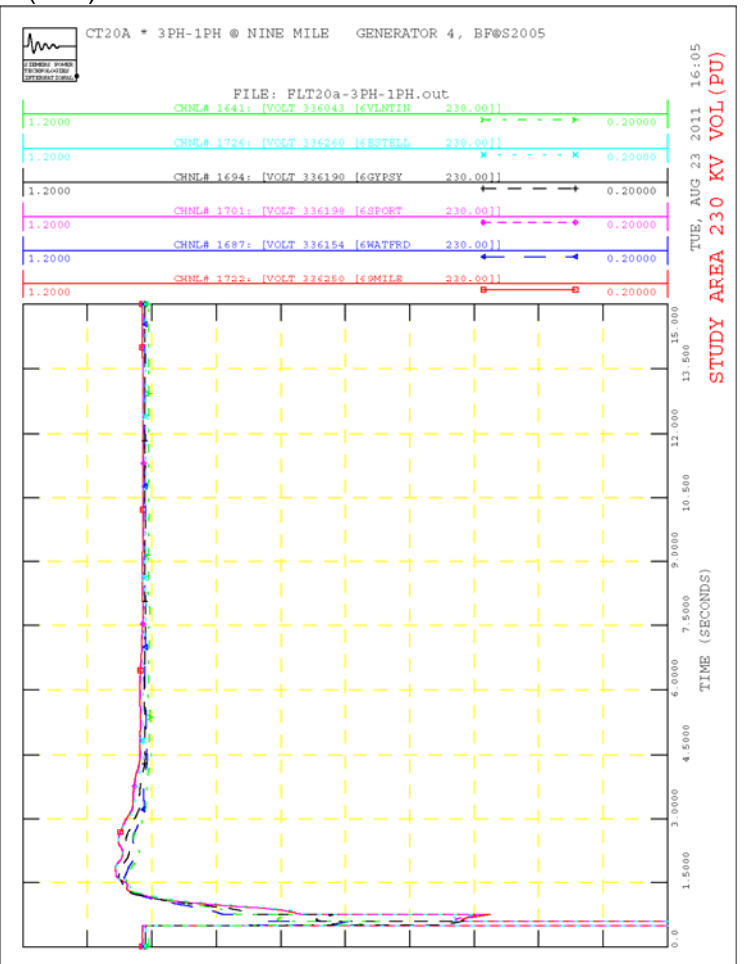
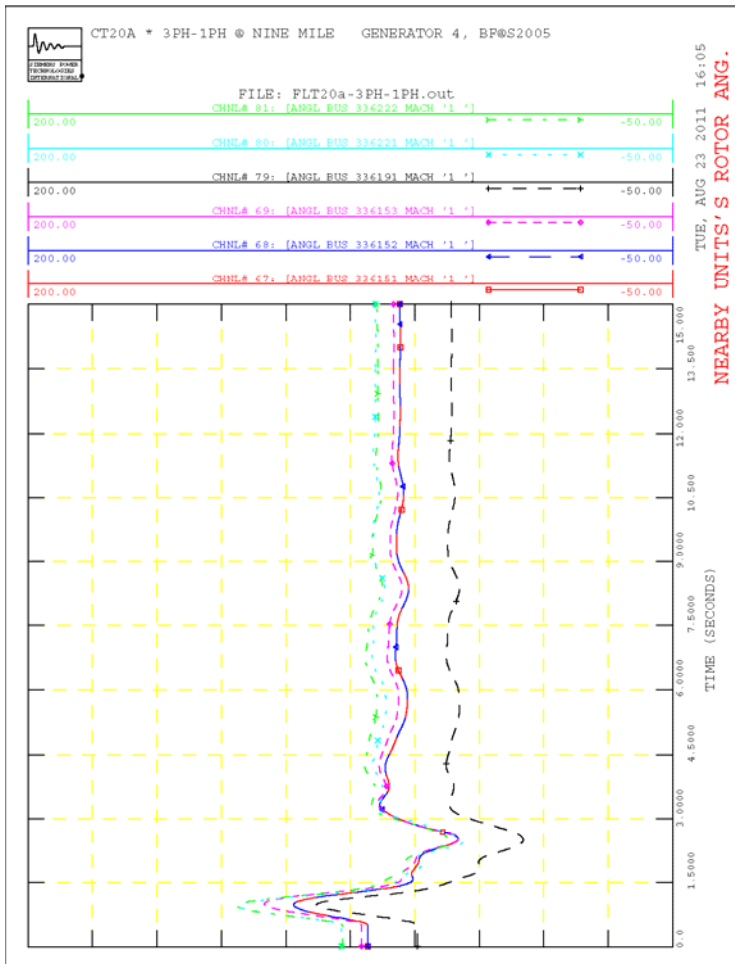
Fault 19a (cont)



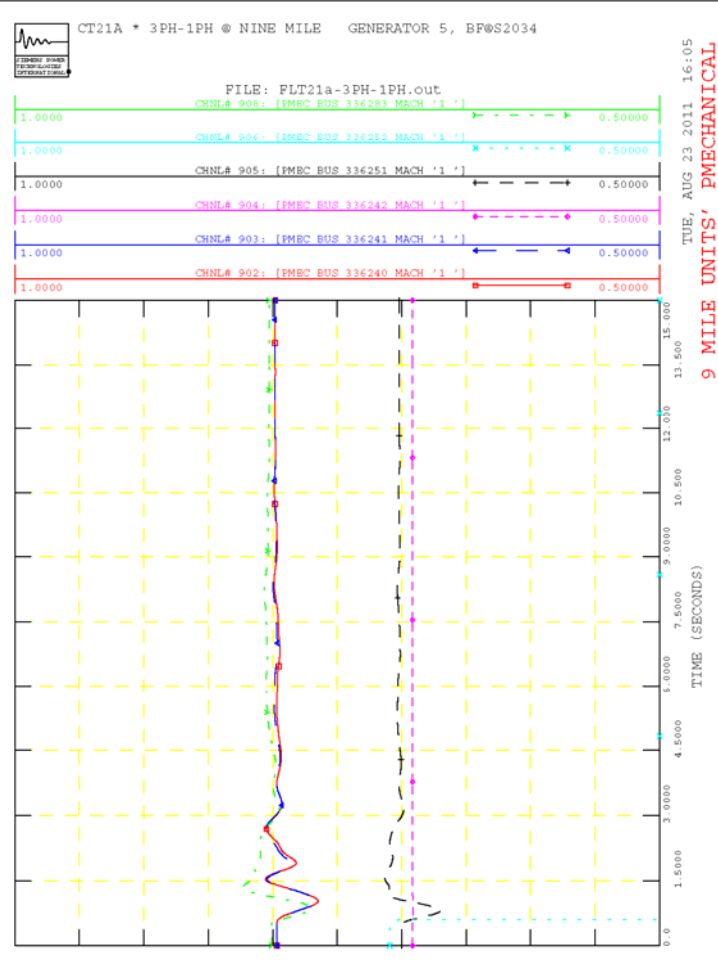
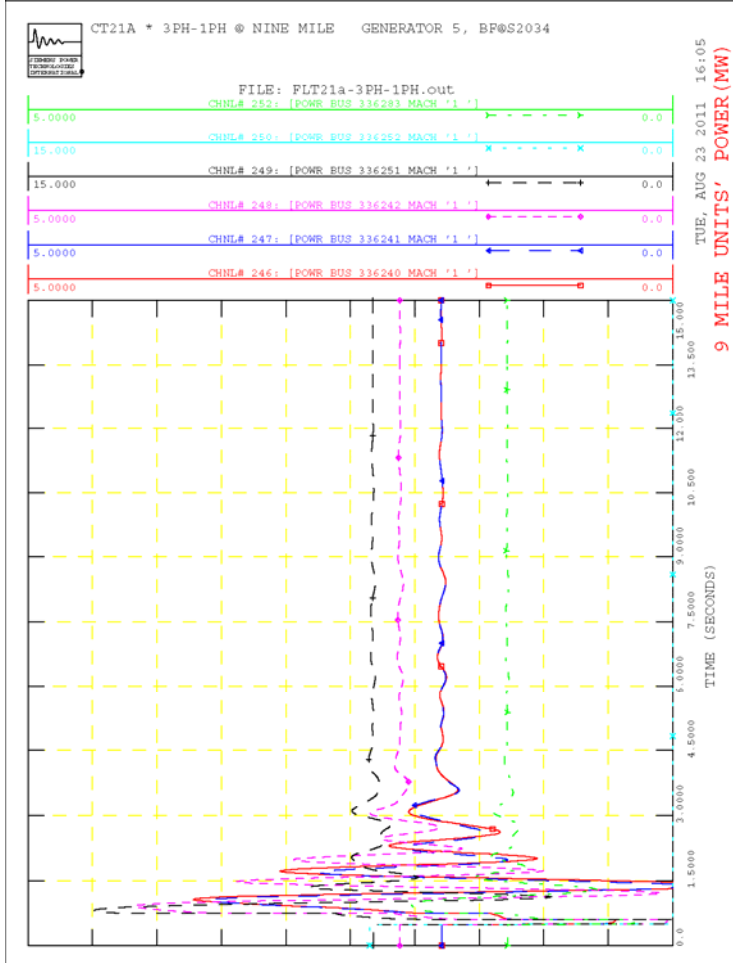
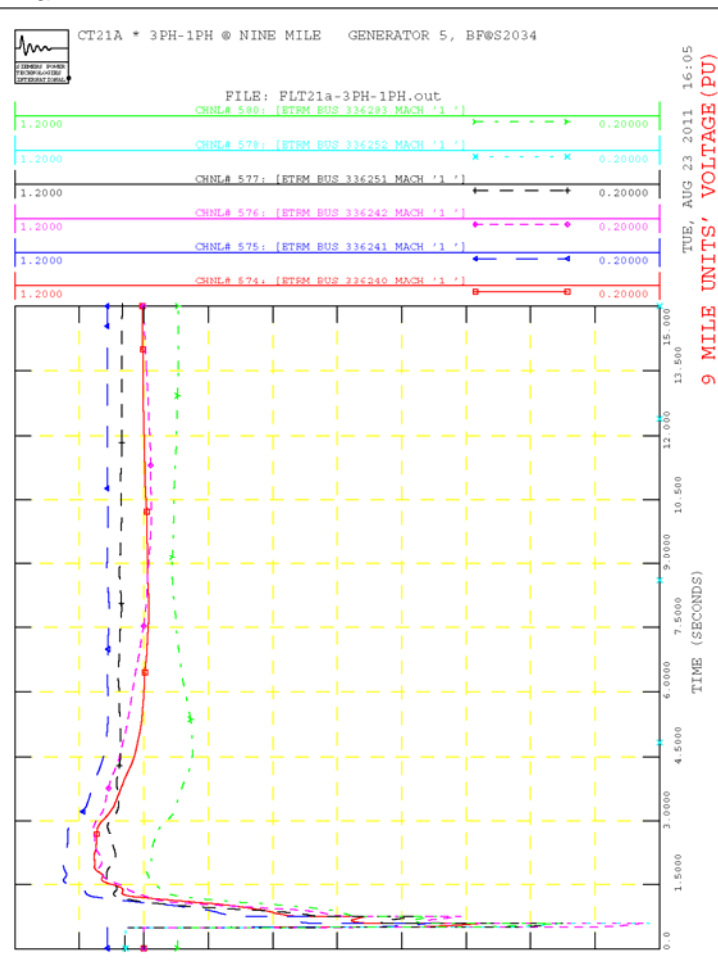
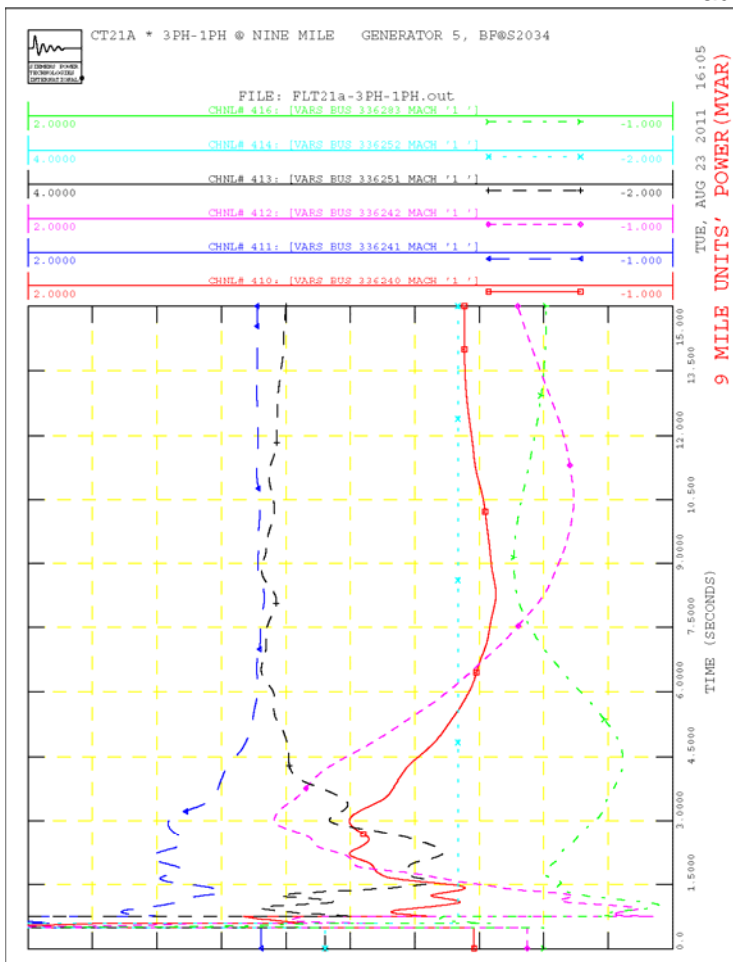
Fault 20a



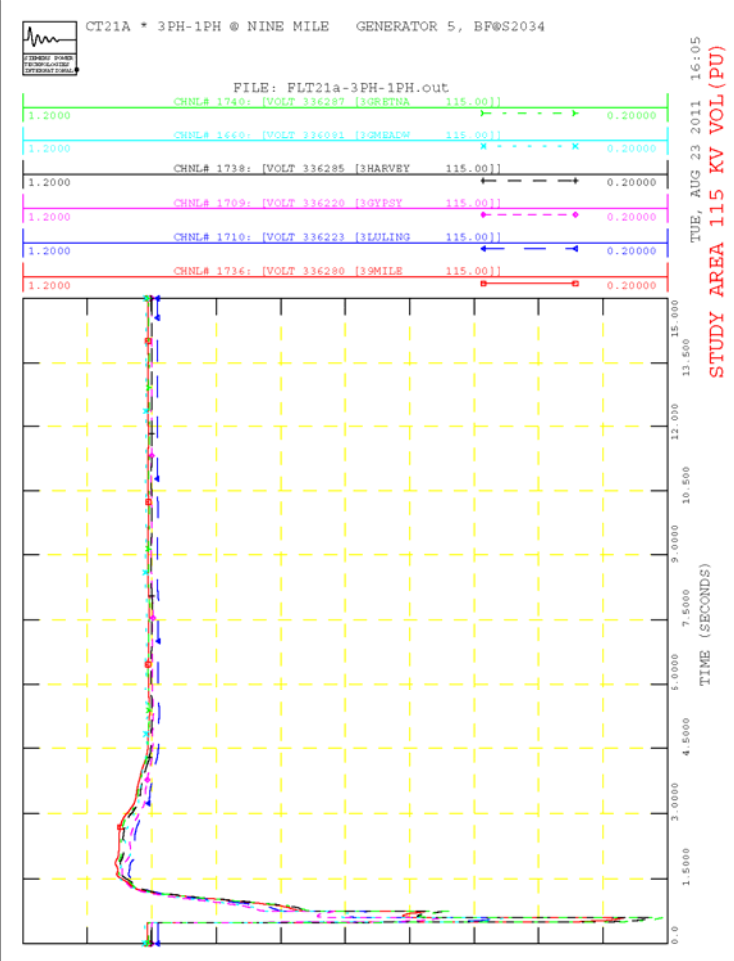
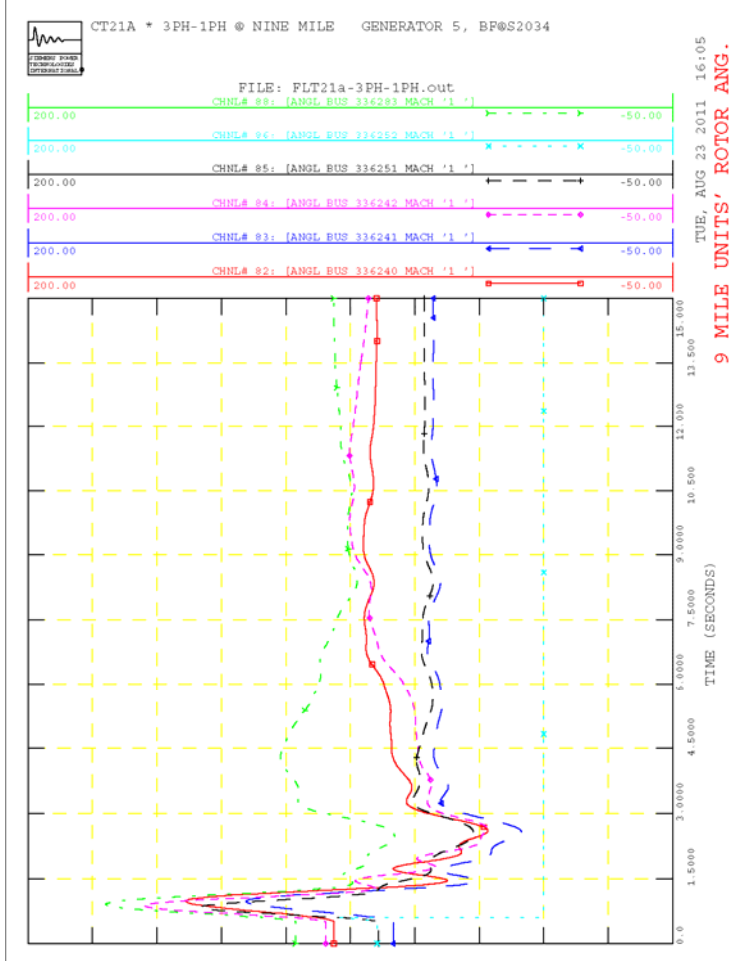
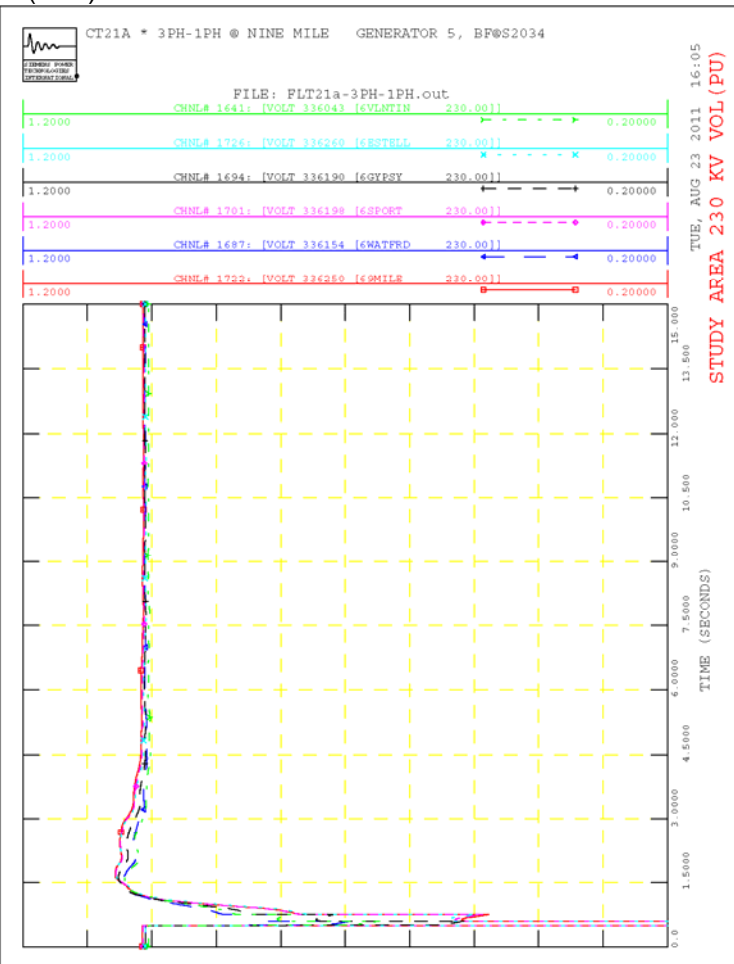
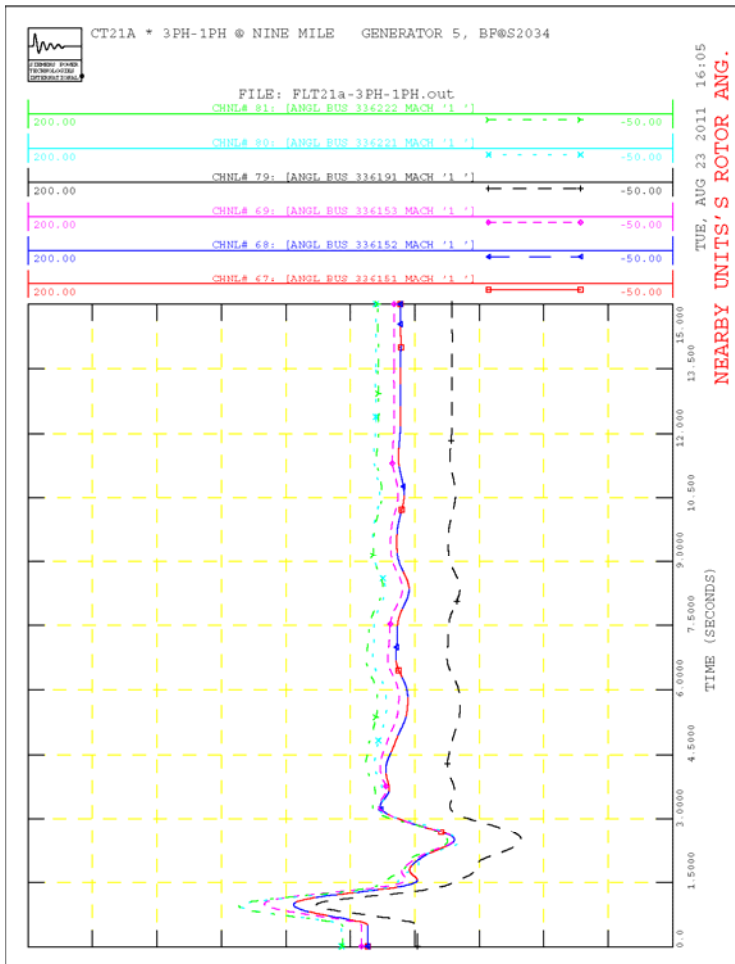
Fault 20a (cont)



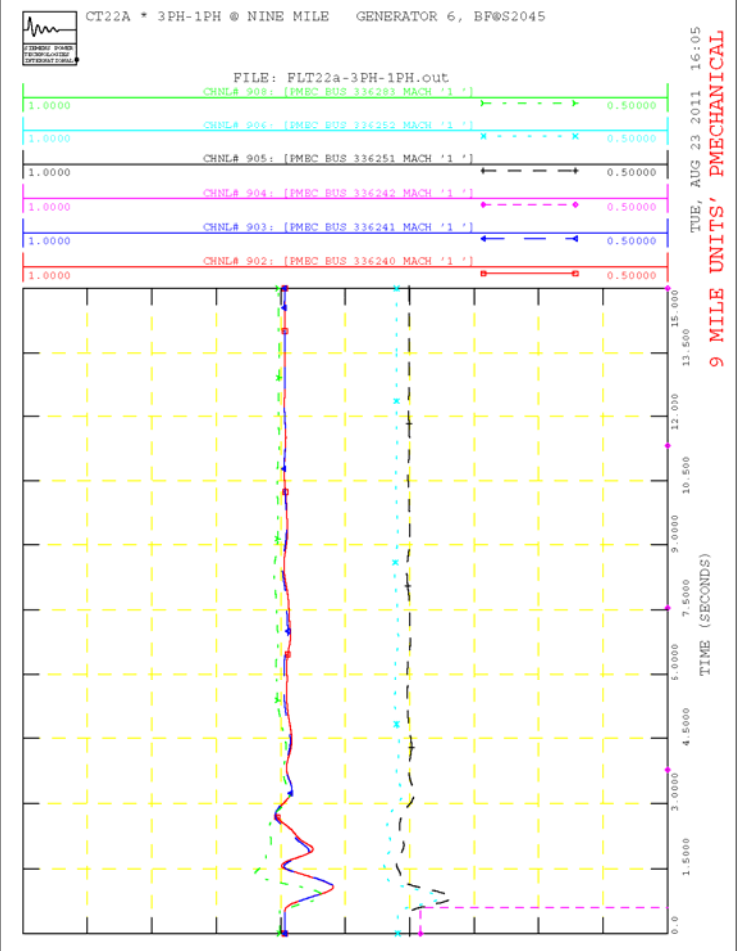
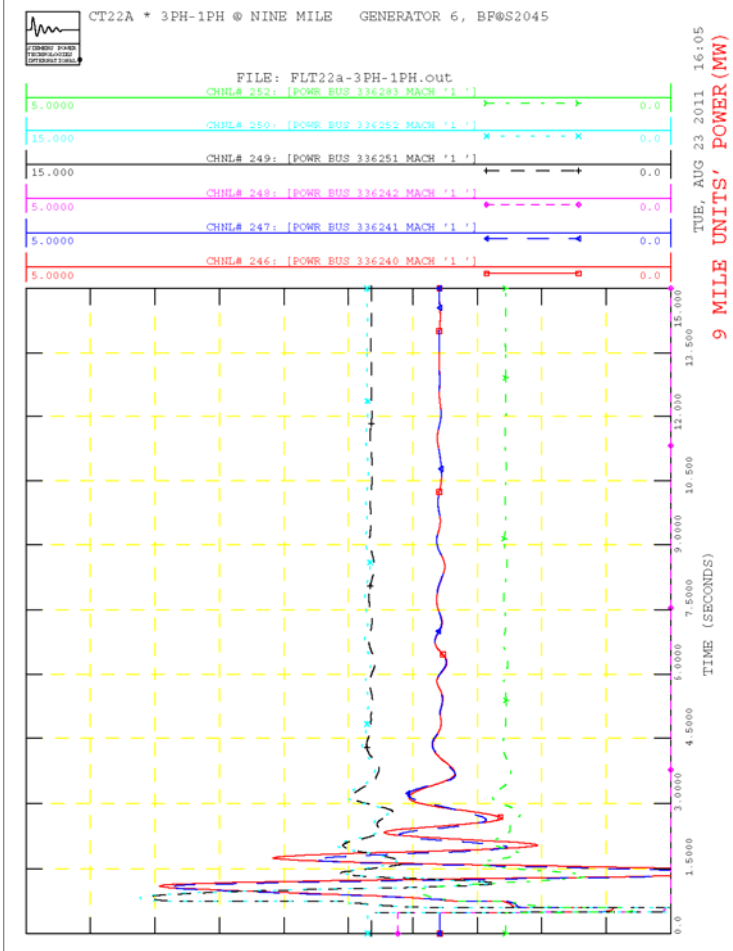
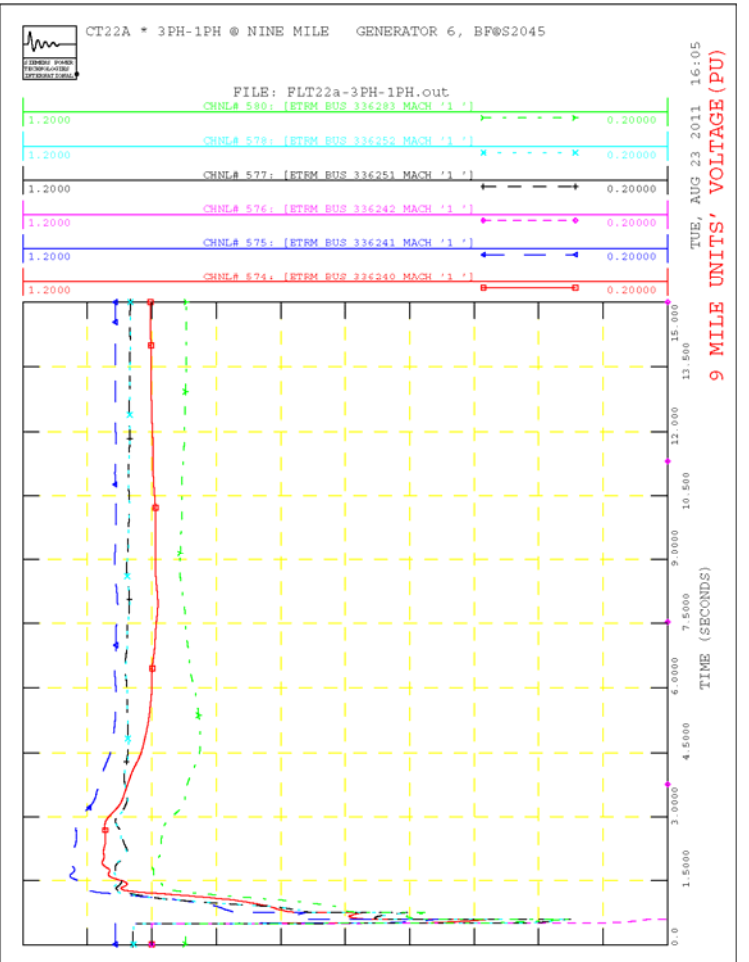
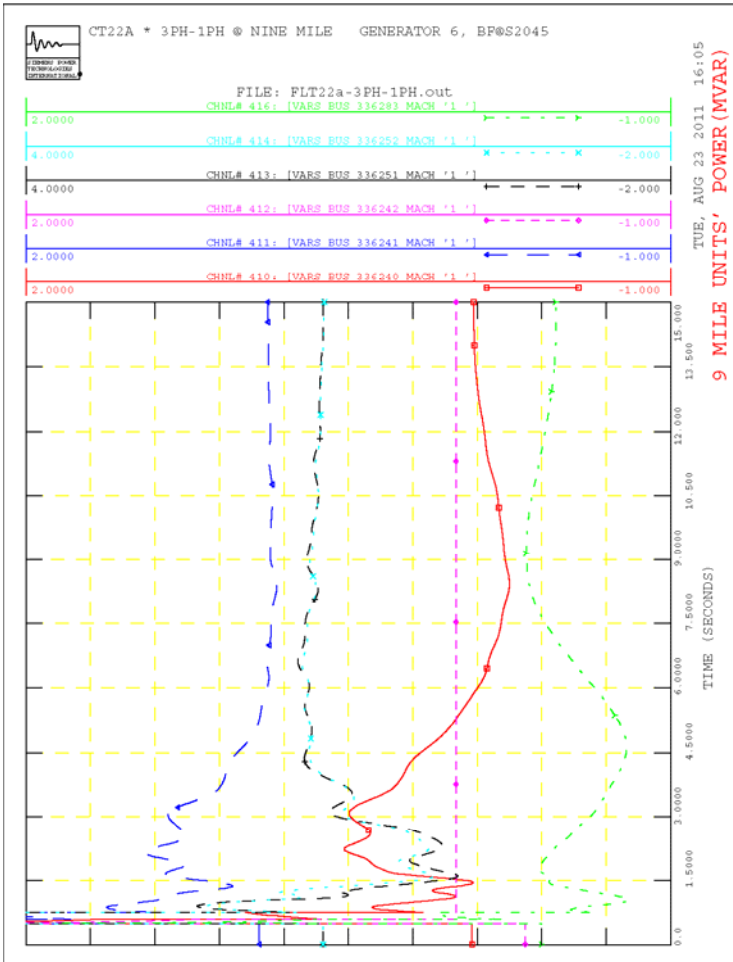
Fault 21a



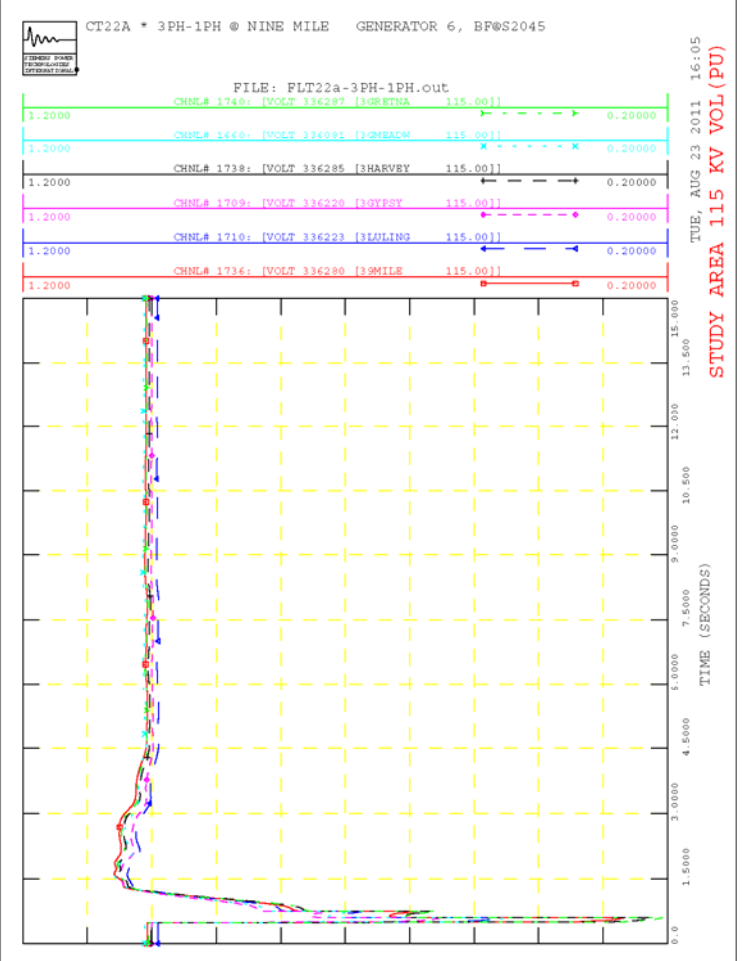
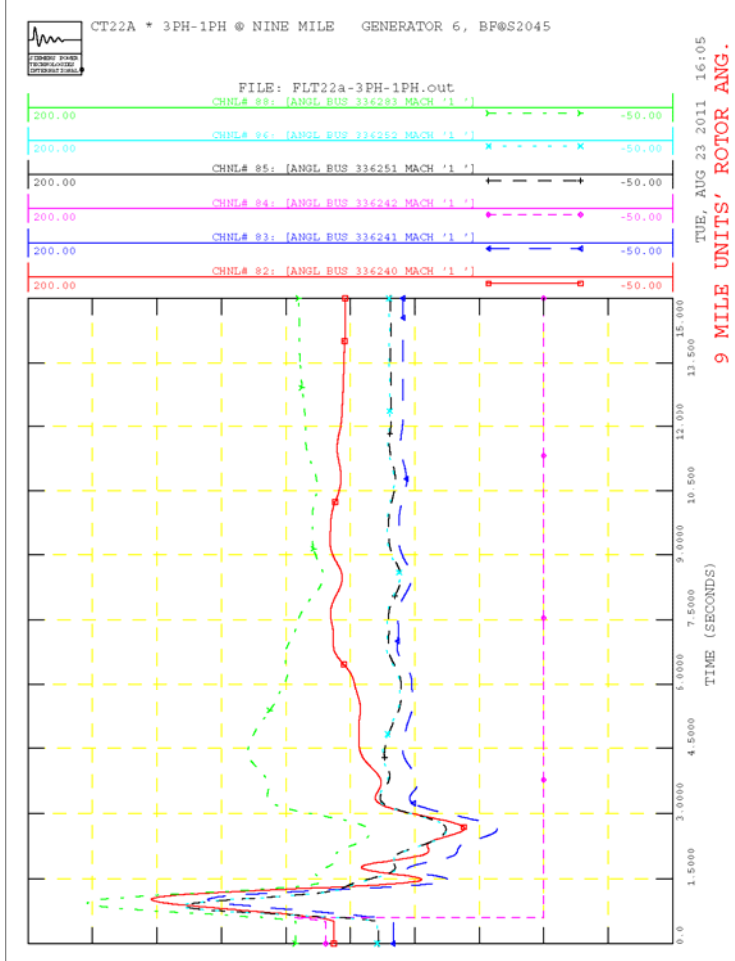
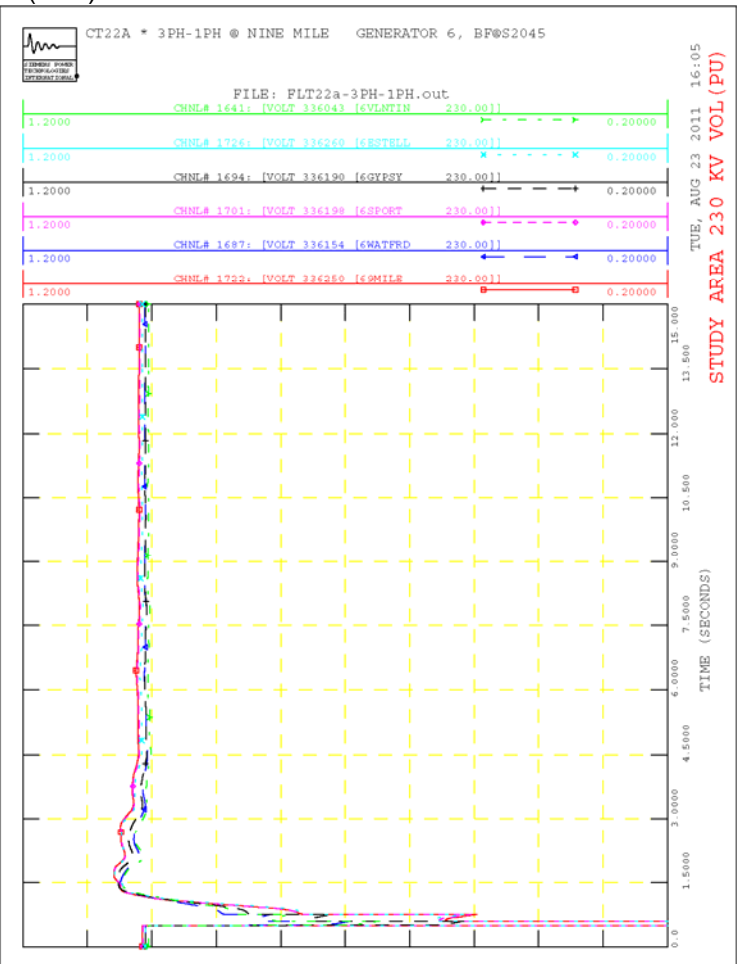
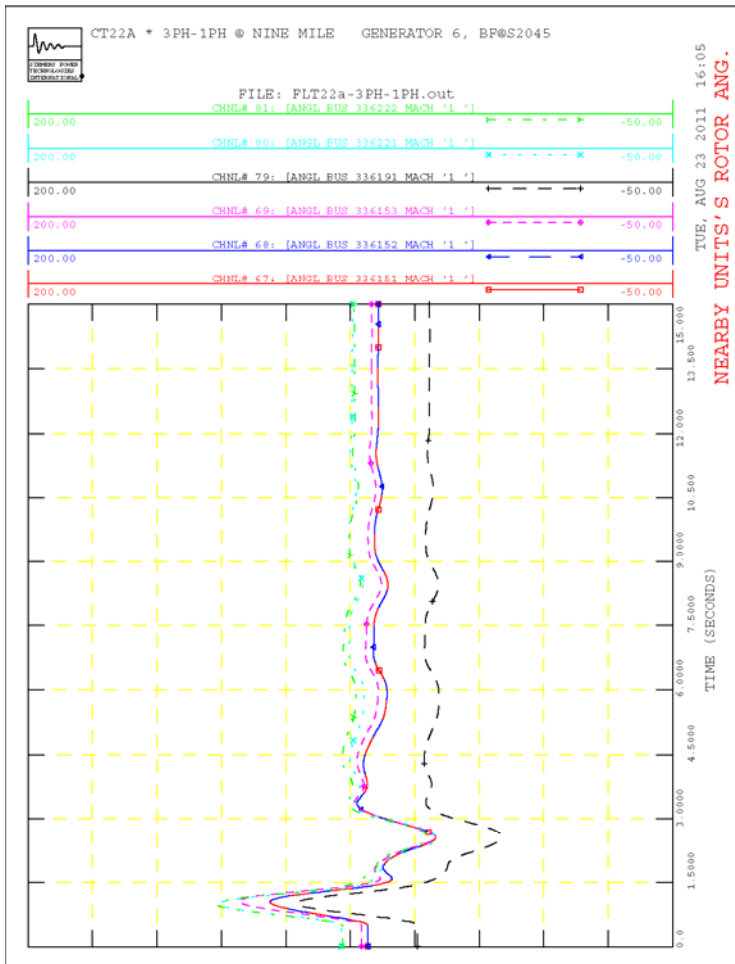
Fault 21a (cont)



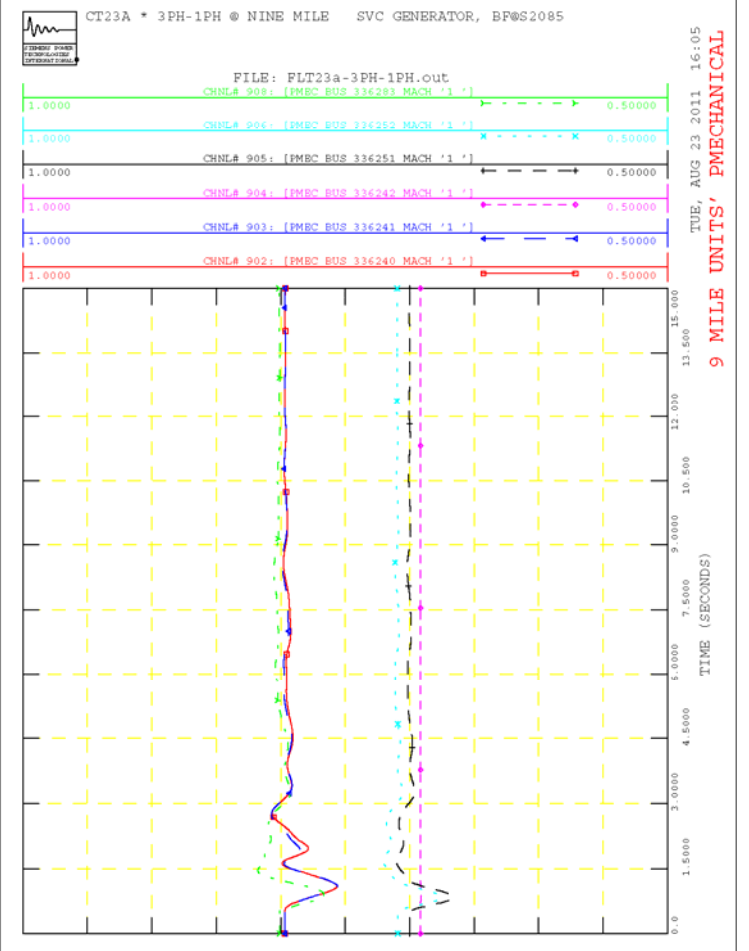
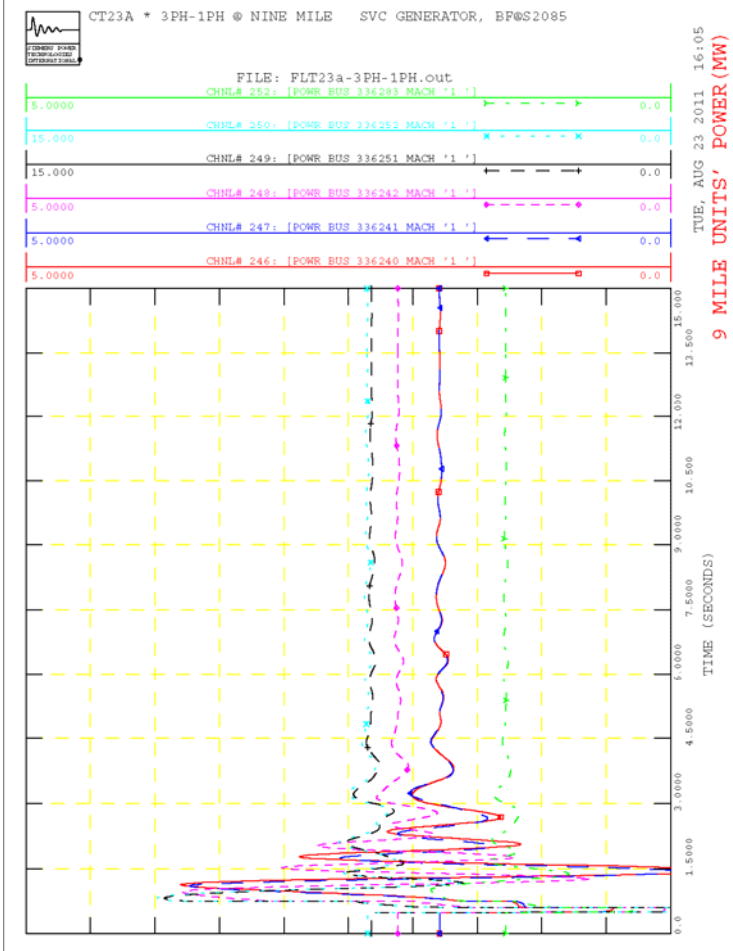
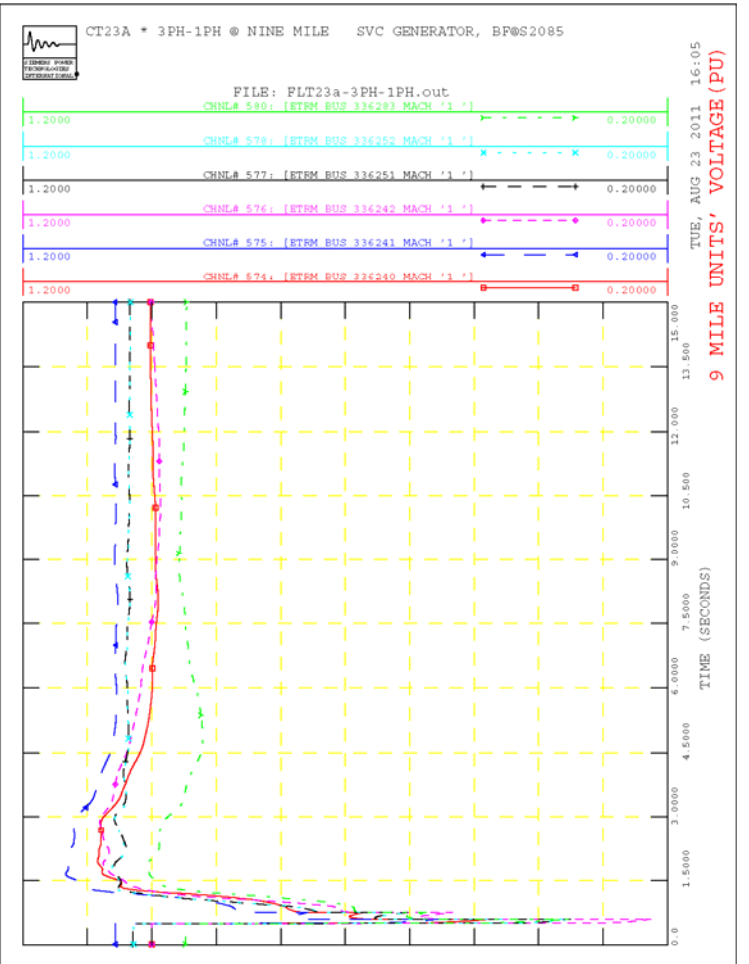
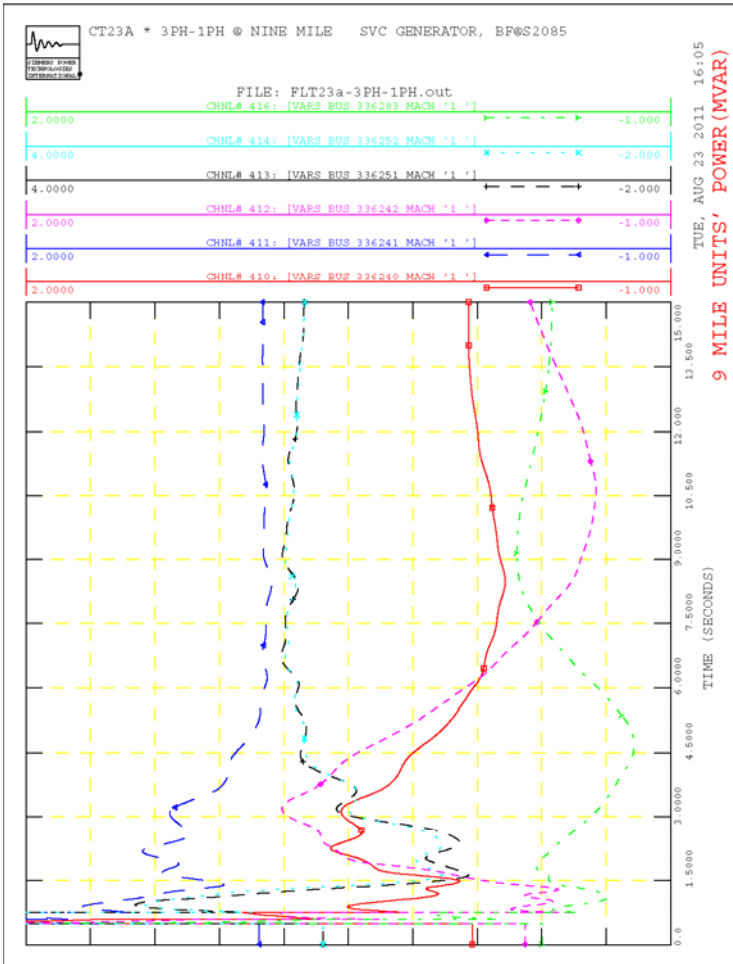
Fault 22a



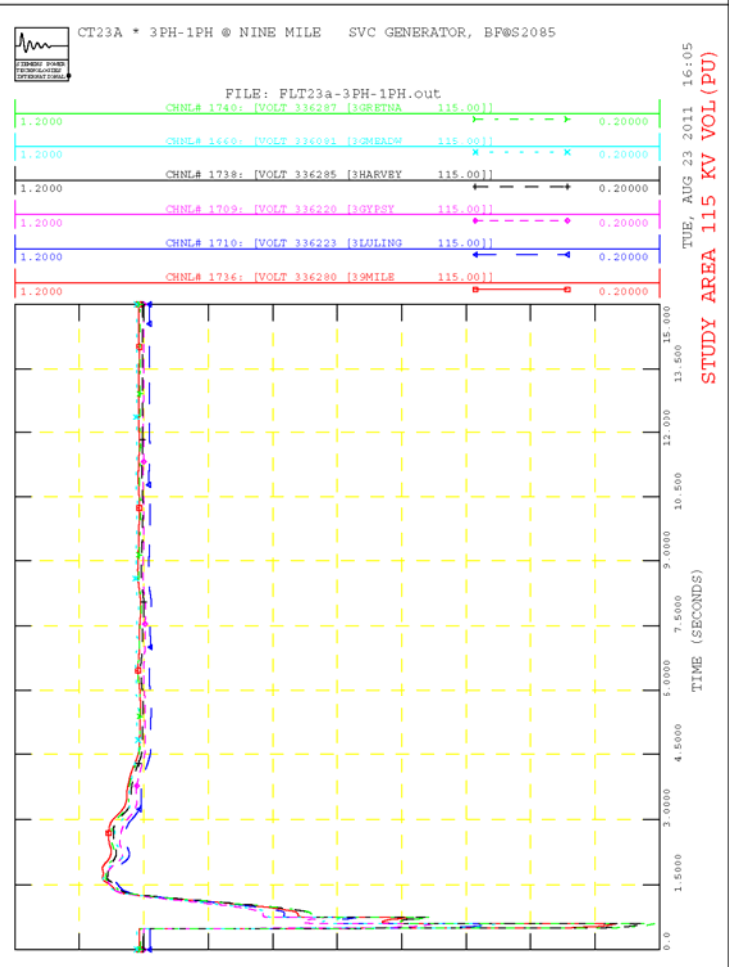
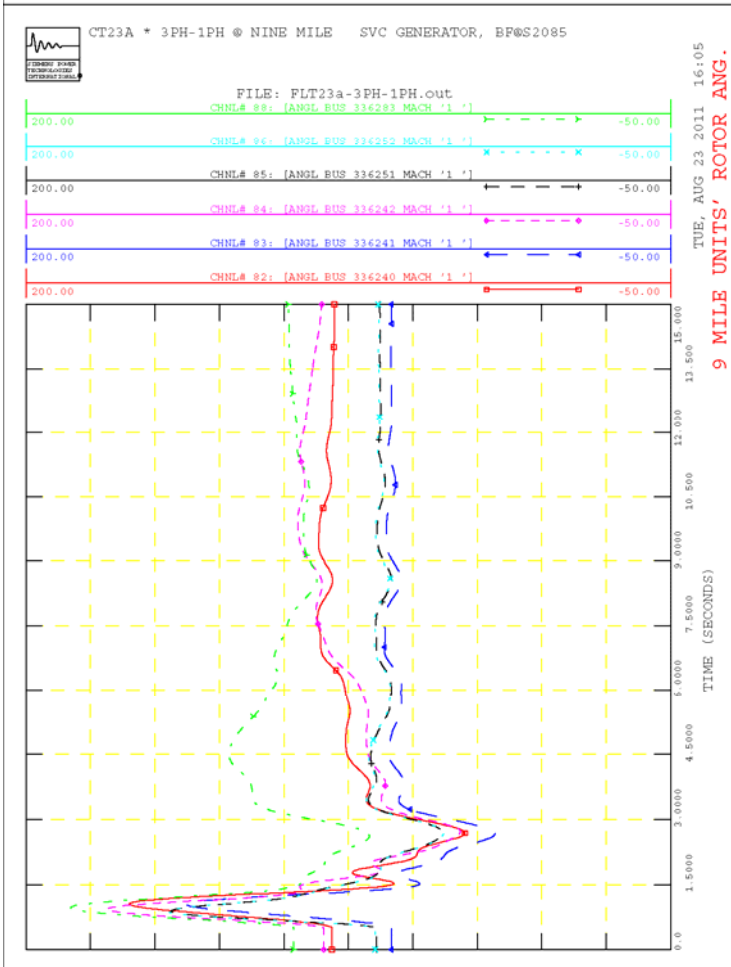
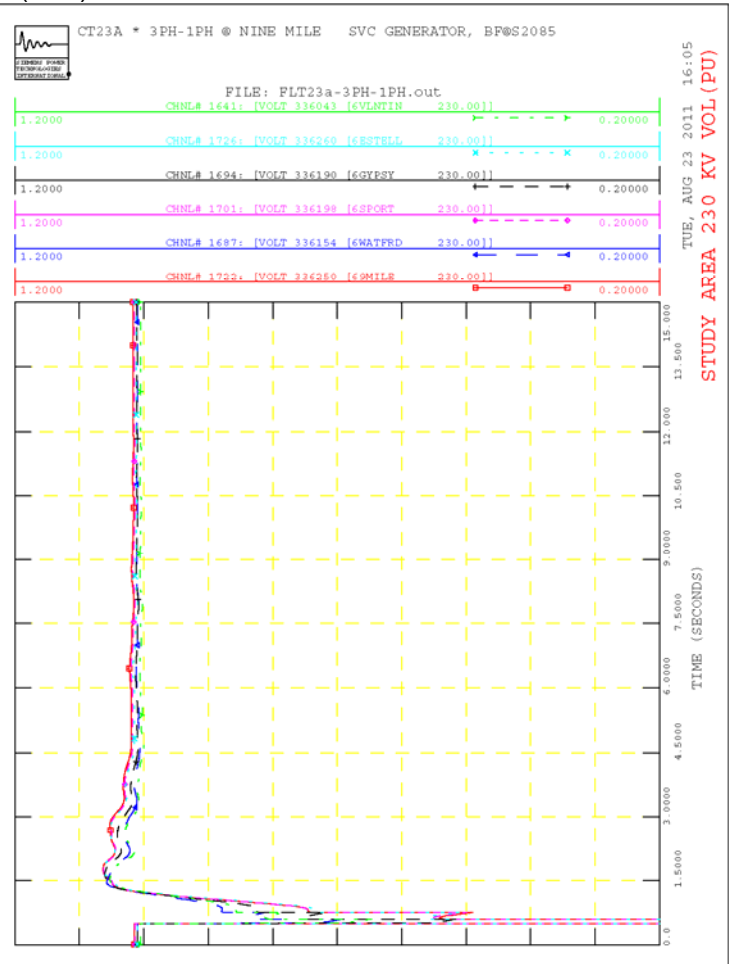
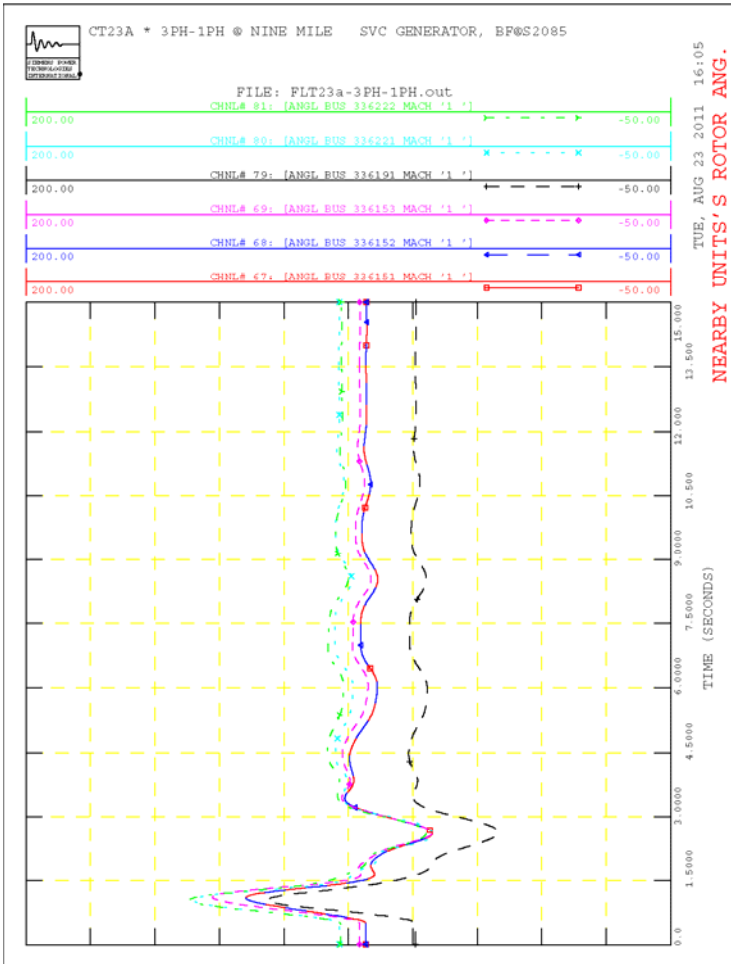
Fault 22a (cont)



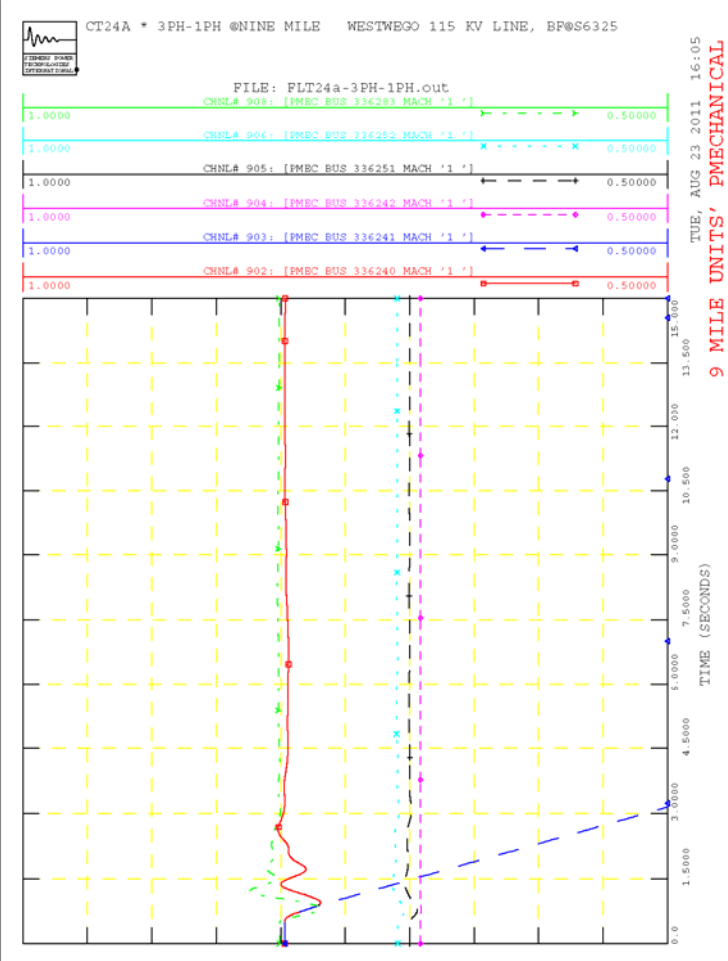
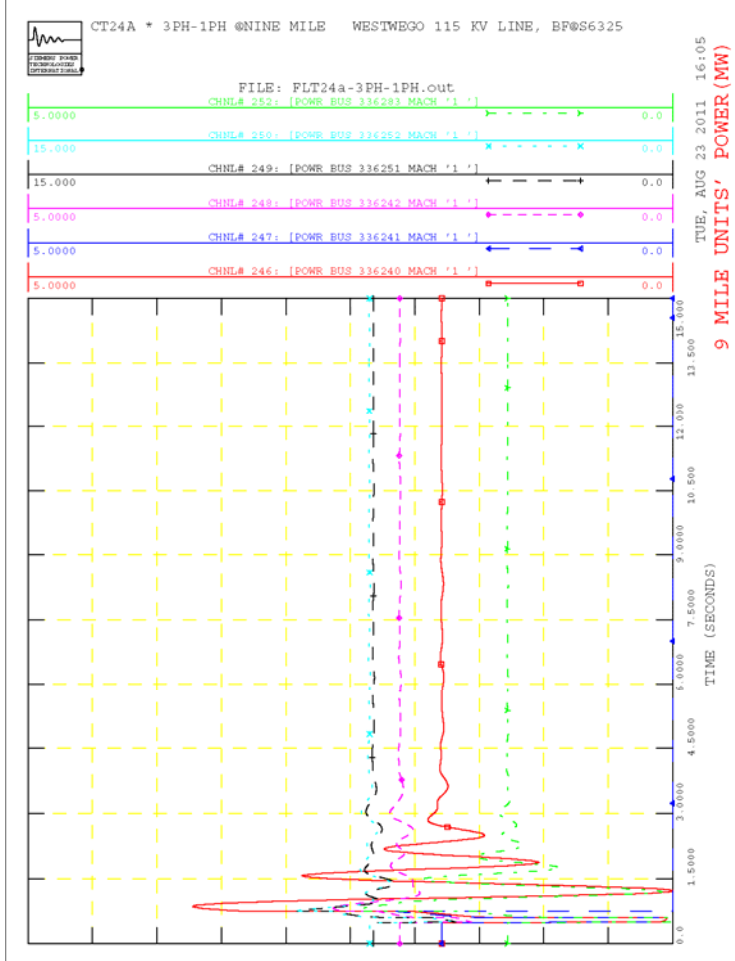
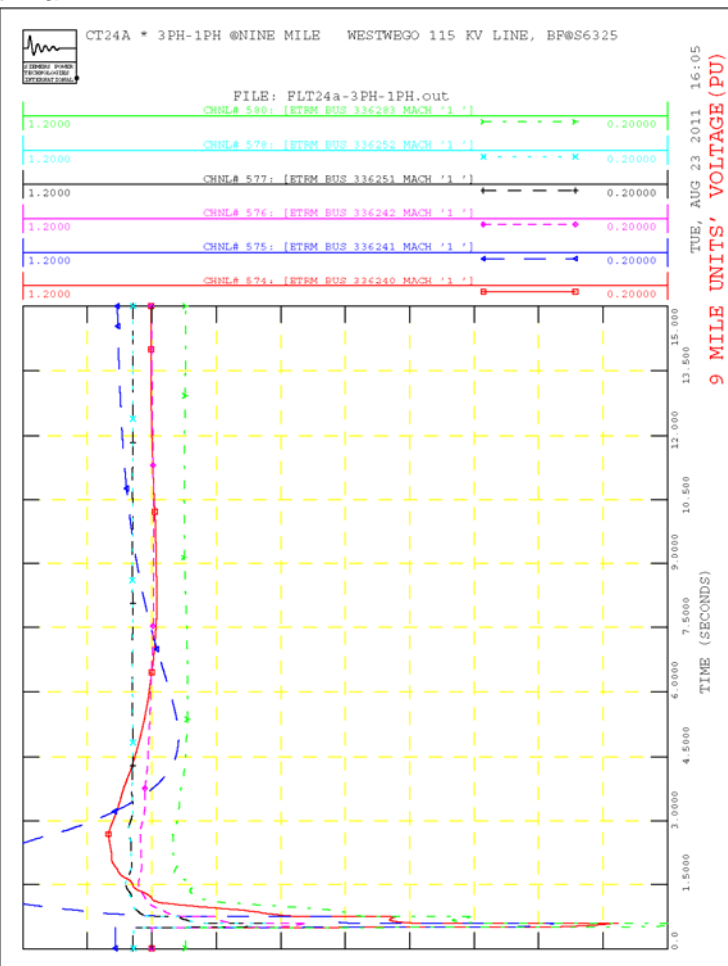
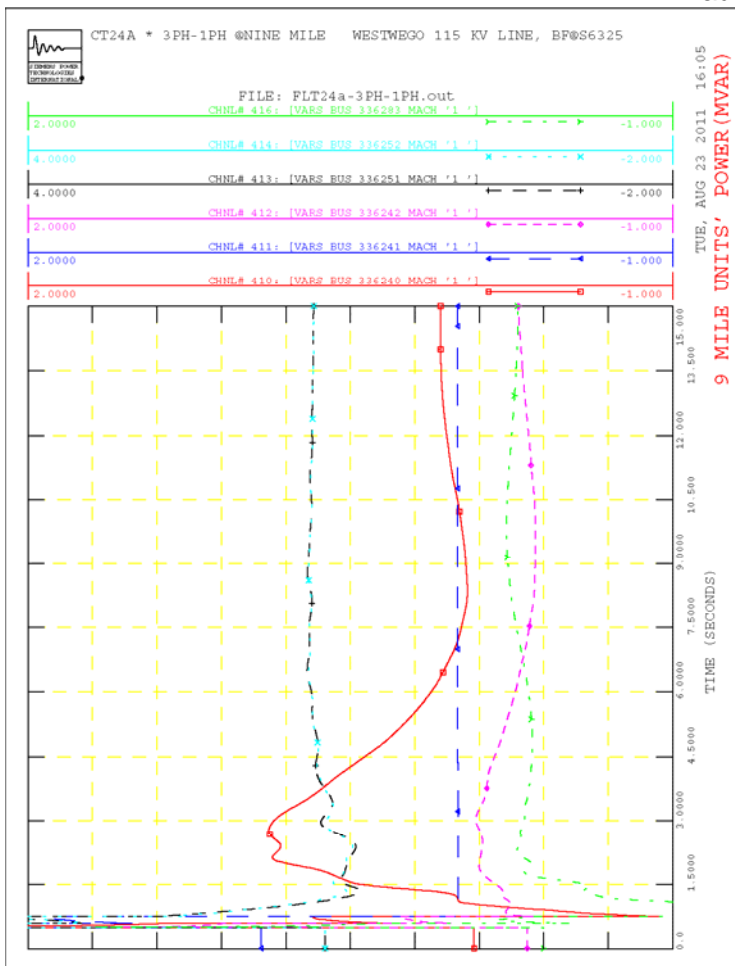
Fault 23a



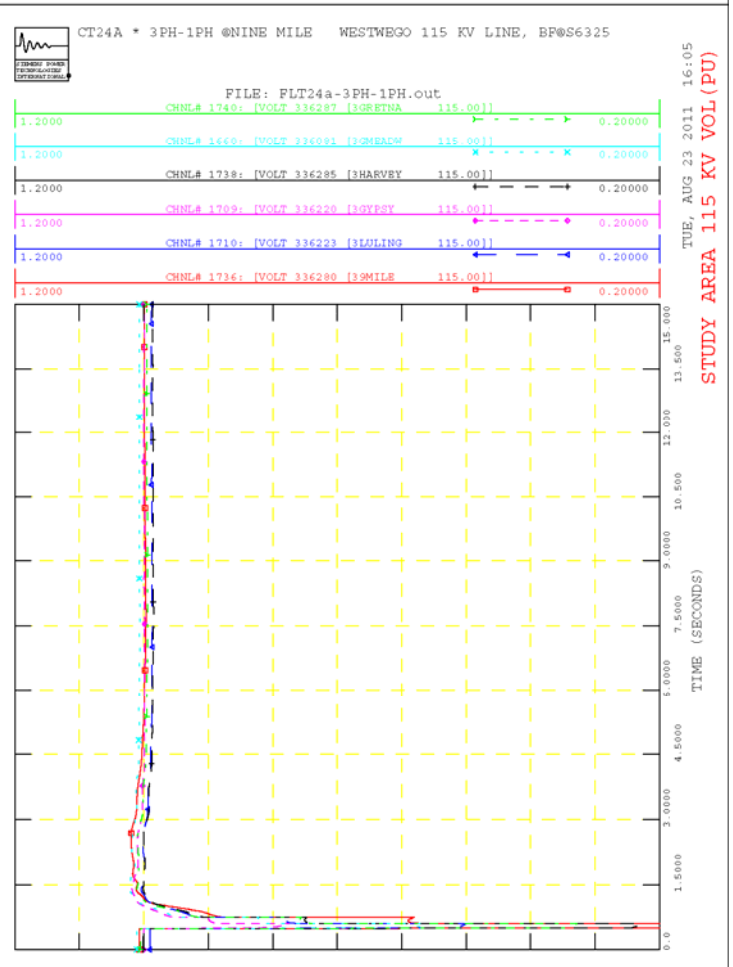
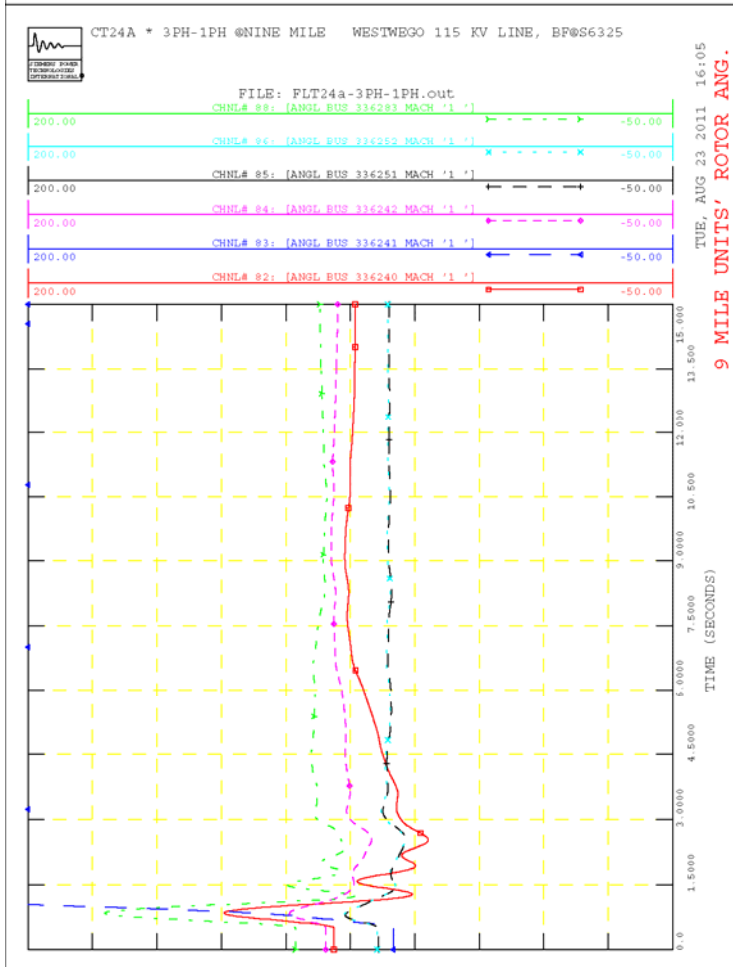
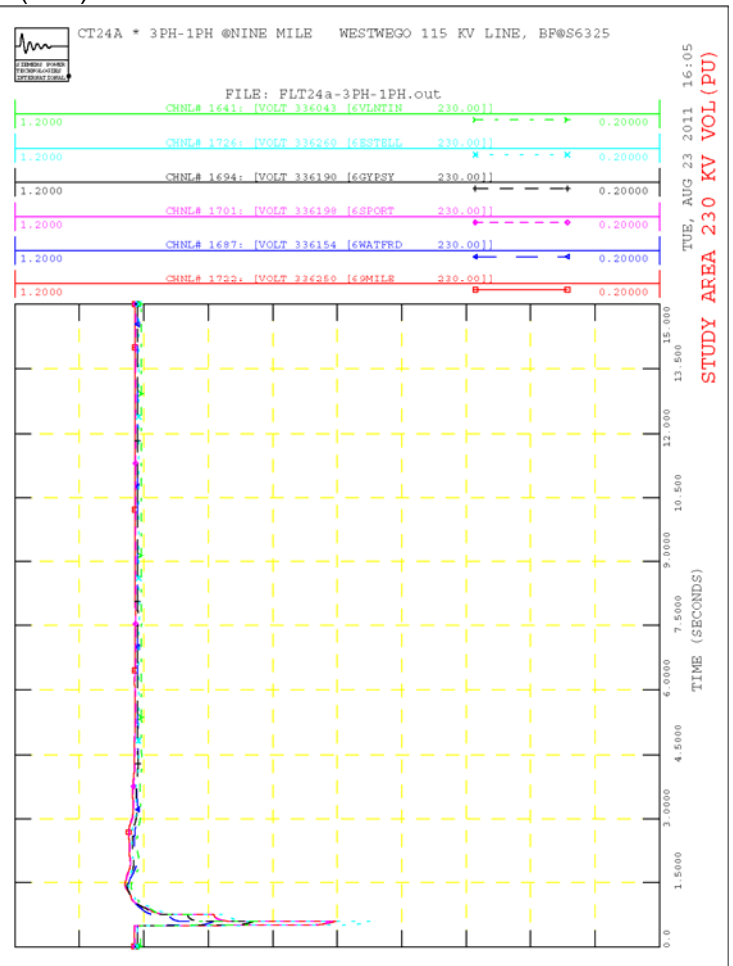
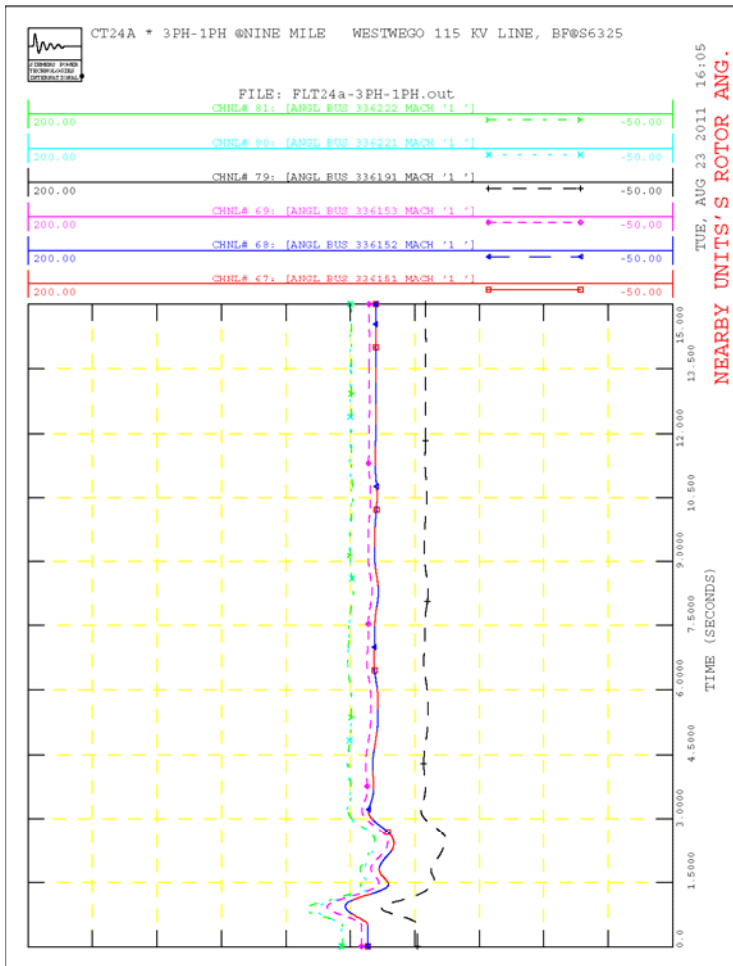
Fault 23a (cont)



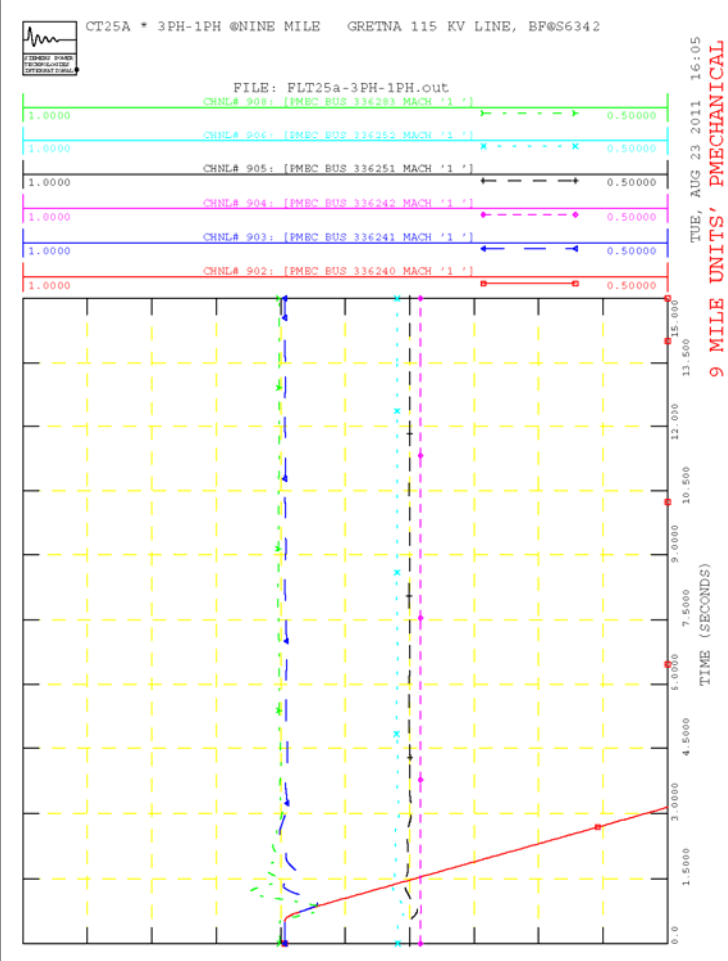
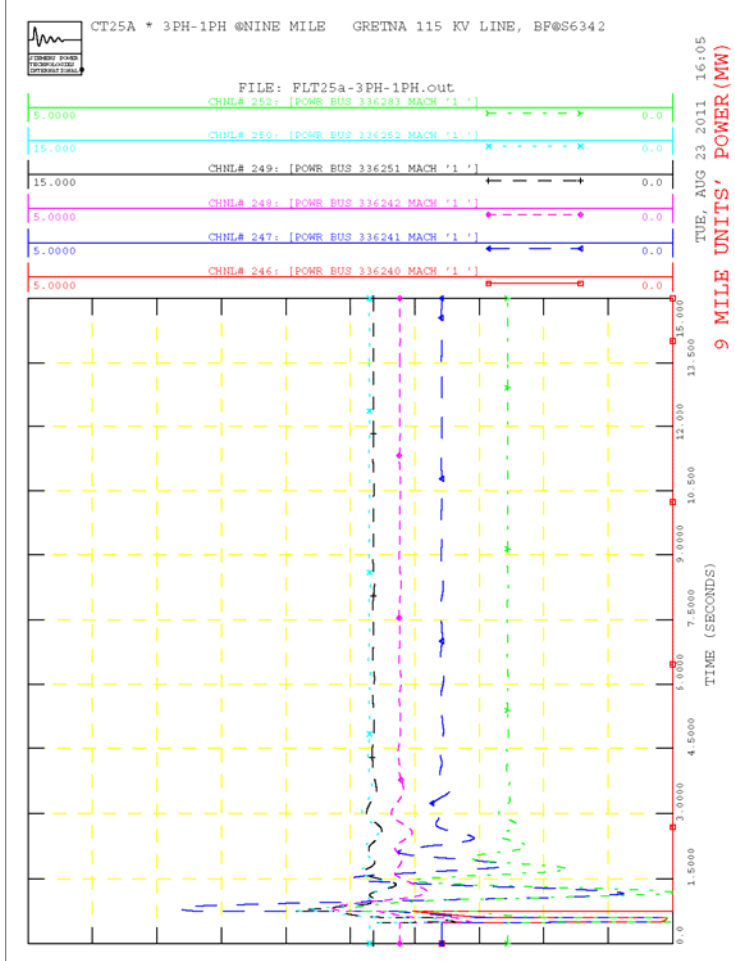
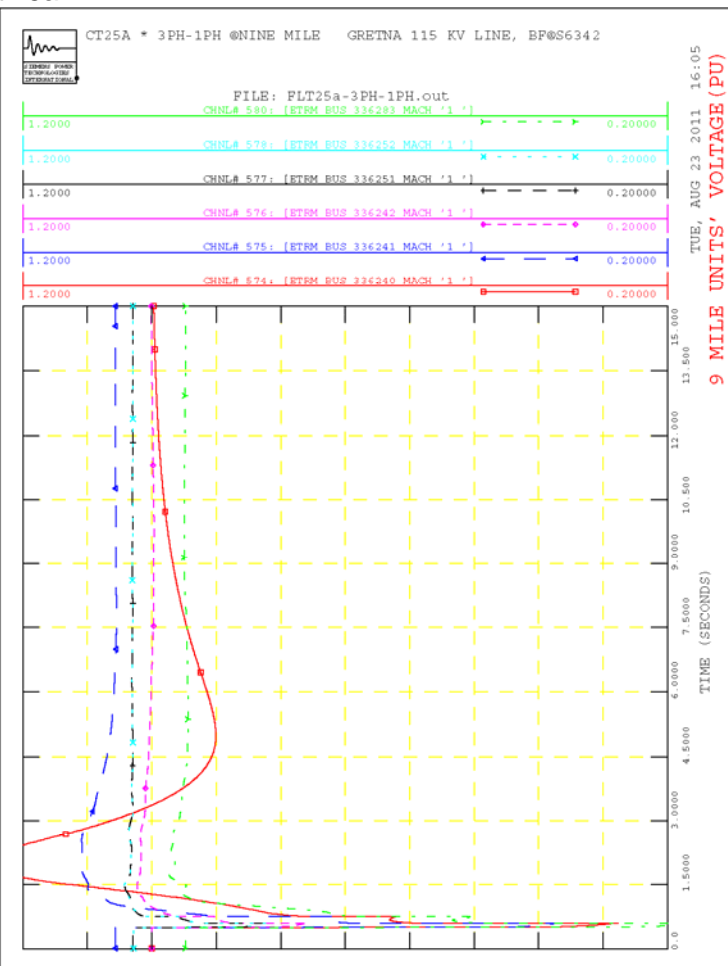
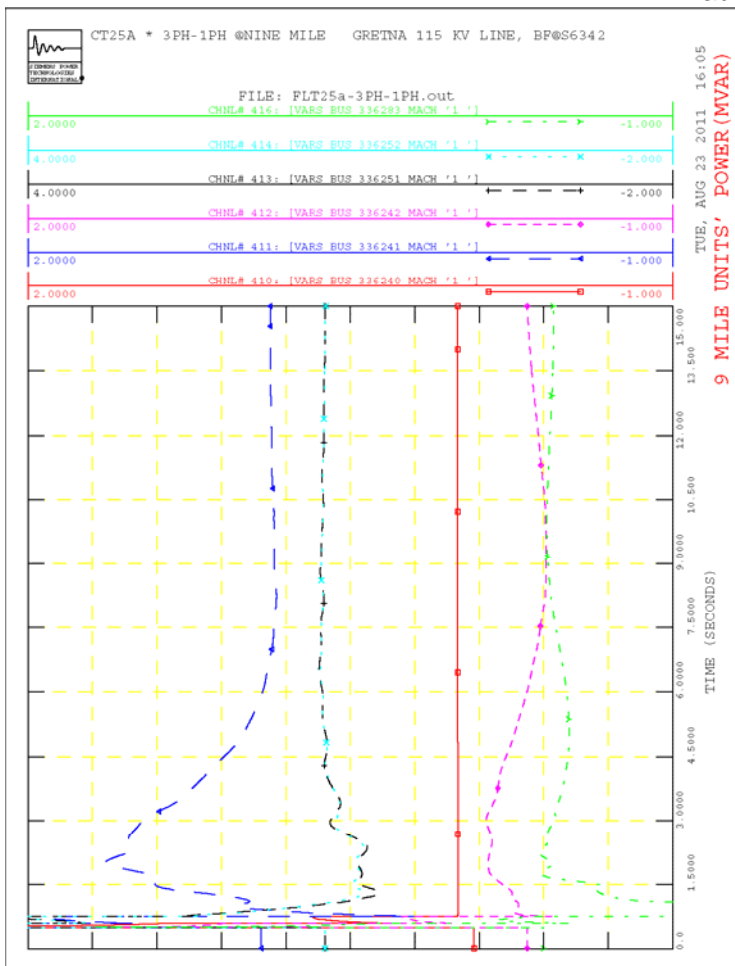
Fault 24a



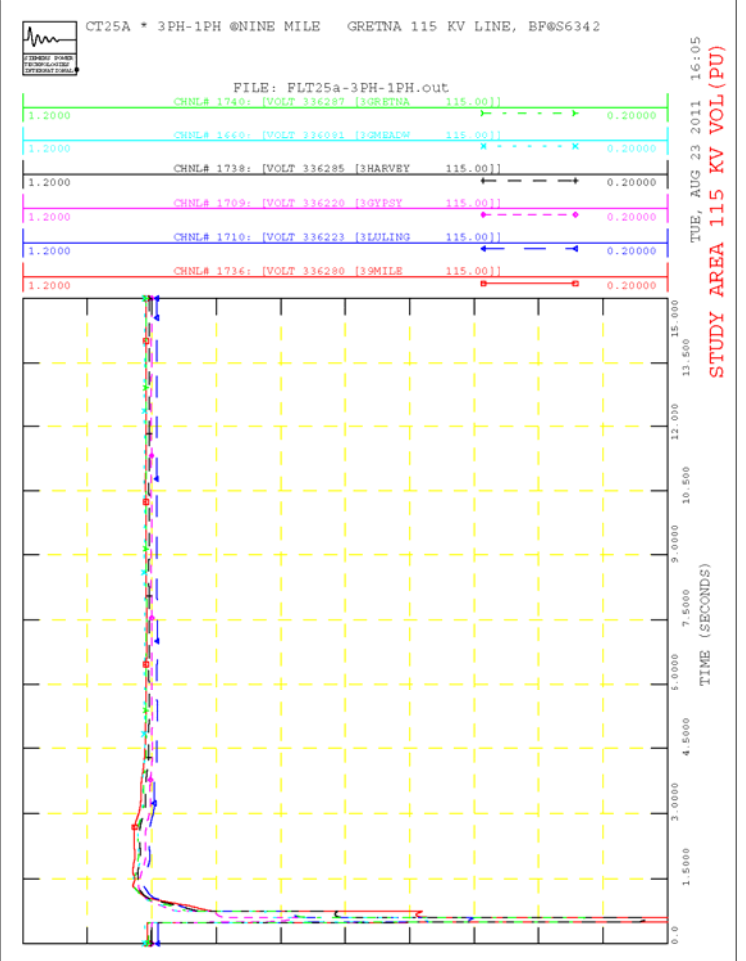
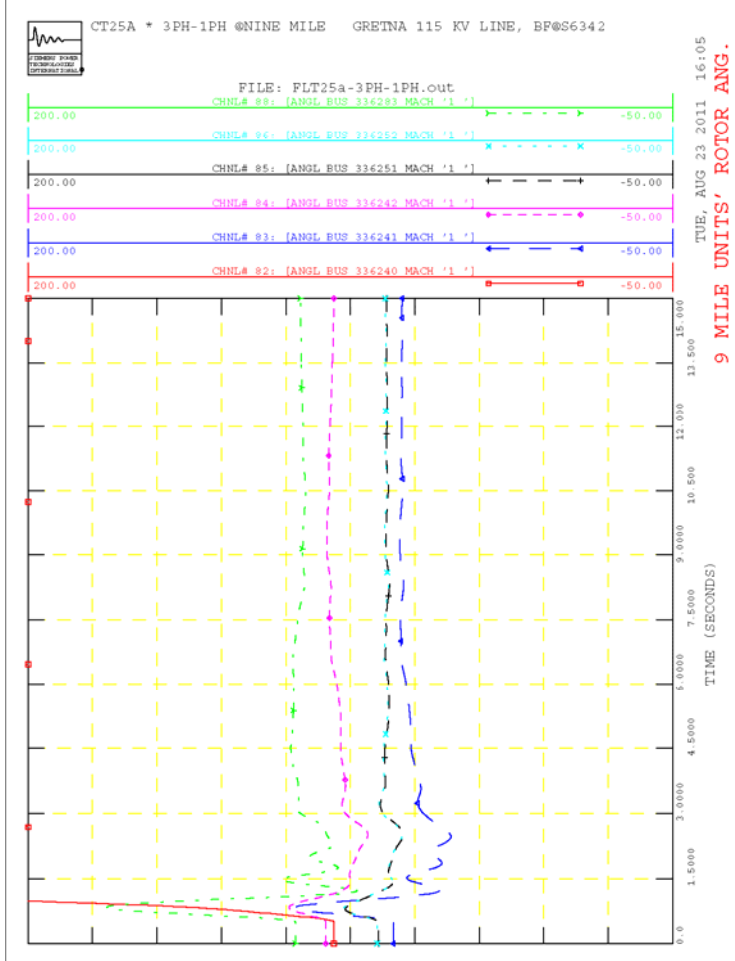
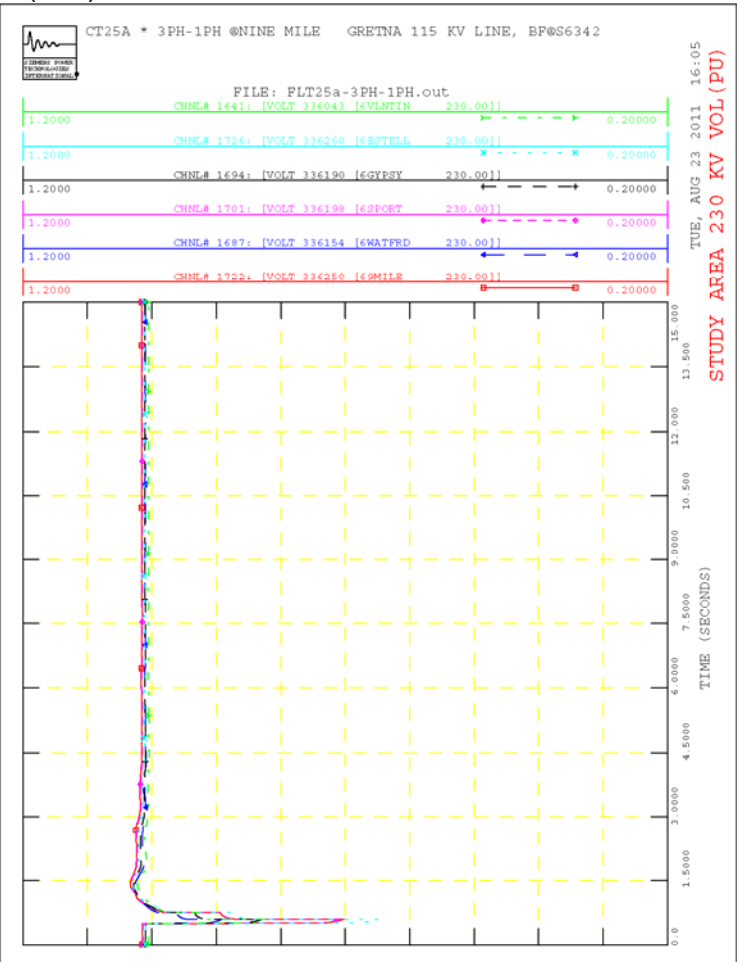
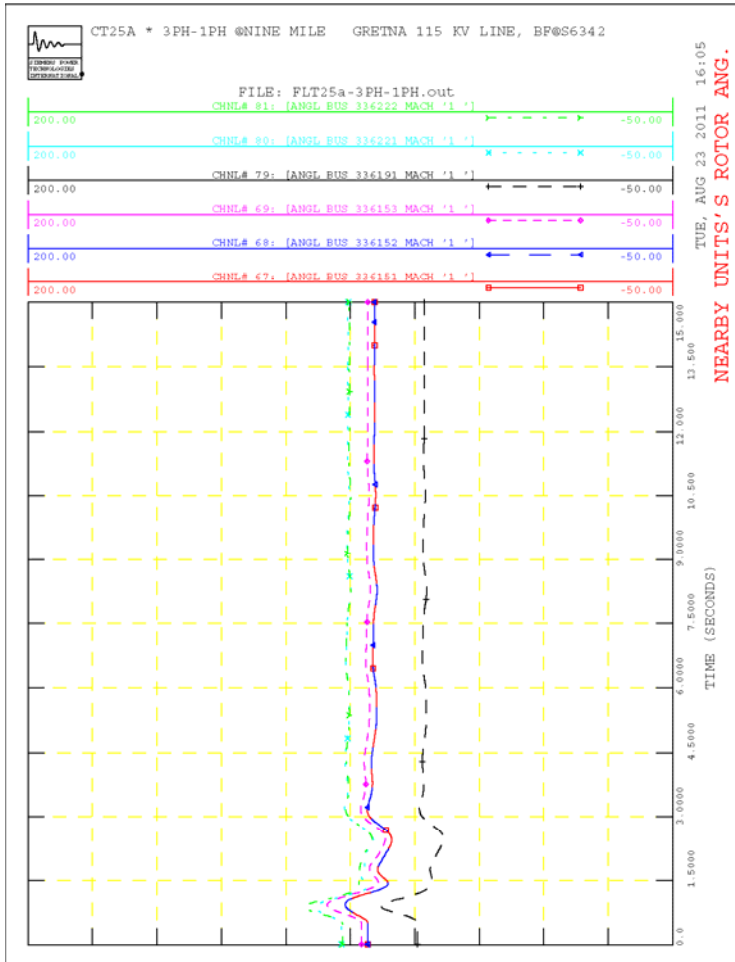
Fault 24a (cont)



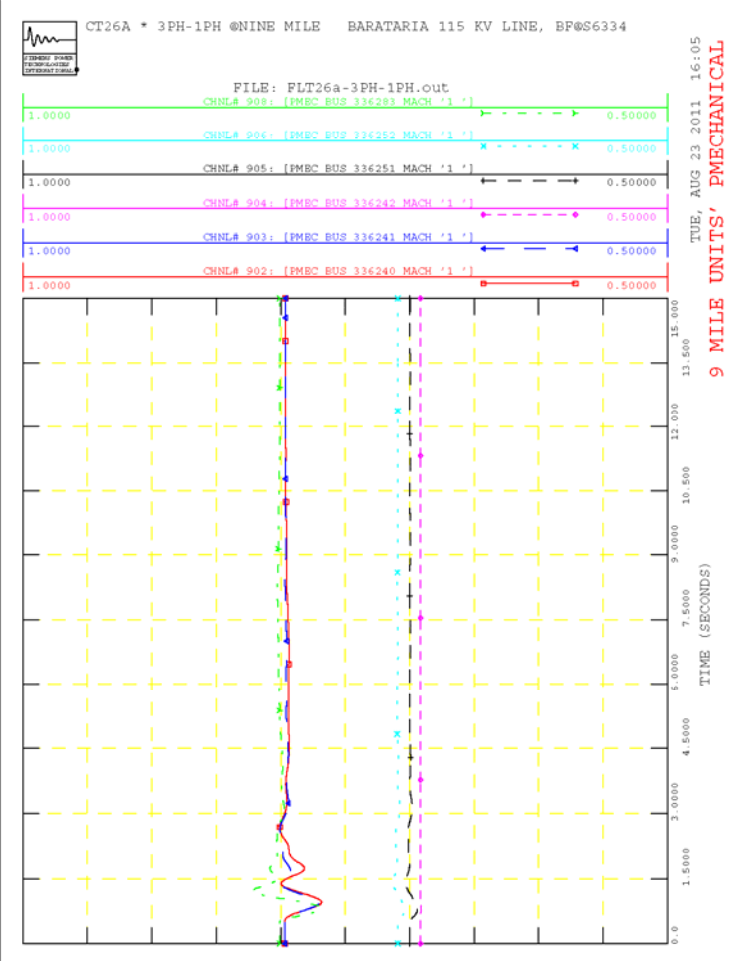
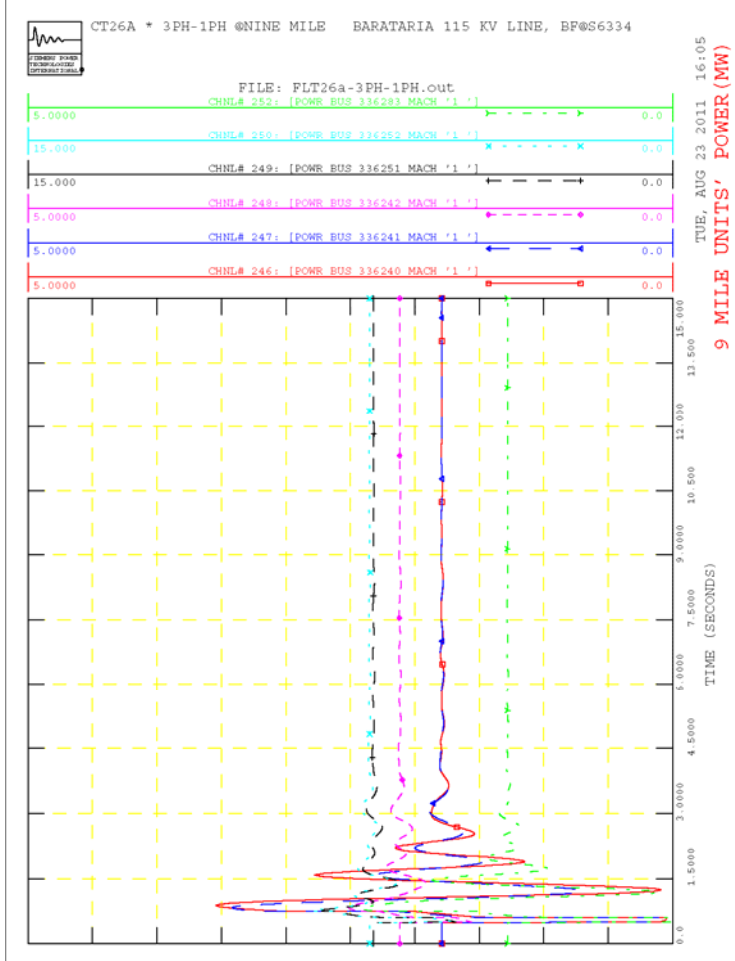
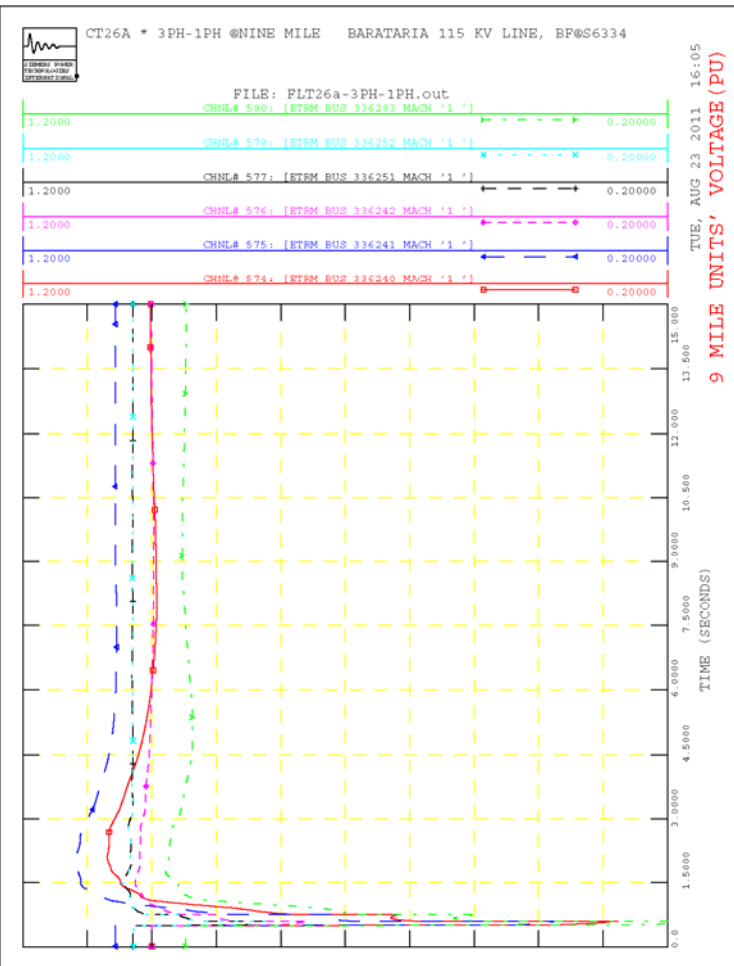
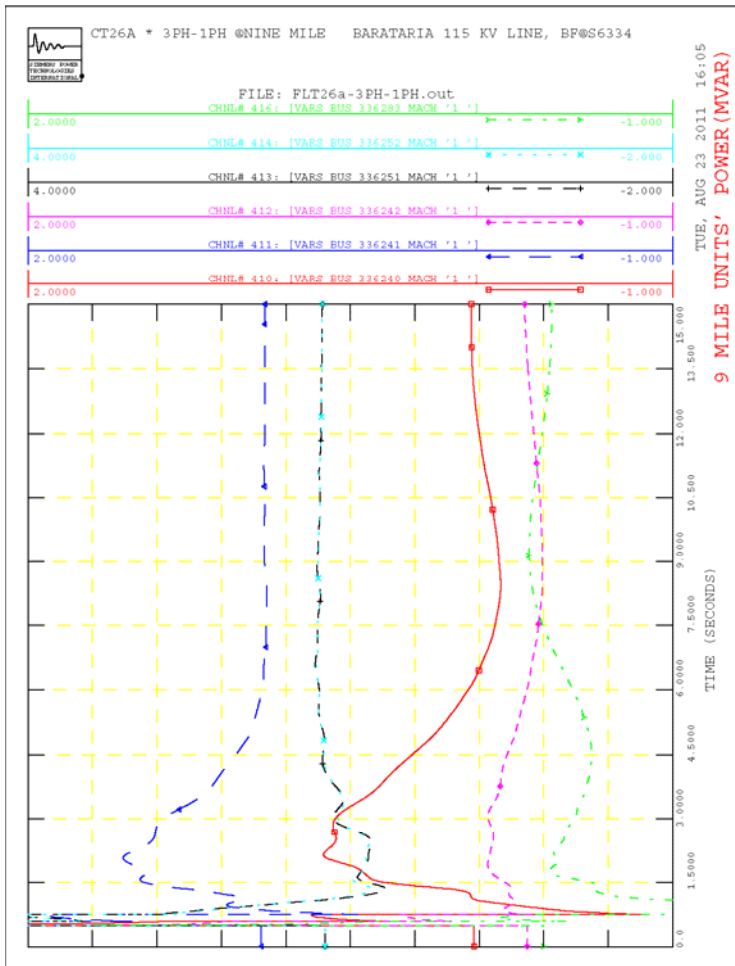
Fault 25a



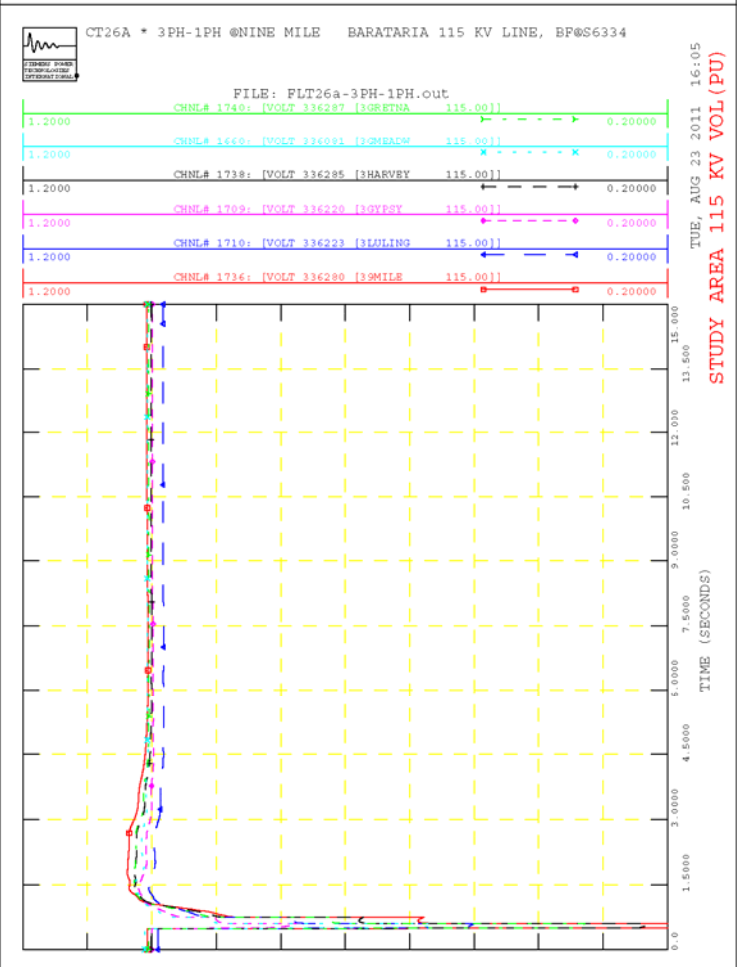
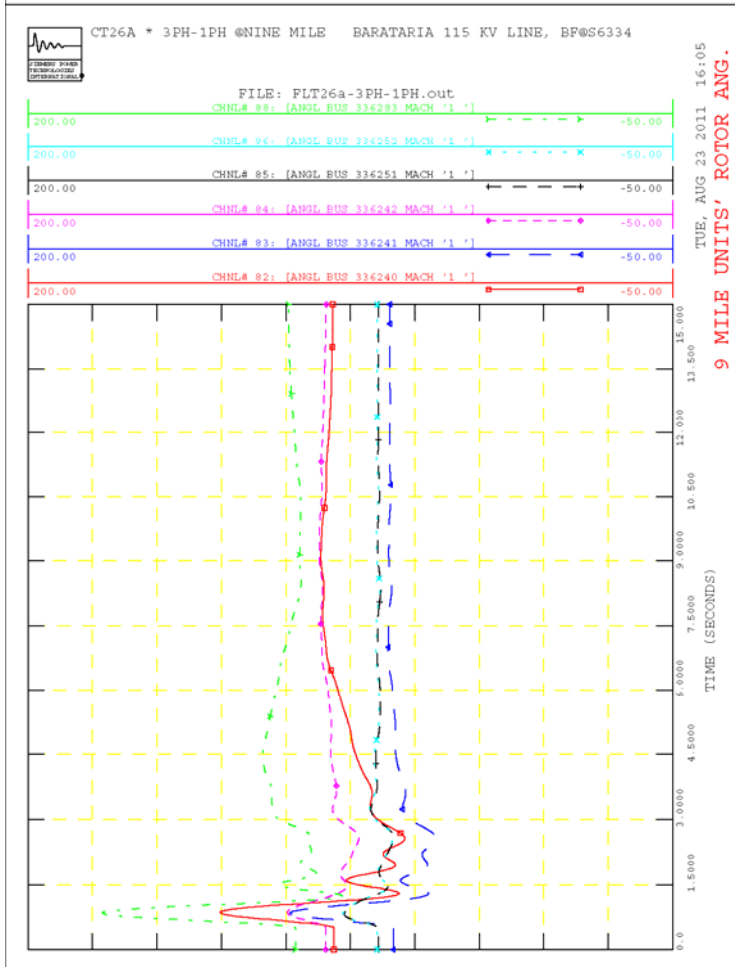
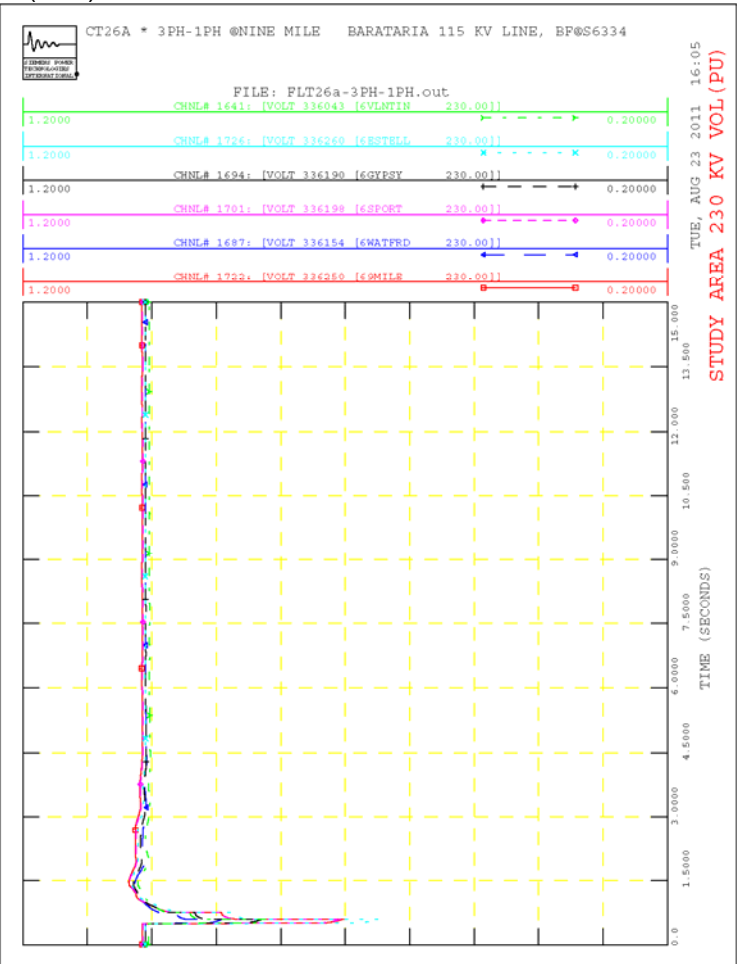
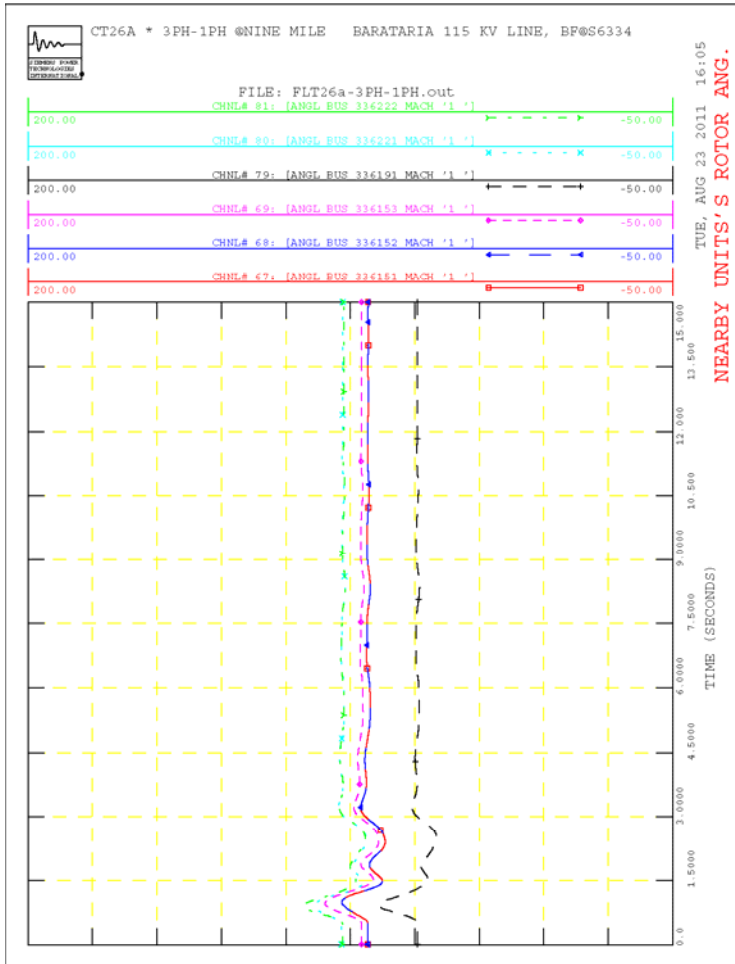
Fault 25a (cont)



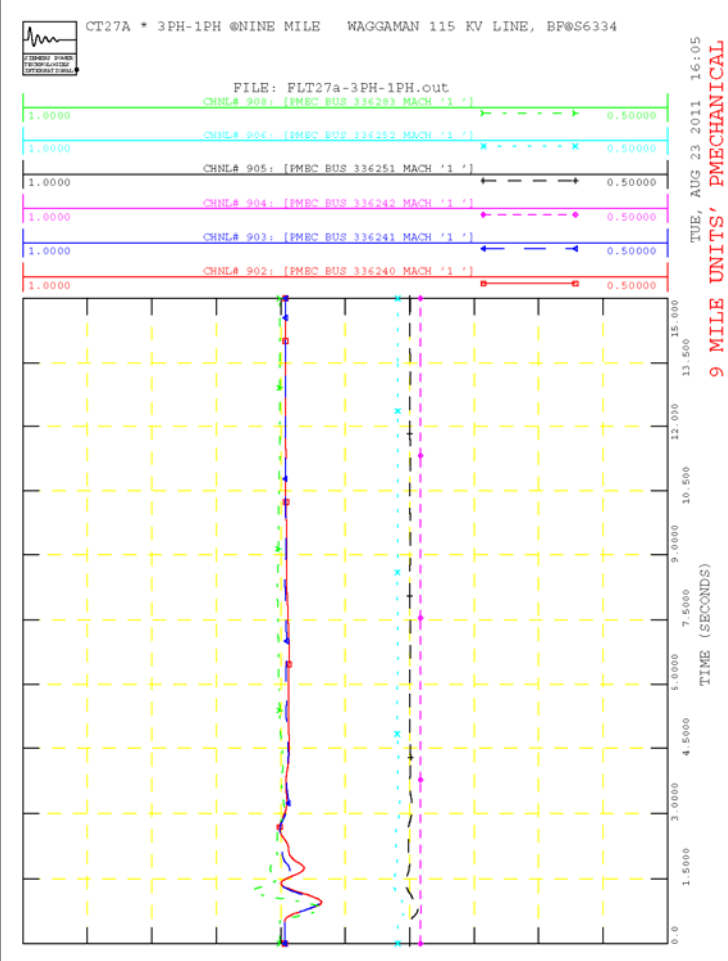
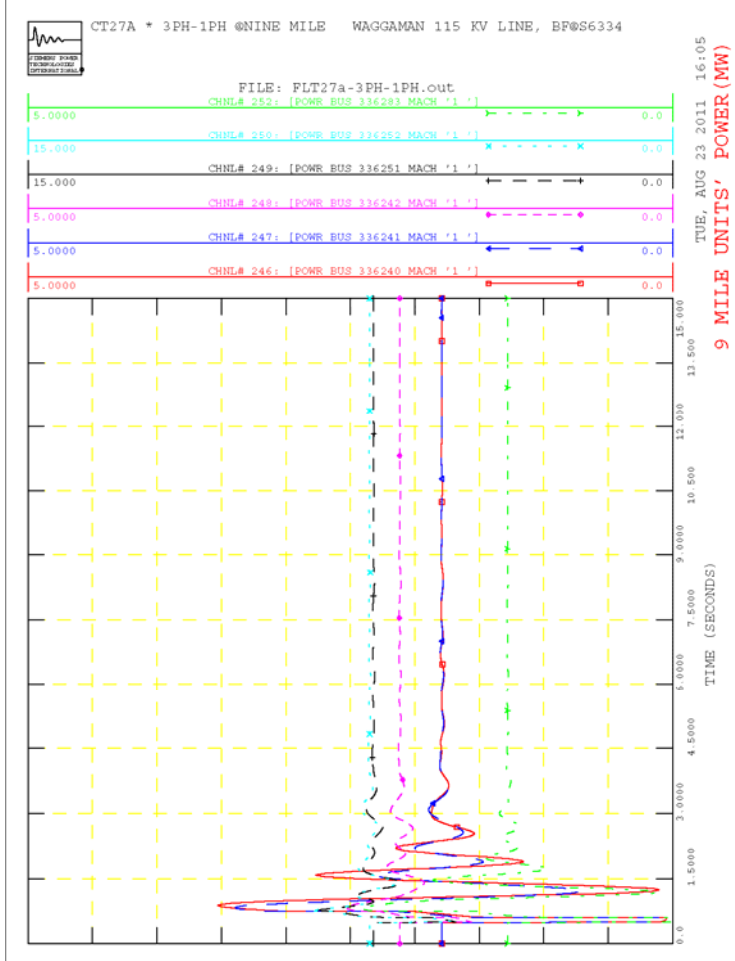
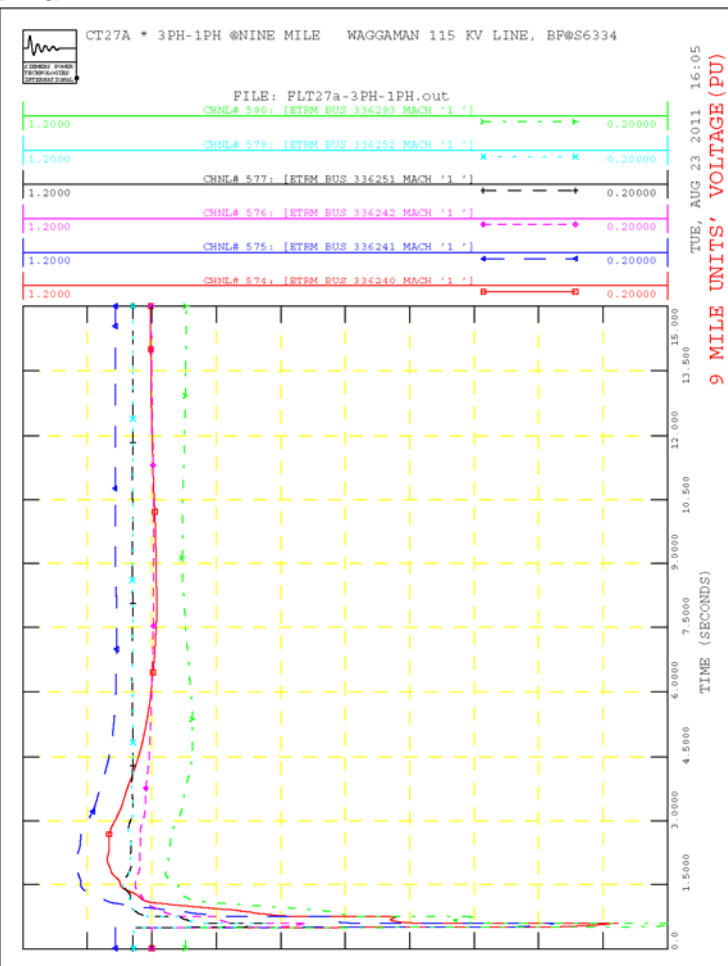
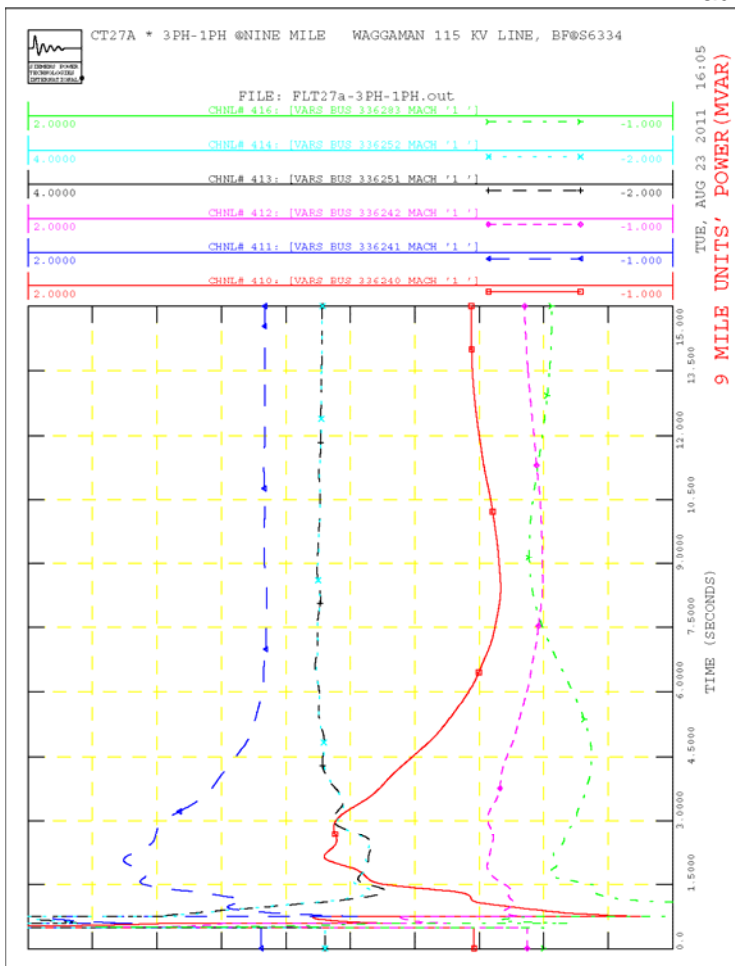
Fault 26a



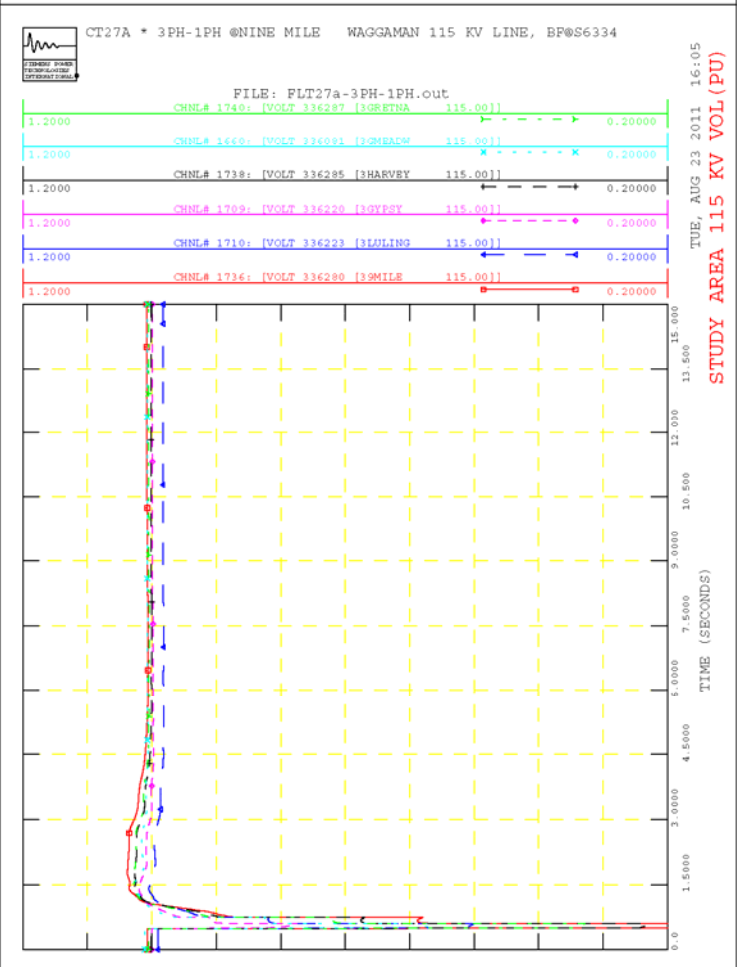
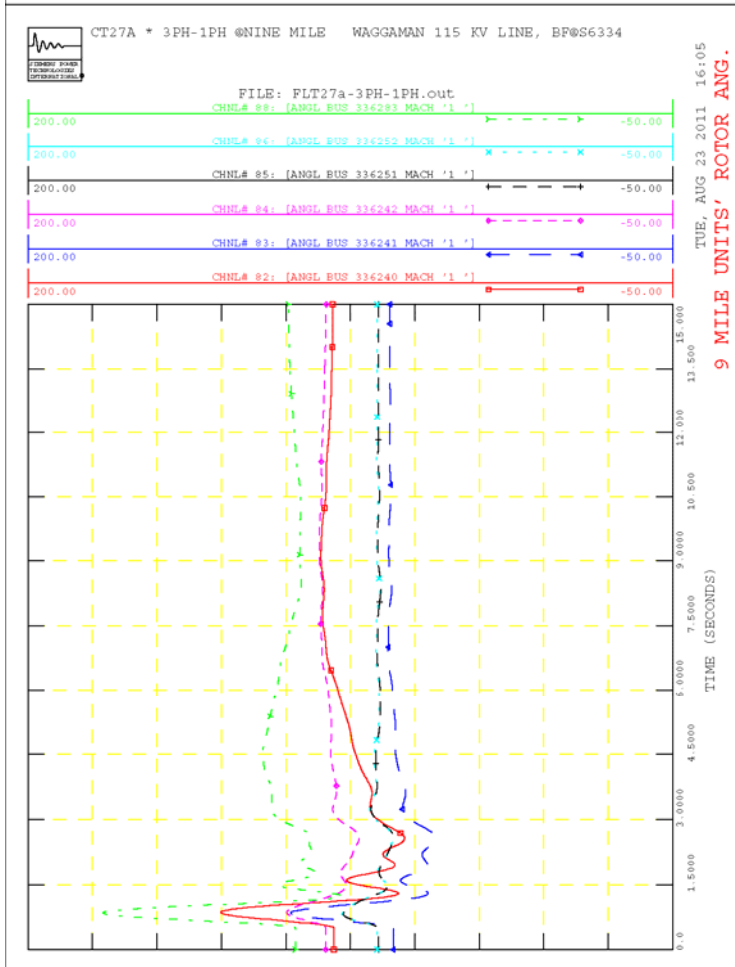
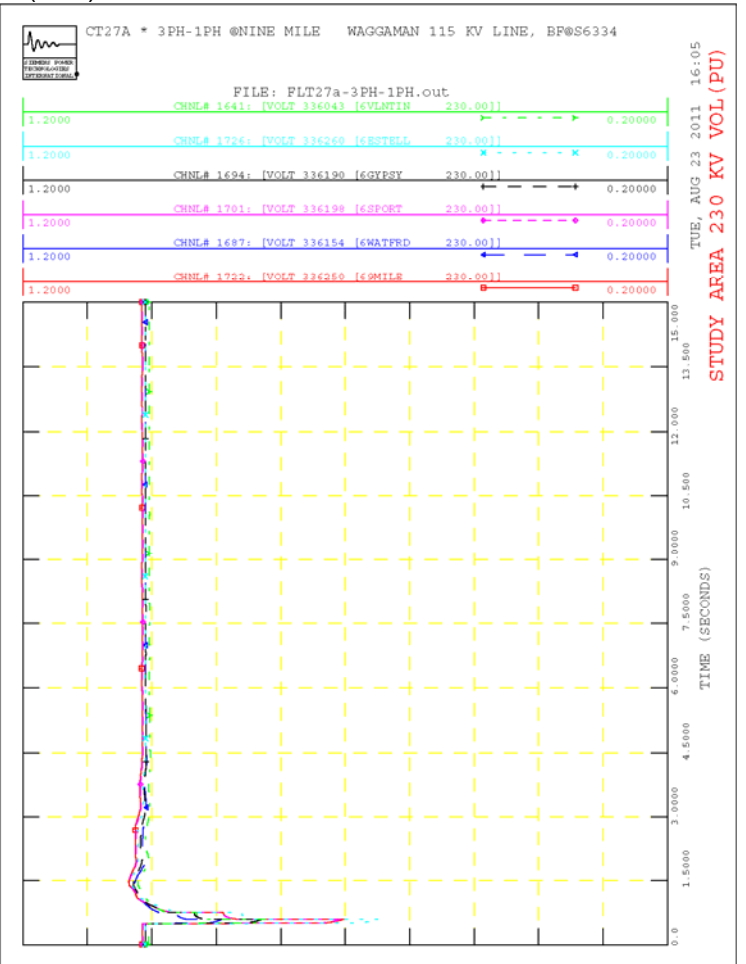
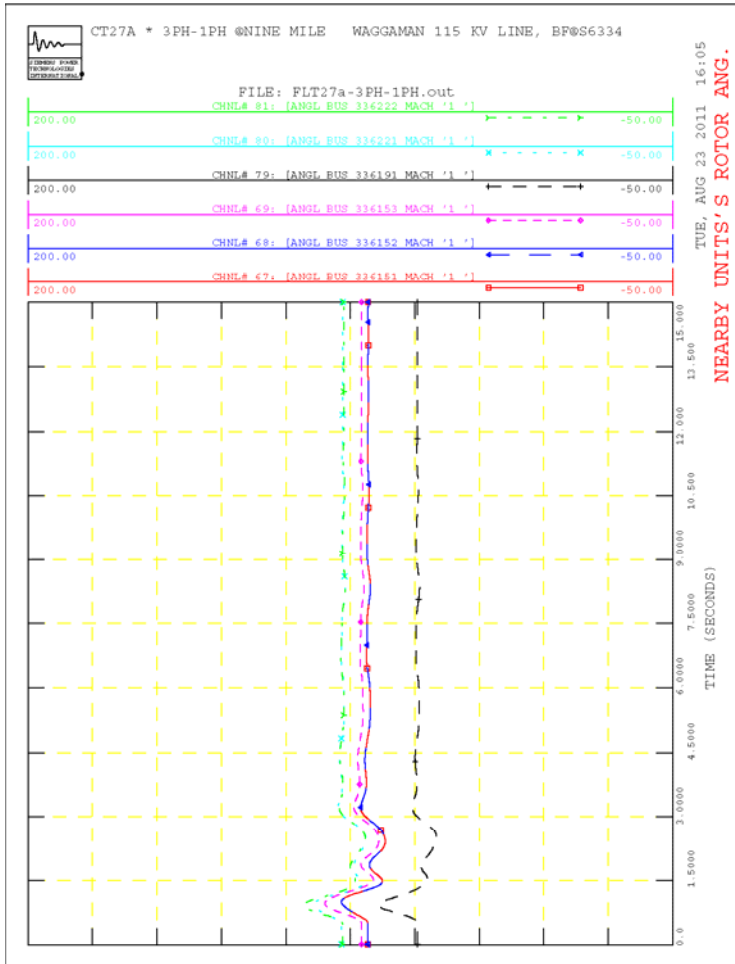
Fault 26a (cont)



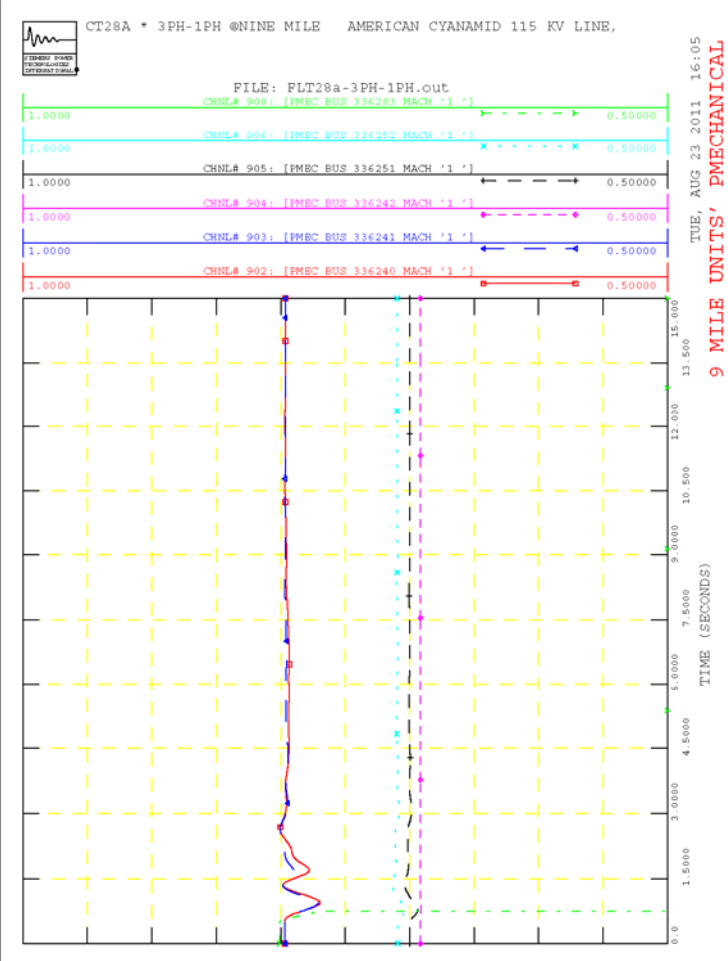
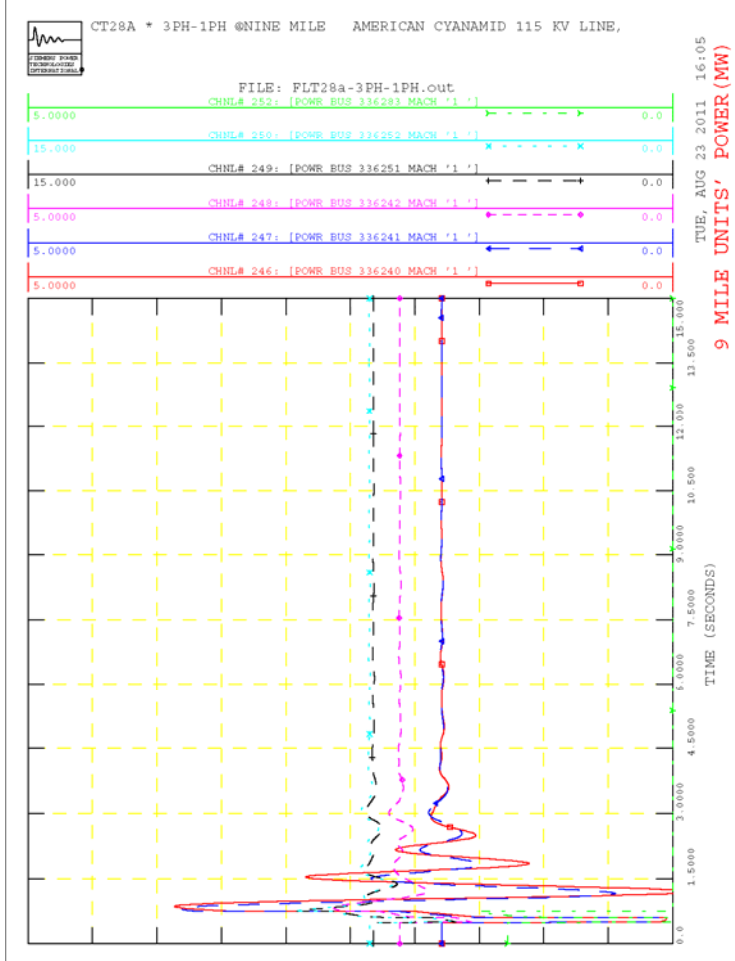
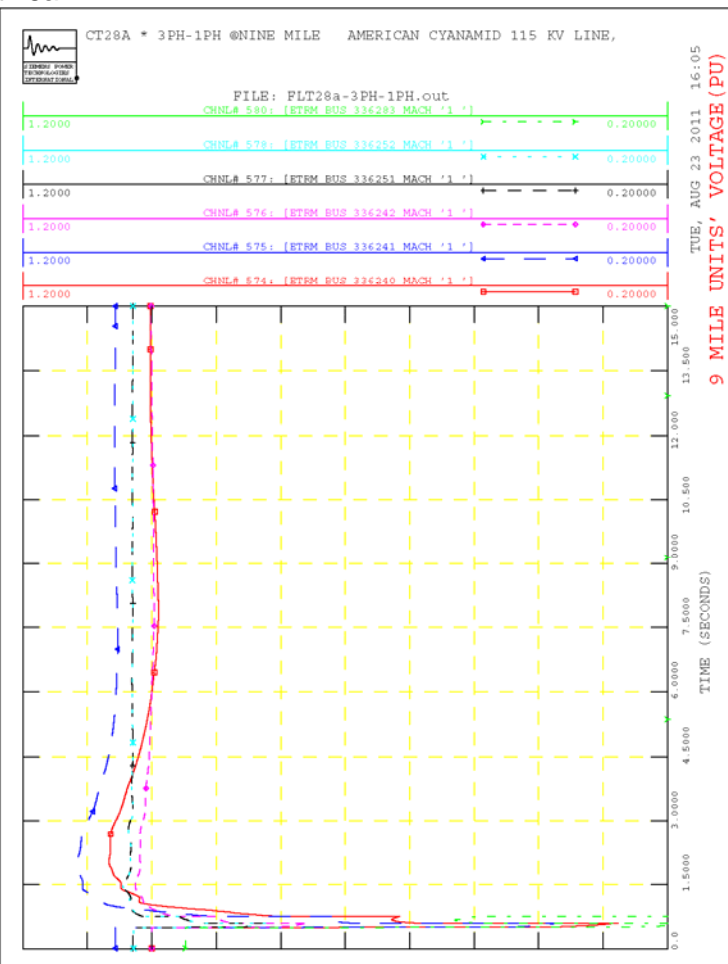
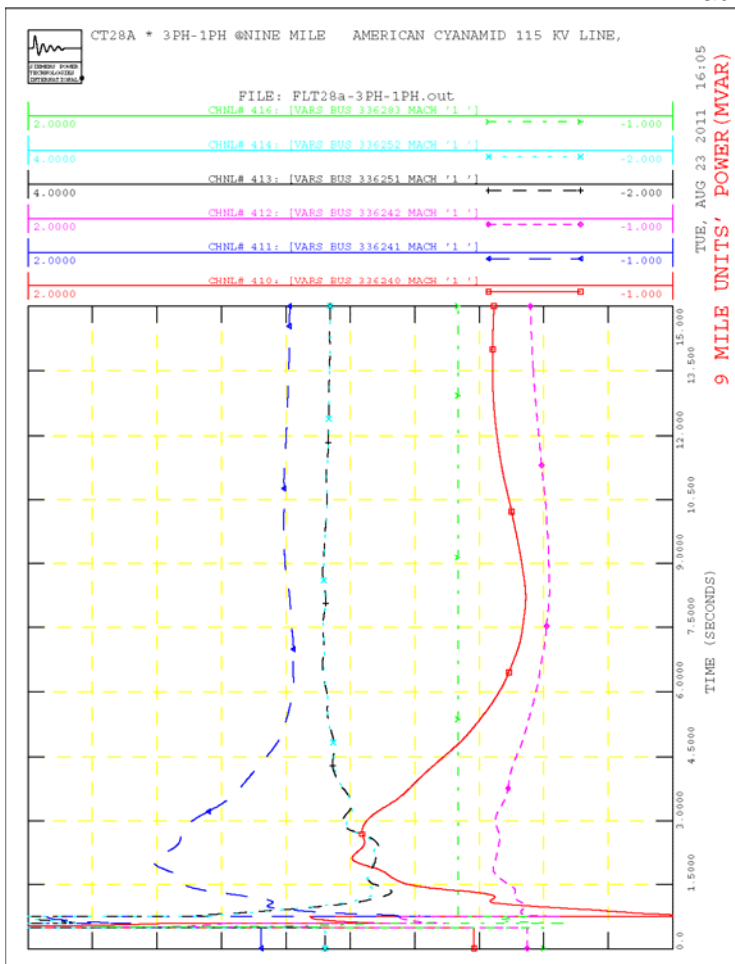
Fault 27a



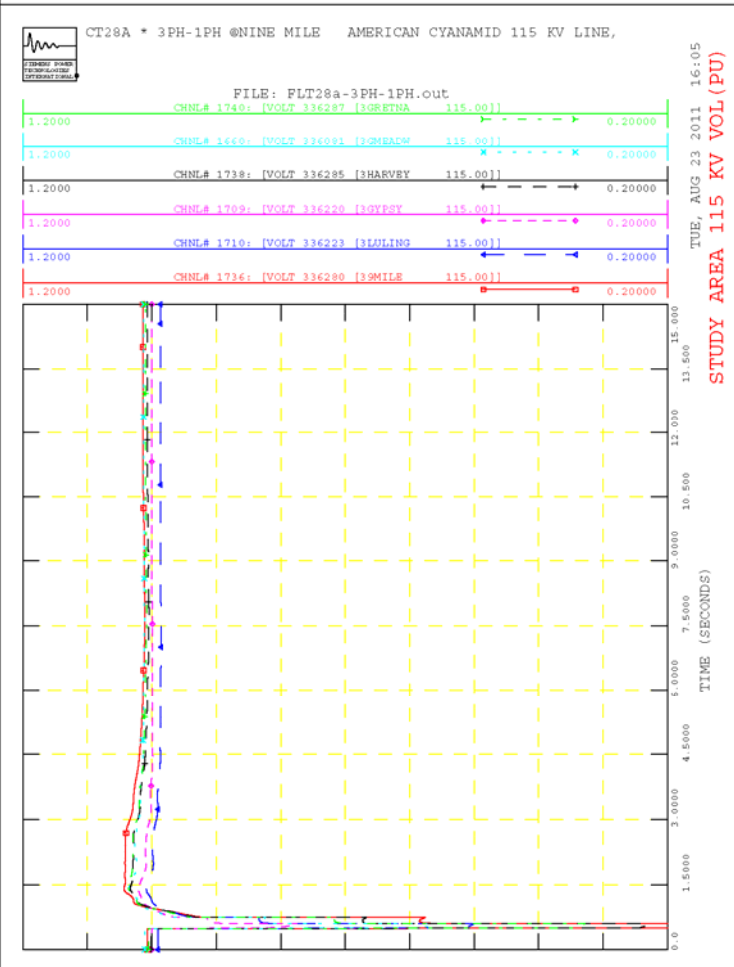
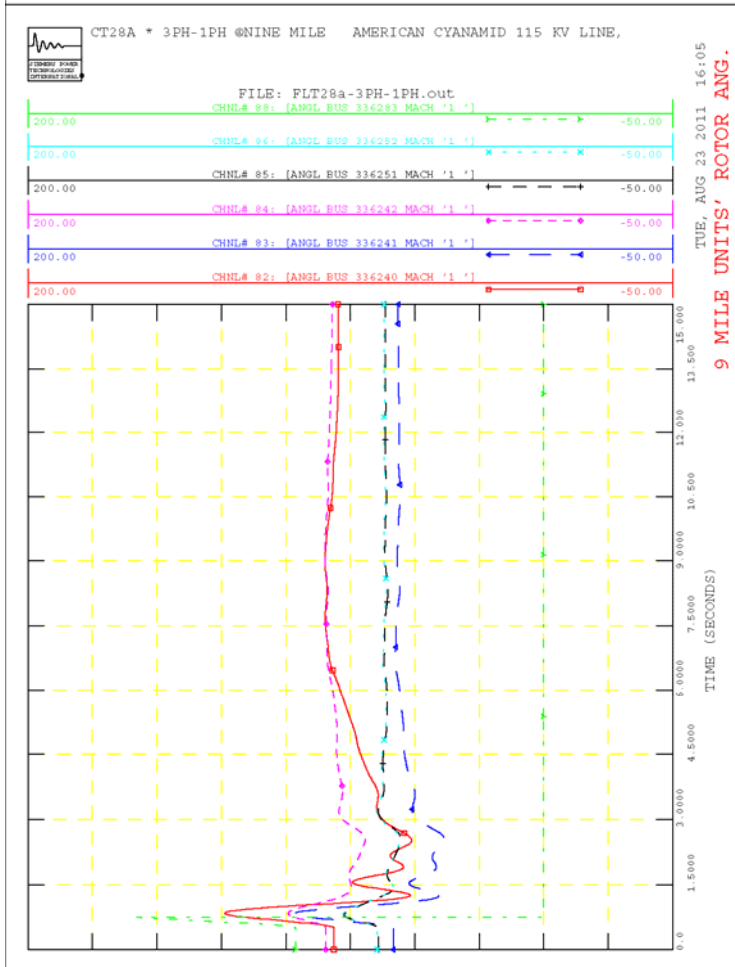
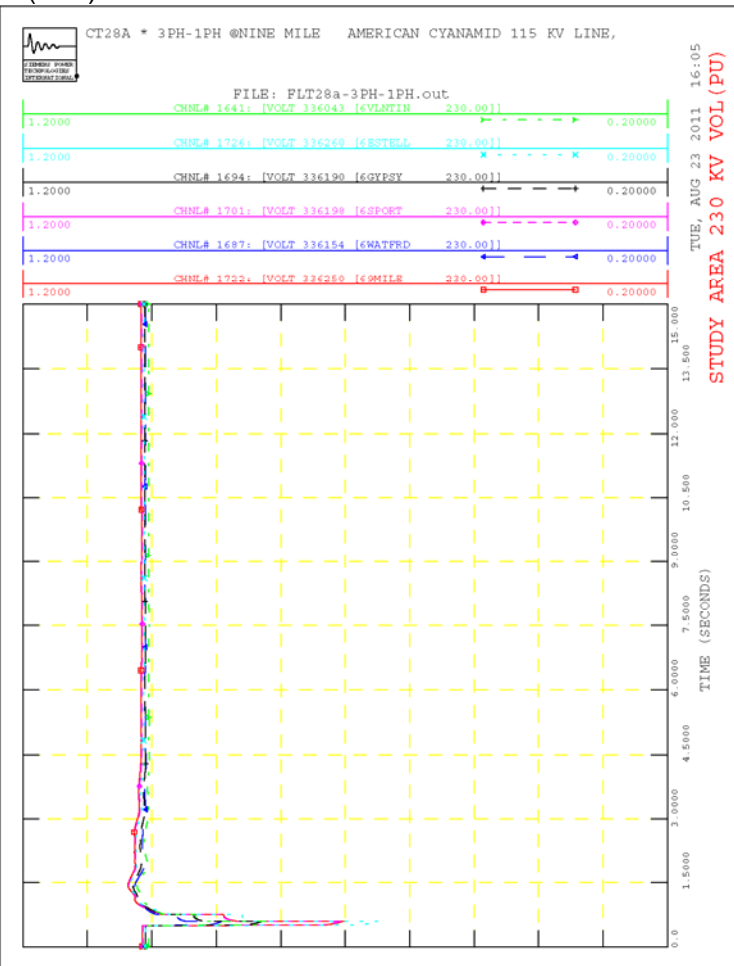
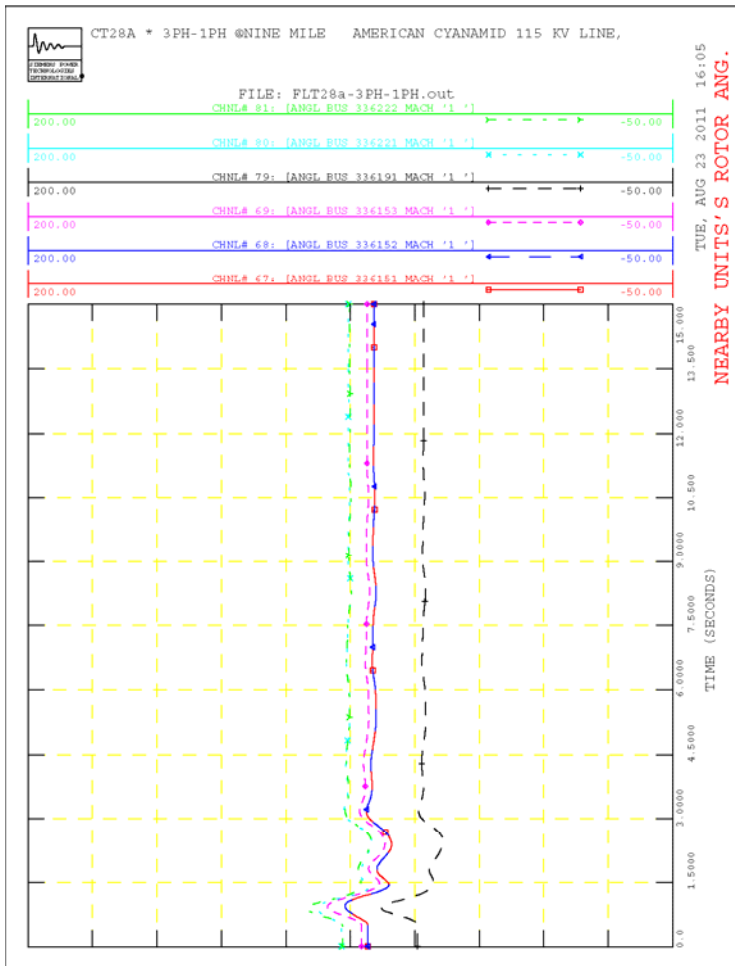
Fault 27a (cont)



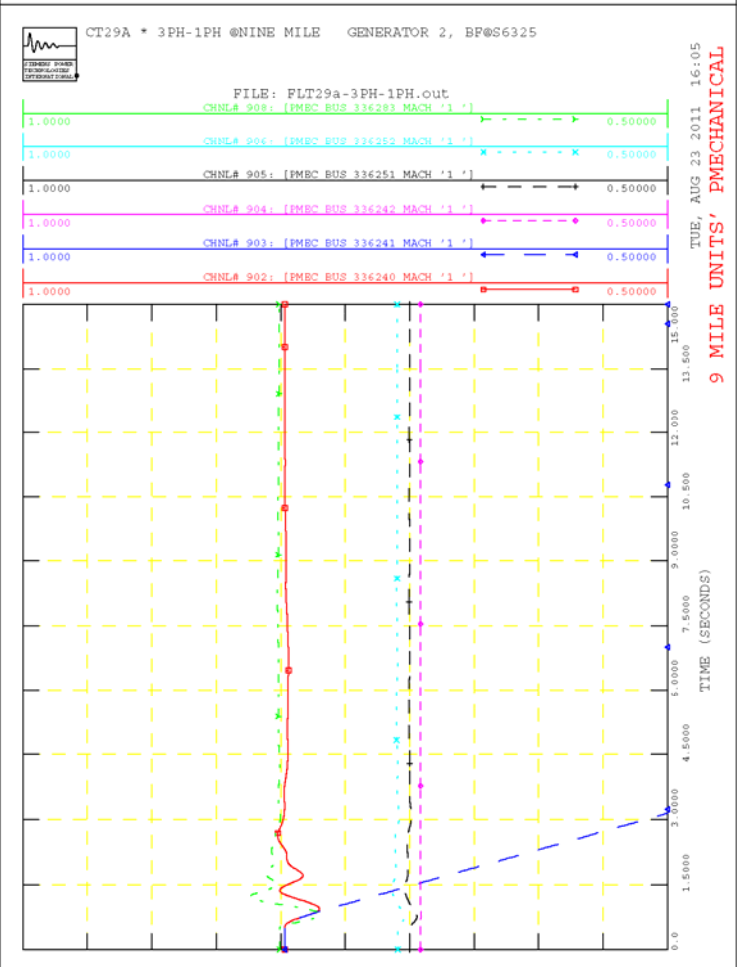
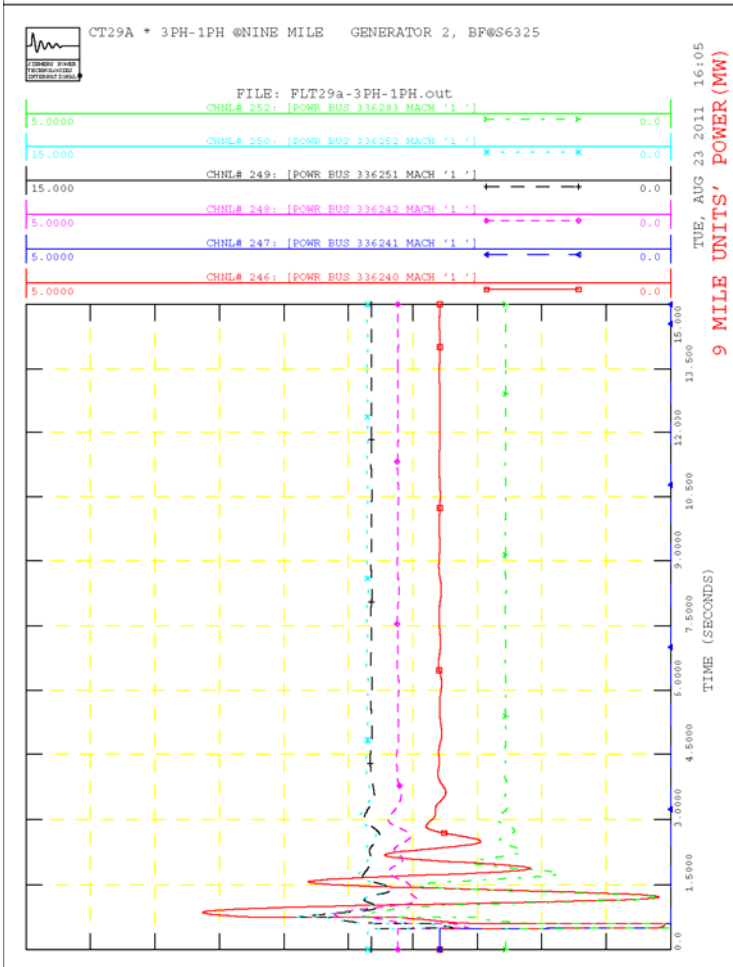
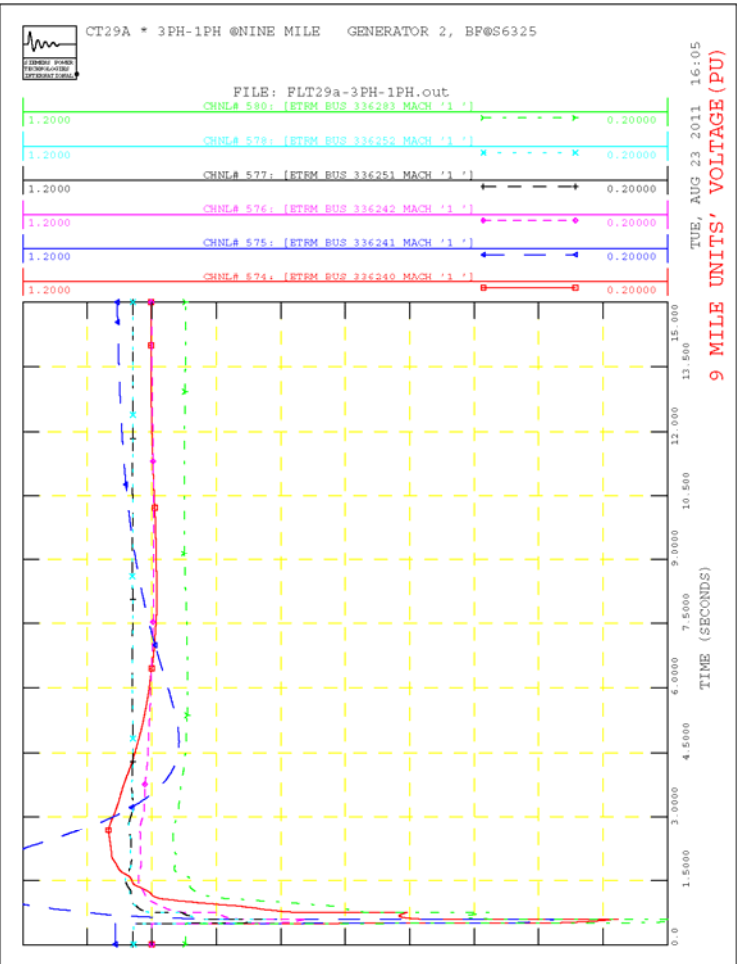
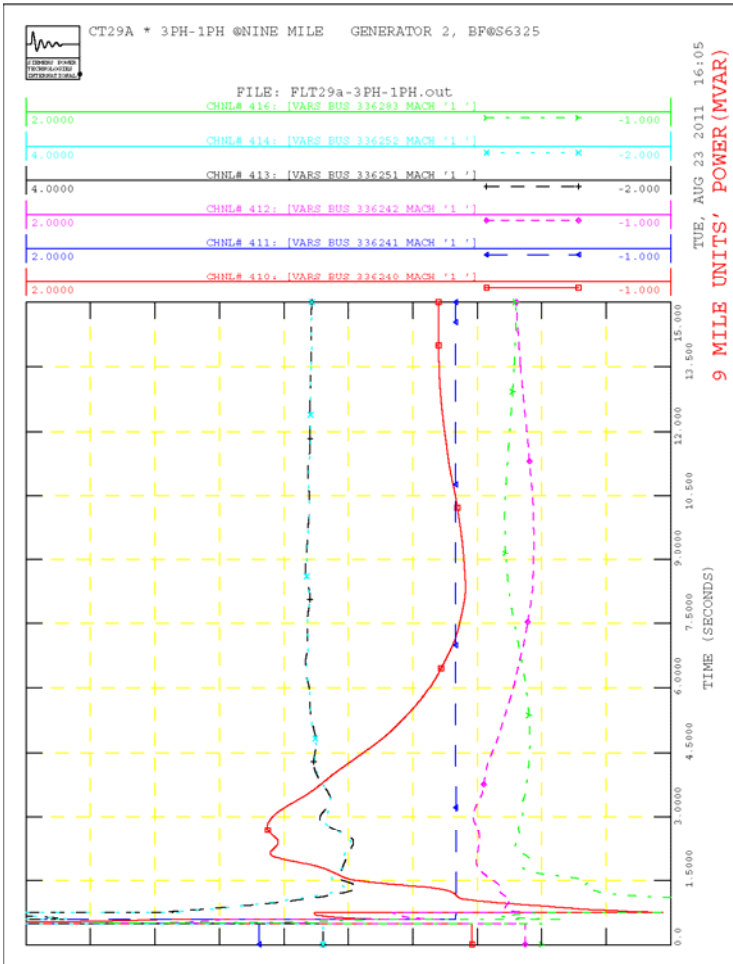
Fault 28a



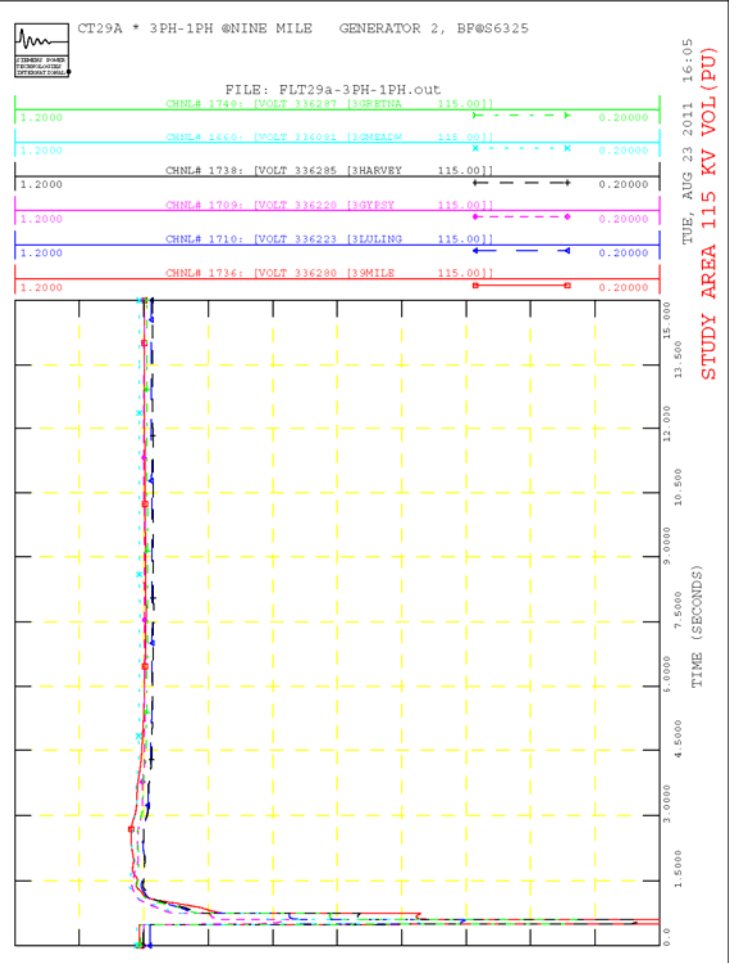
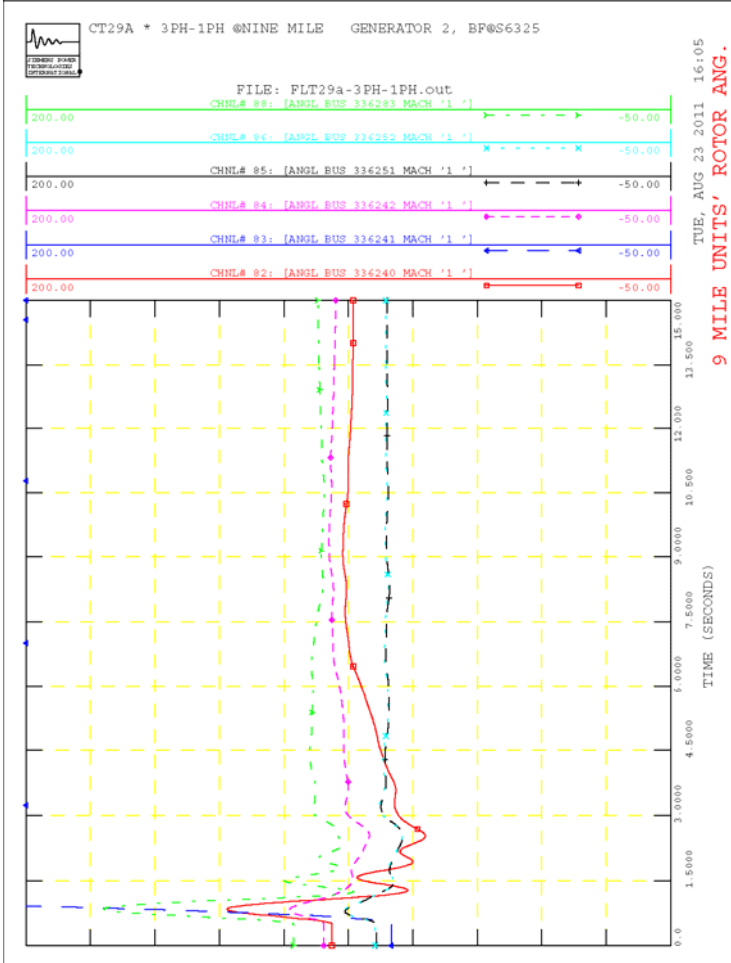
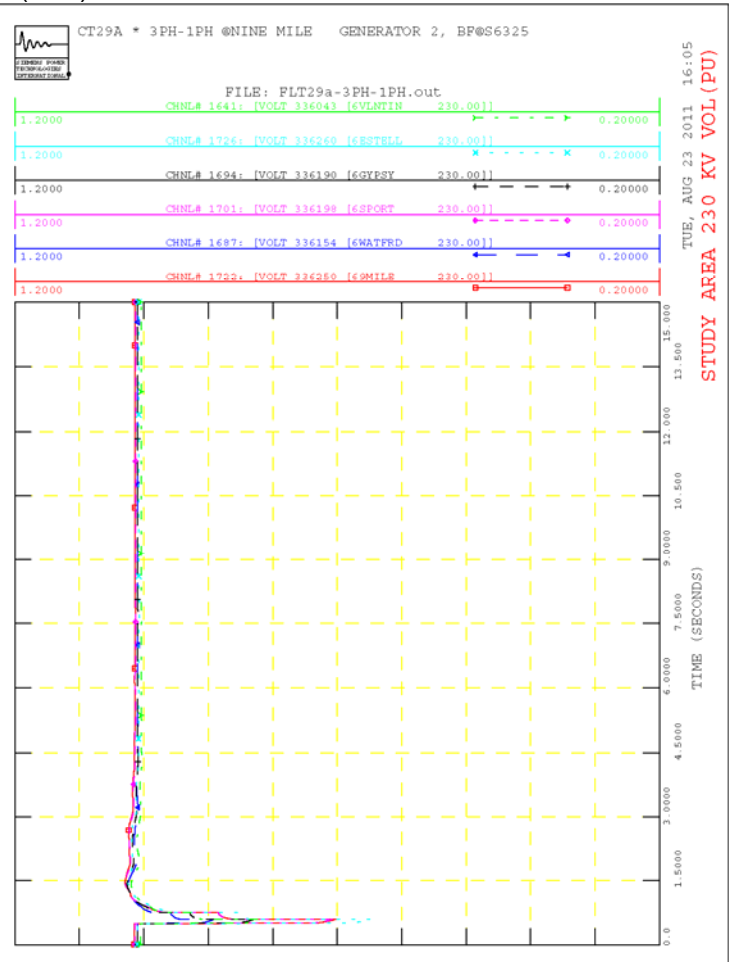
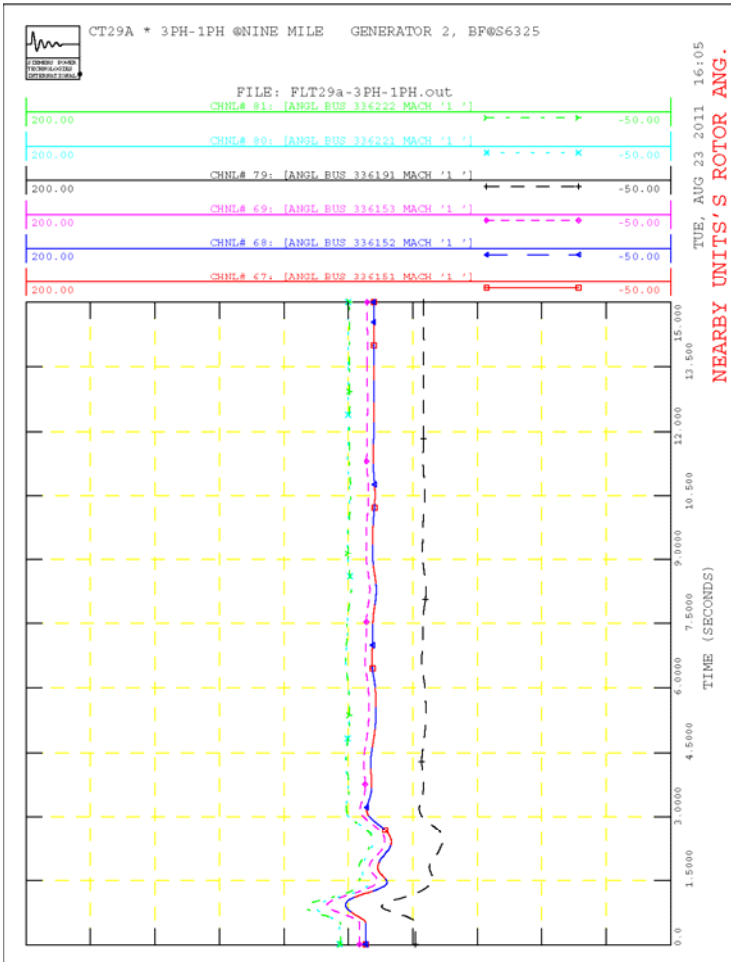
Fault 28a (cont)



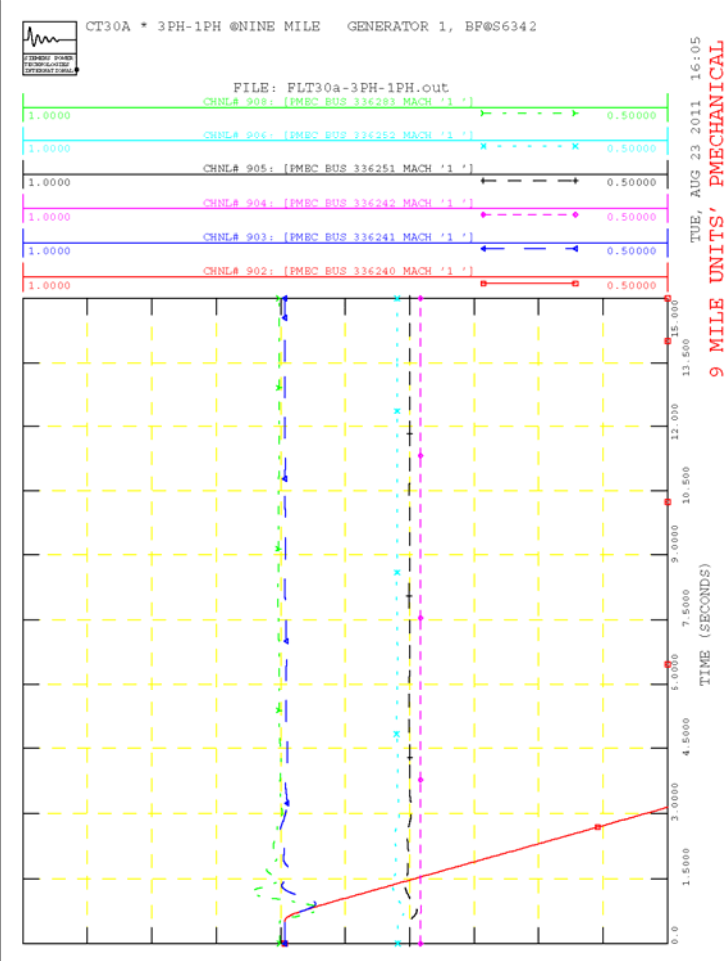
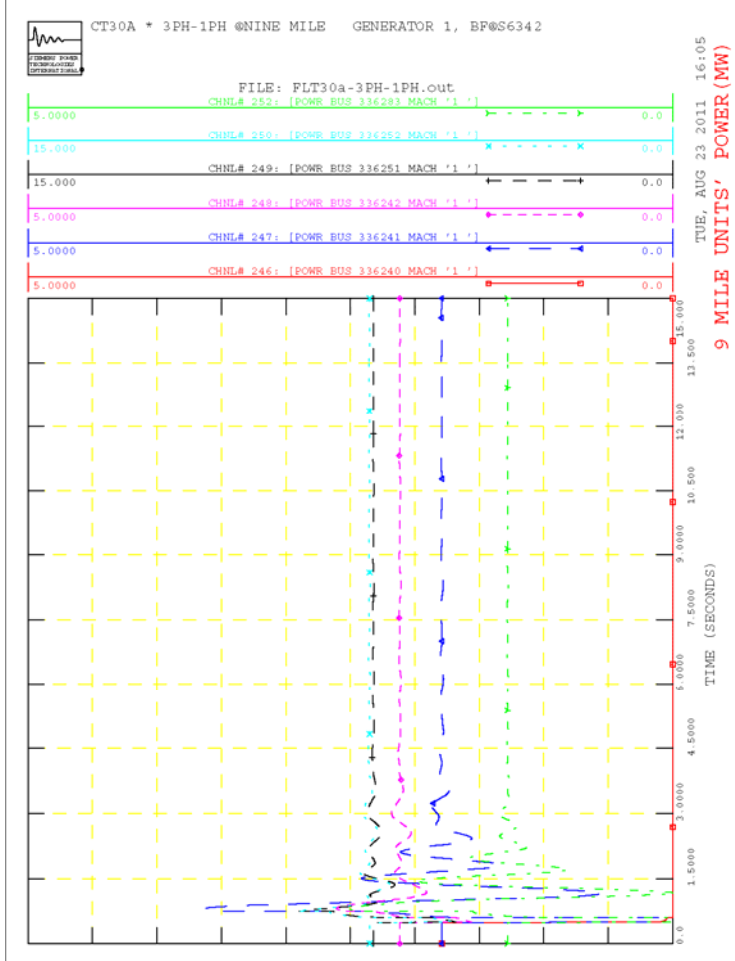
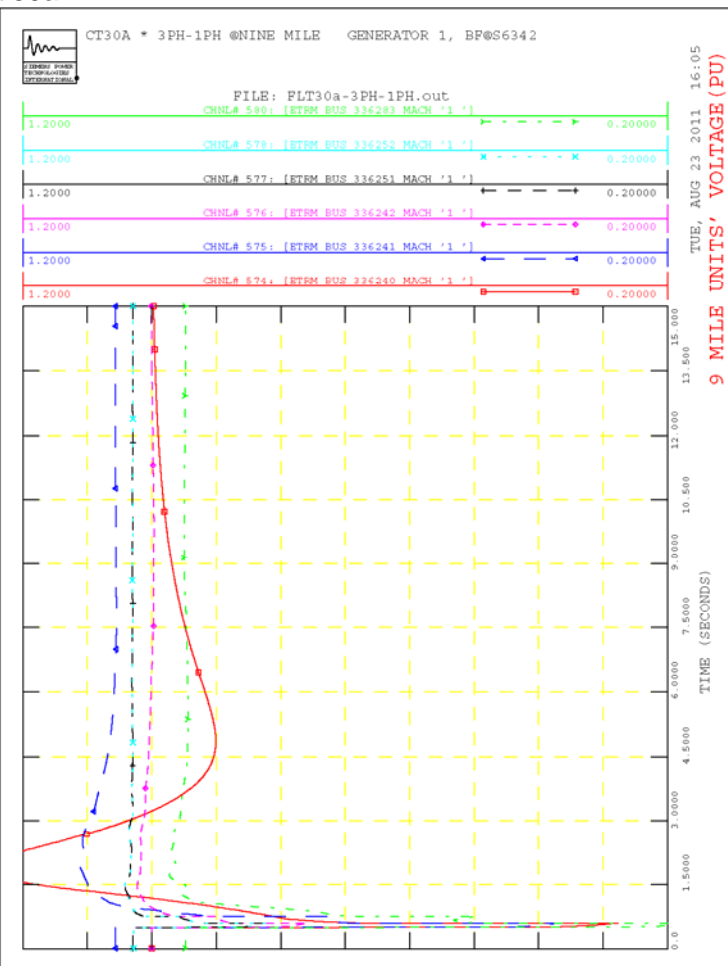
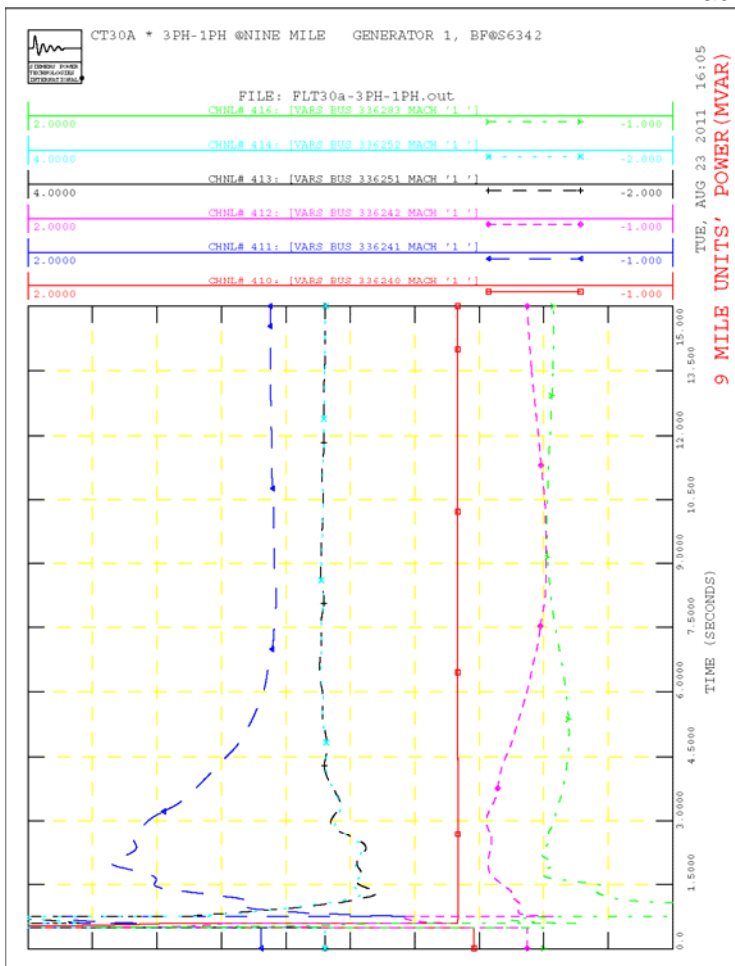
Fault 29a



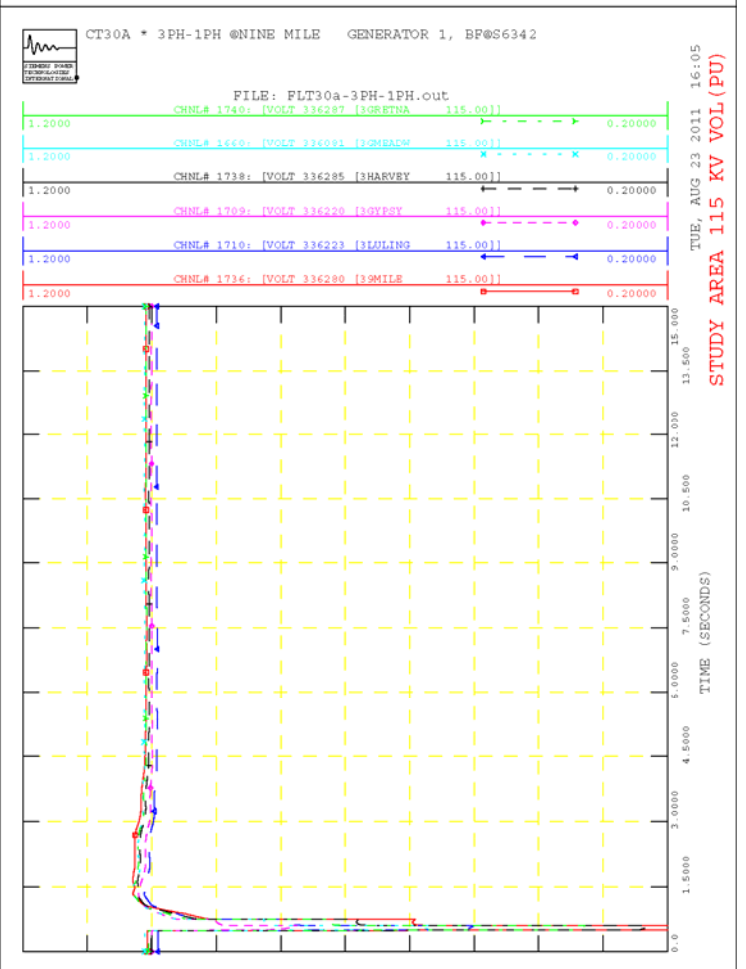
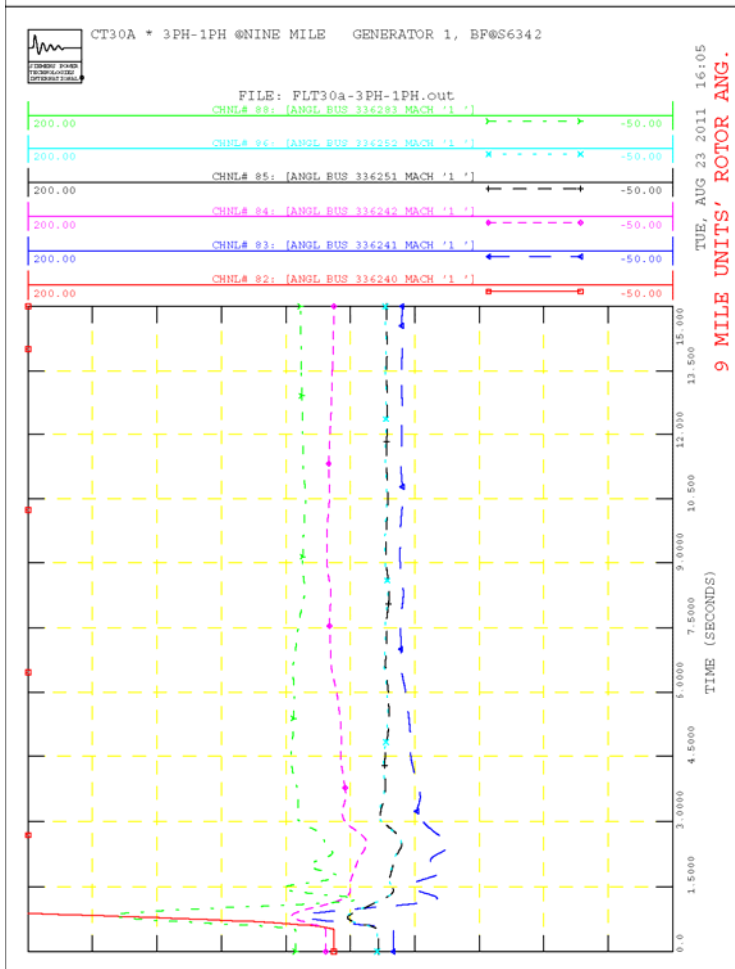
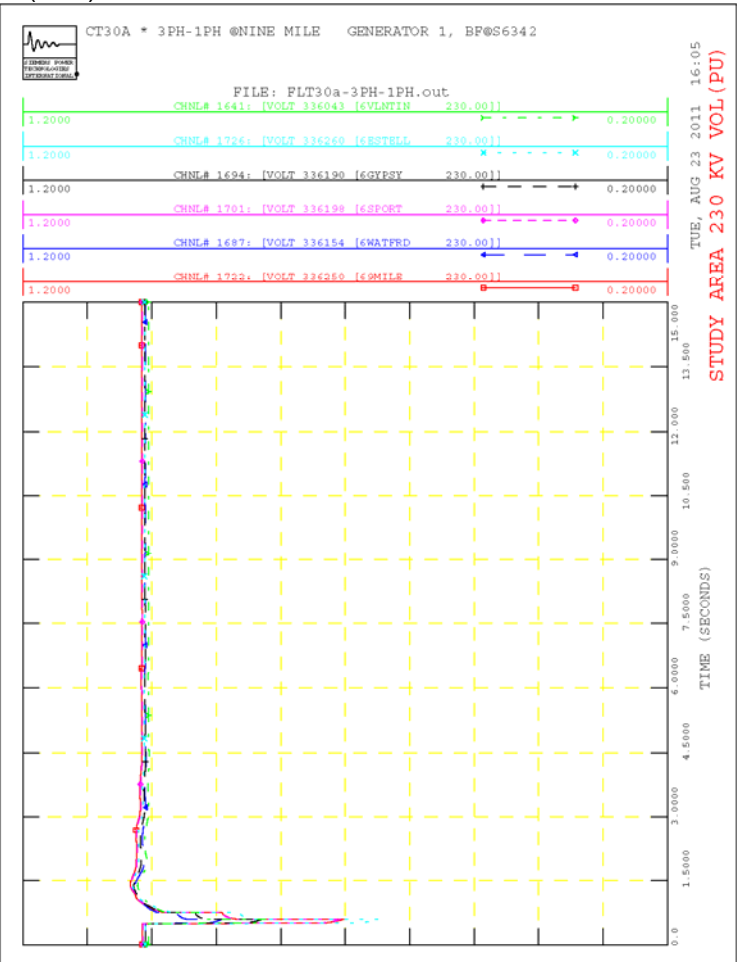
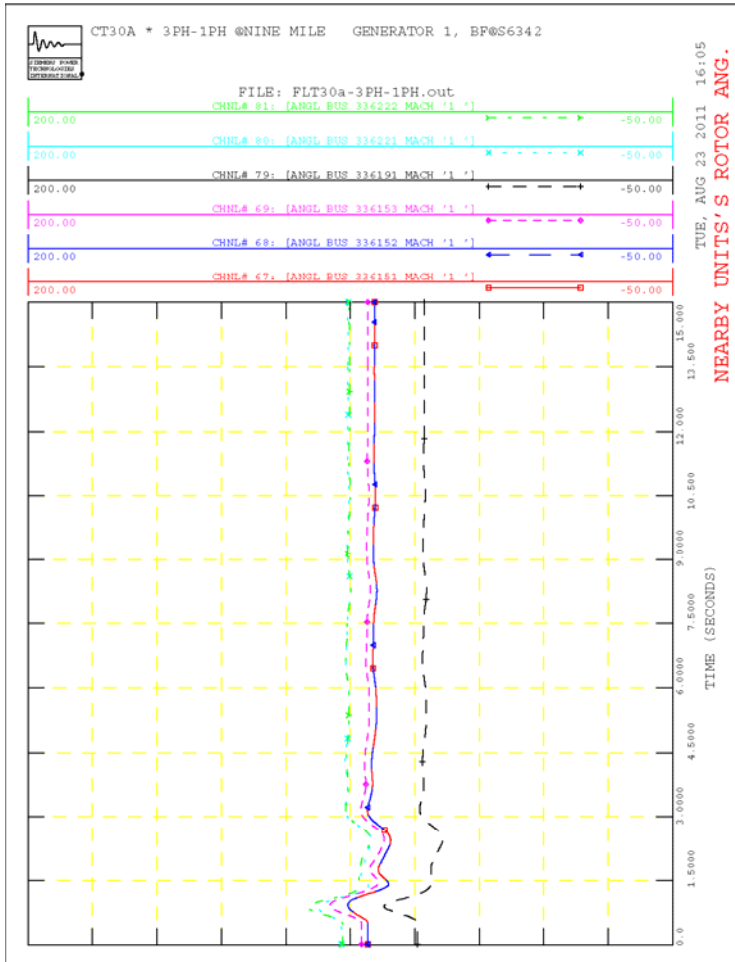
Fault 29a (cont)



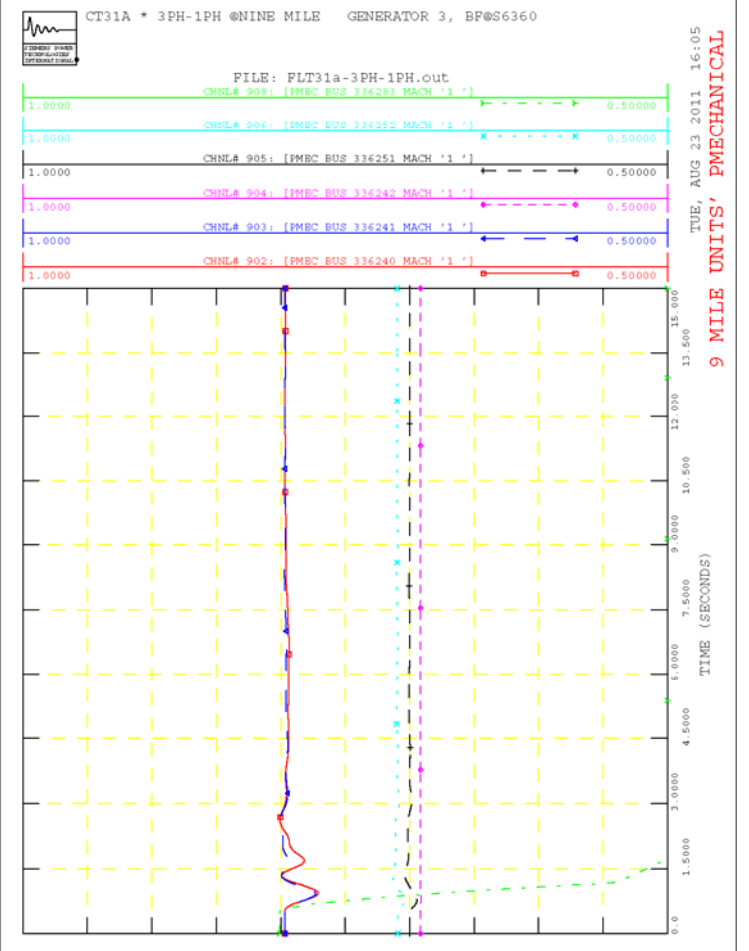
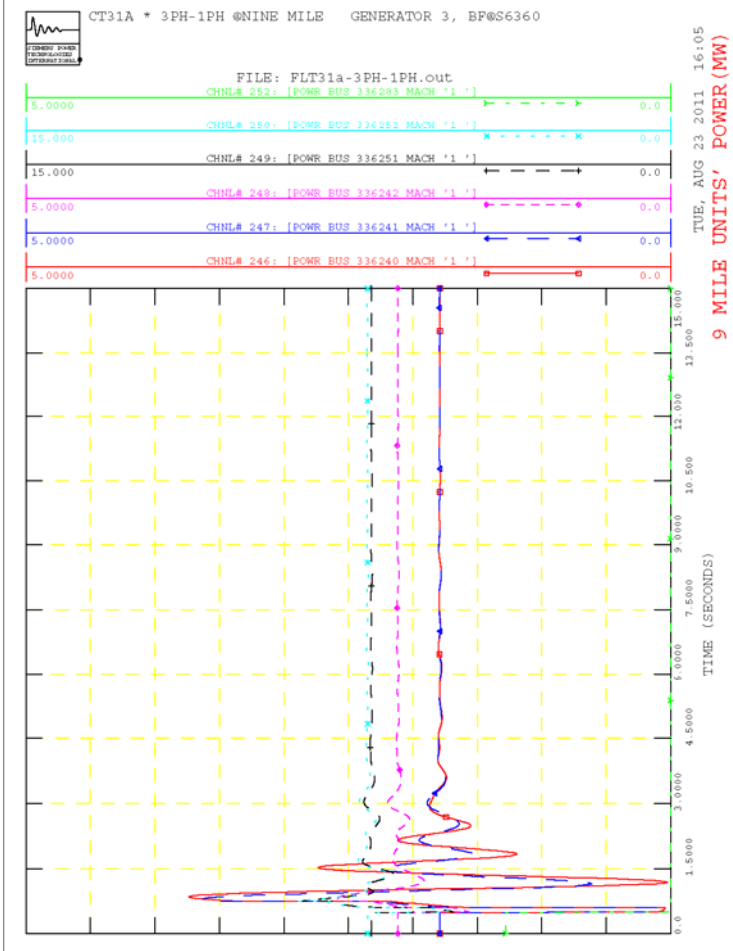
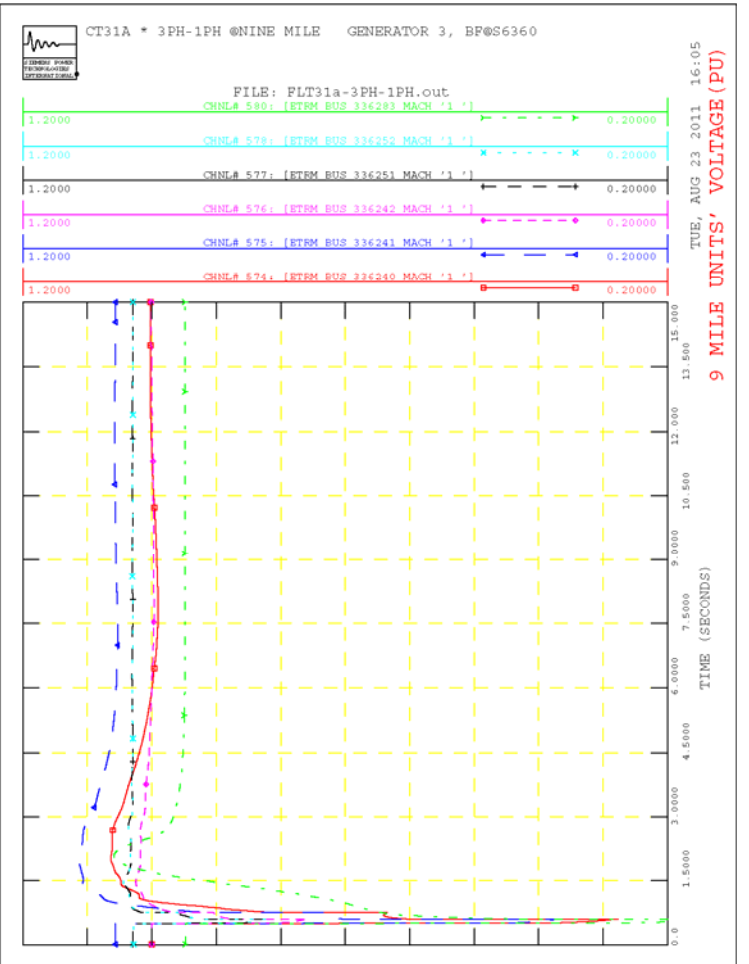
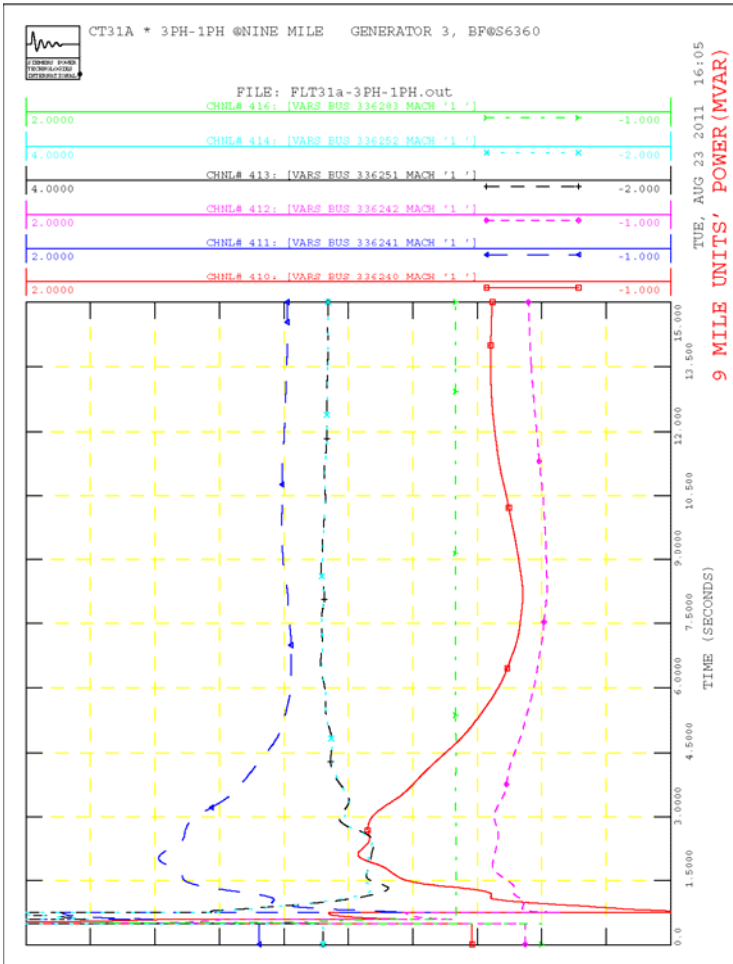
Fault 30a



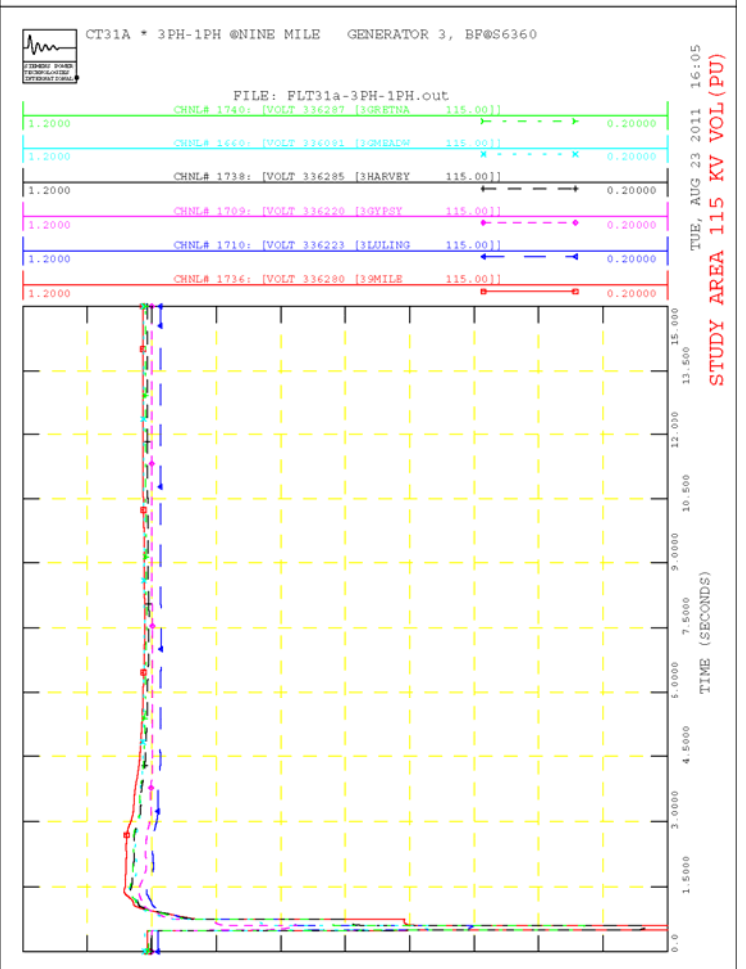
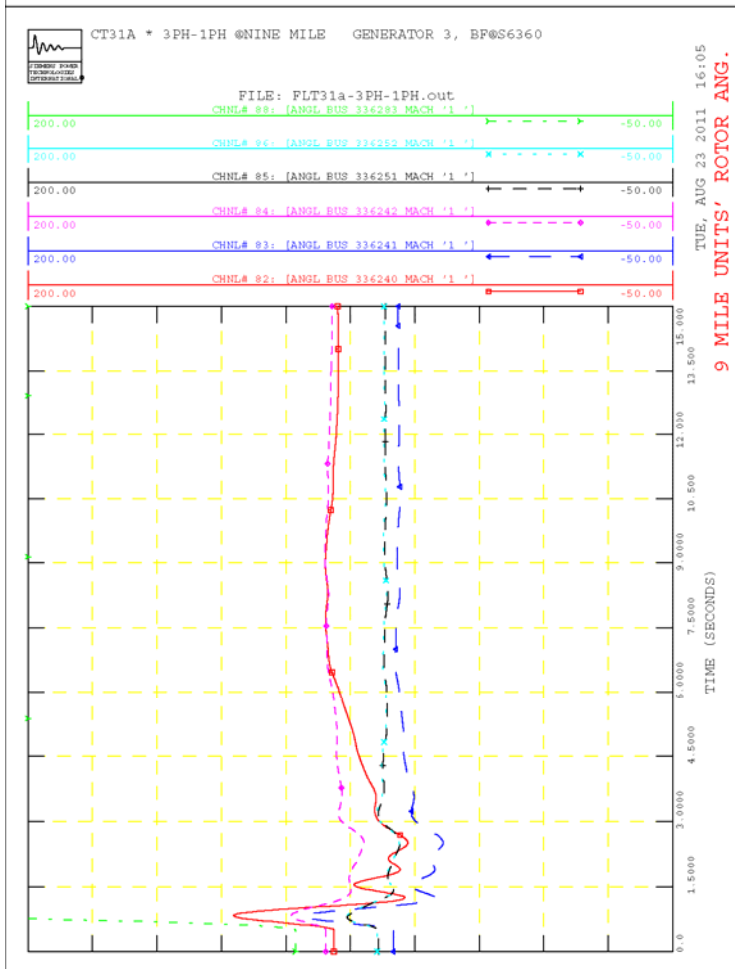
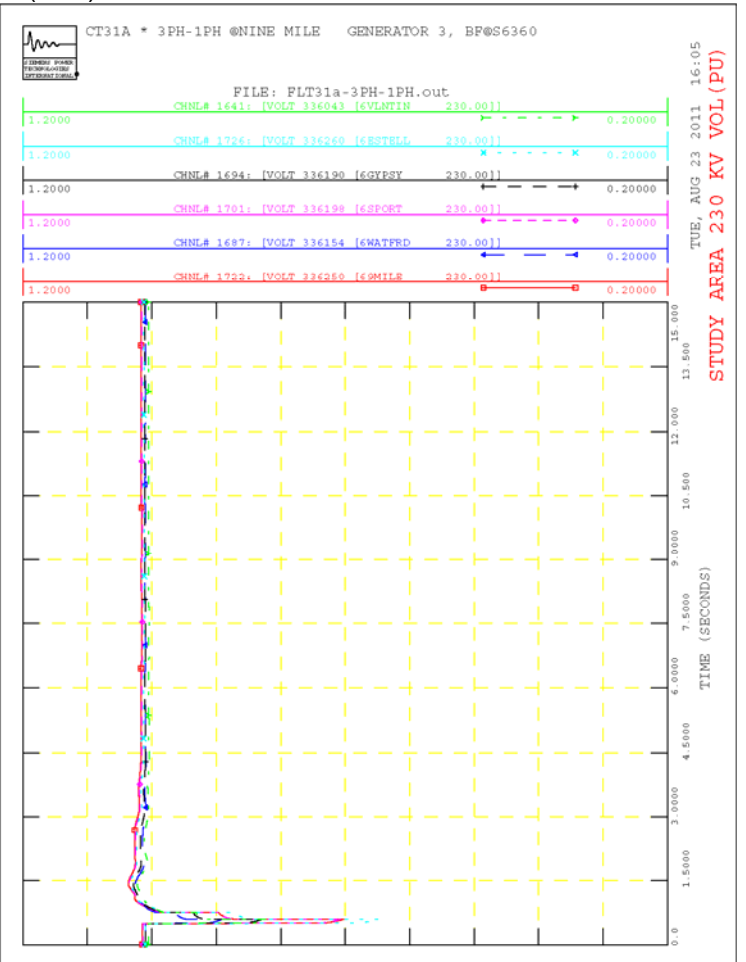
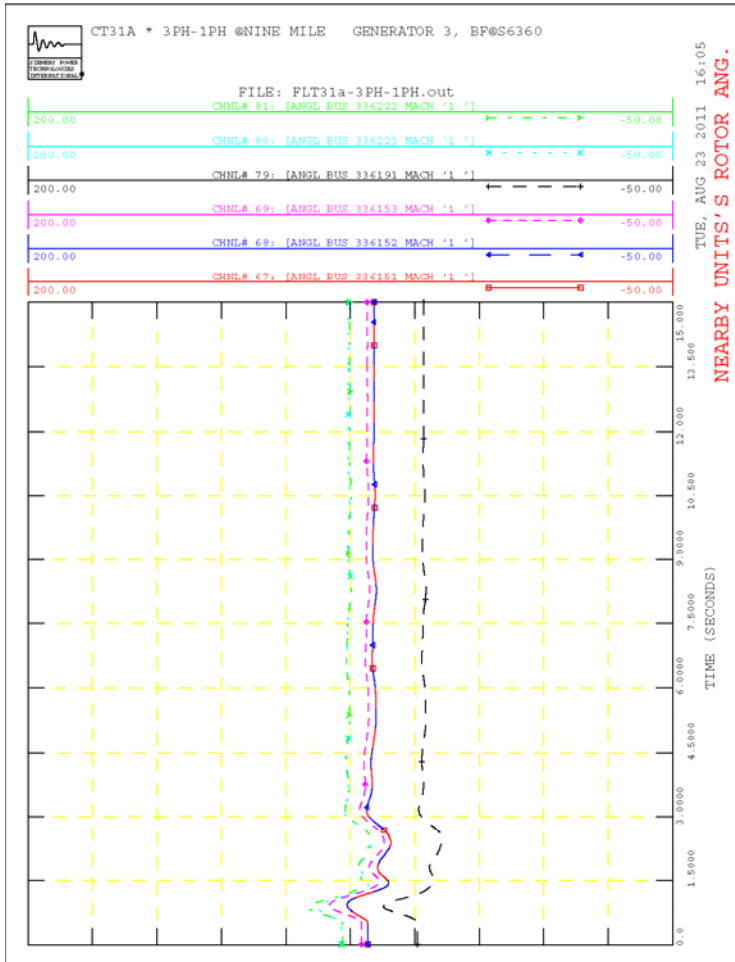
Fault 30a (cont)



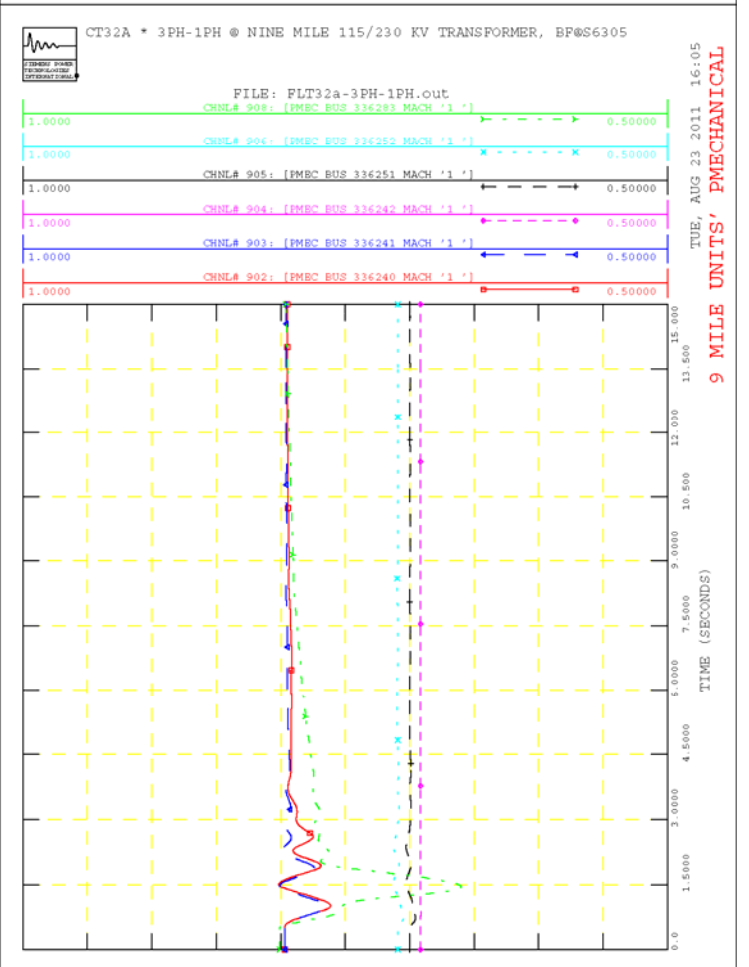
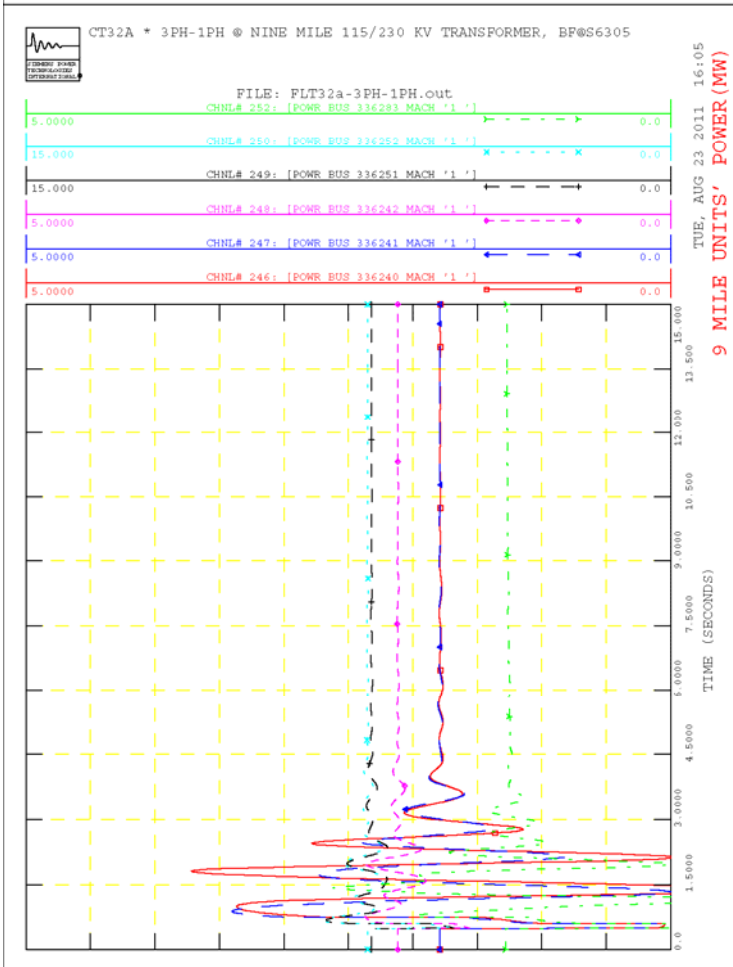
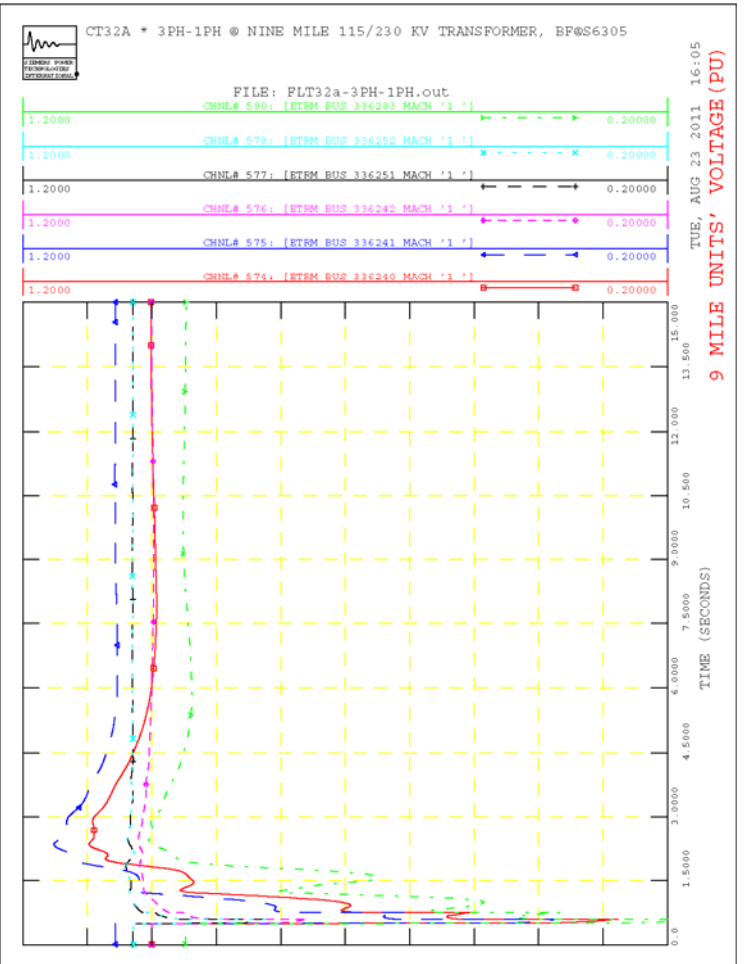
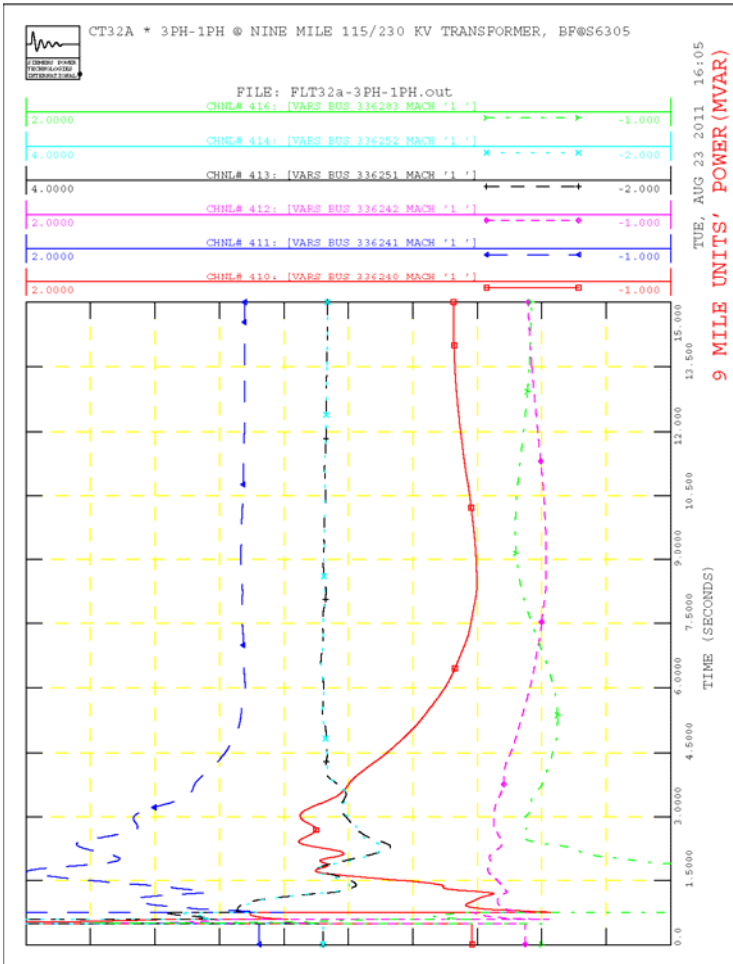
Fault 31a



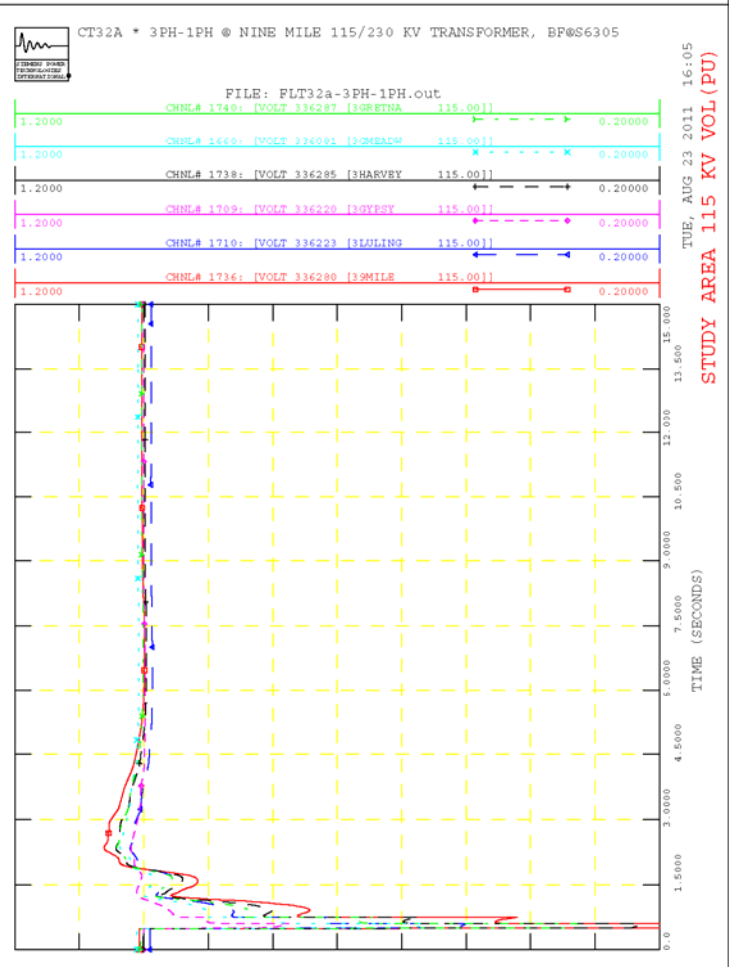
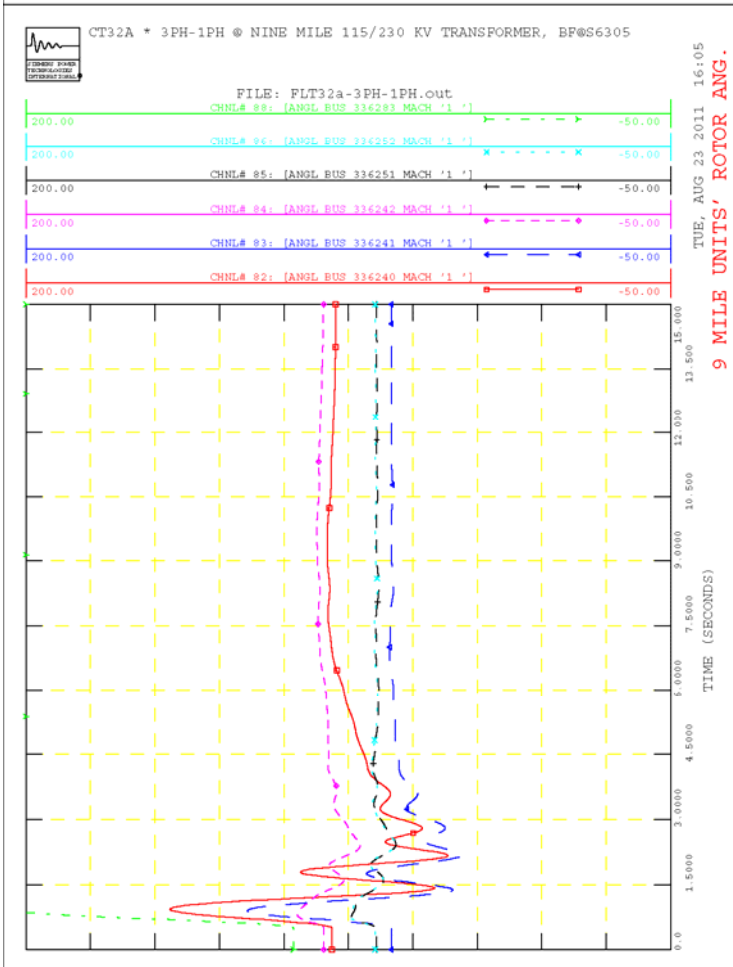
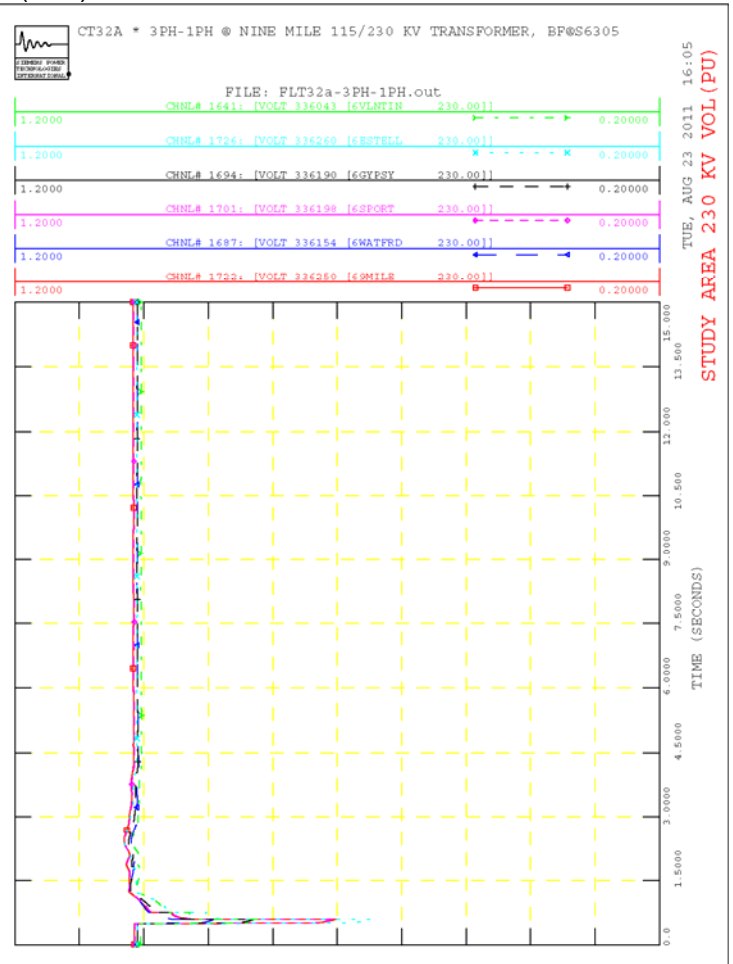
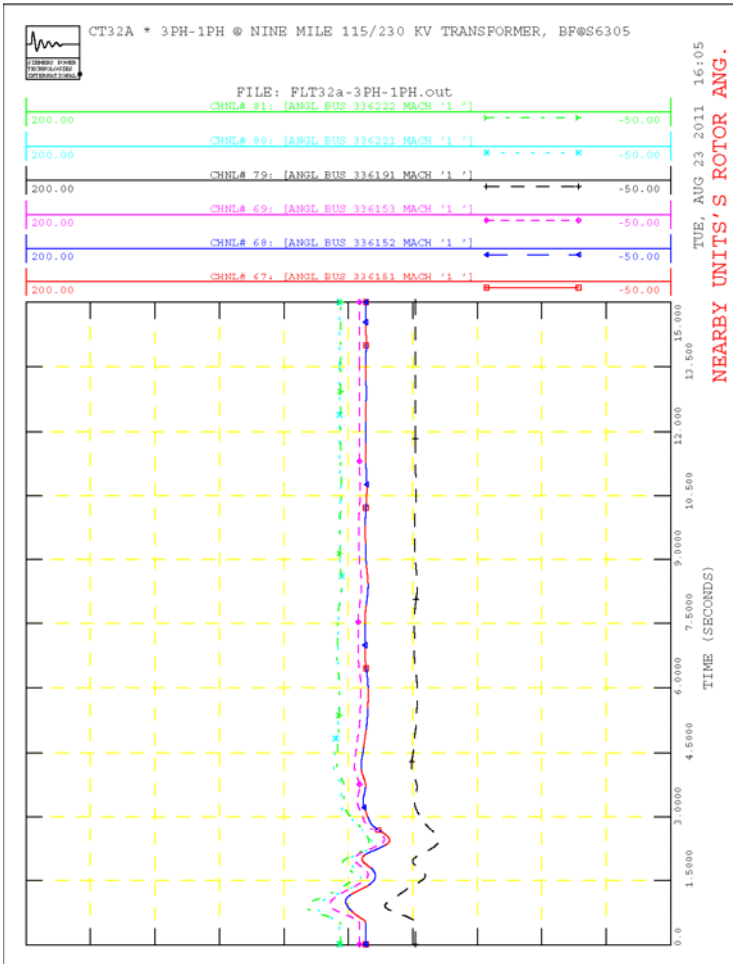
Fault 31a (cont)



Fault 32a

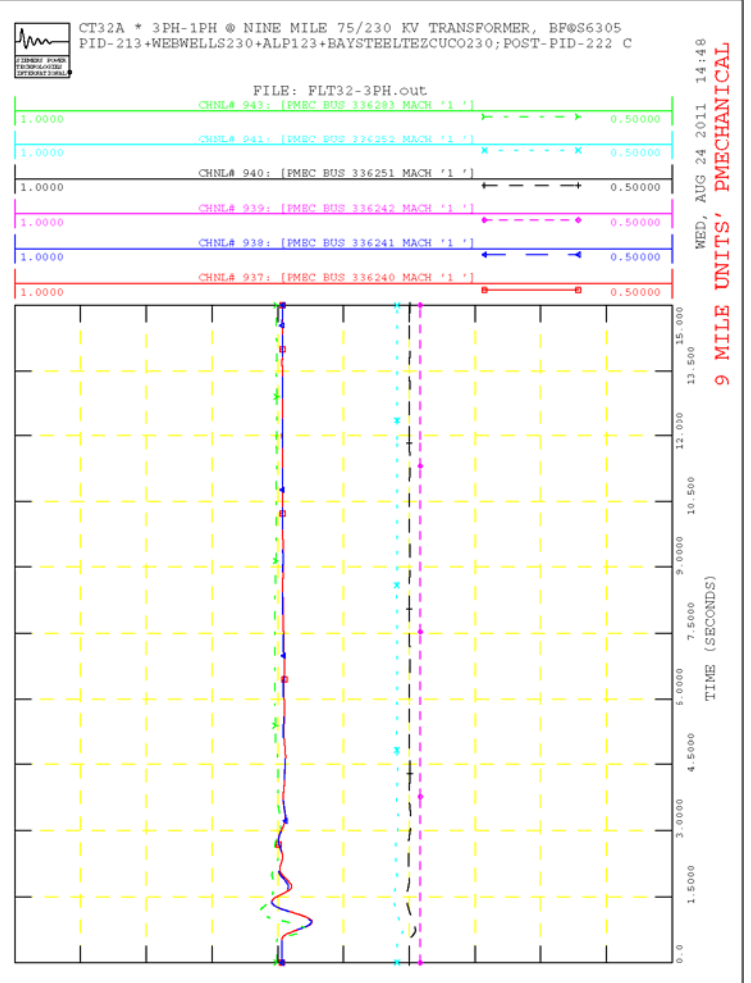
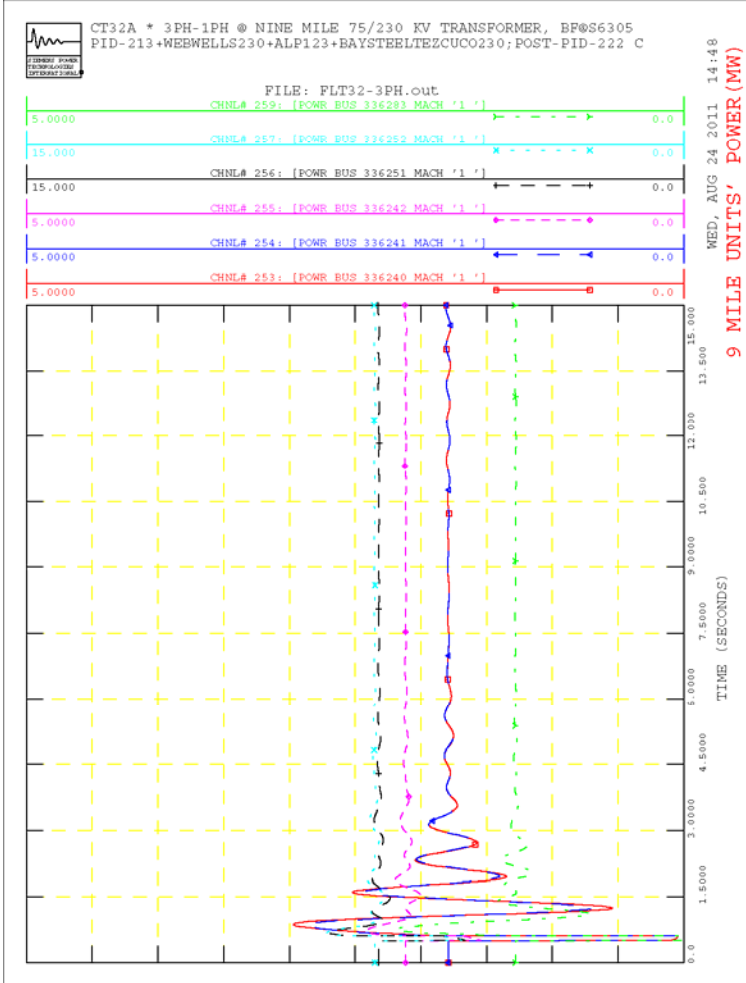
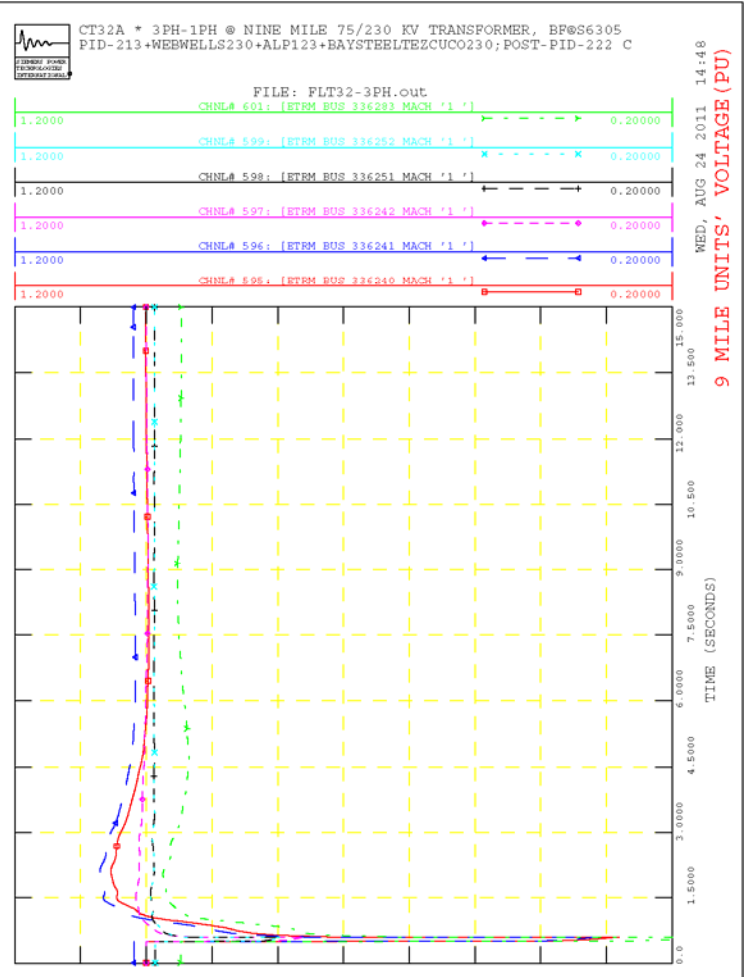
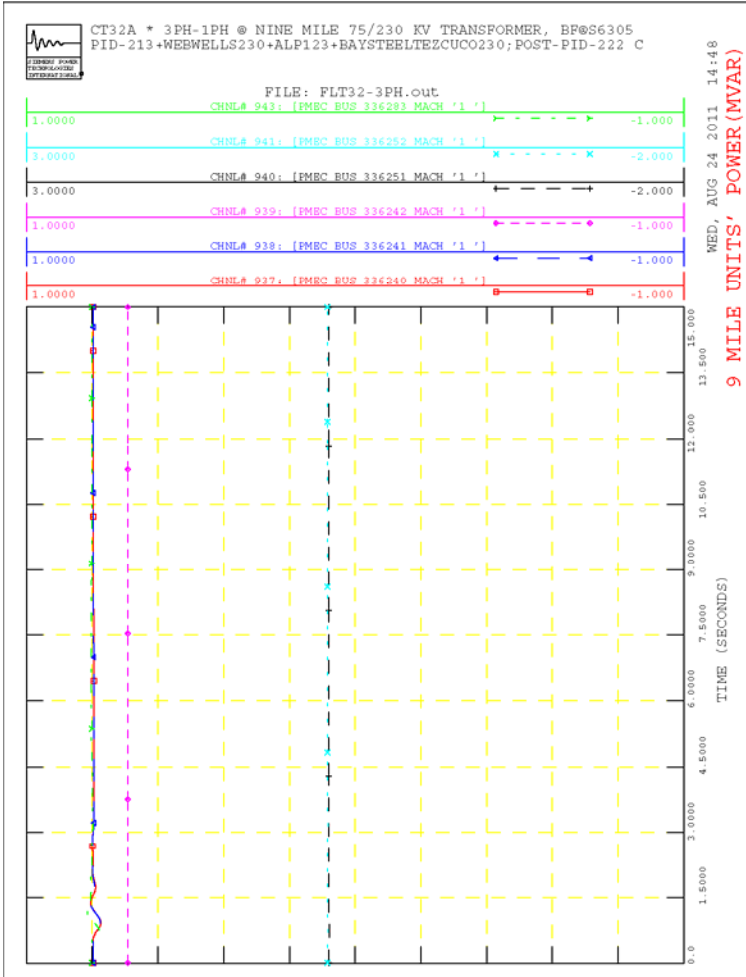


Fault 32a (cont)

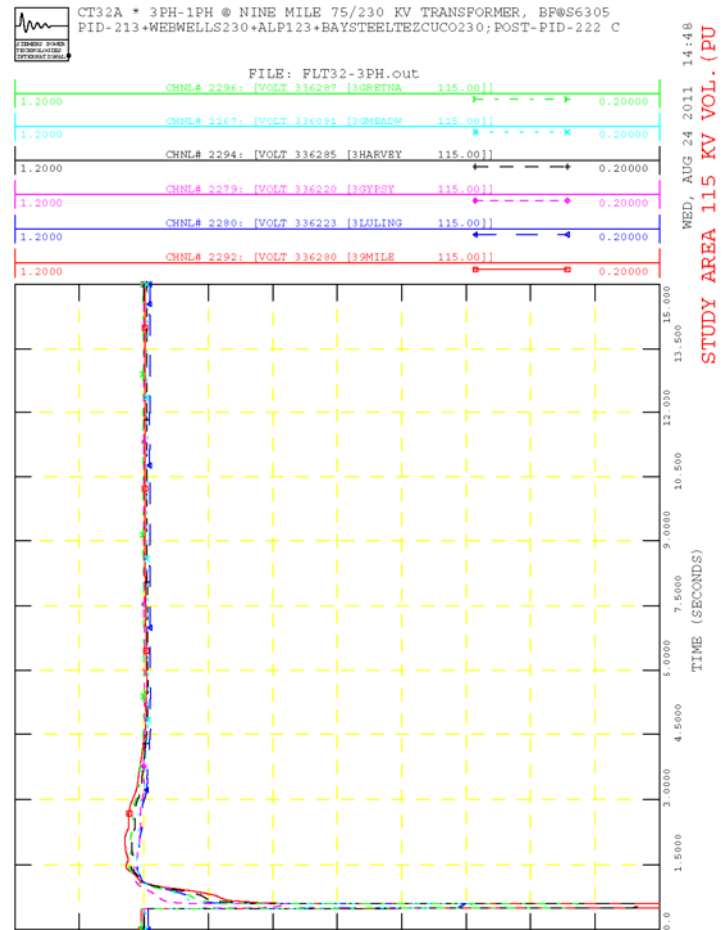
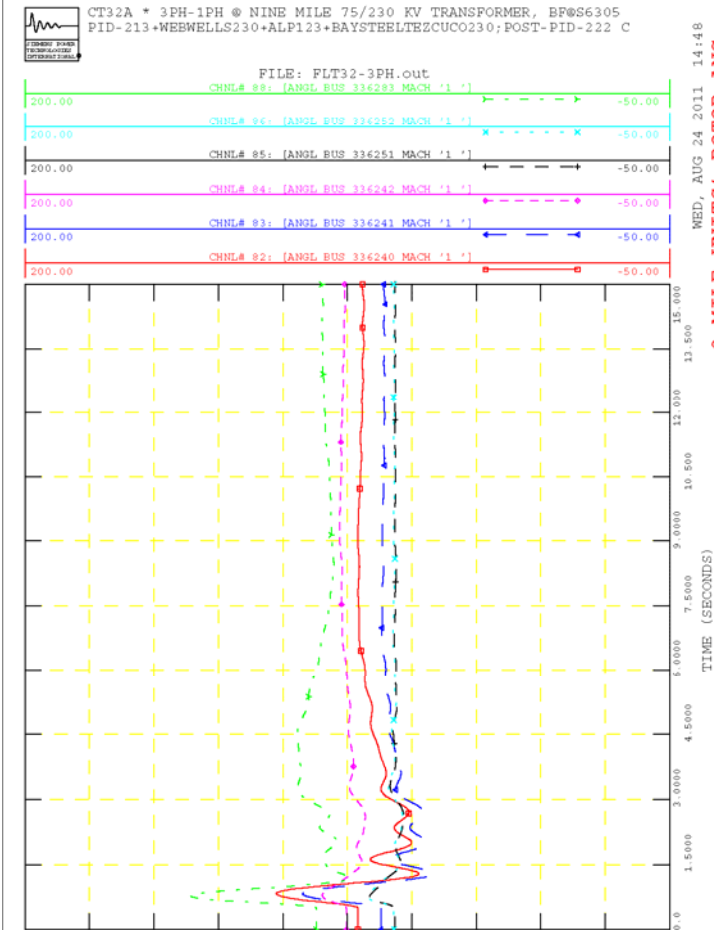
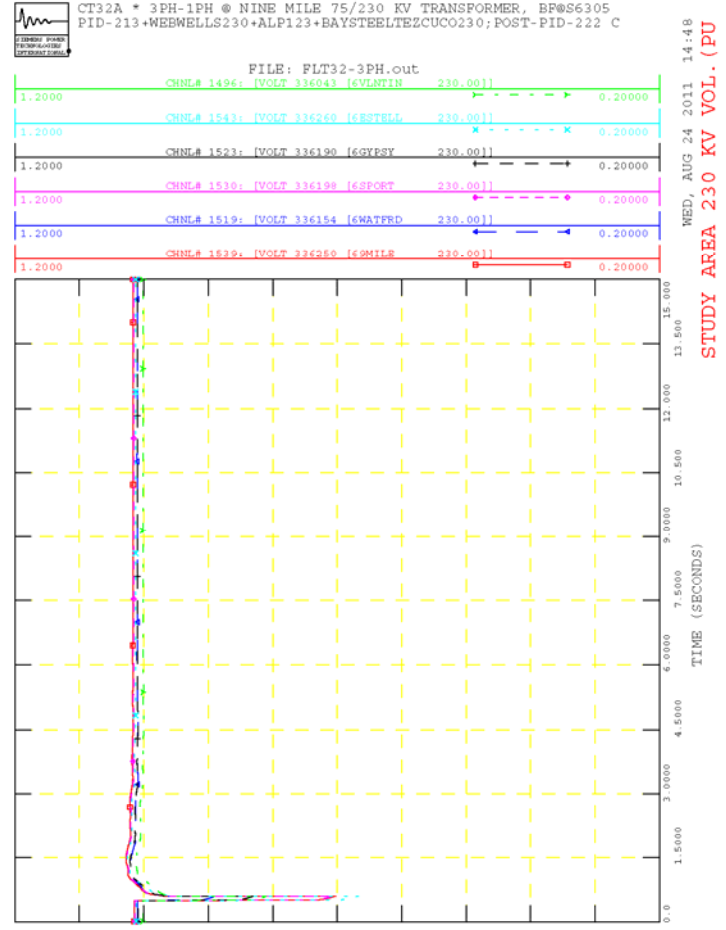
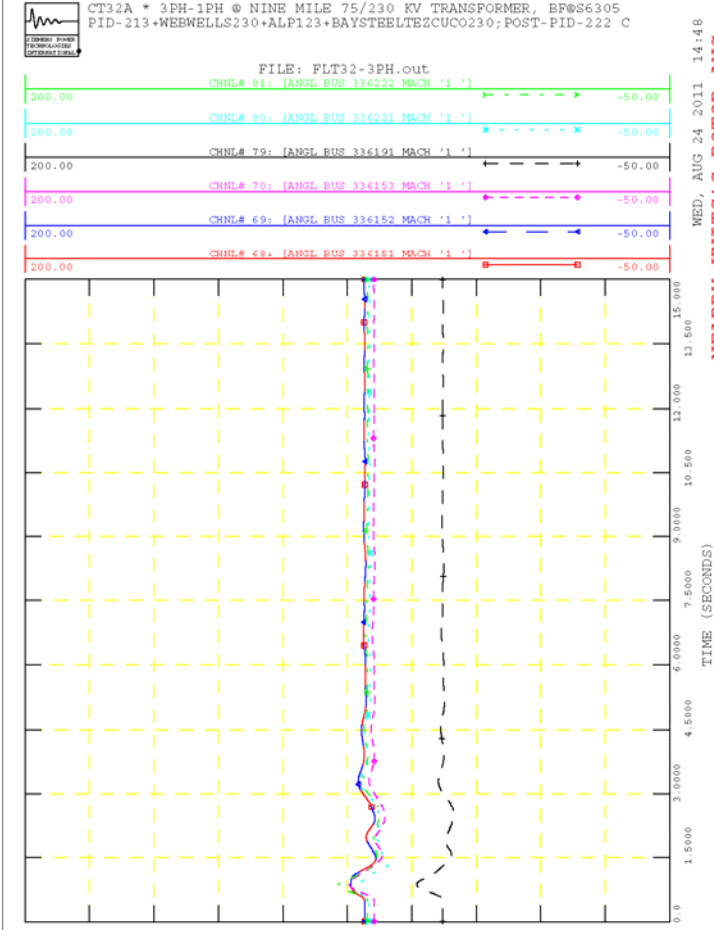


C.1.2 Fault_32a – Three Phase Fault with Normal Clearing

Fault 32a - 3PH

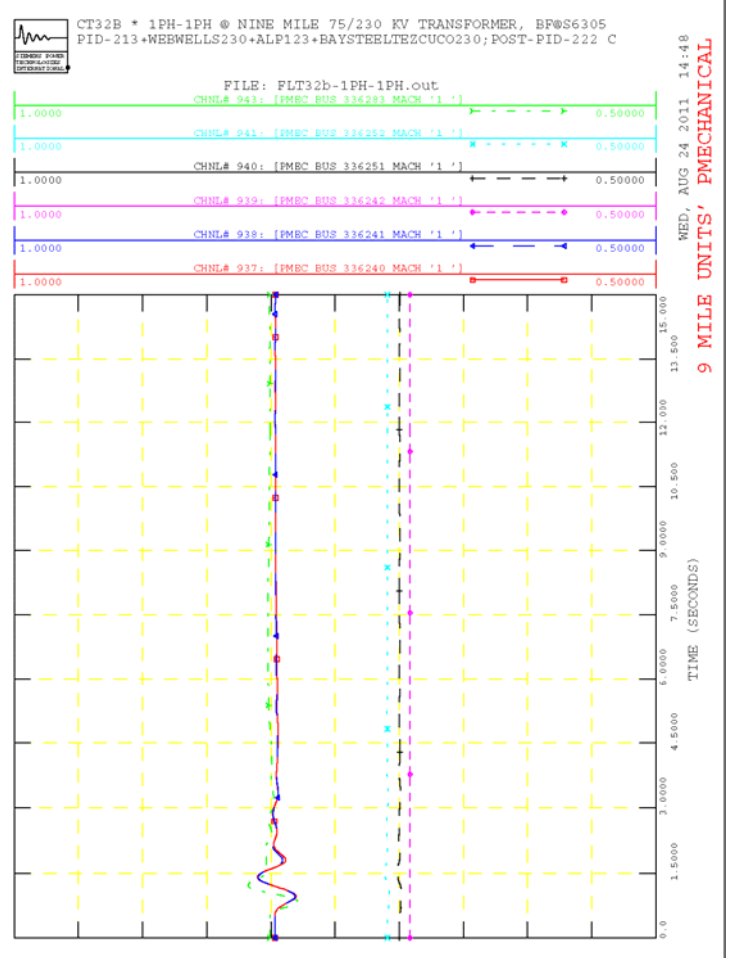
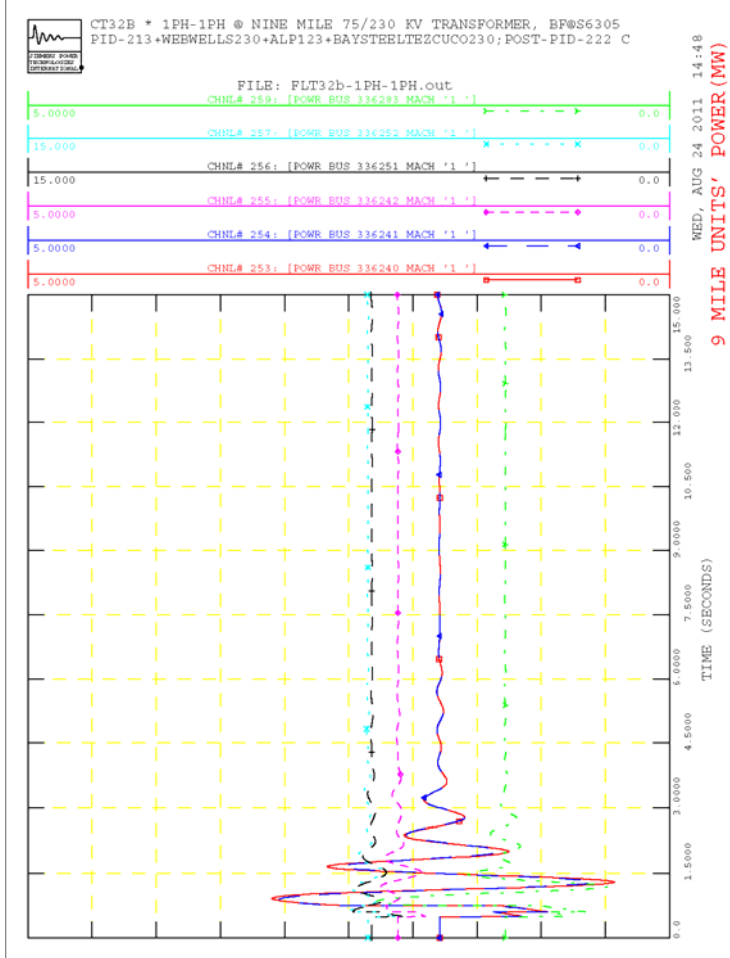
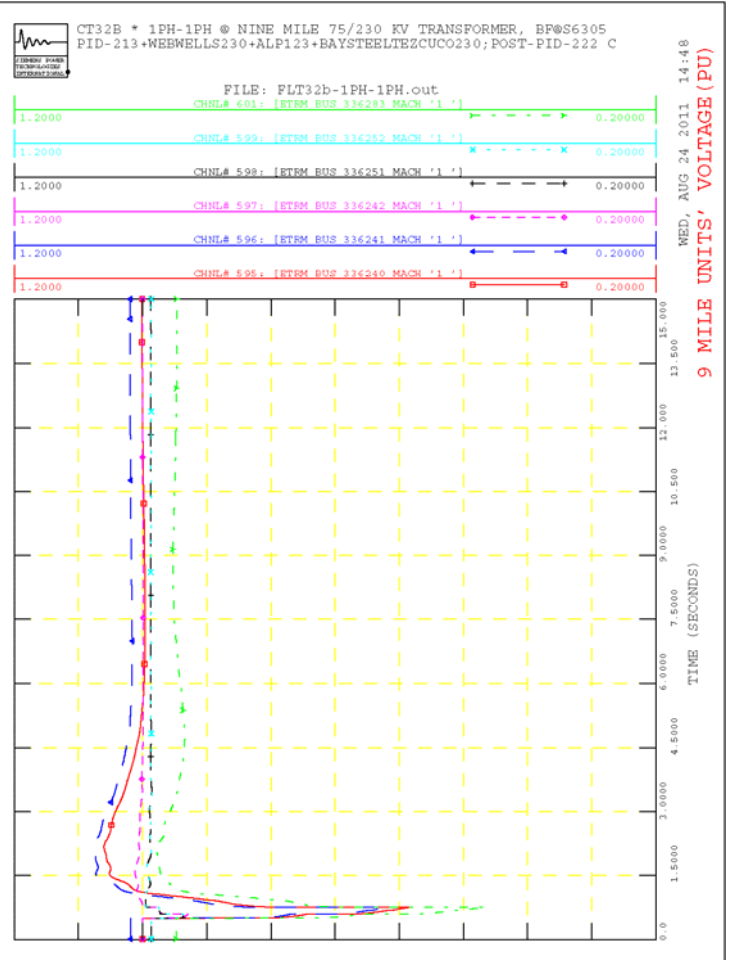
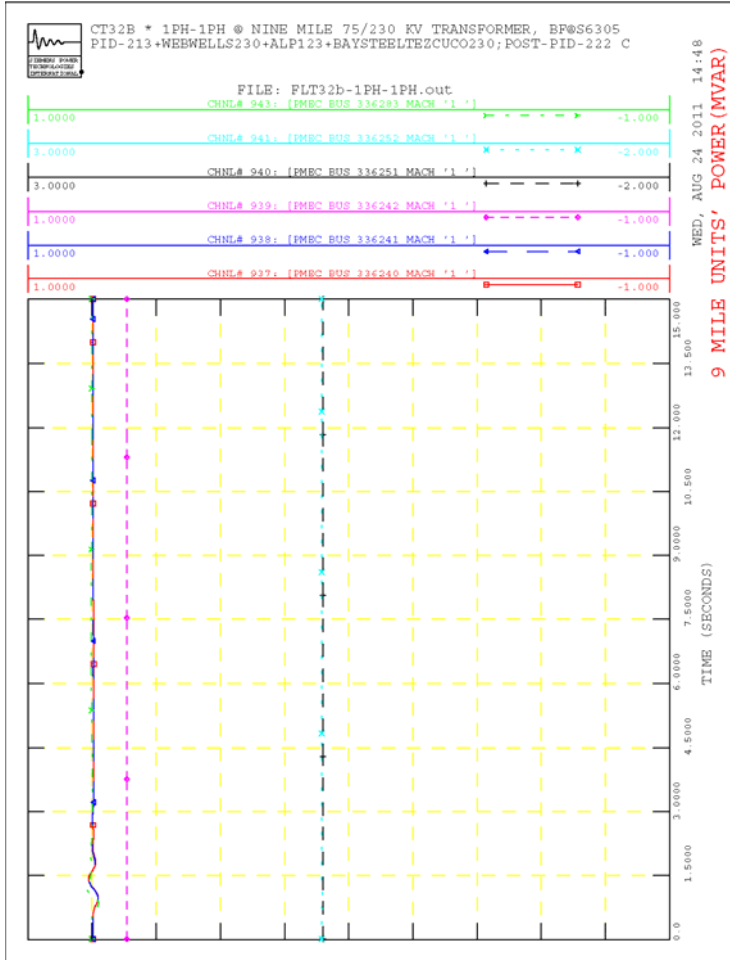


Fault 32a – 3PH (cont)

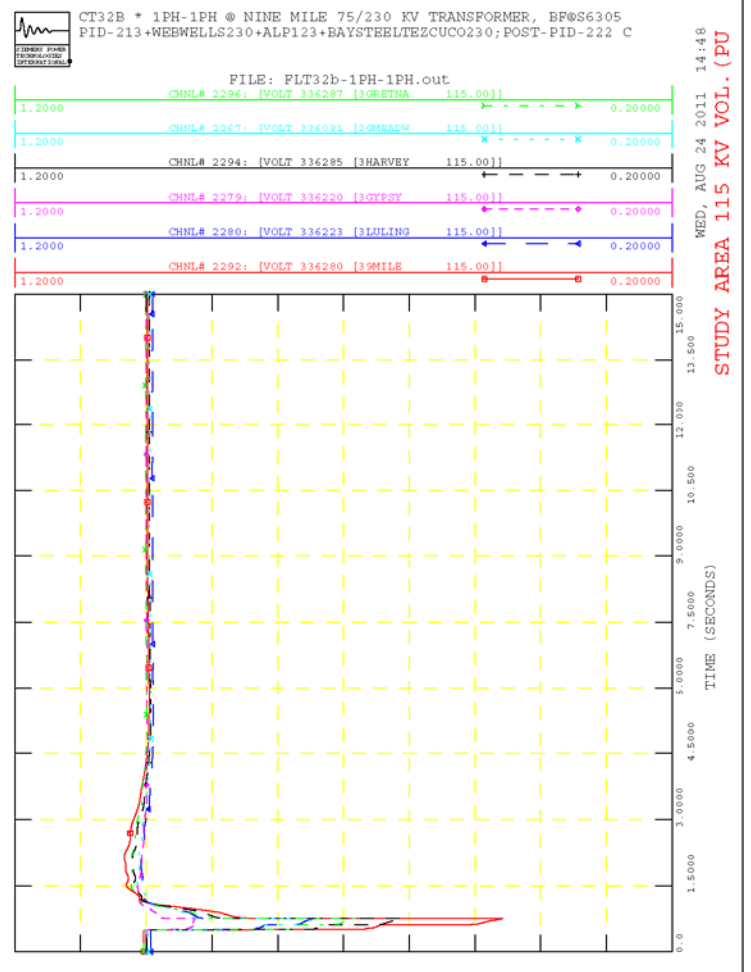
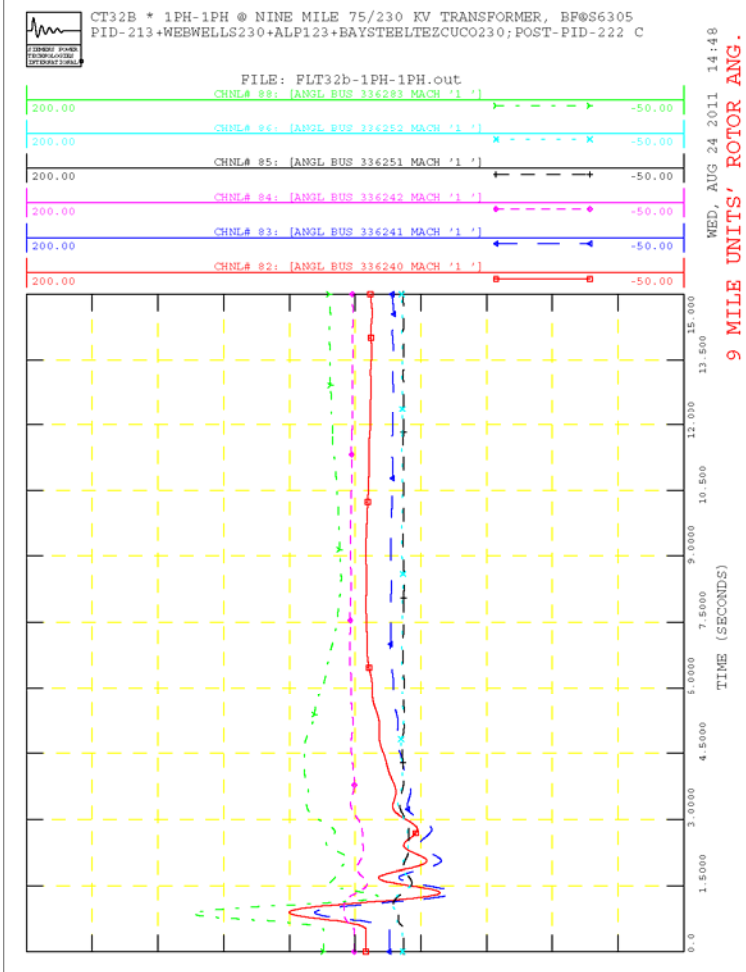
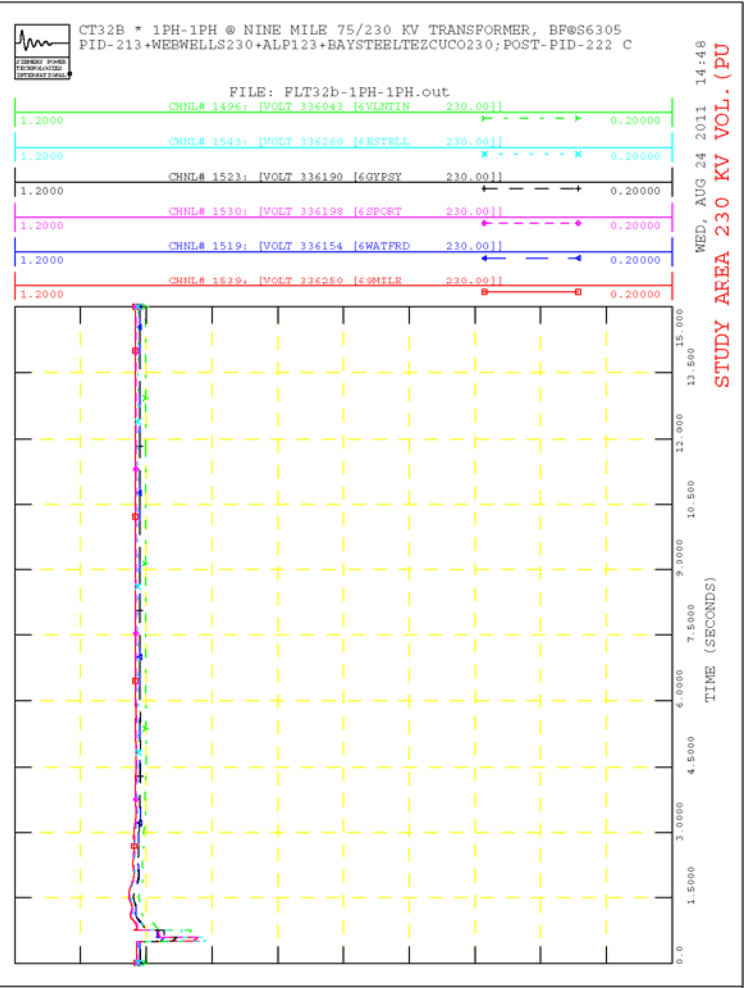
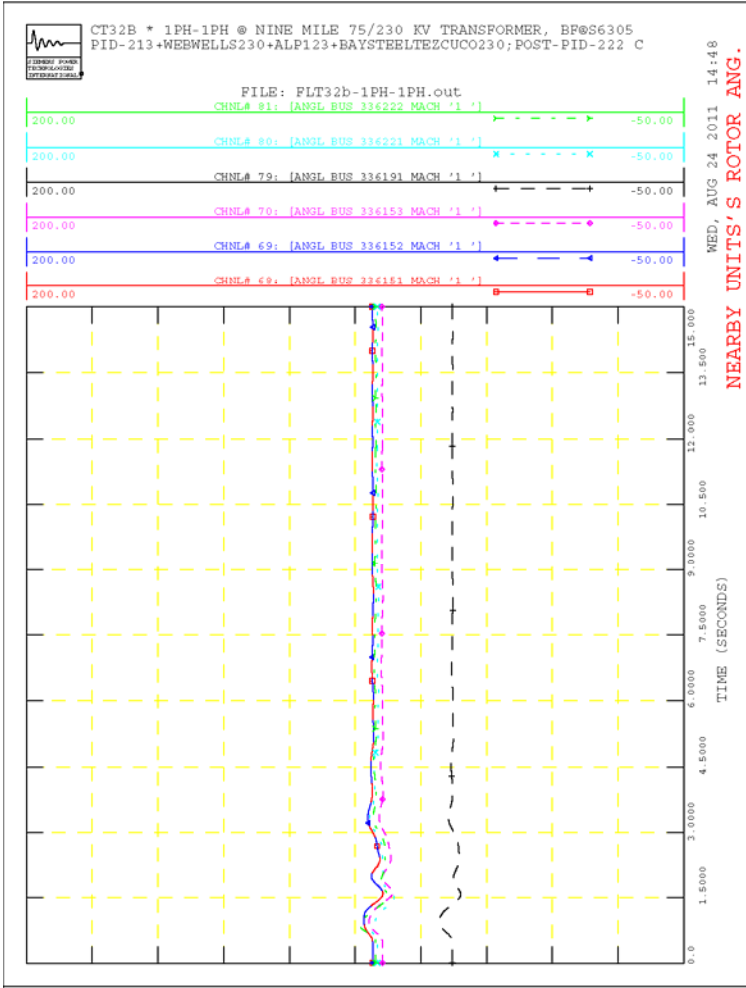


C.1.3 Fault_32a – Single Line to Ground Fault with Stuck Breaker

Fault 32a – SLG SB



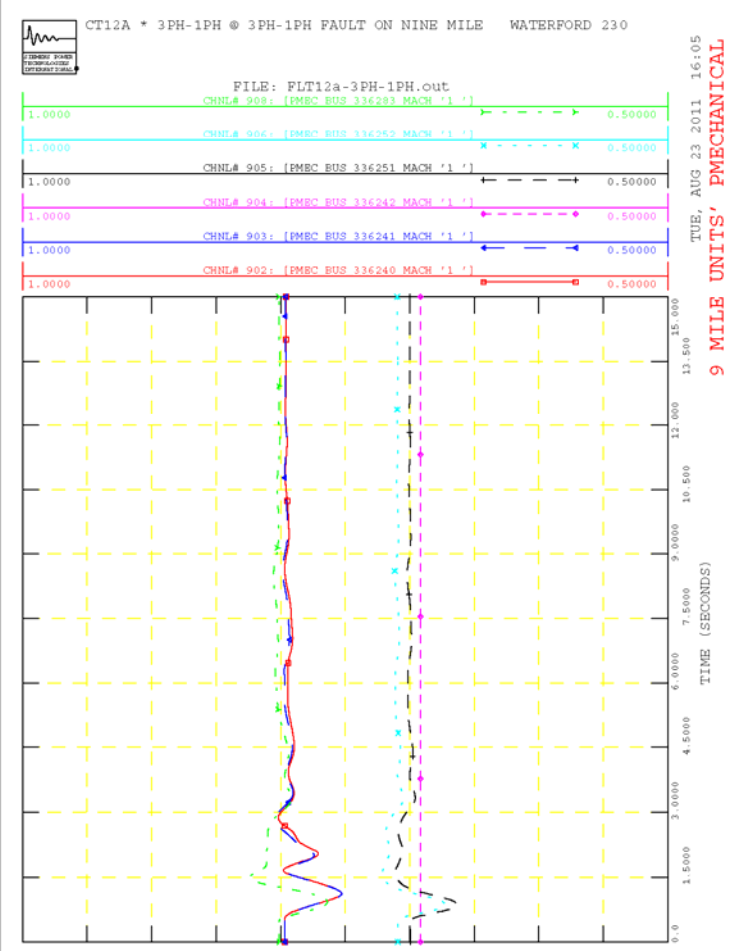
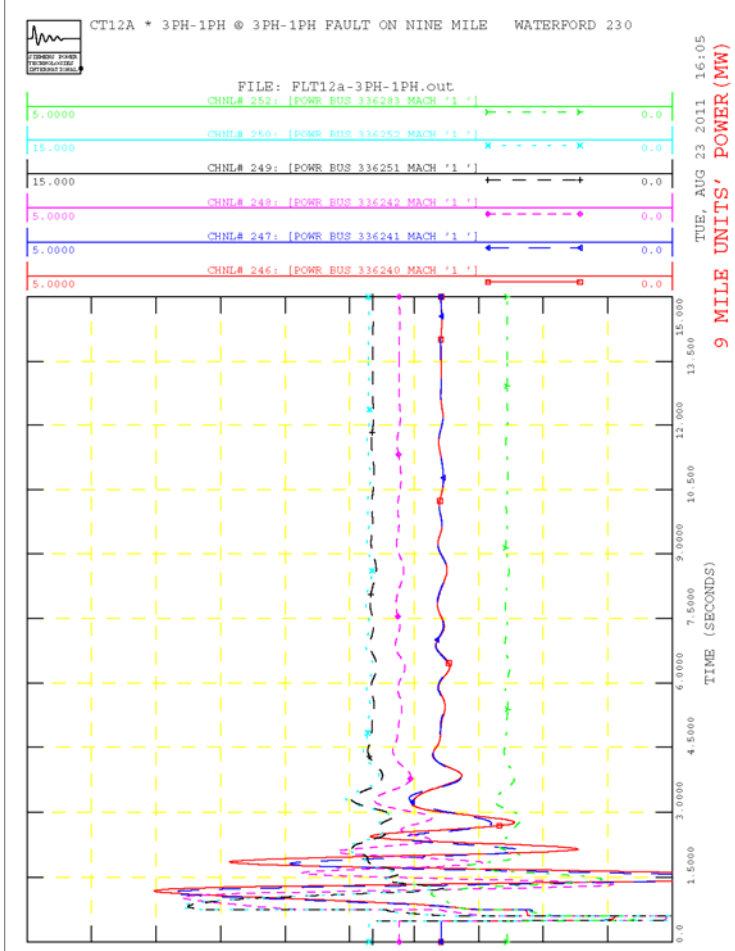
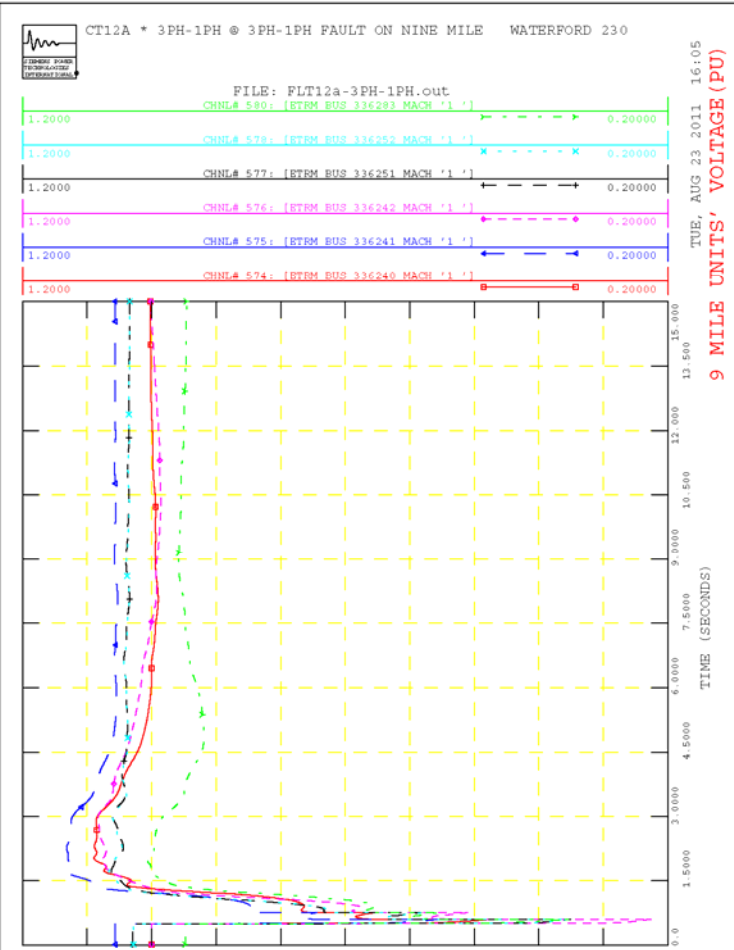
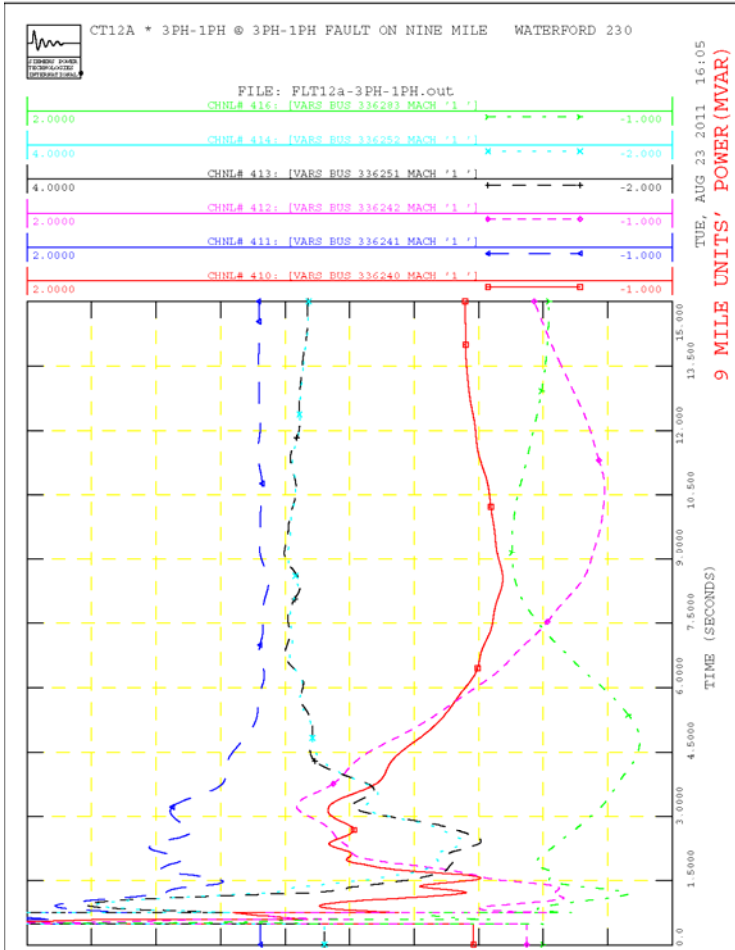
Fault 32a – SLG SB (cont)



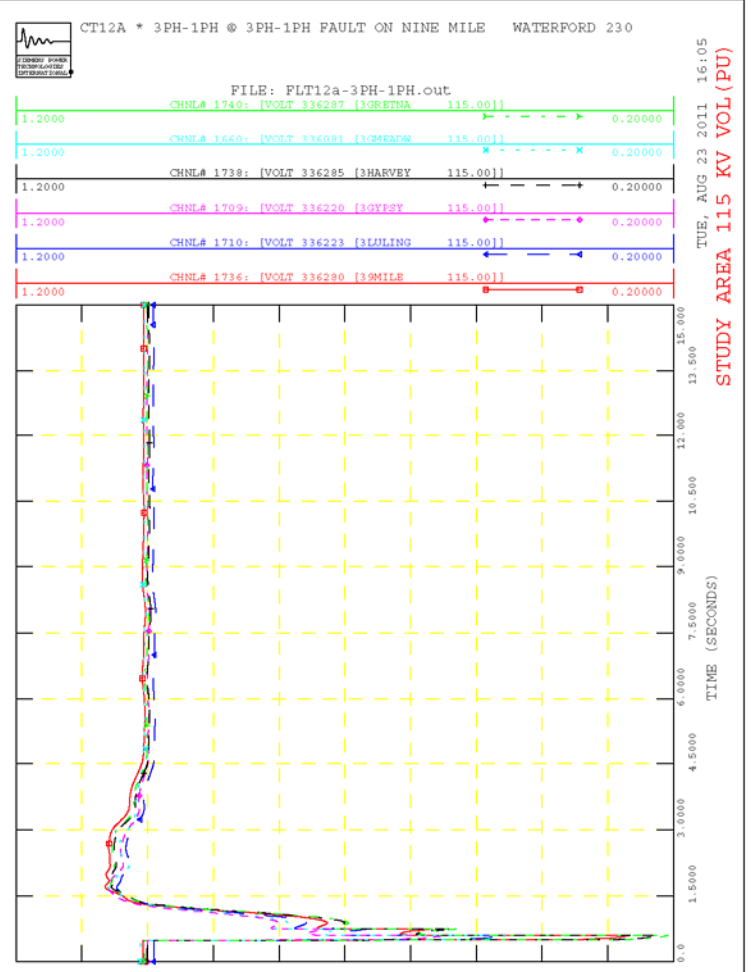
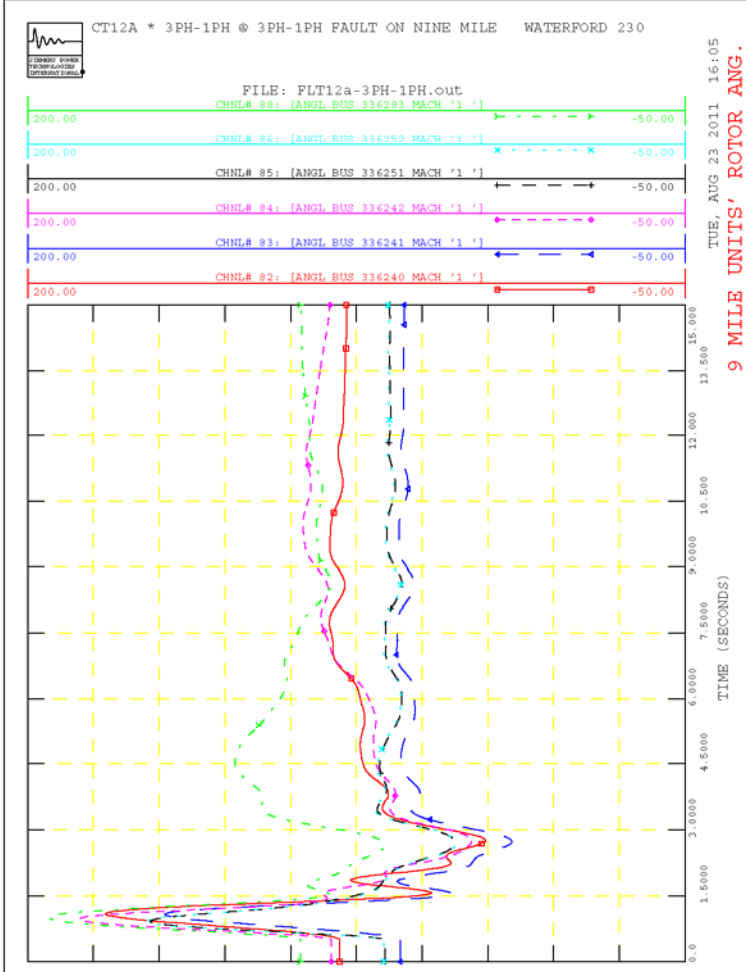
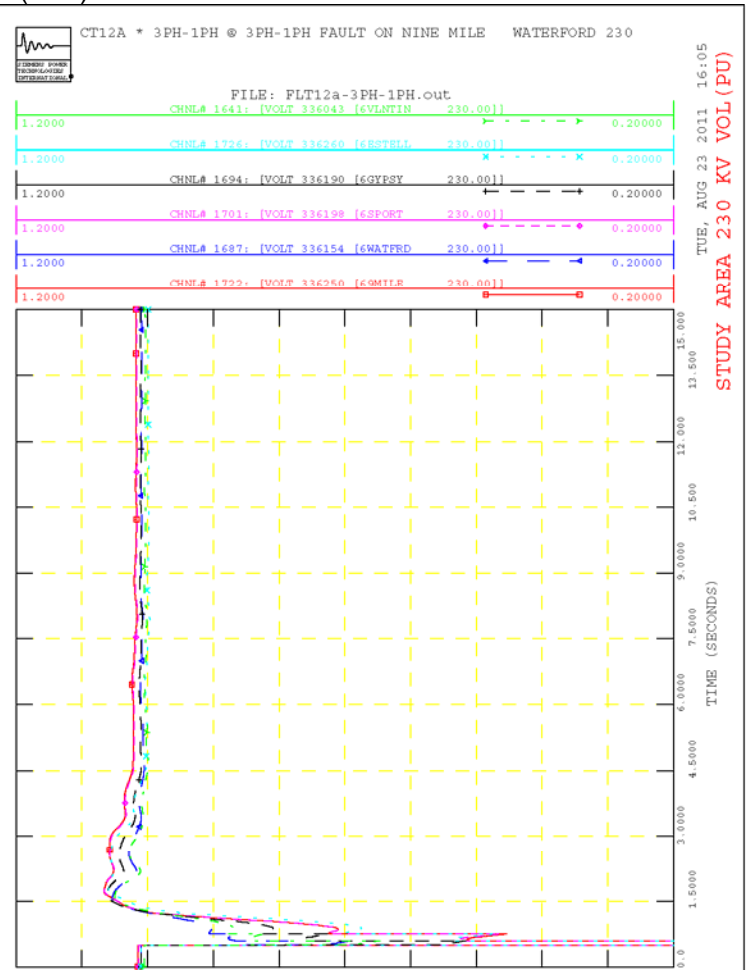
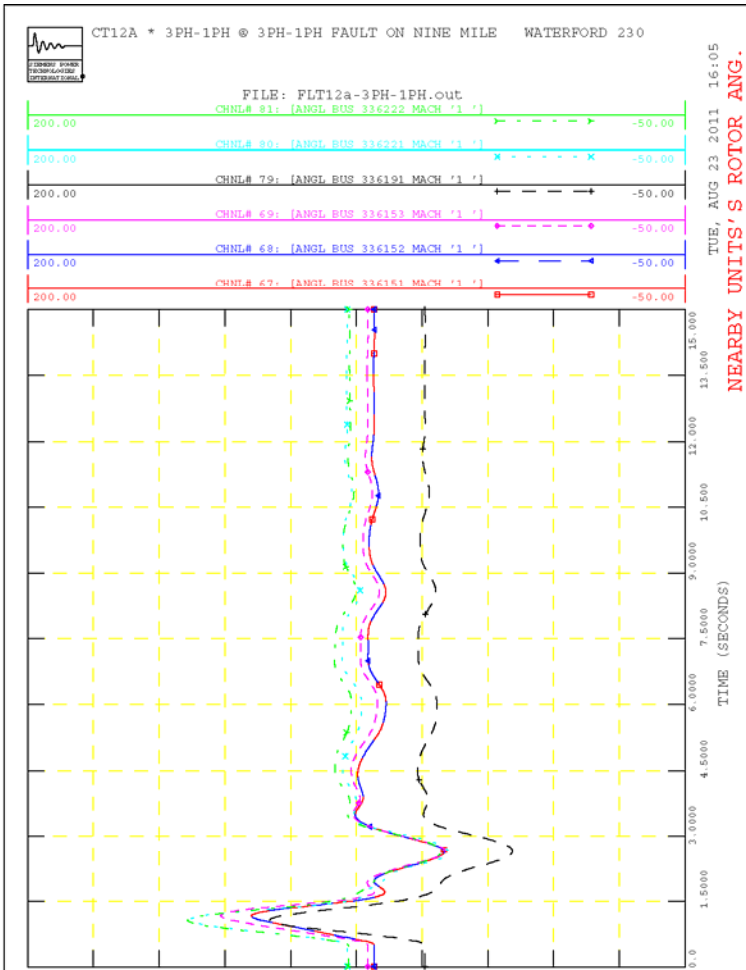
C.2 Phase 2 – 2014 Summer Peak Load Flow Model with PID 228

C.2.1 Three Phase Faults with Stuck Breaker

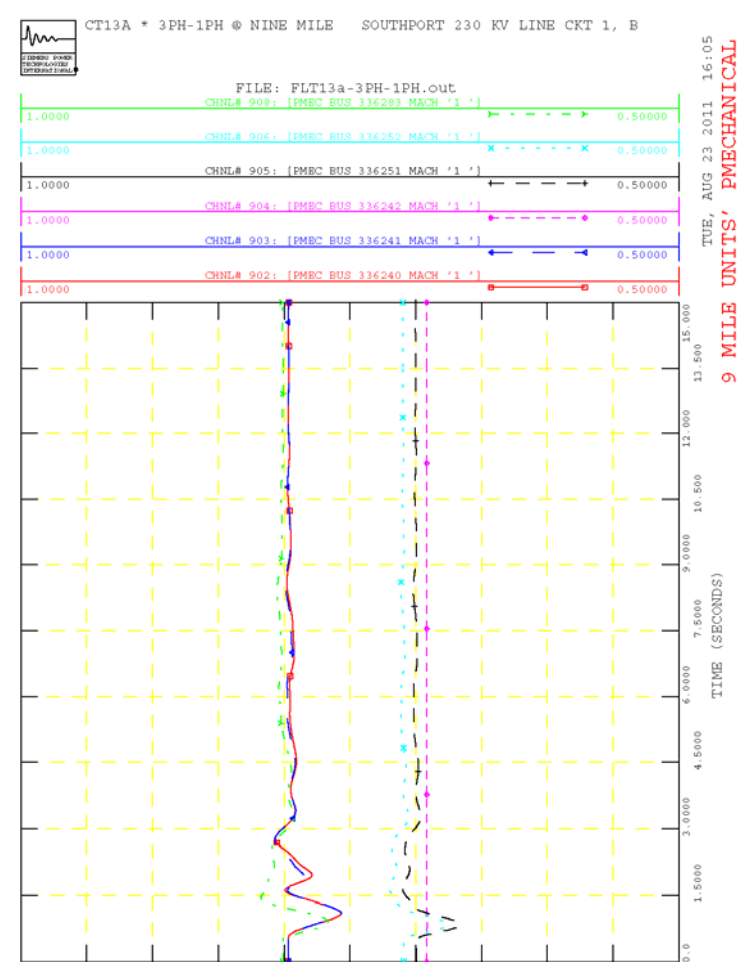
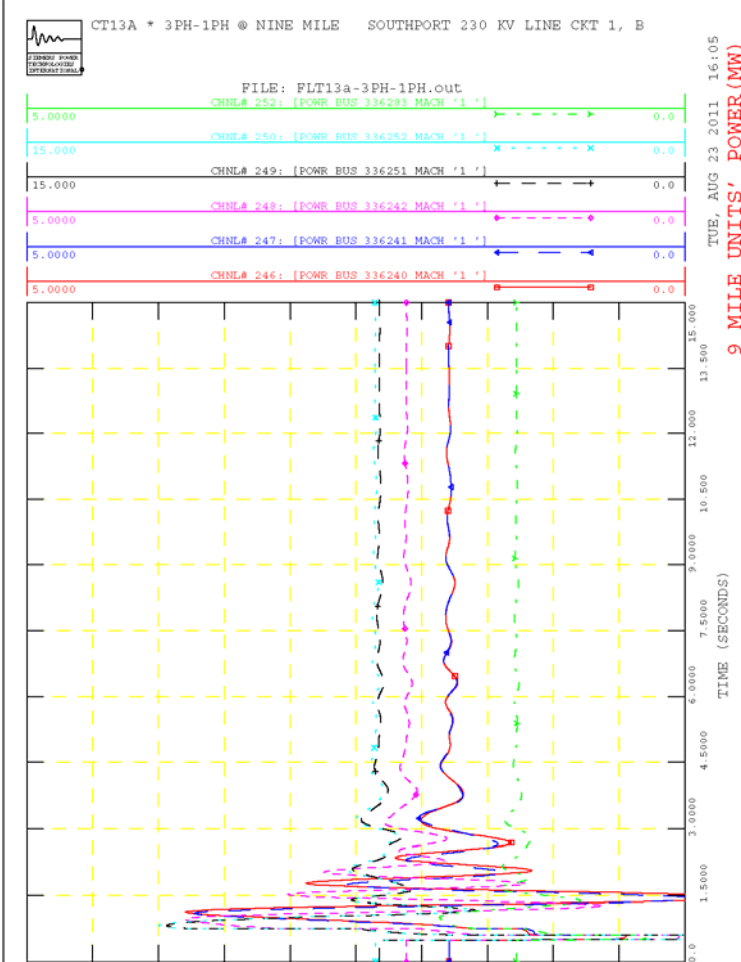
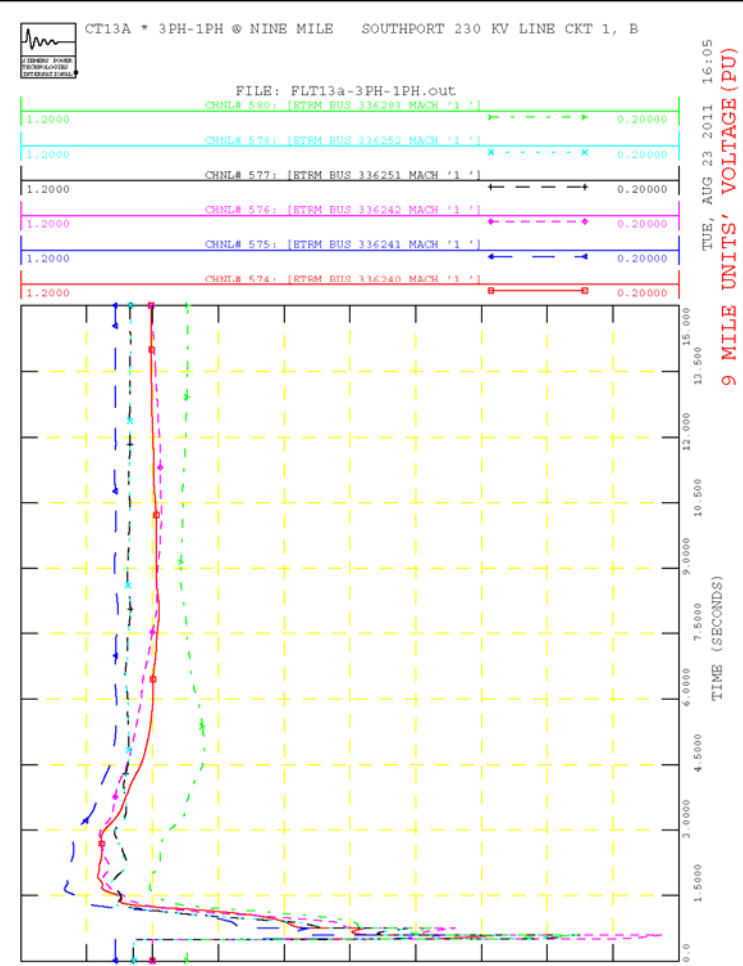
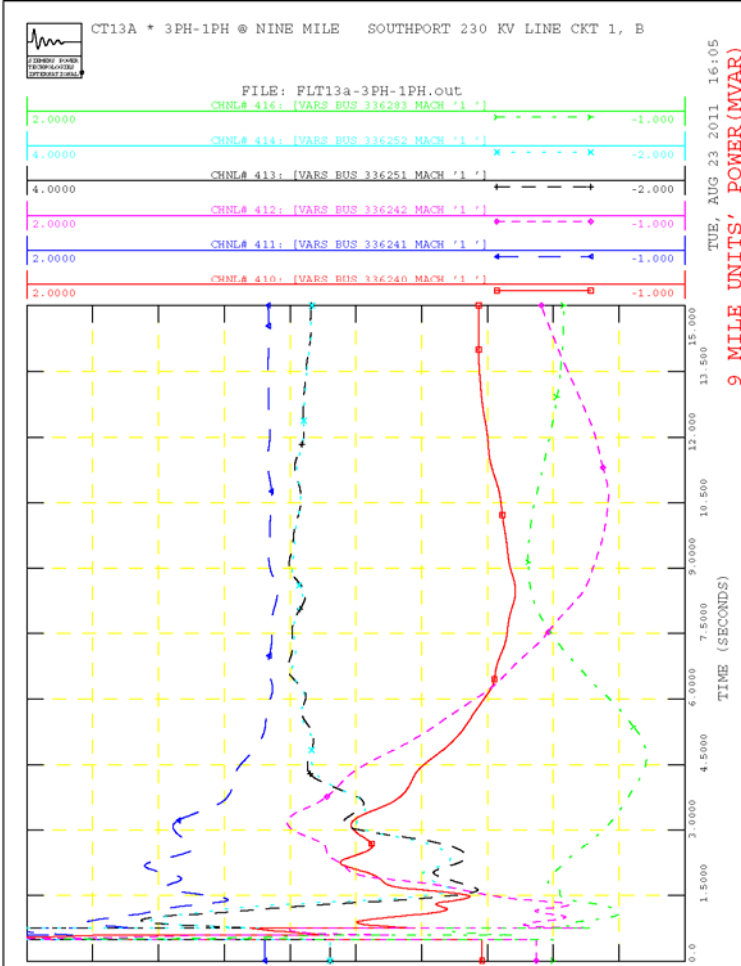
Fault 12a



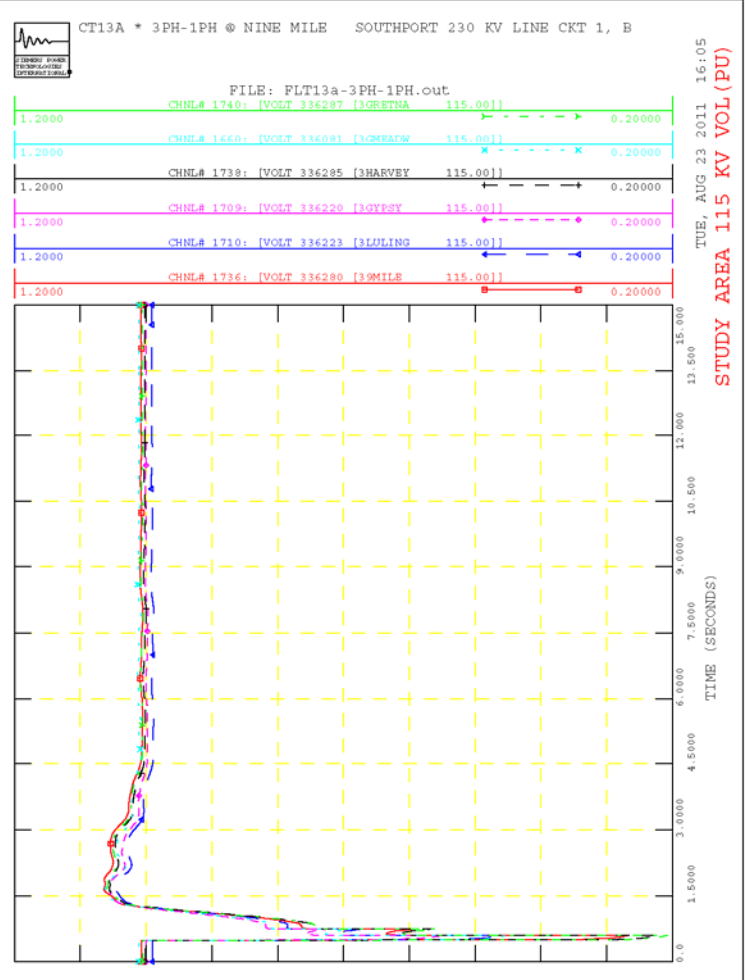
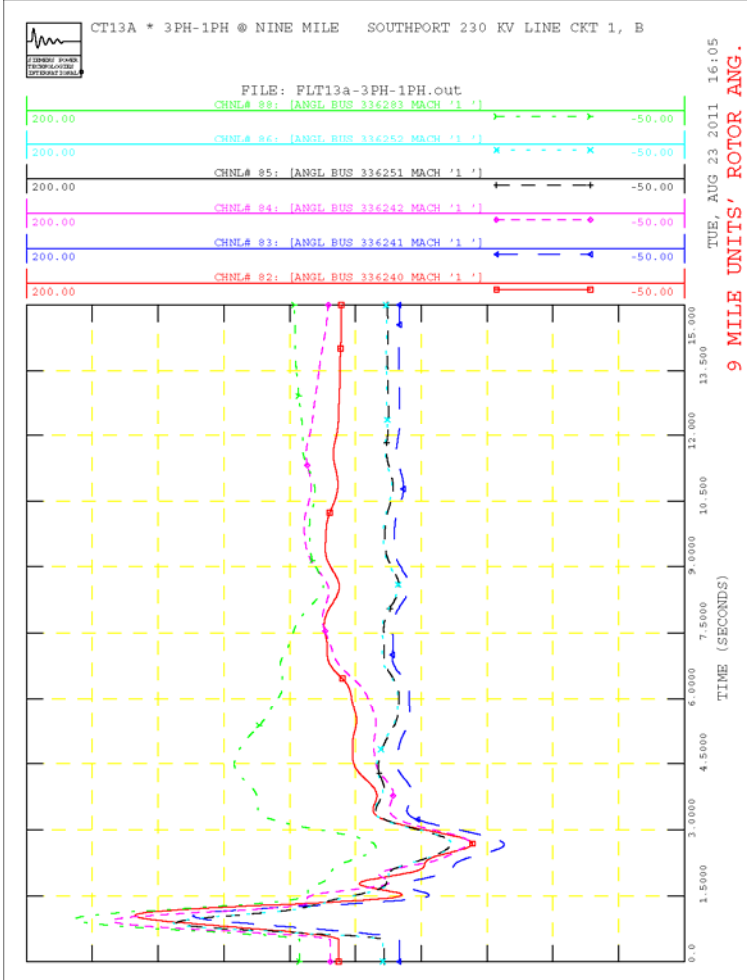
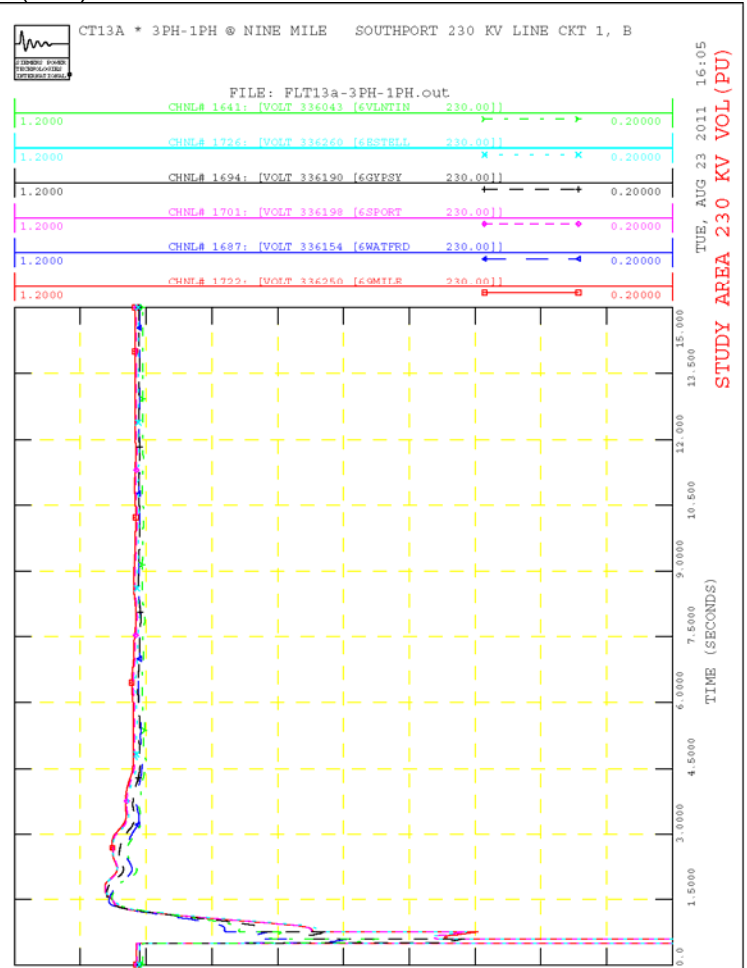
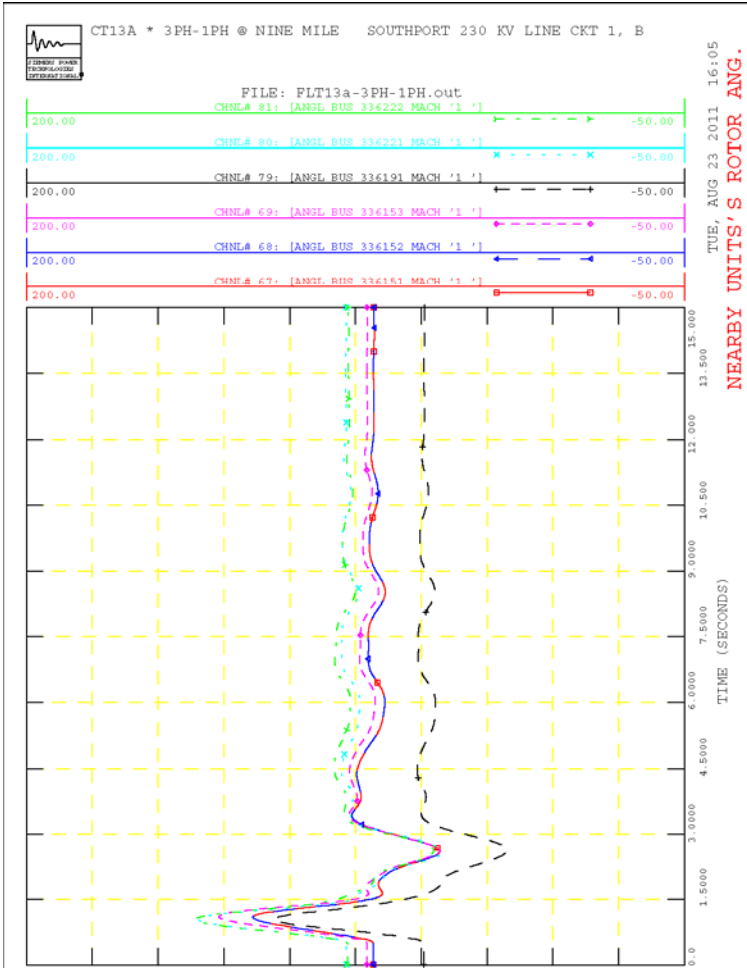
Fault 12a (cont)



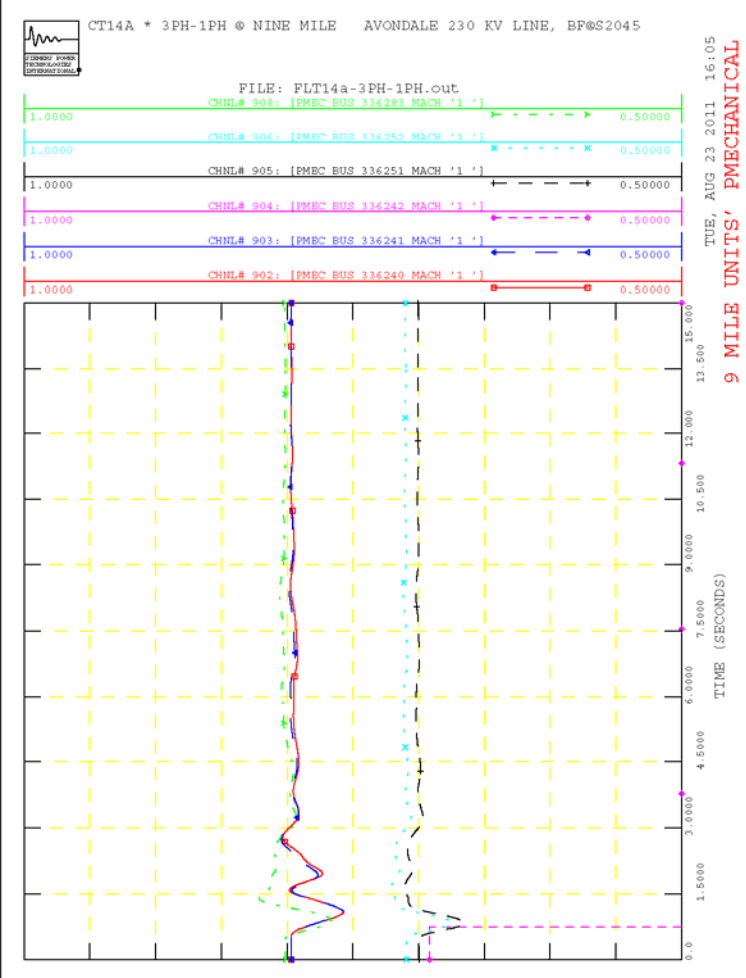
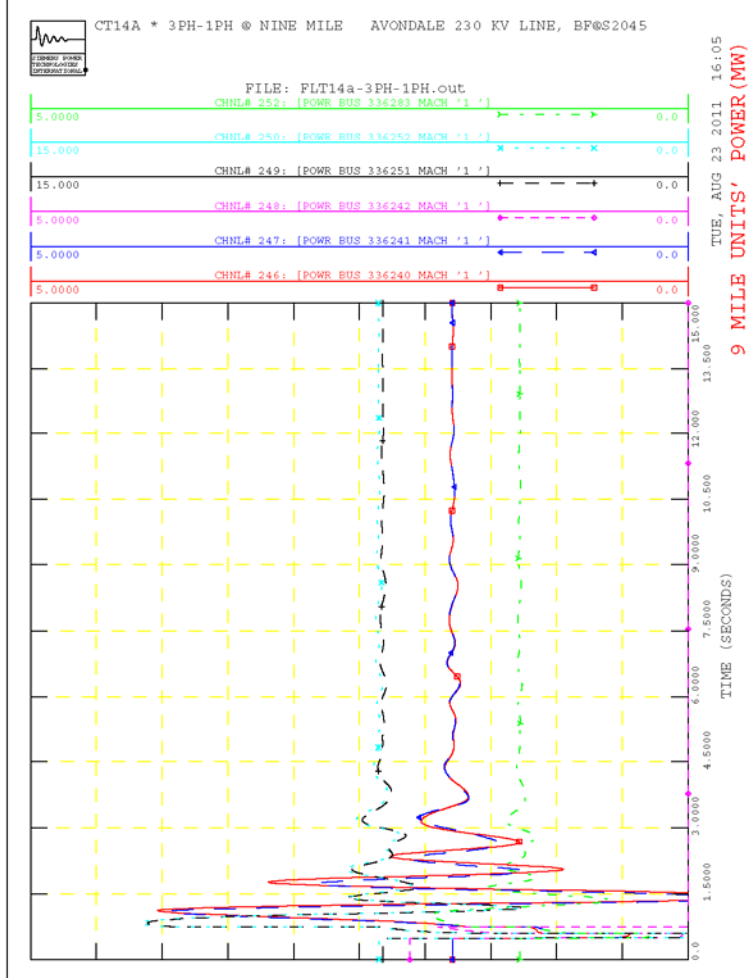
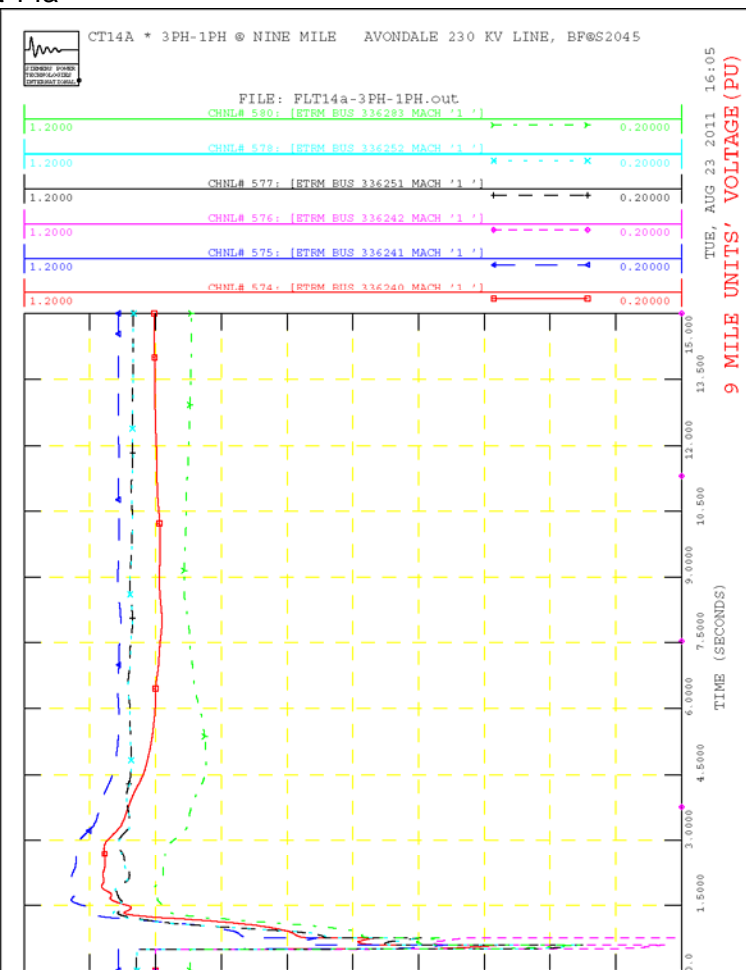
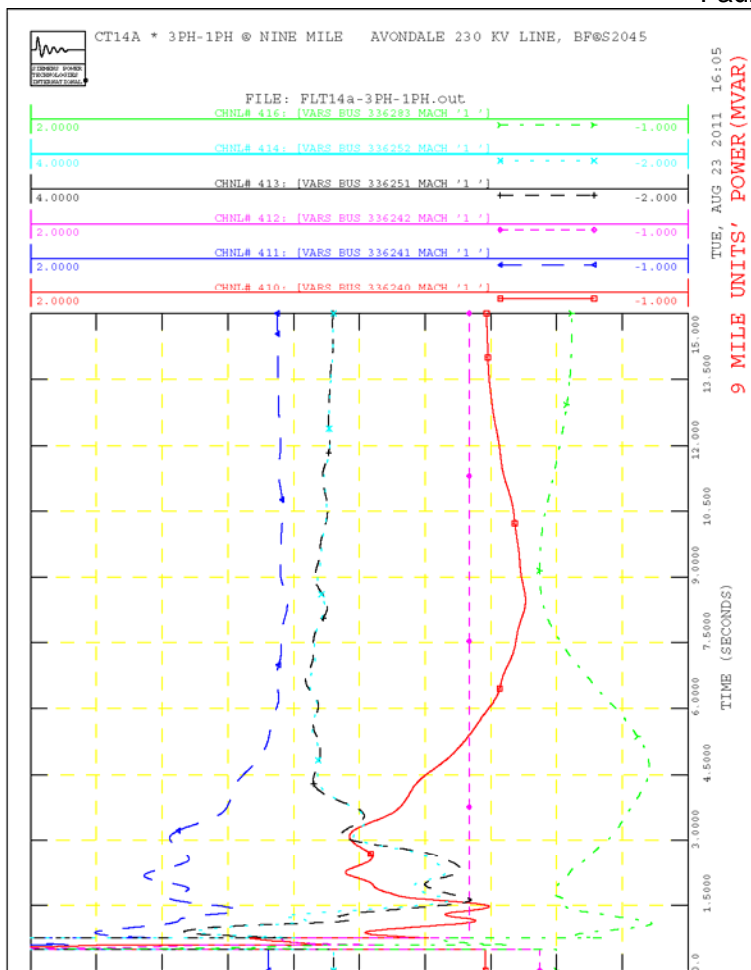
Fault 13a



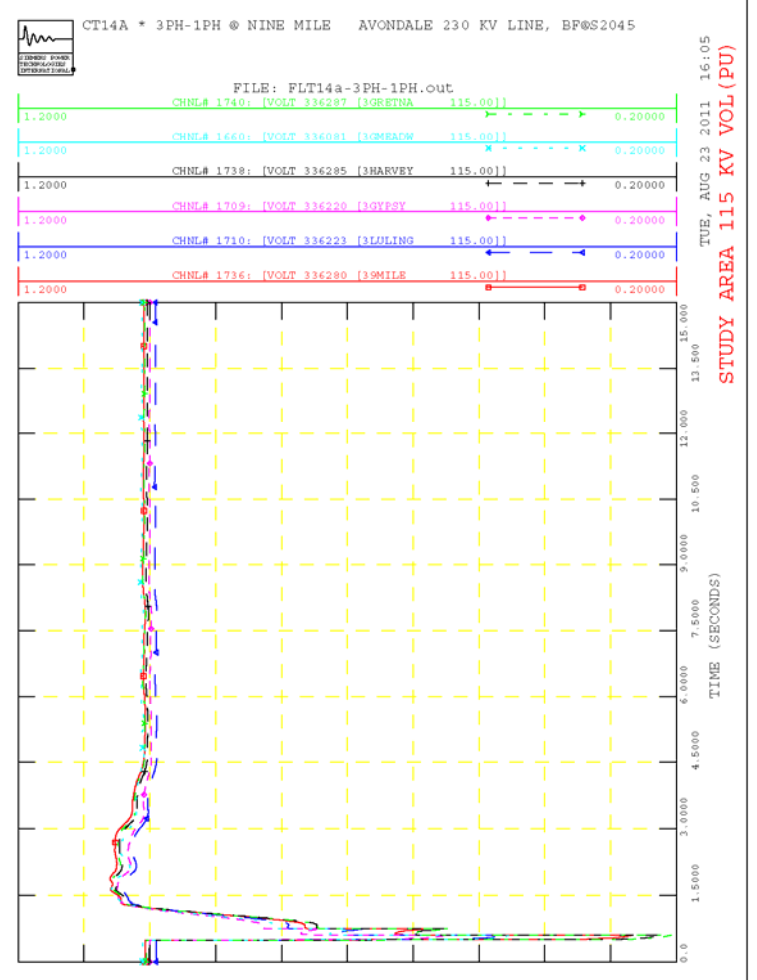
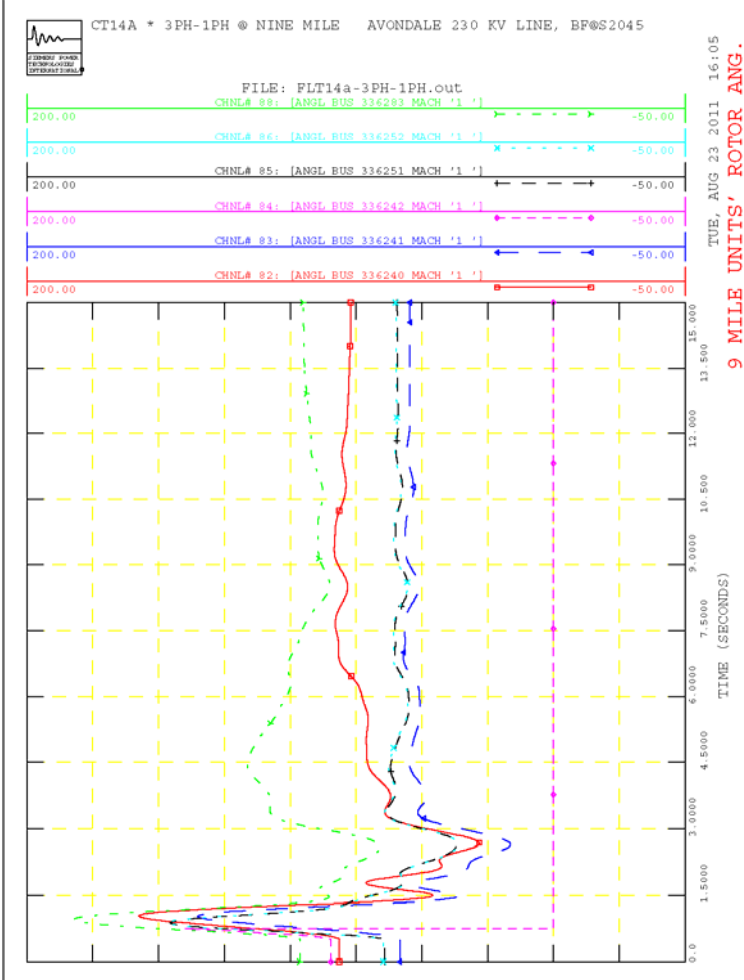
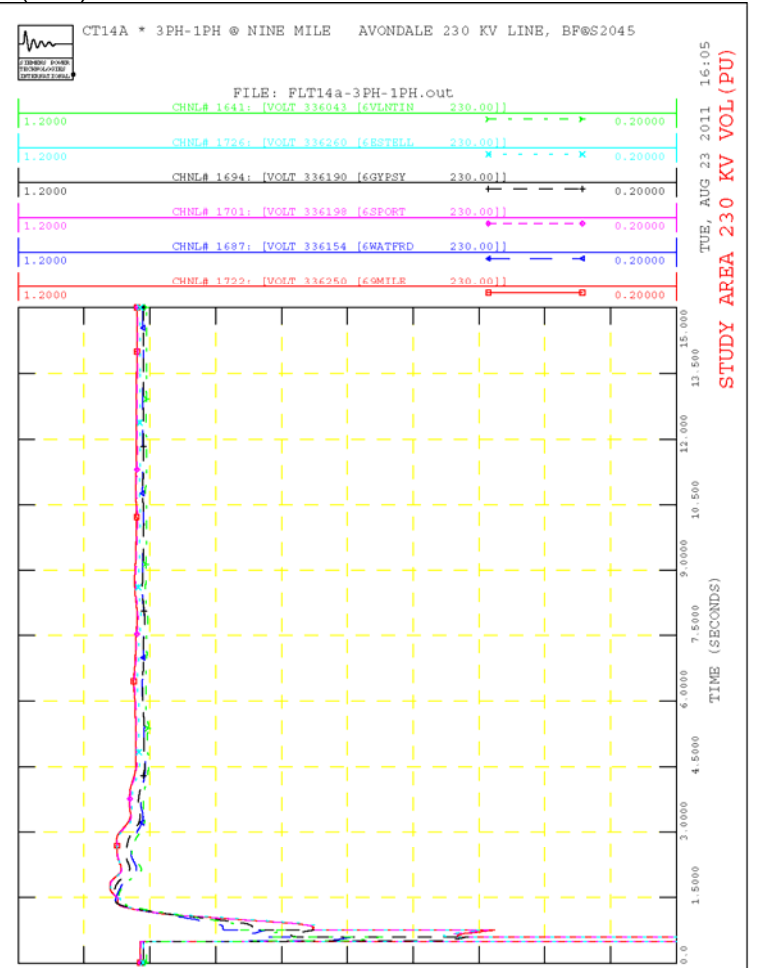
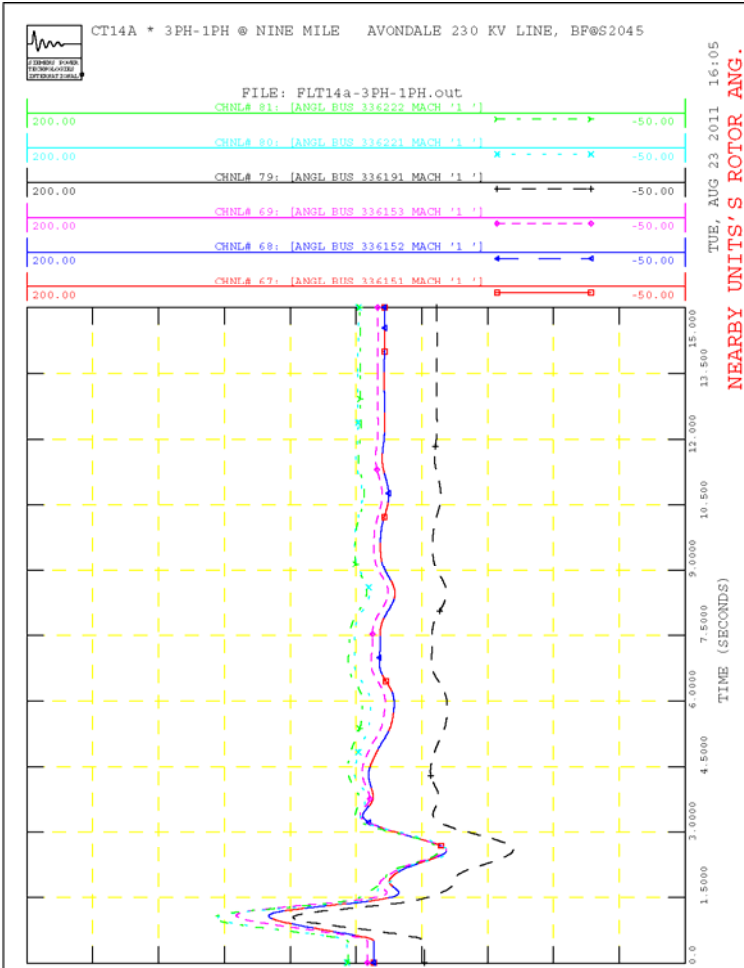
Fault 13a (cont)



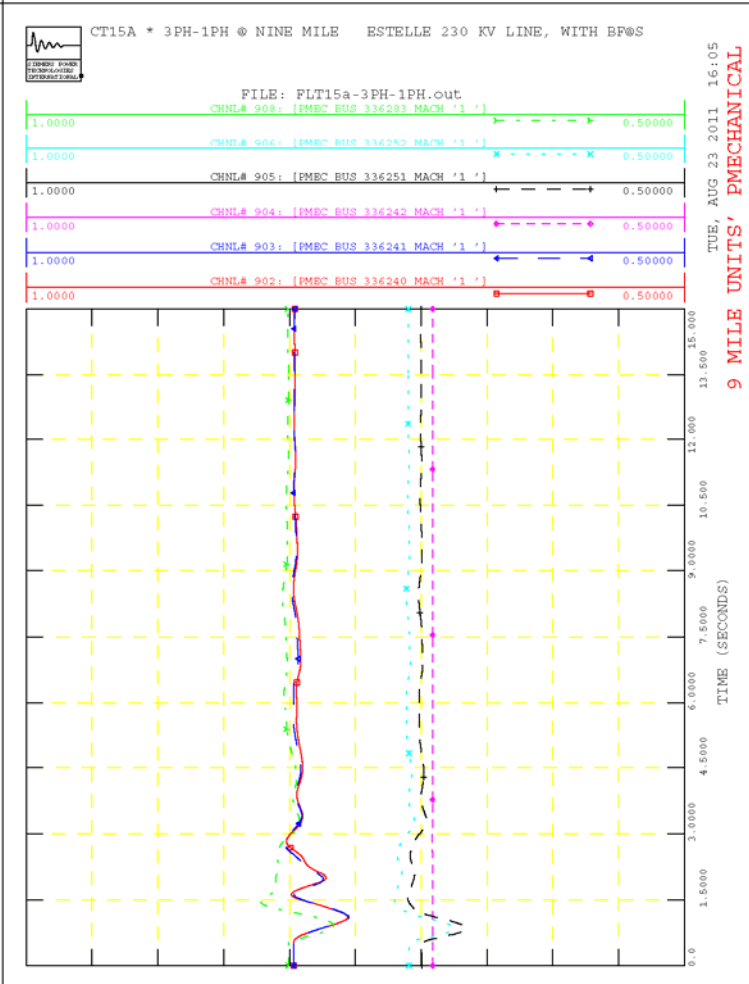
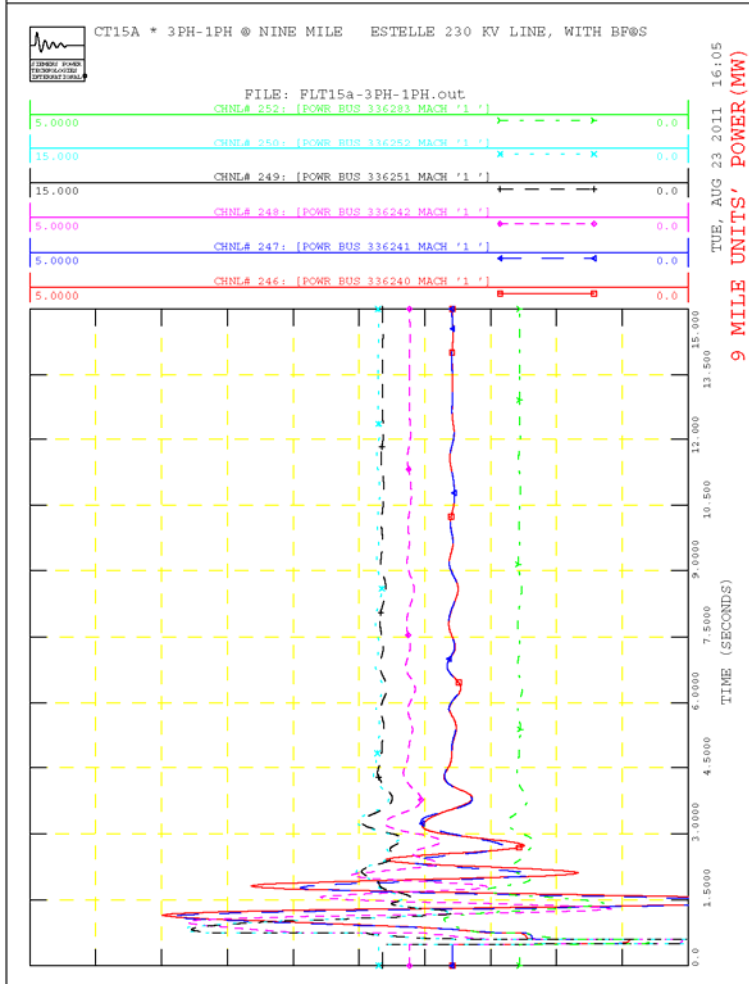
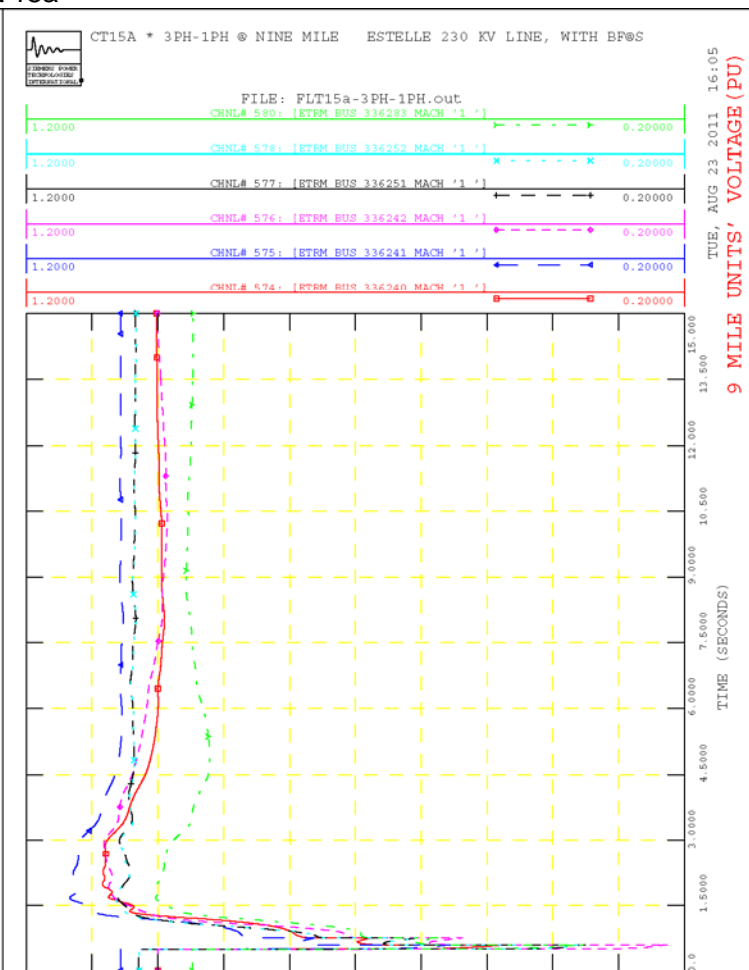
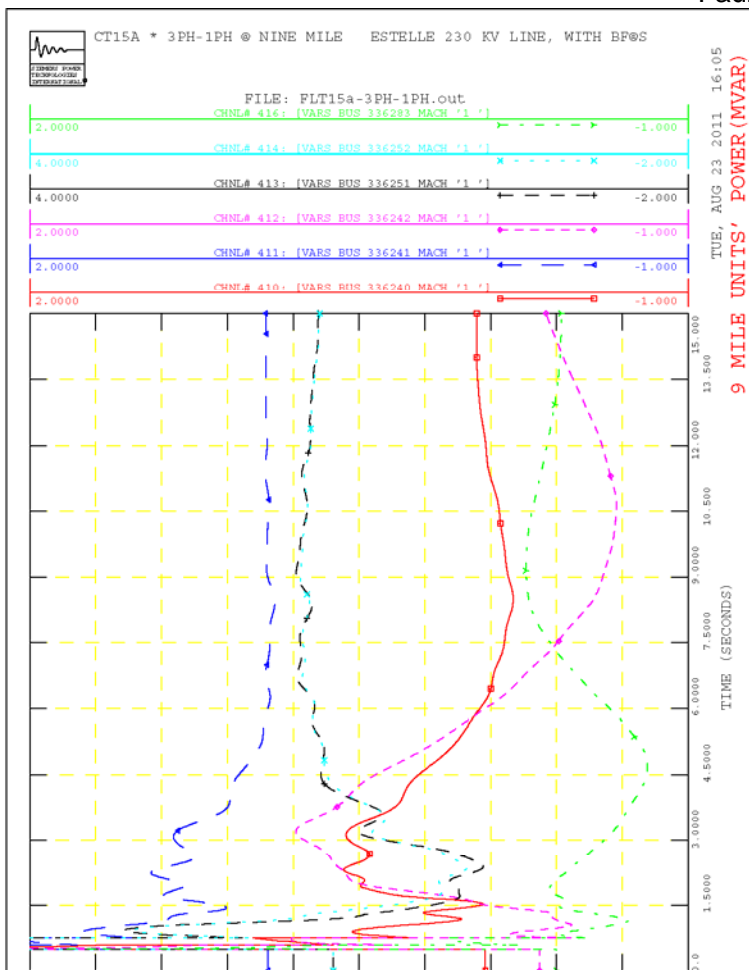
Fault 14a



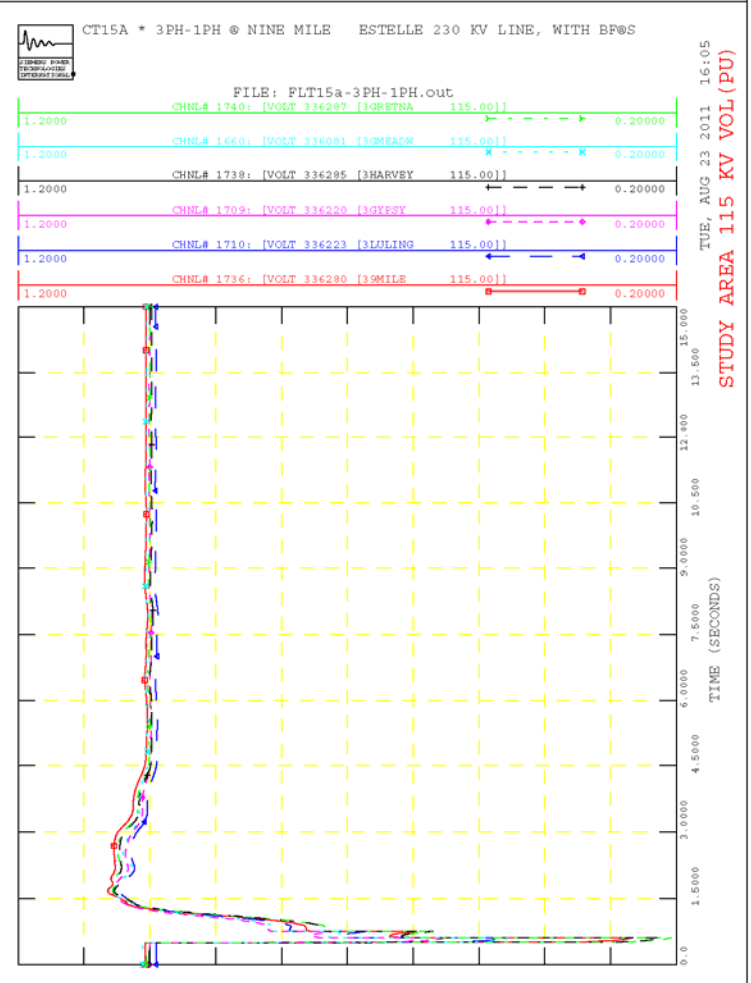
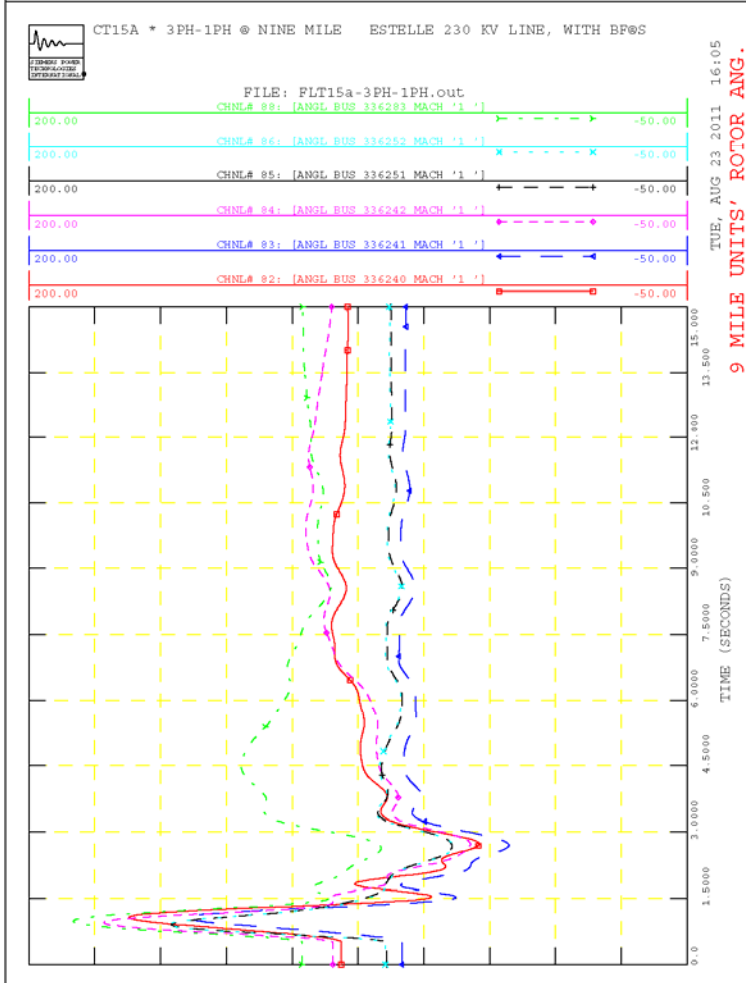
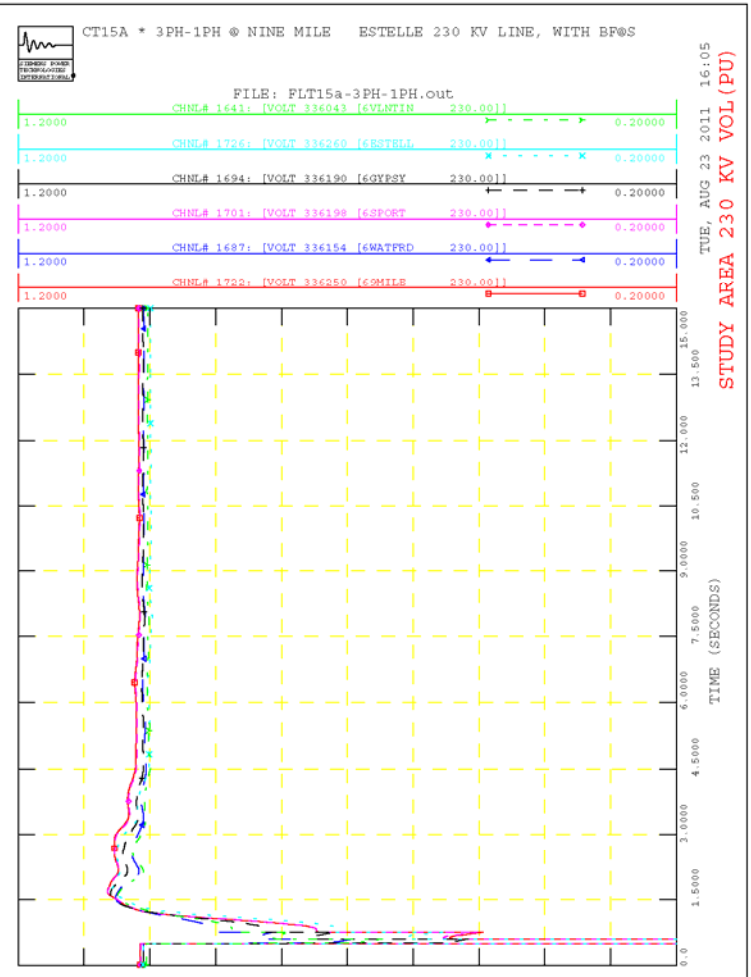
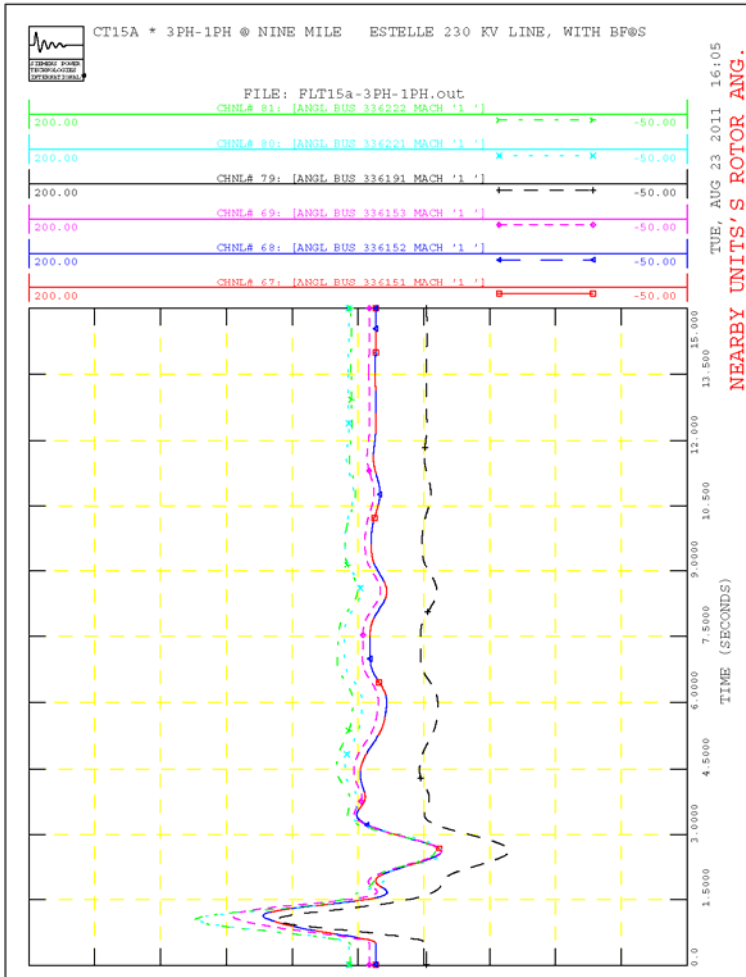
Fault 14a (cont)



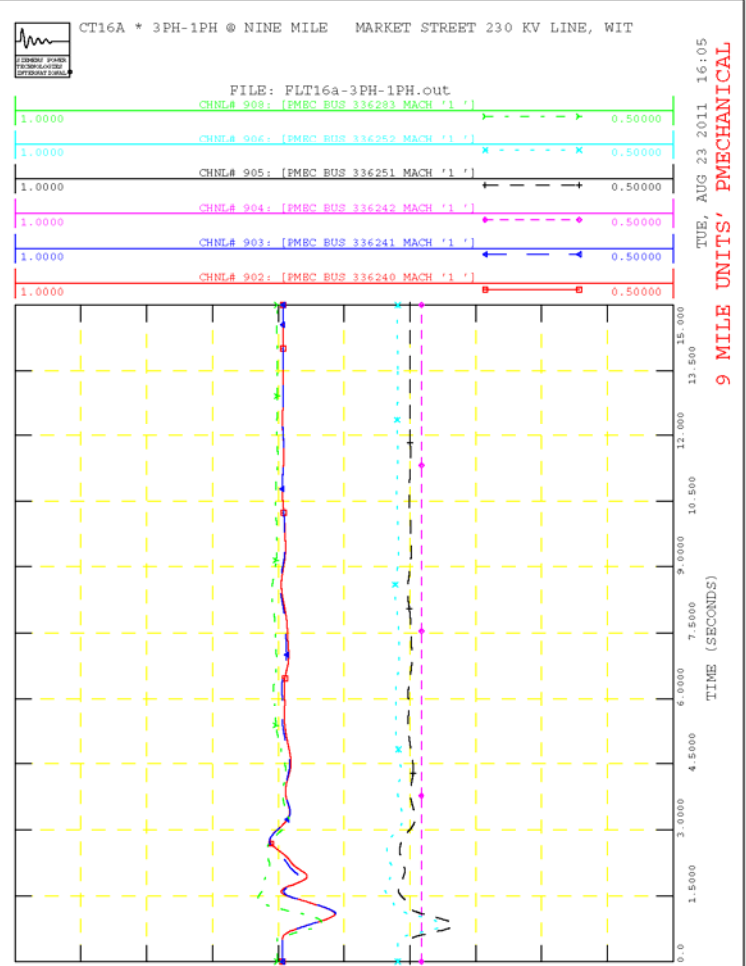
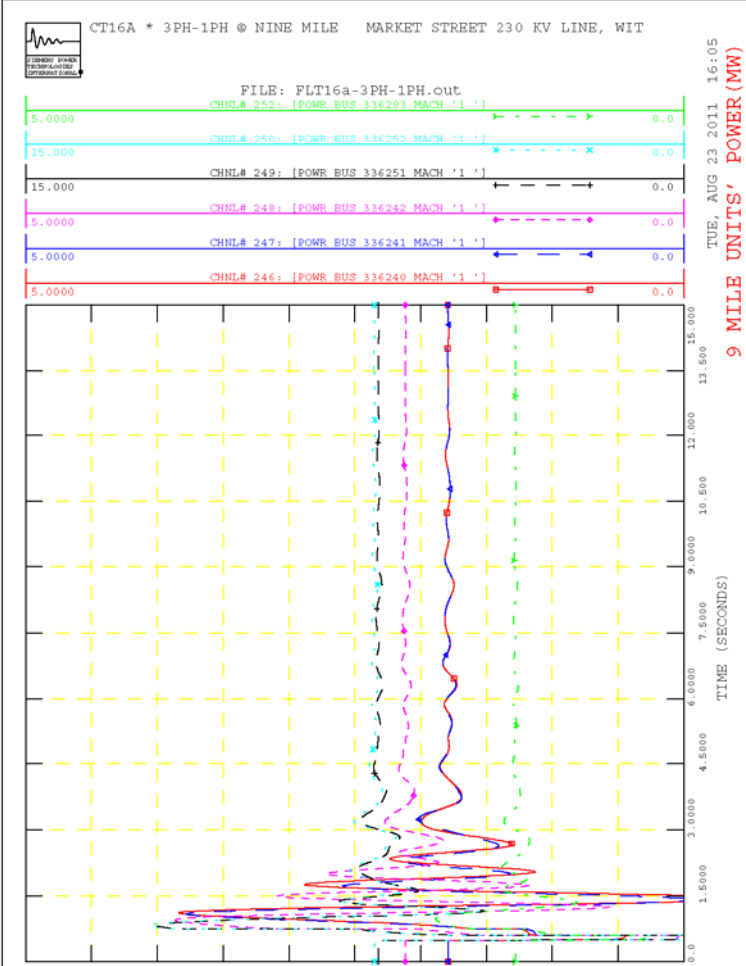
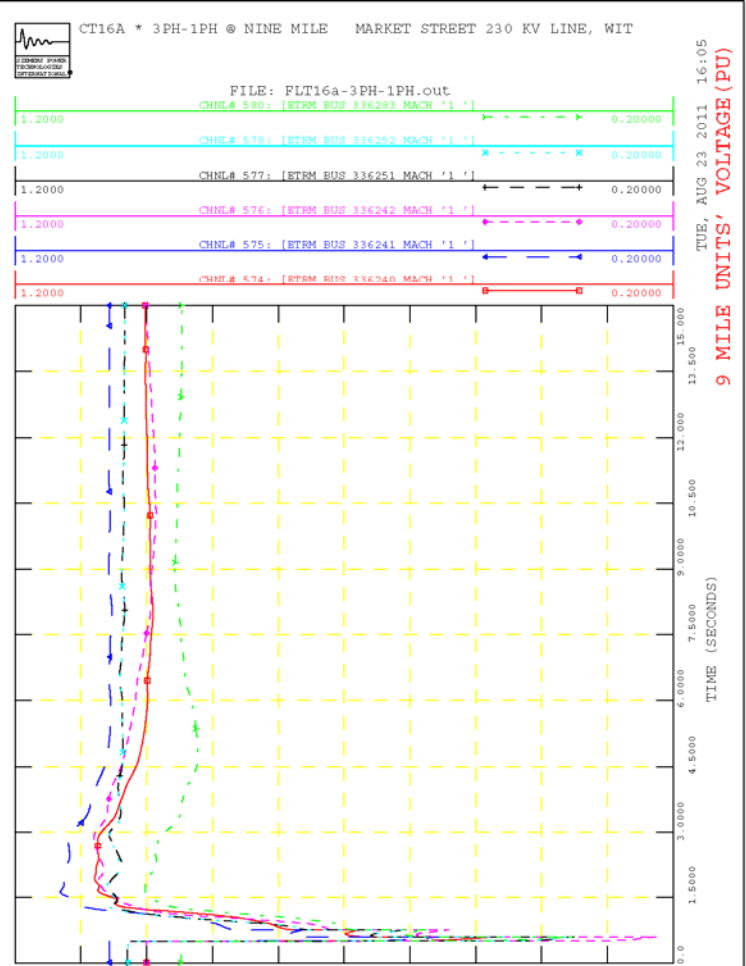
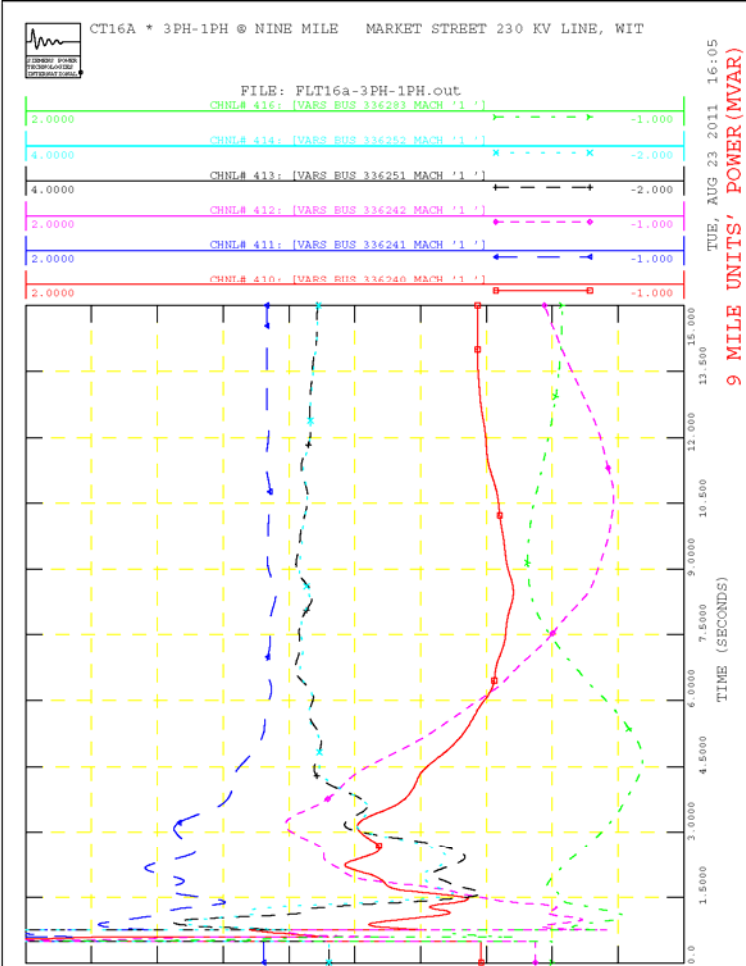
Fault 15a



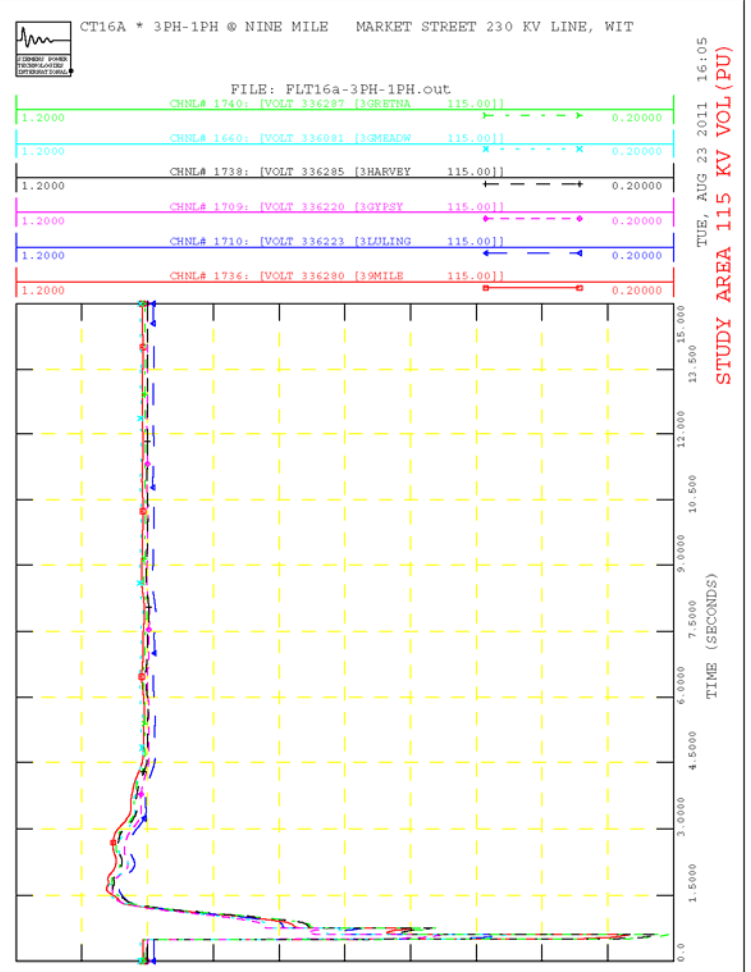
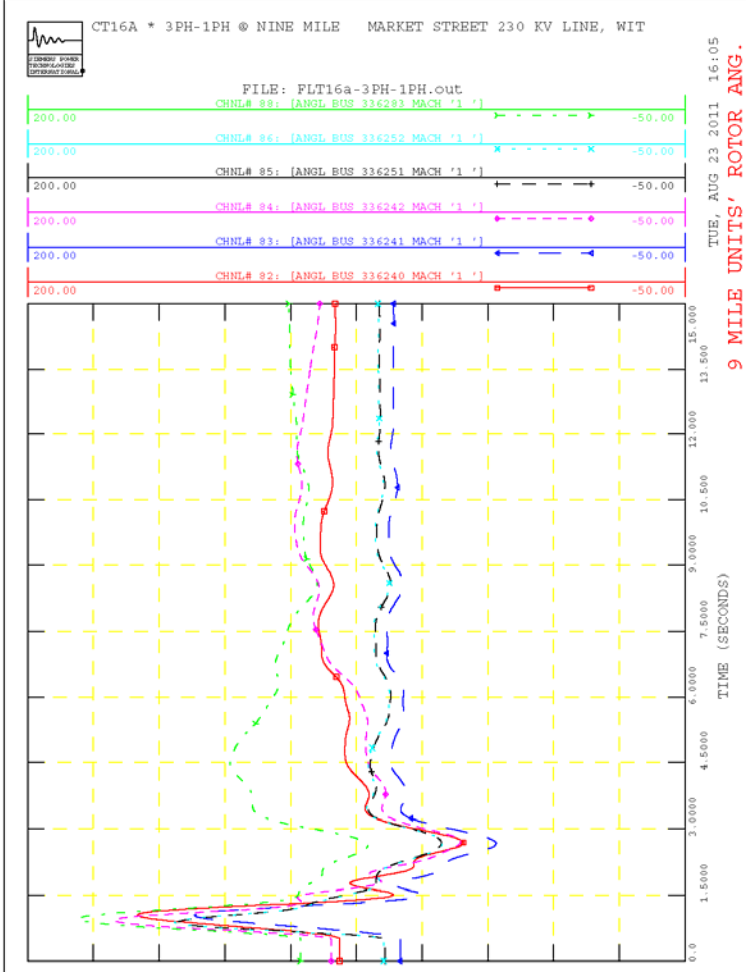
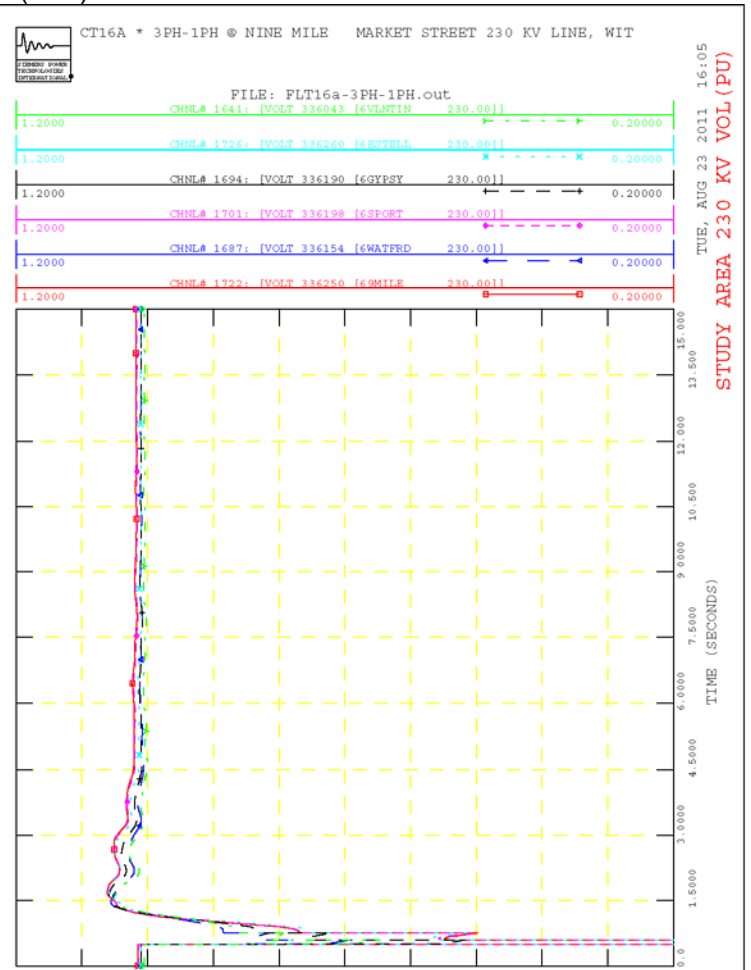
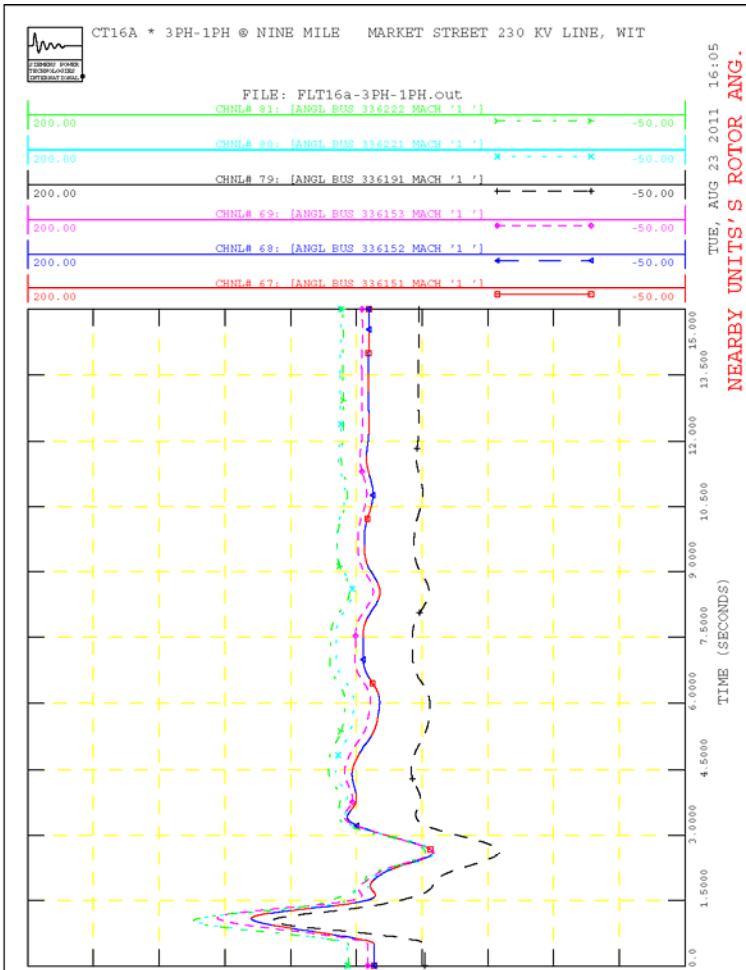
Fault 15a (cont)



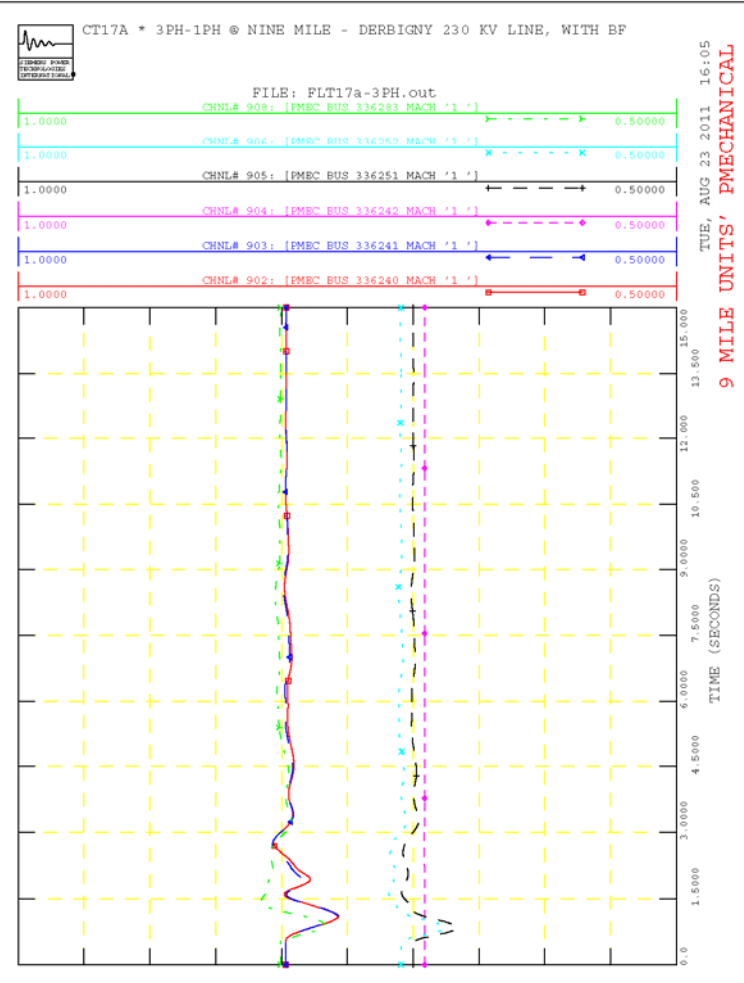
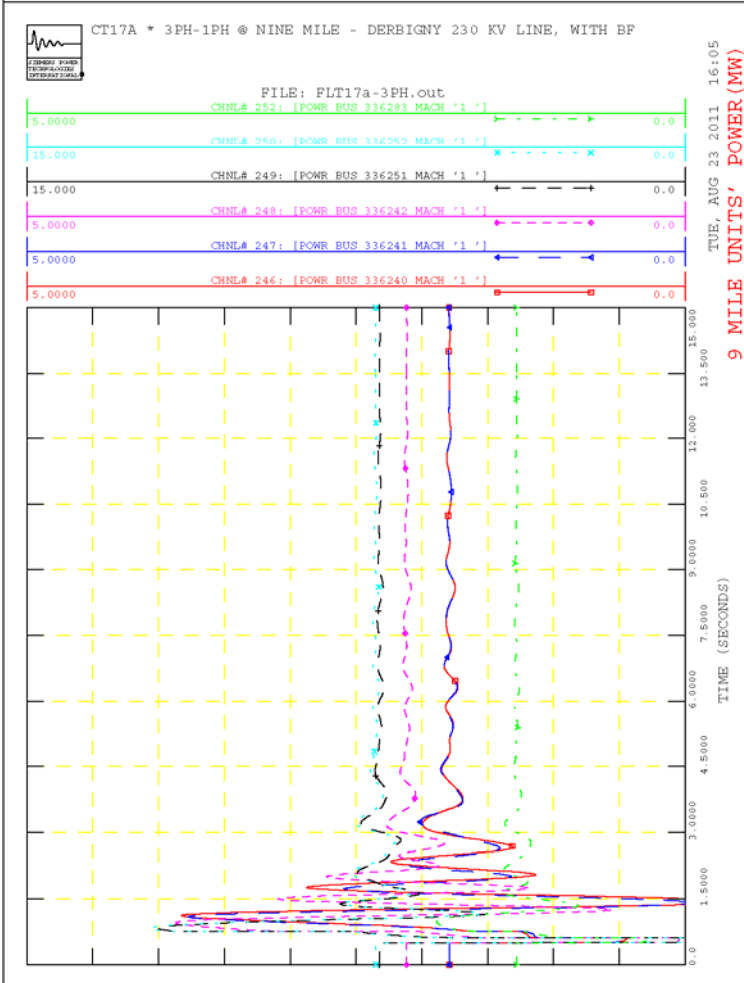
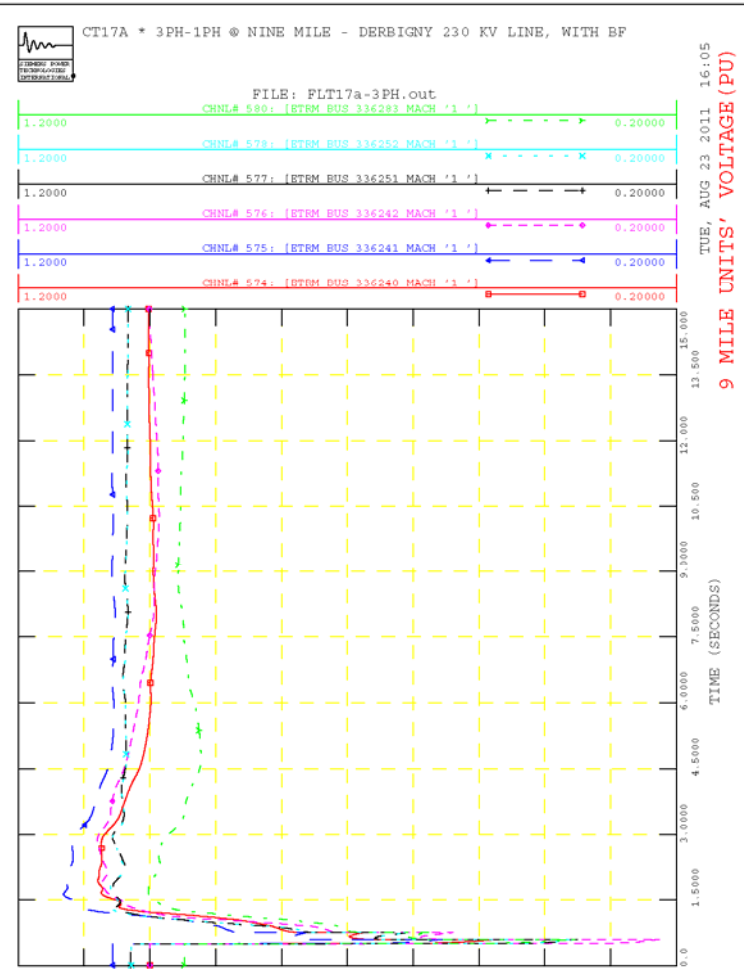
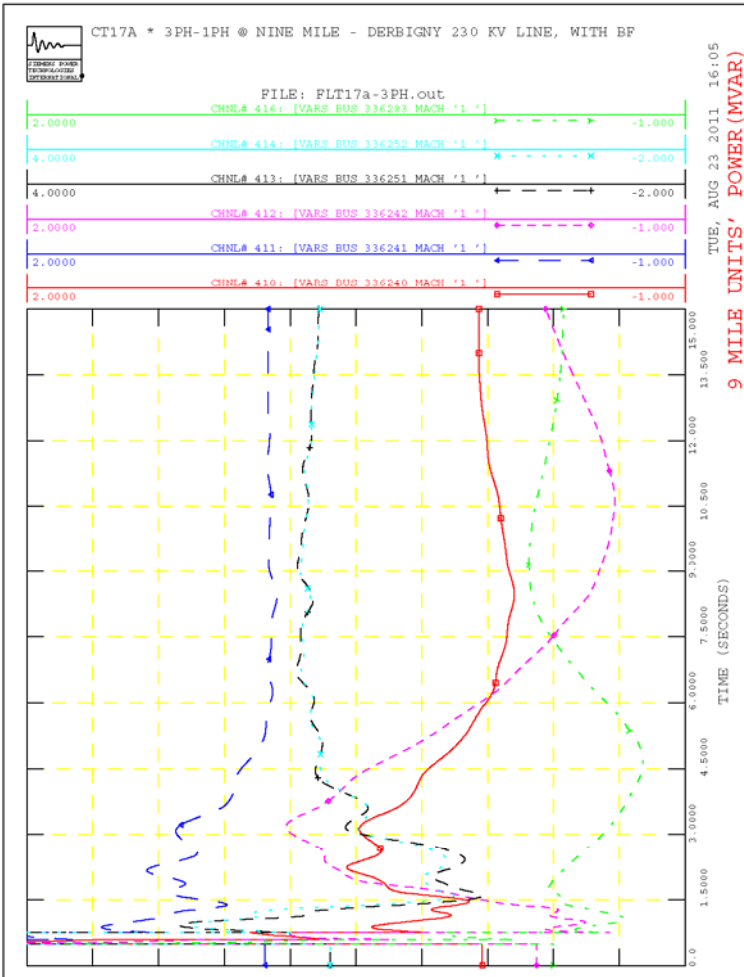
Fault 16a



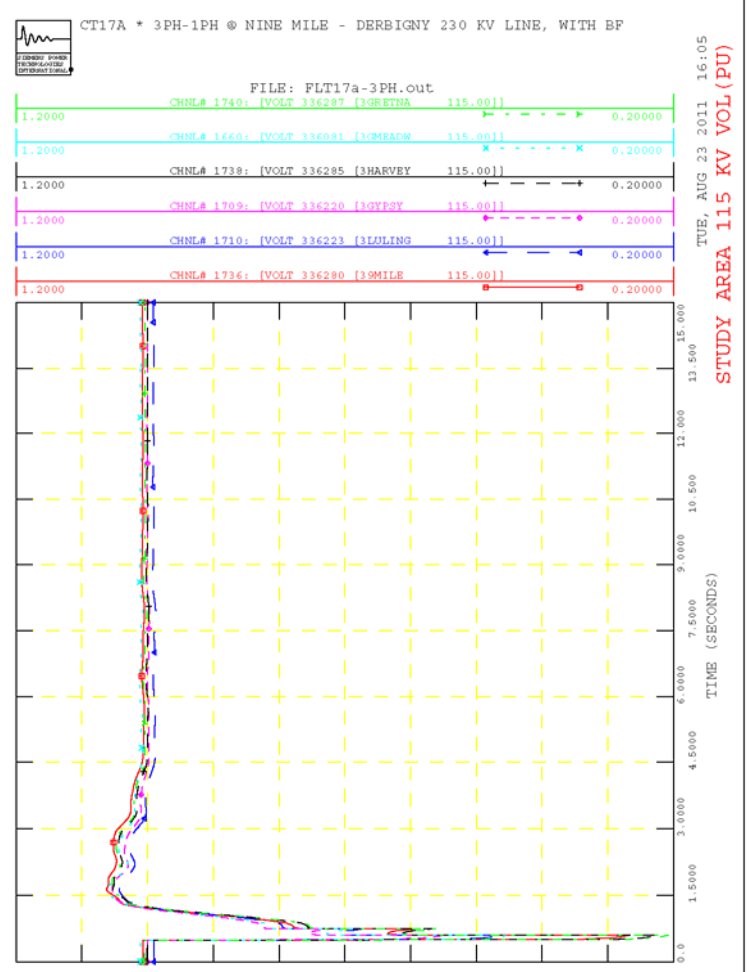
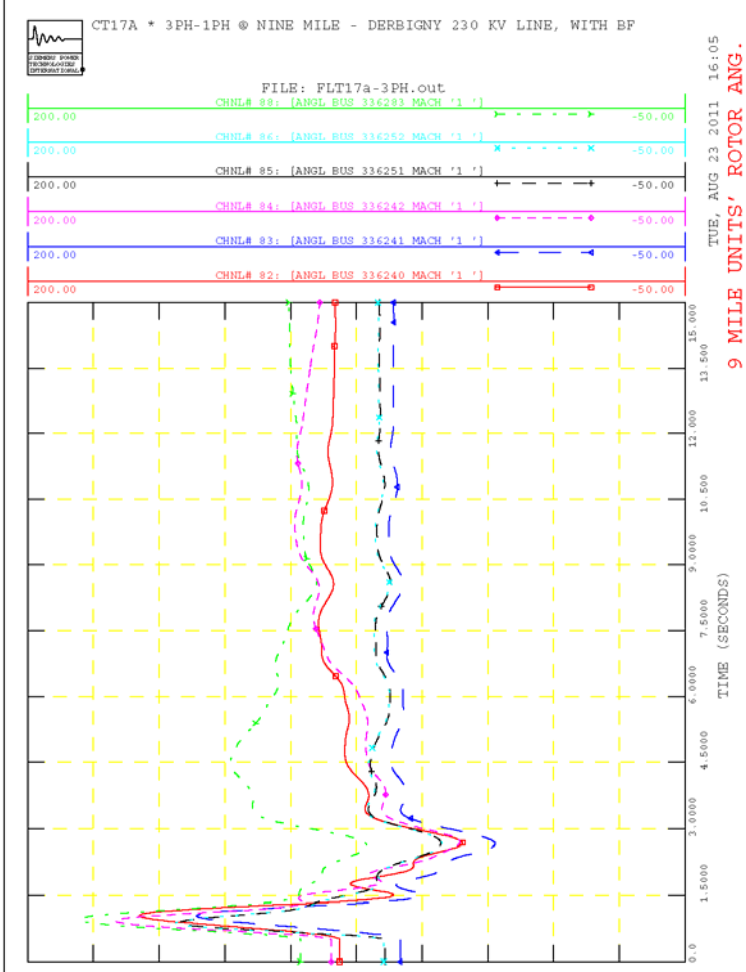
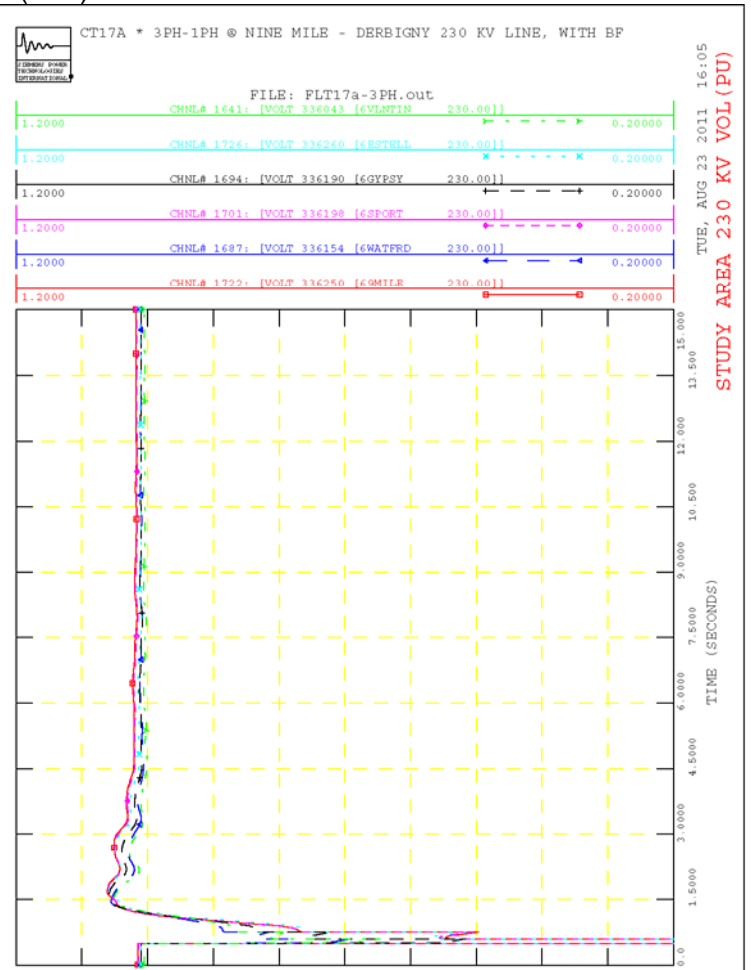
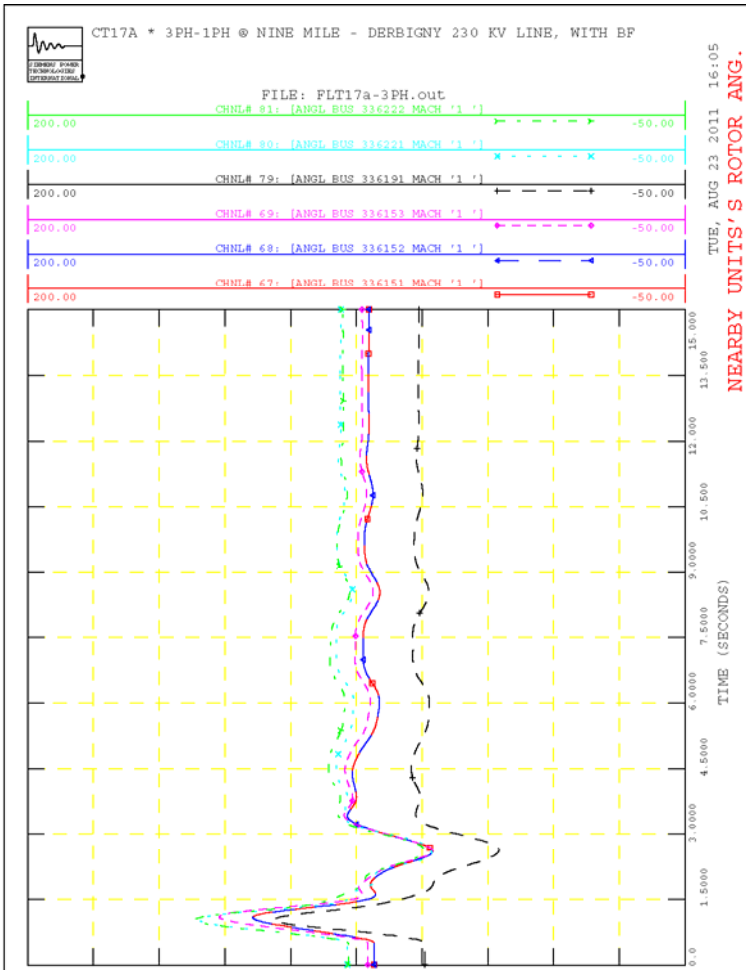
Fault 16a (cont)



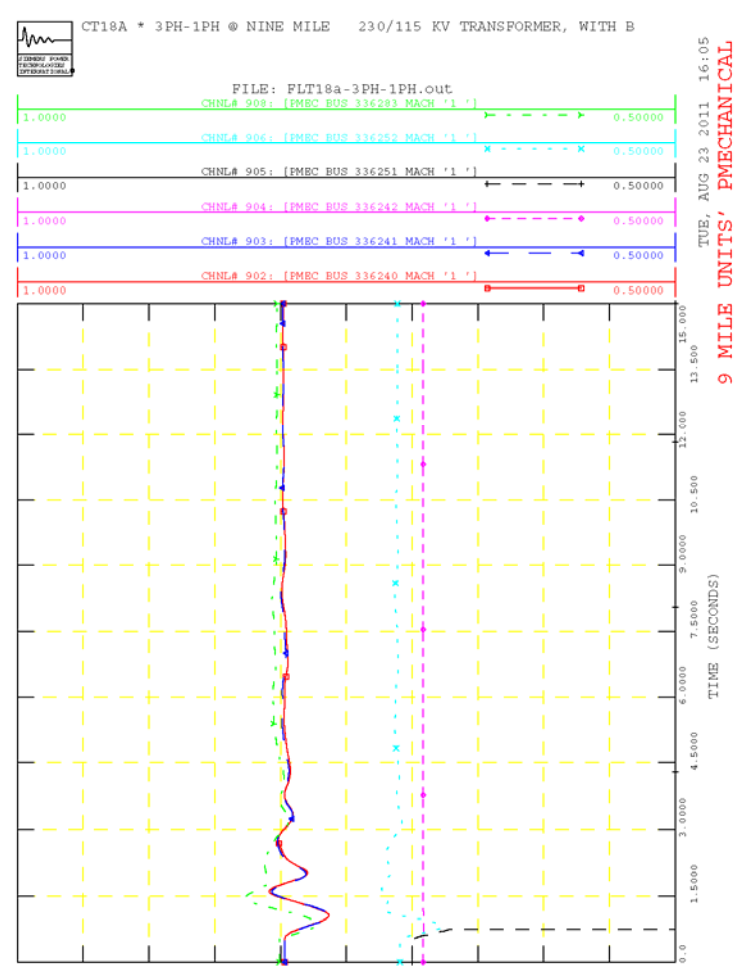
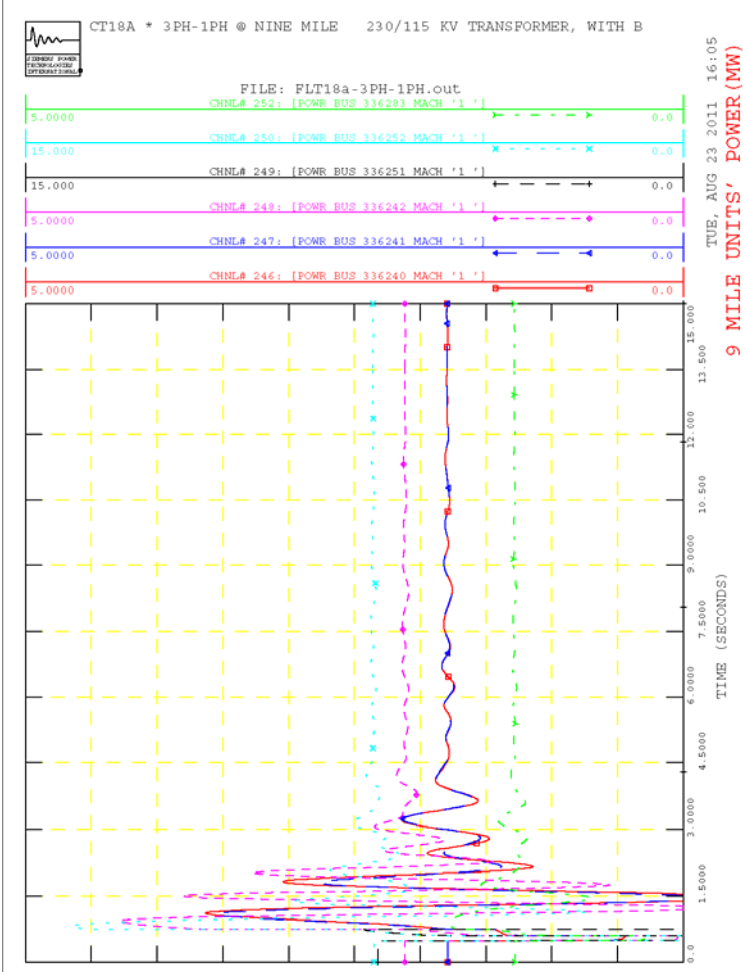
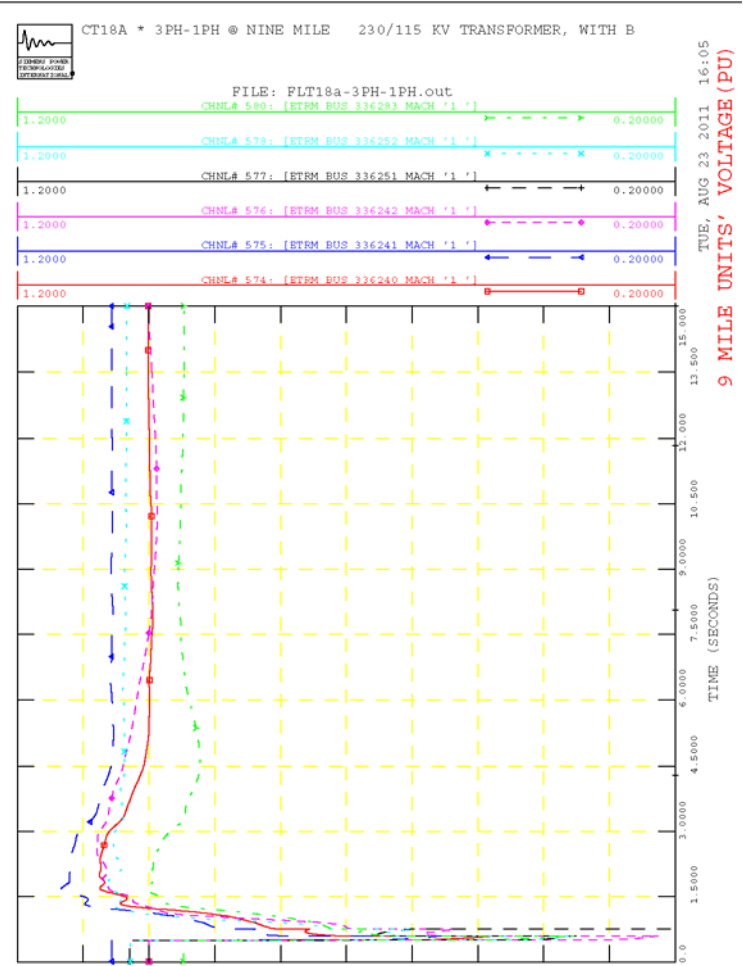
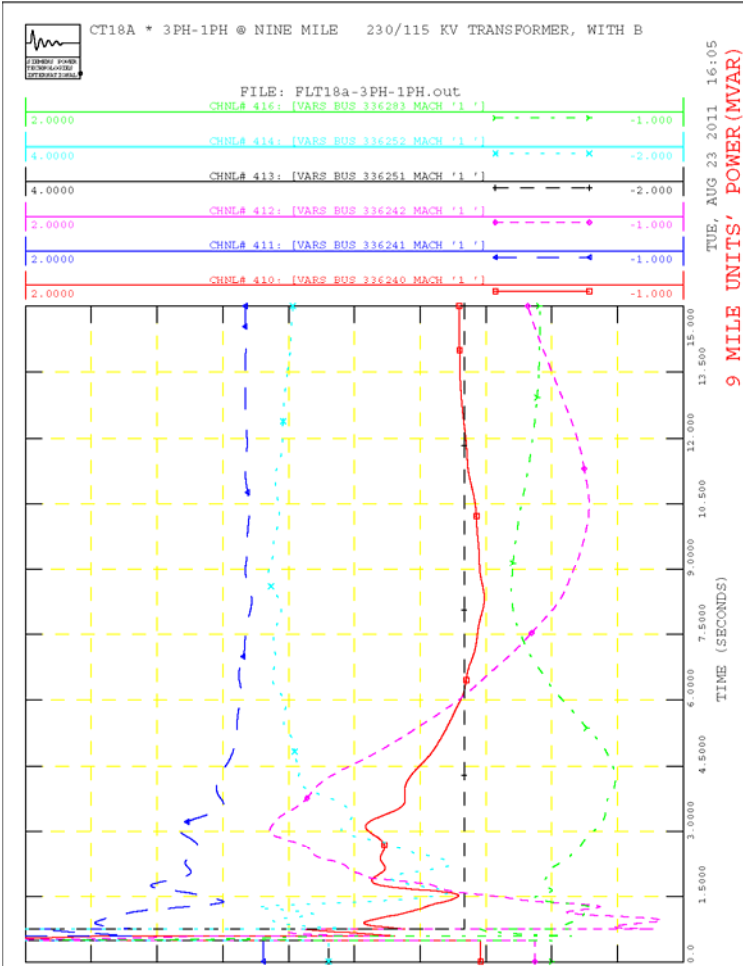
Fault 17a



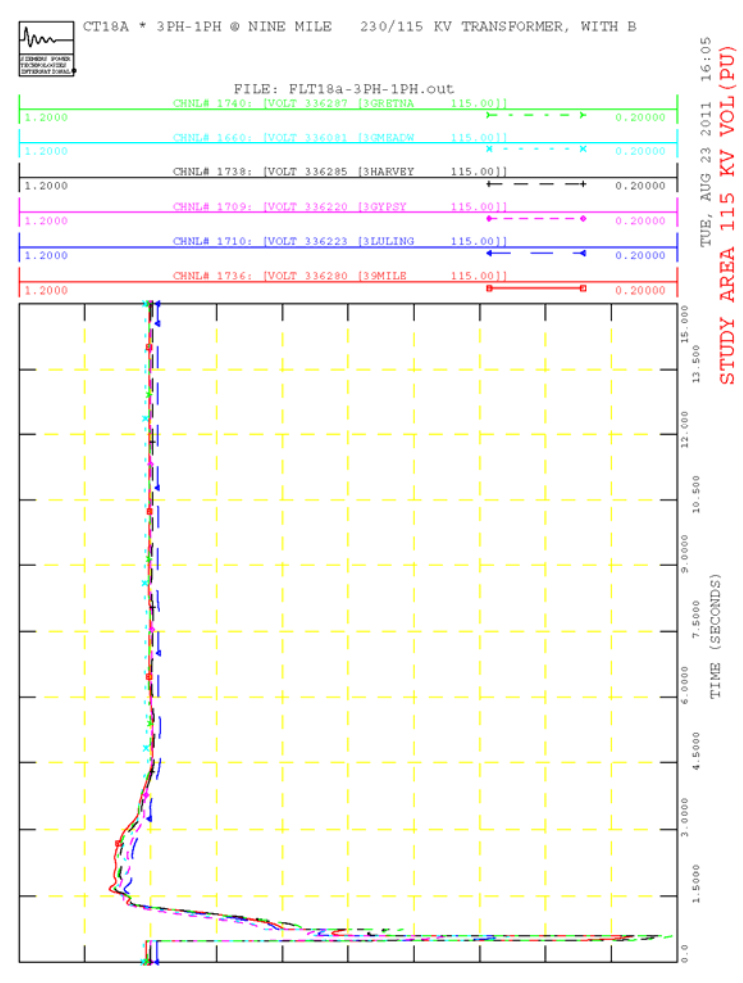
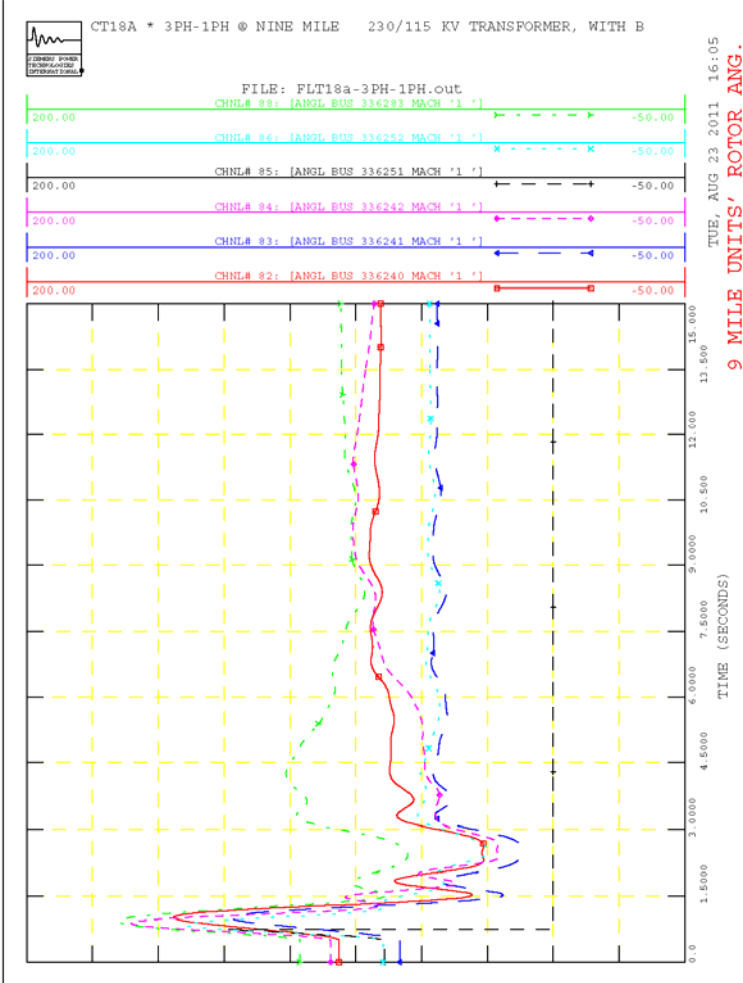
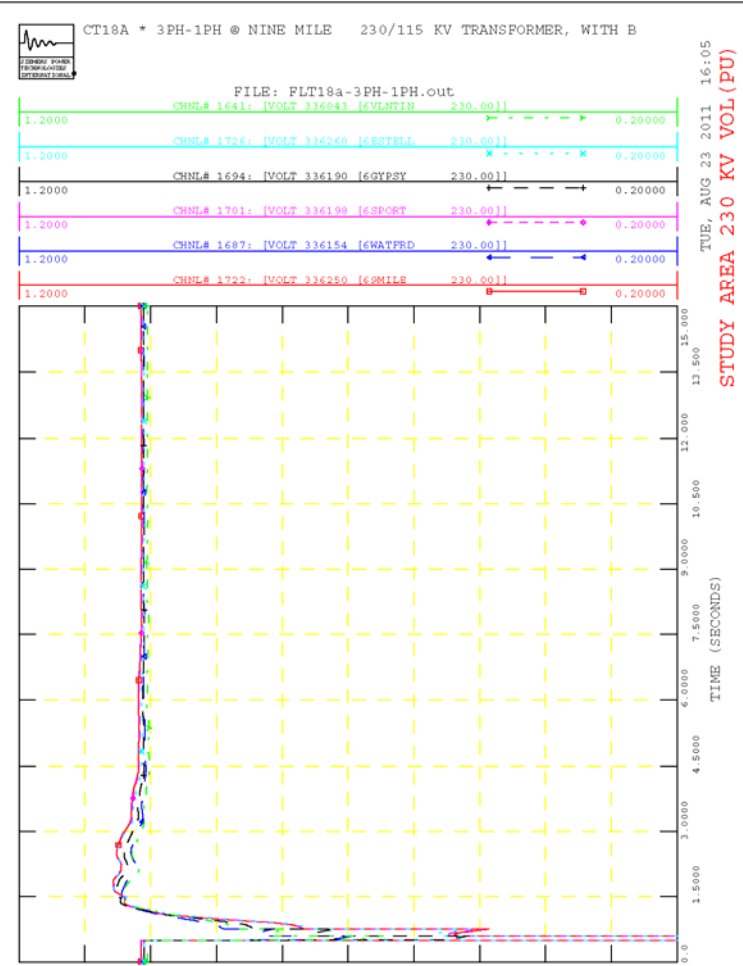
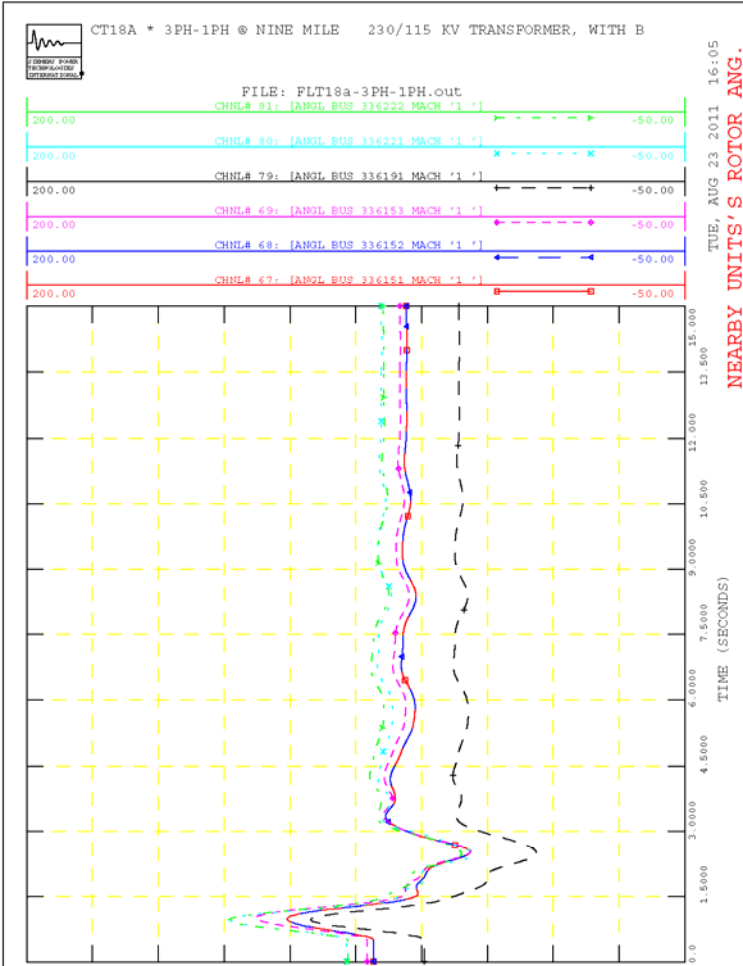
Fault 17a (cont)



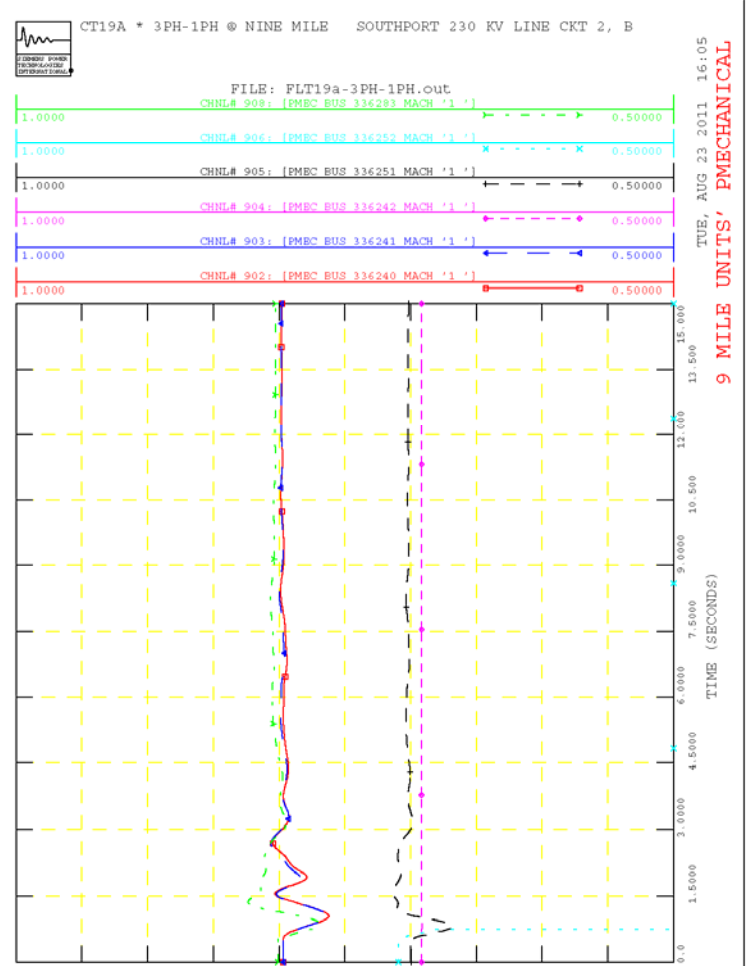
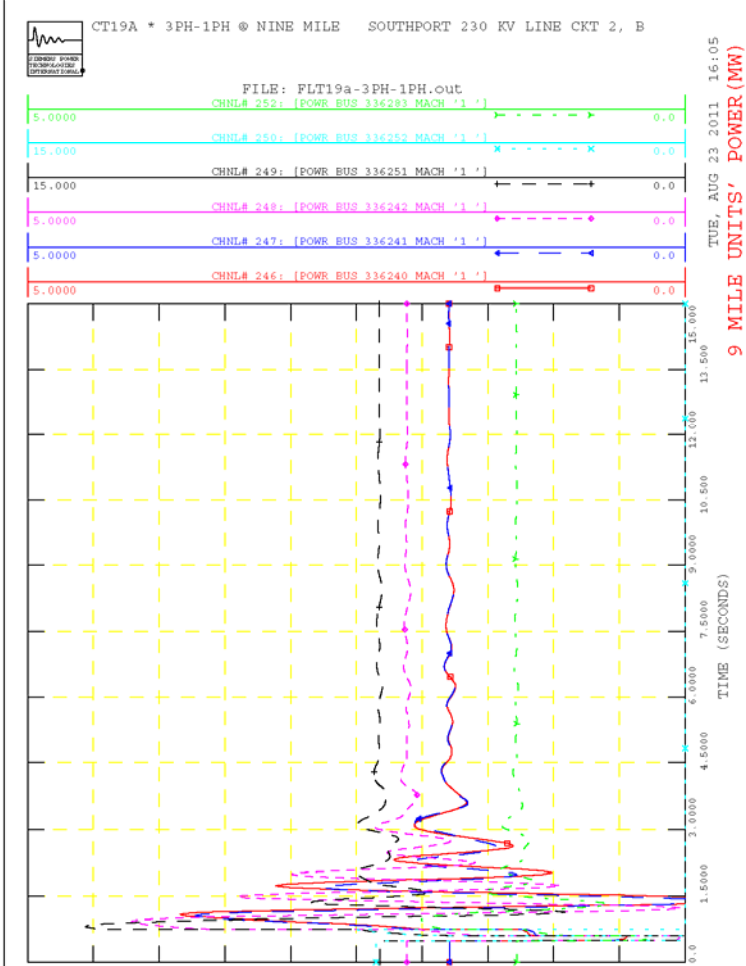
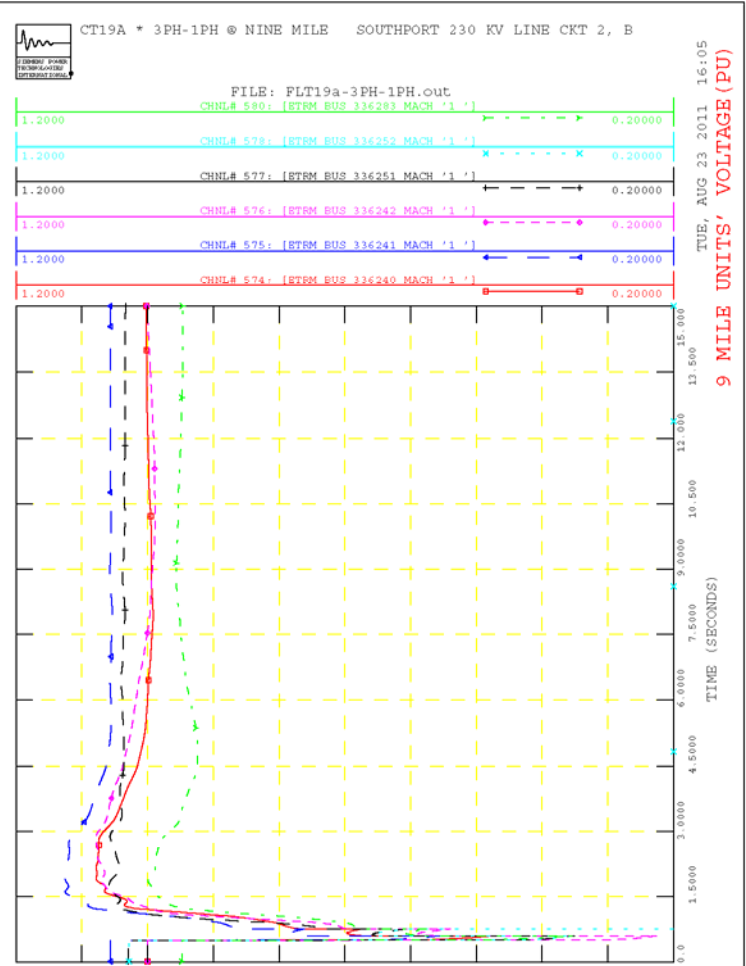
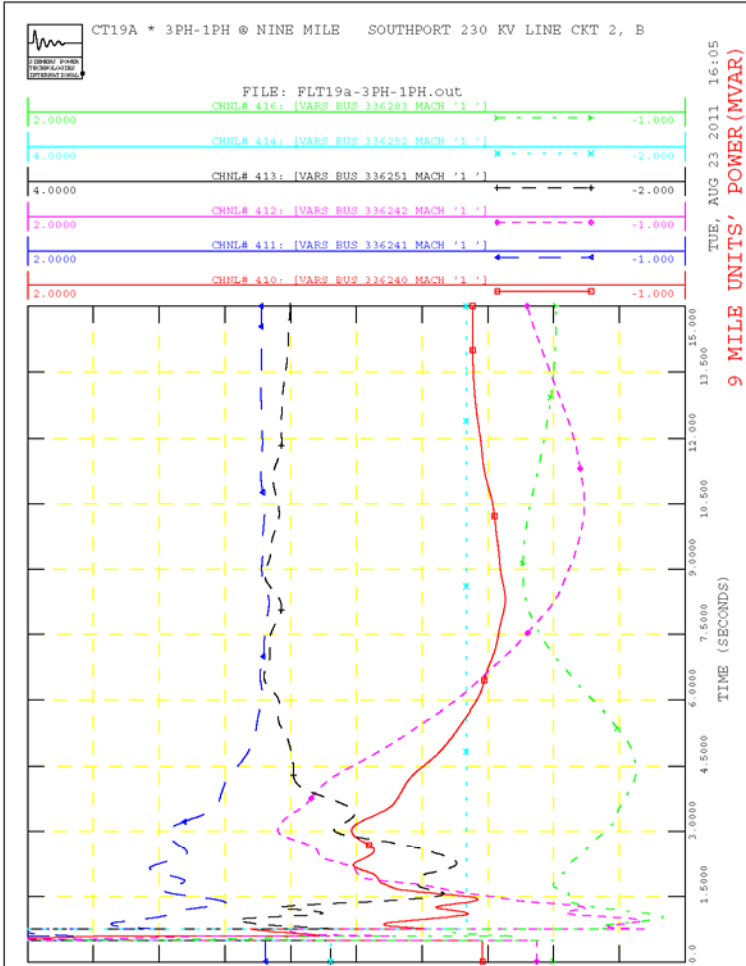
Fault 18a



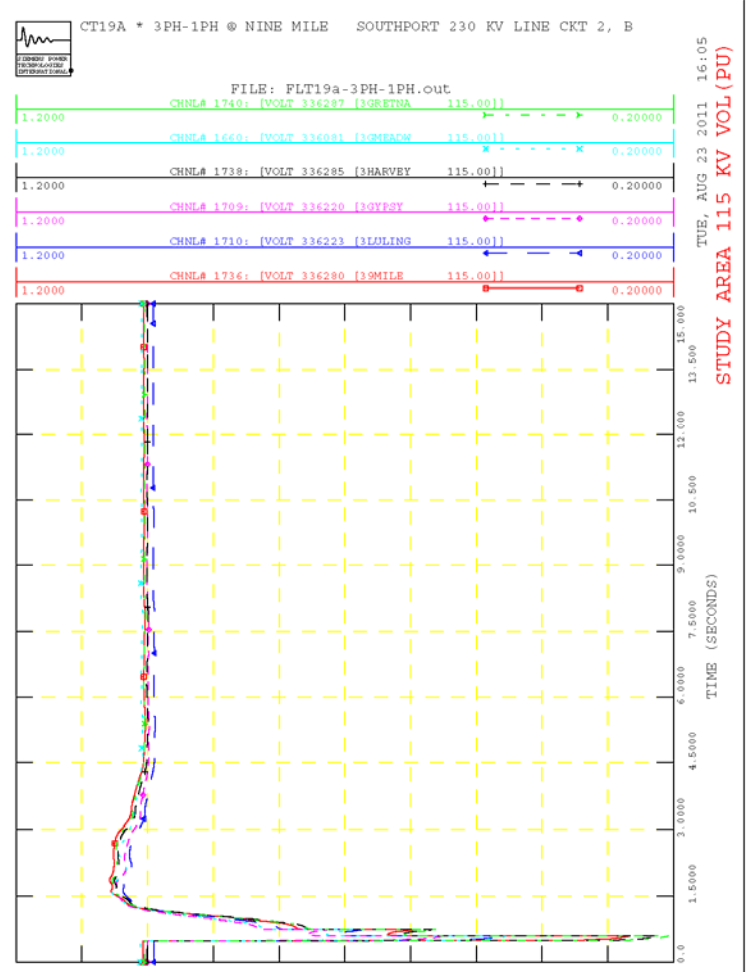
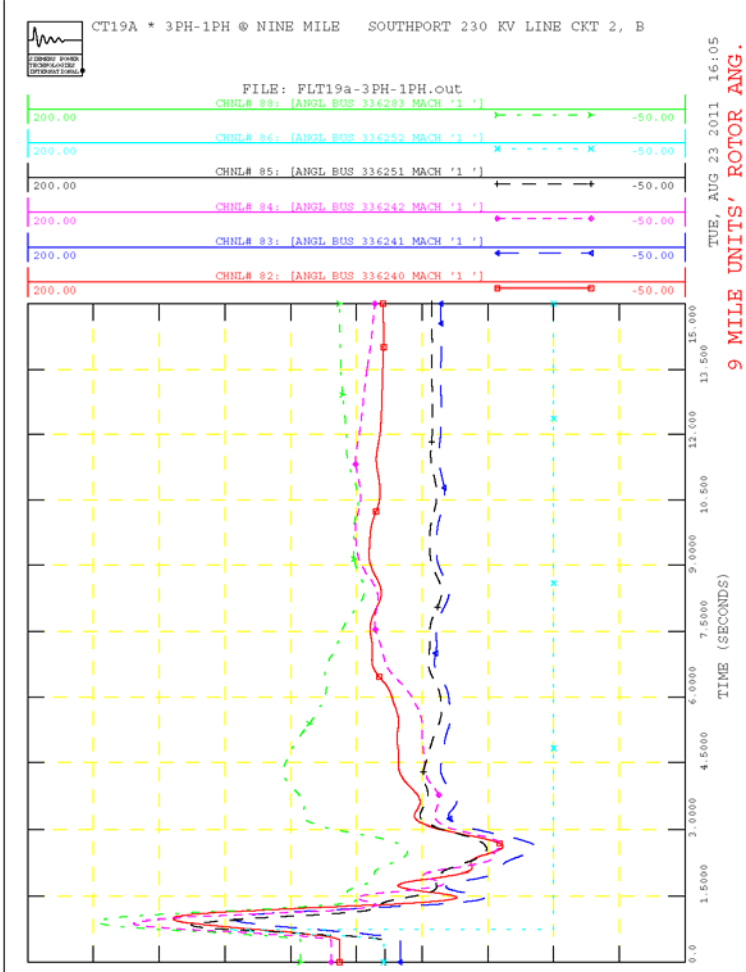
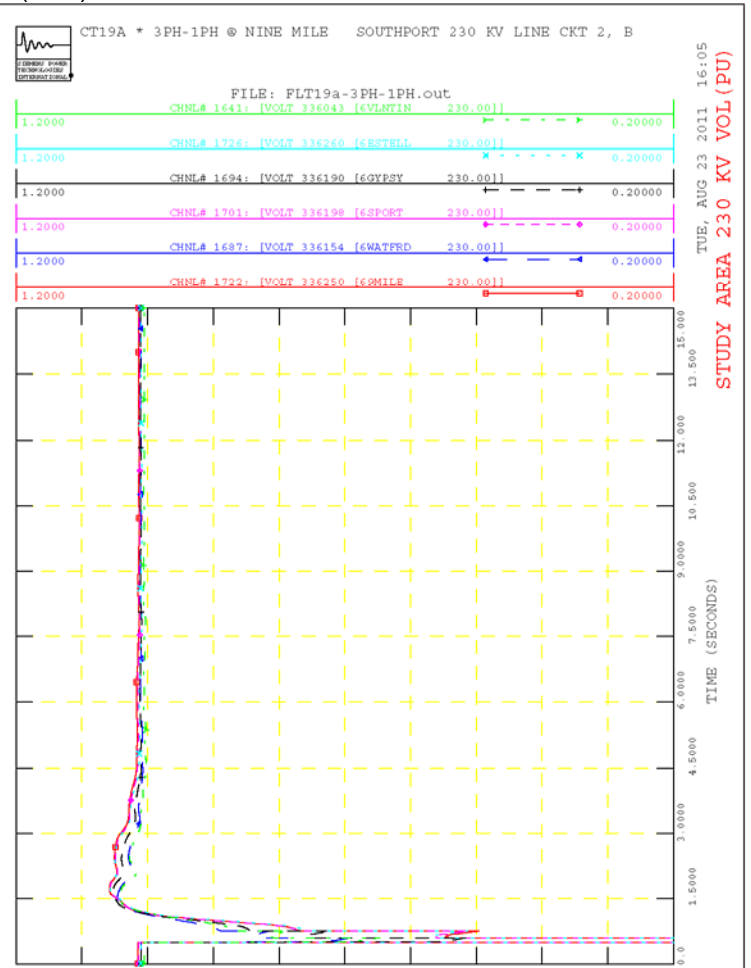
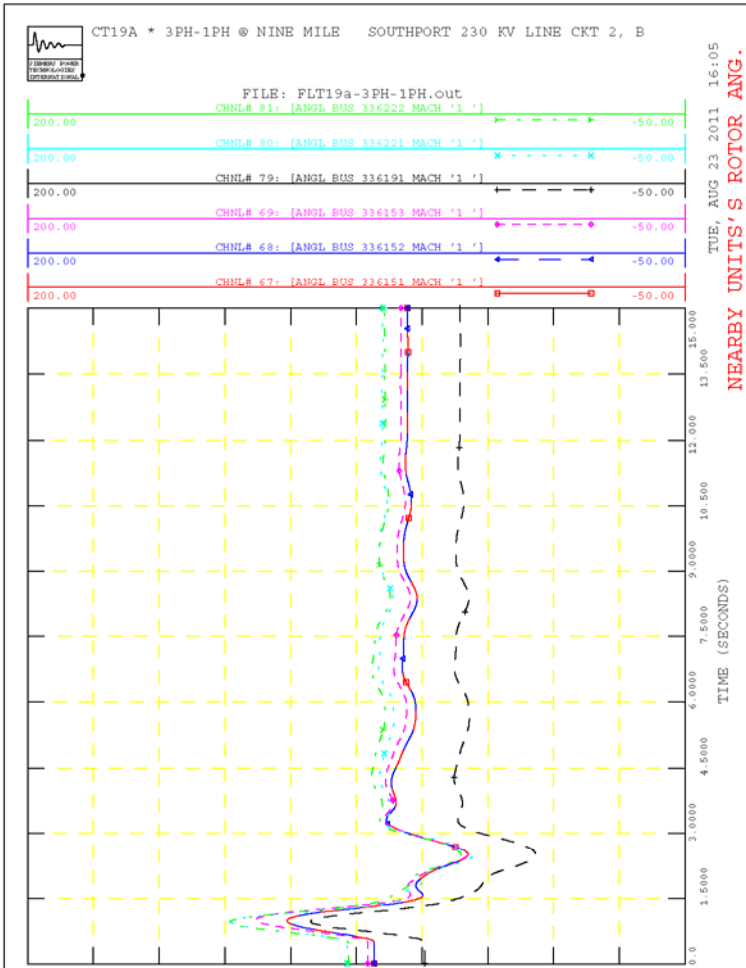
Fault 18a (cont)



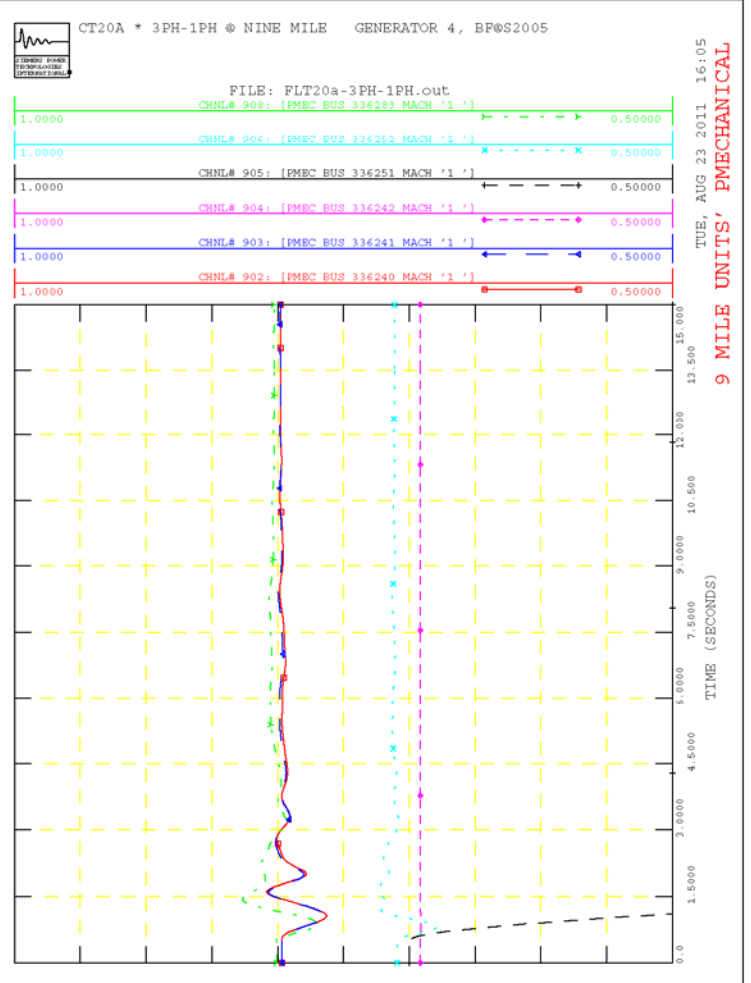
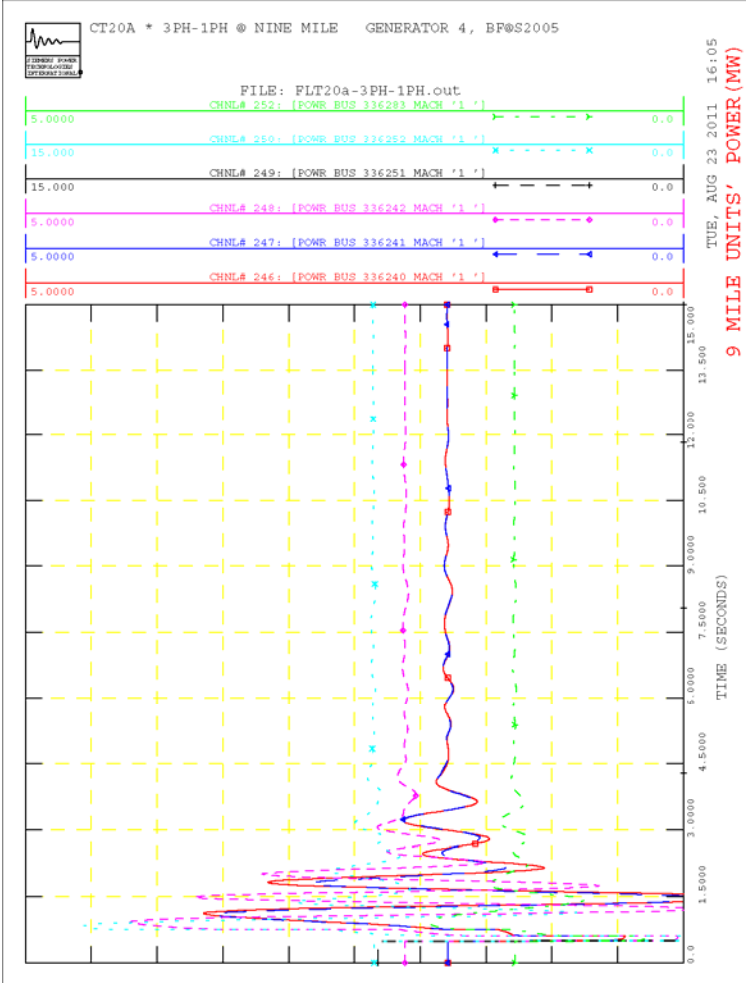
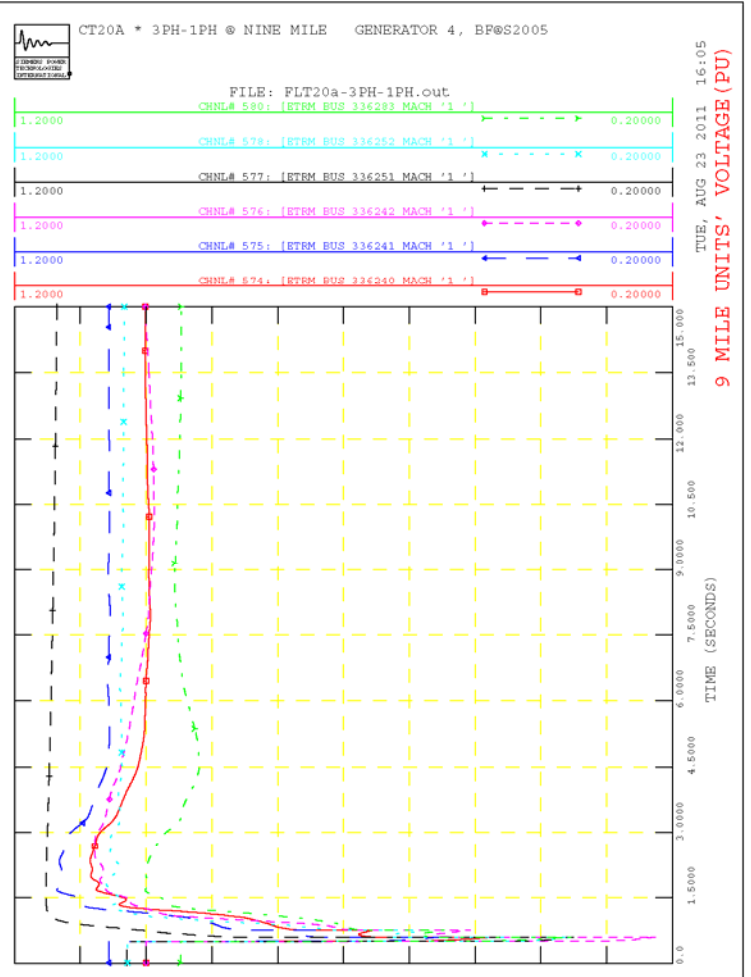
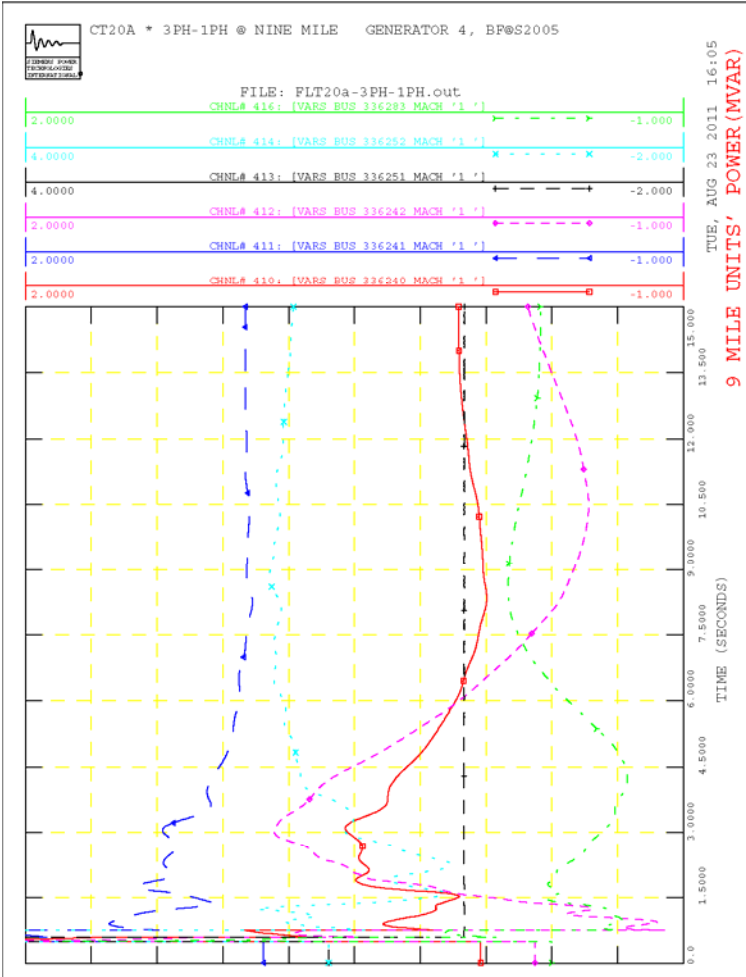
Fault 19a



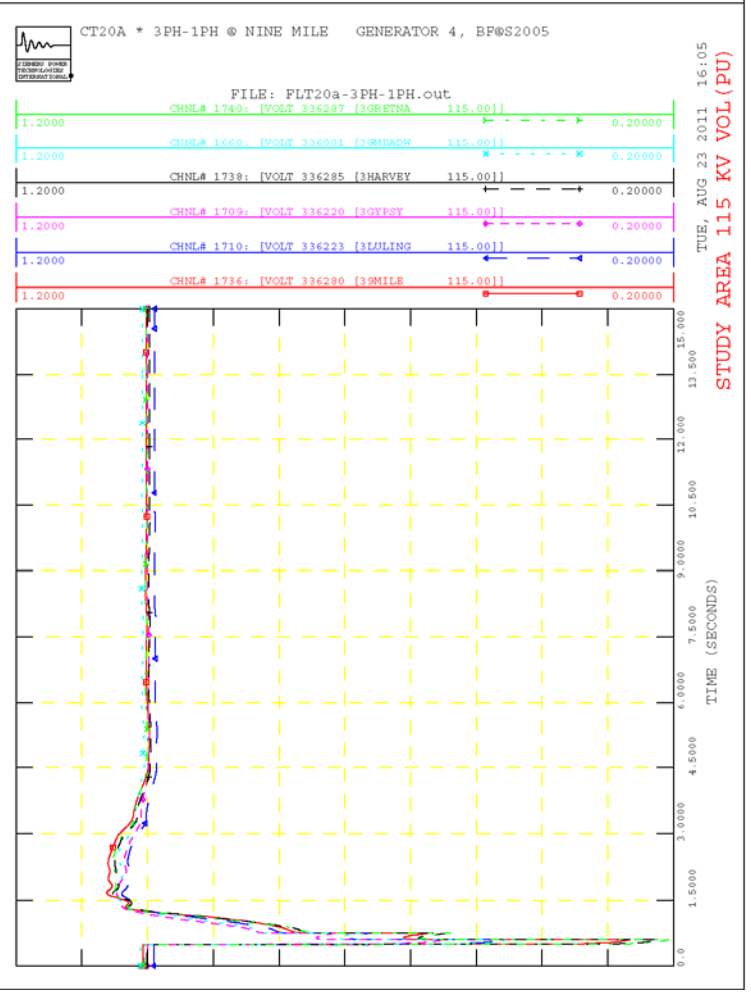
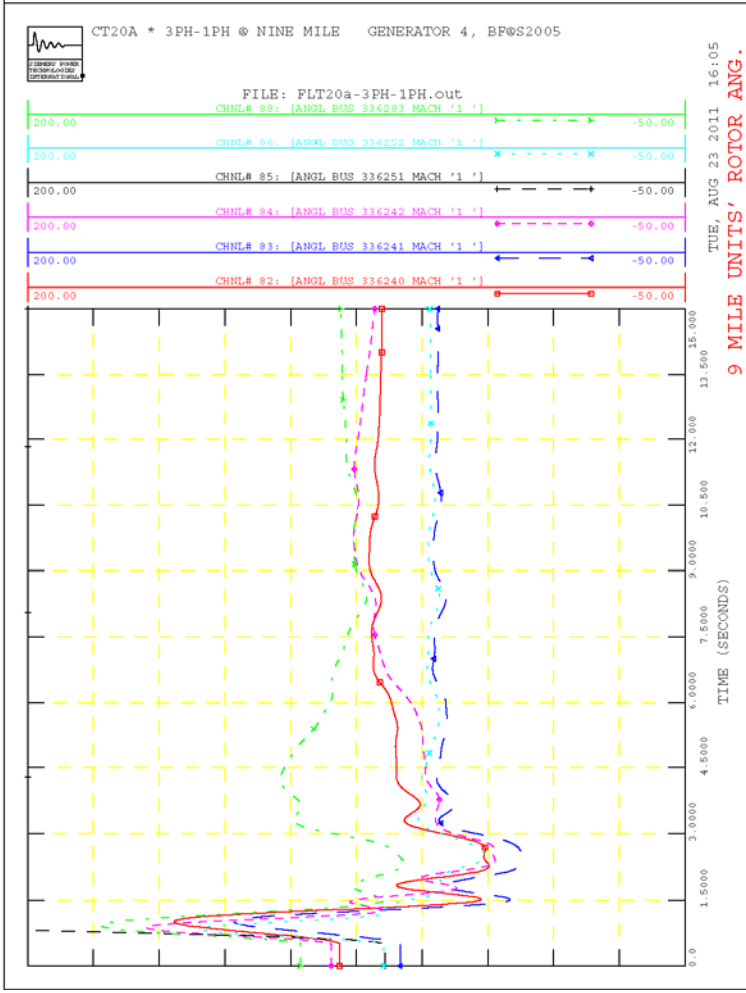
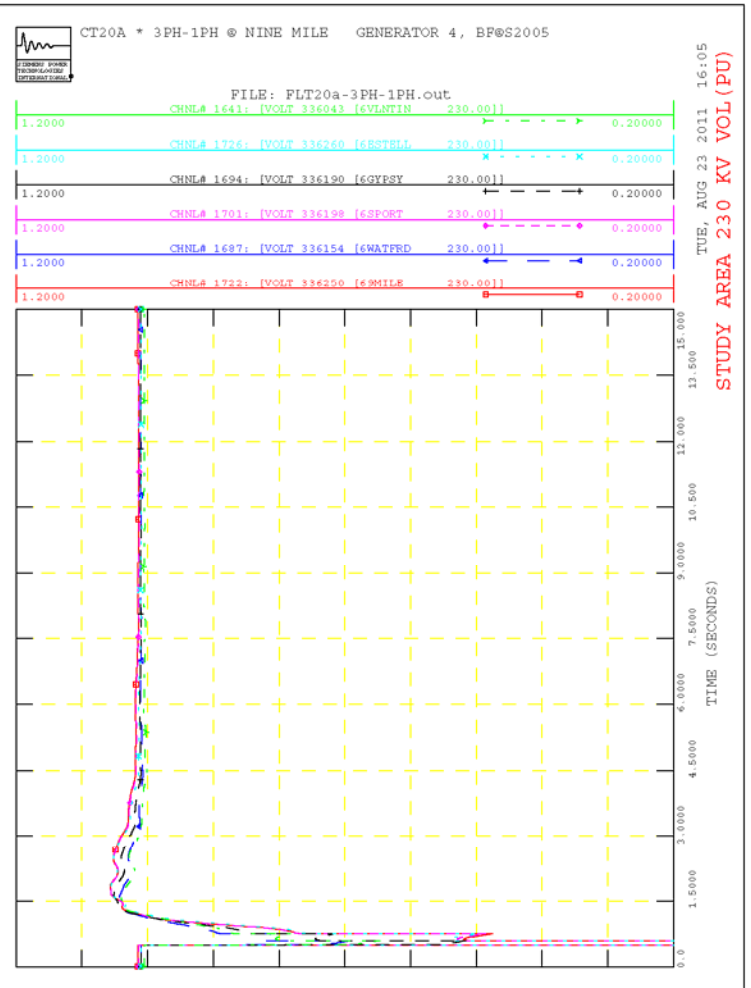
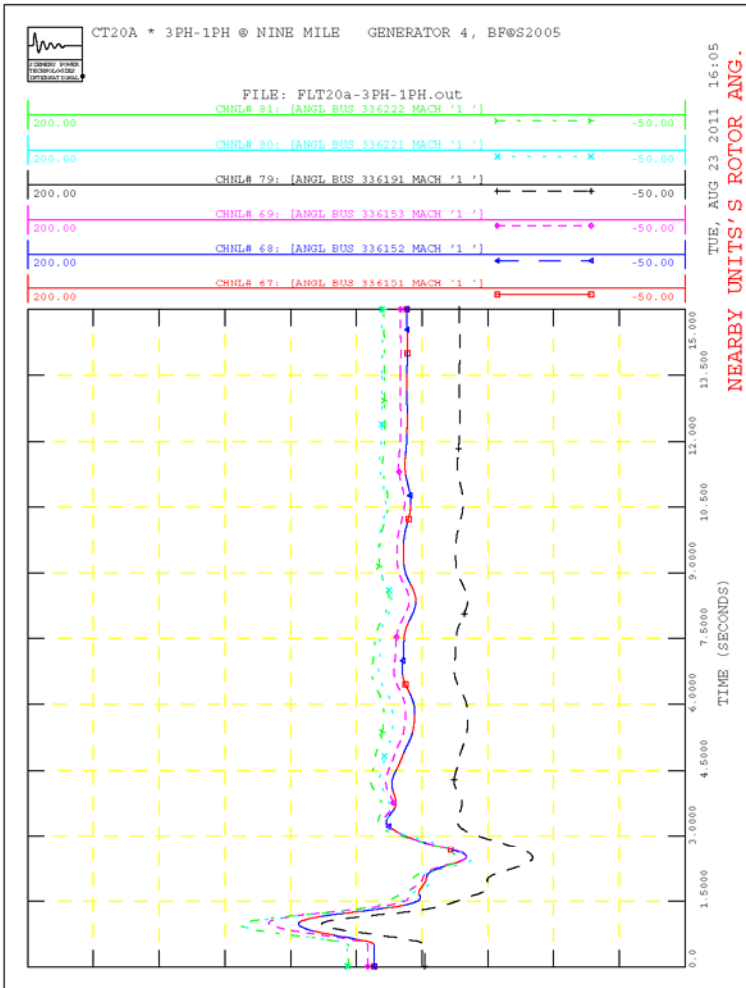
Fault 19a (cont)



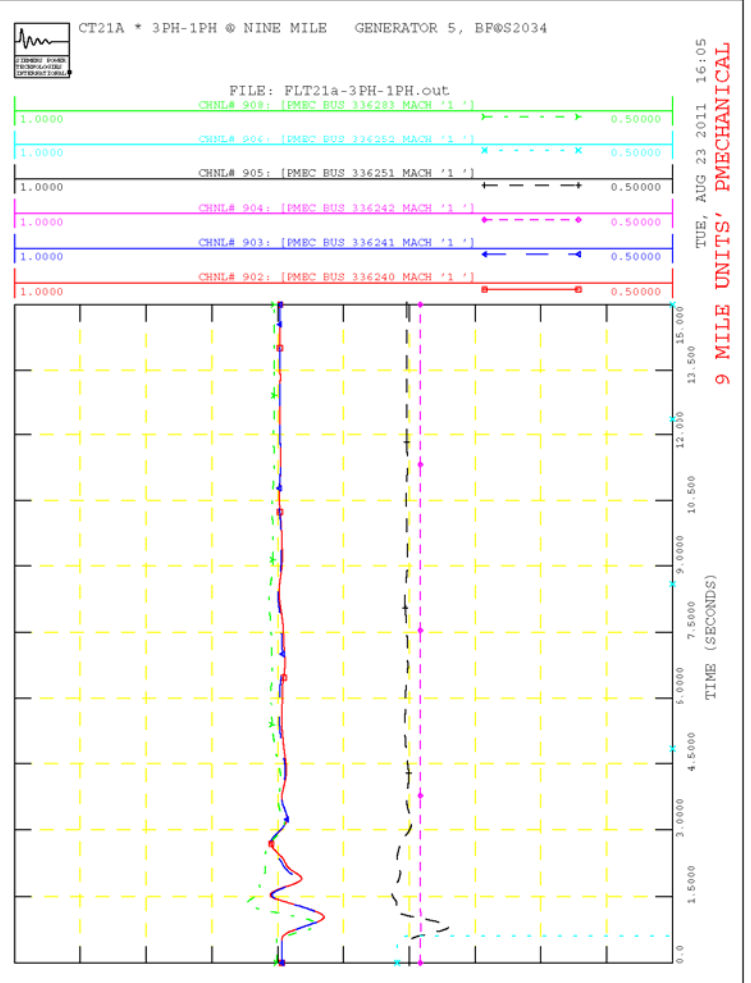
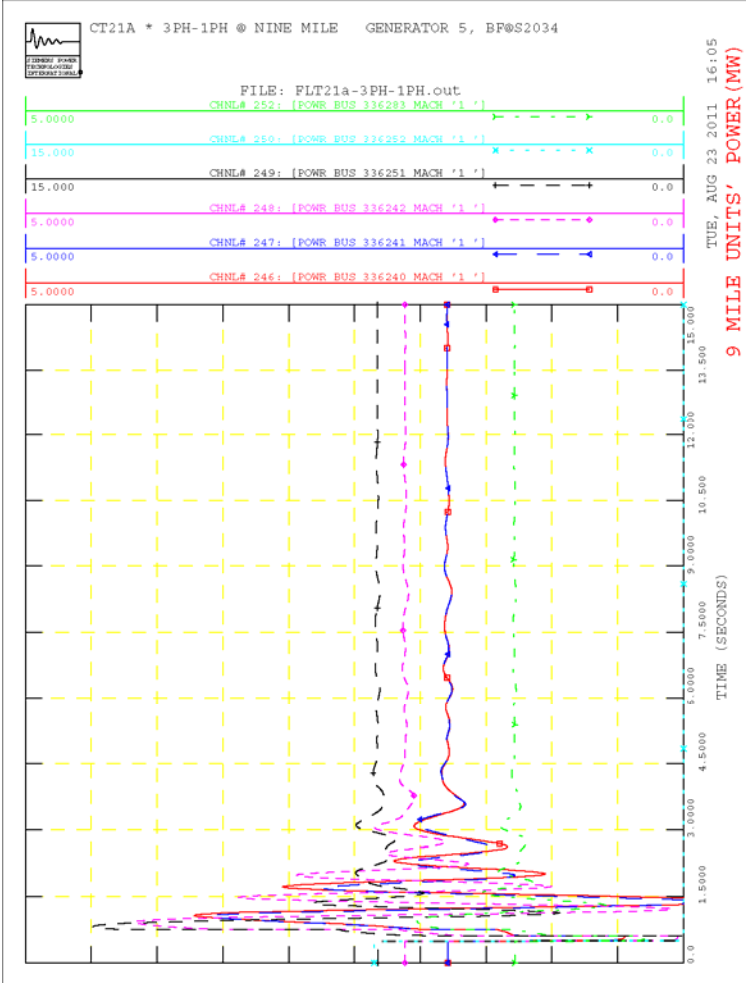
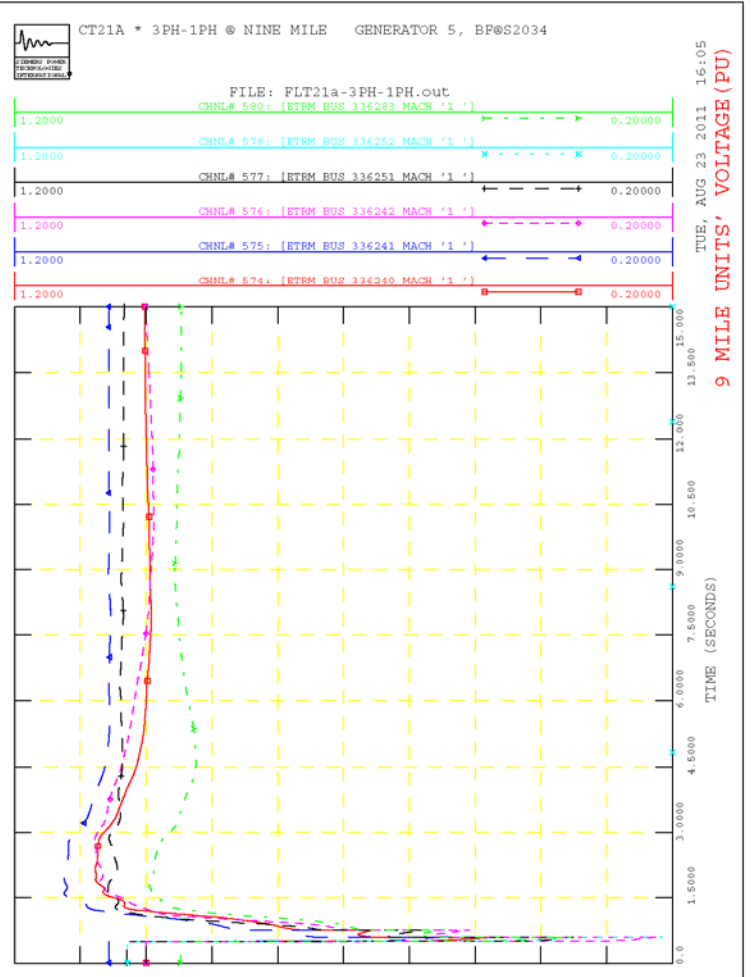
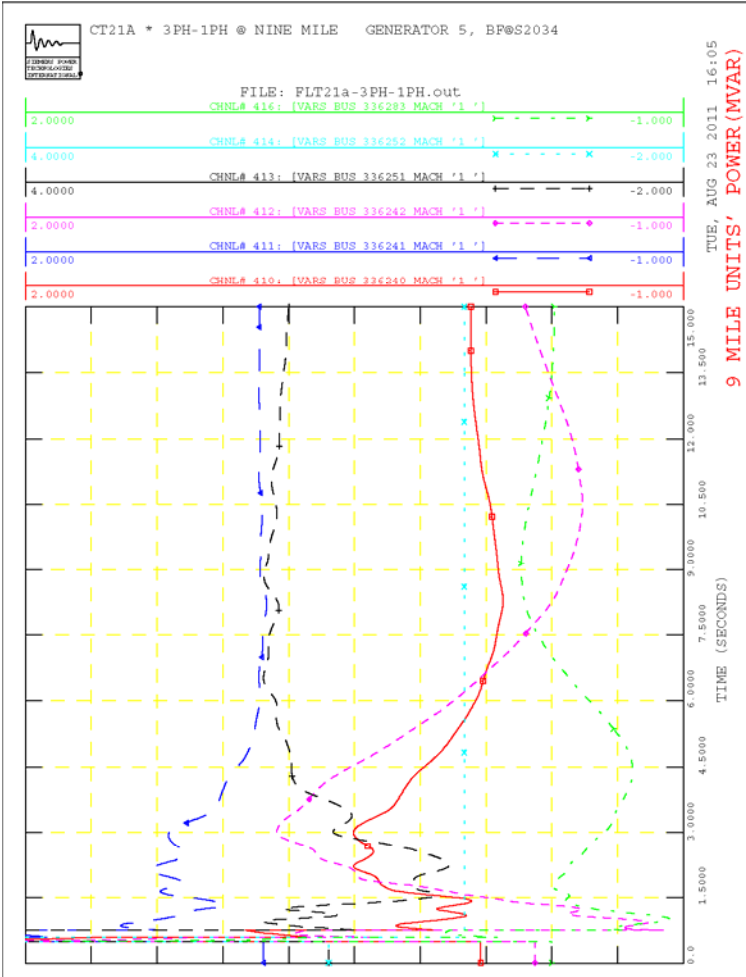
Fault 20a



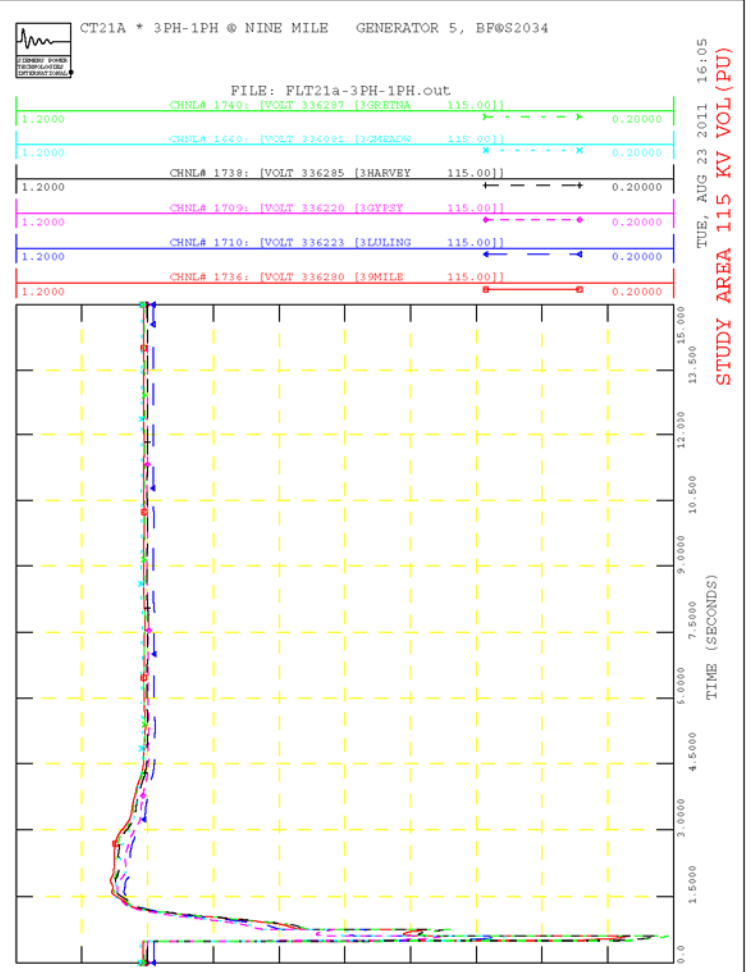
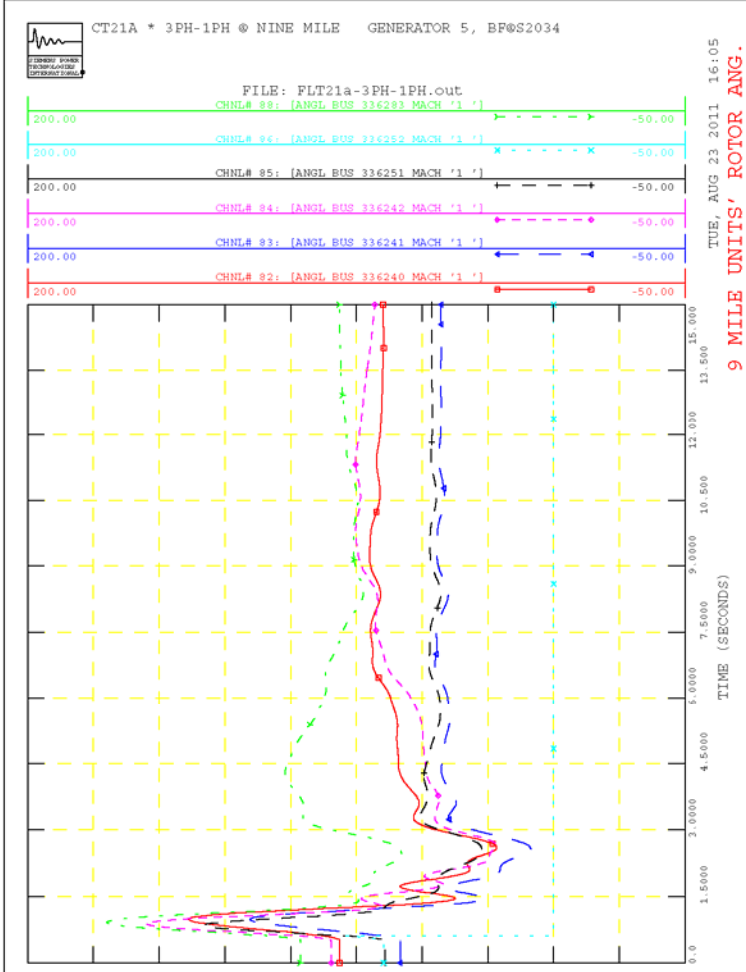
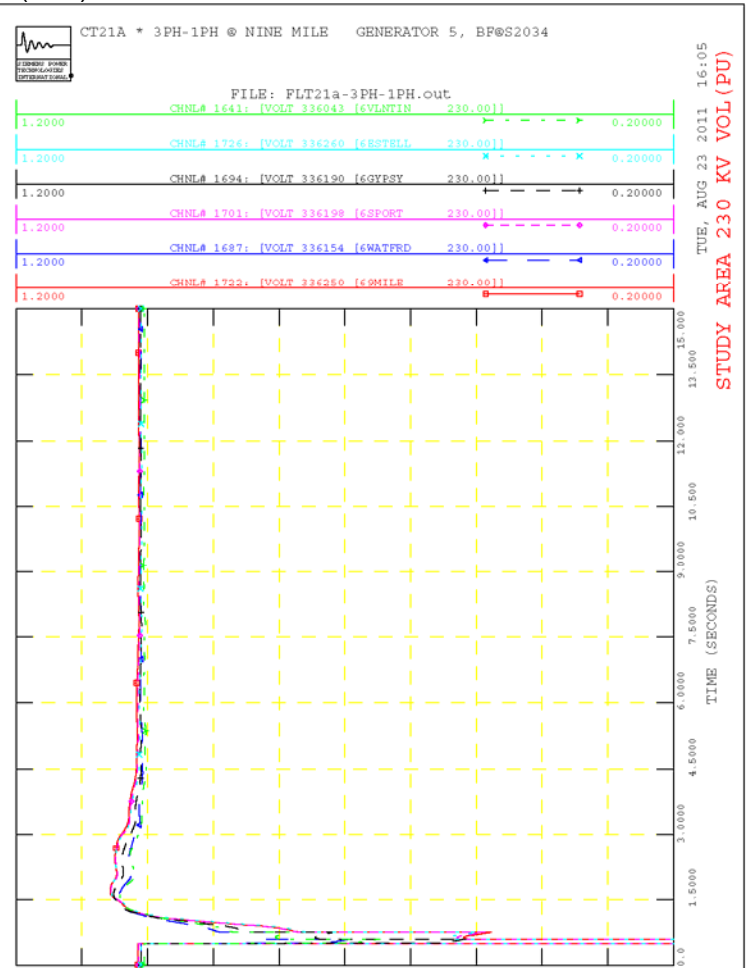
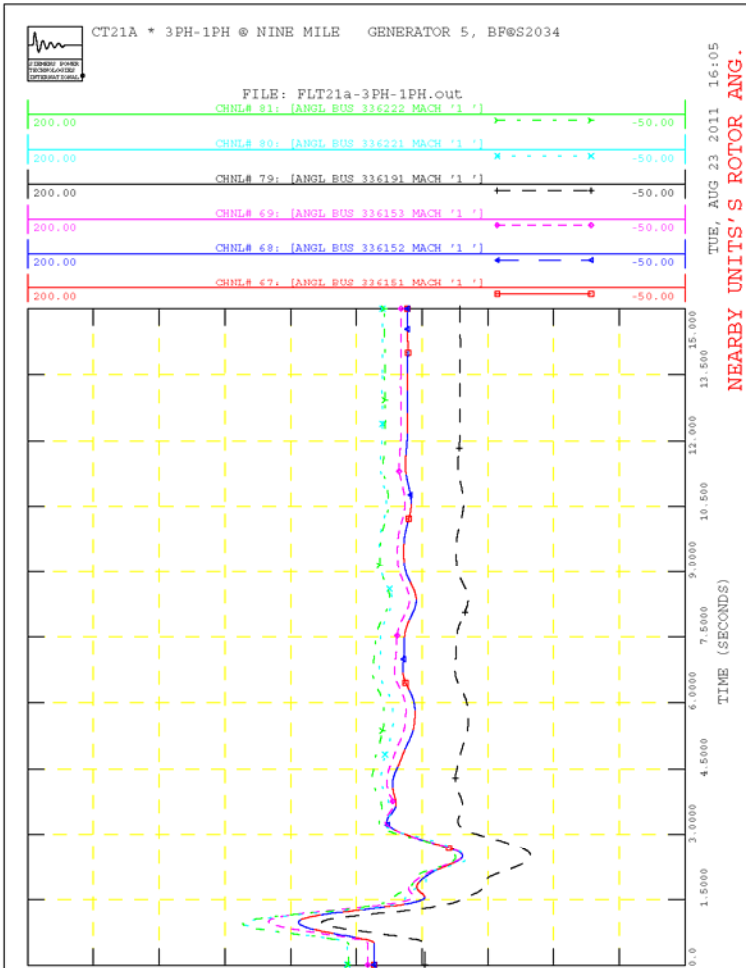
Fault 20a (cont)



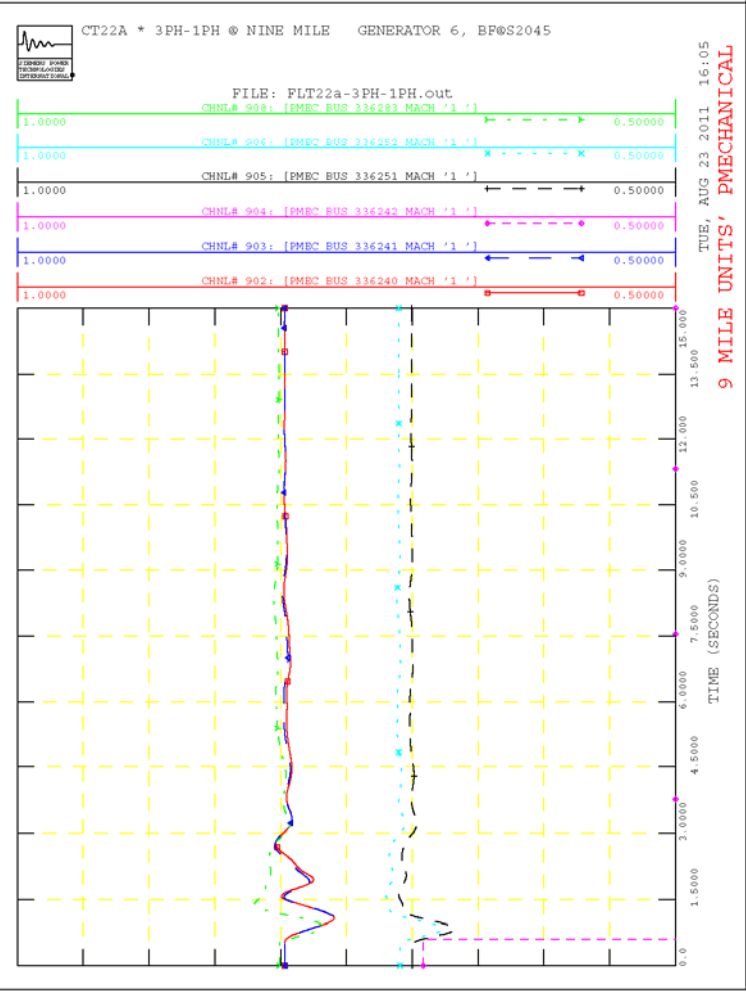
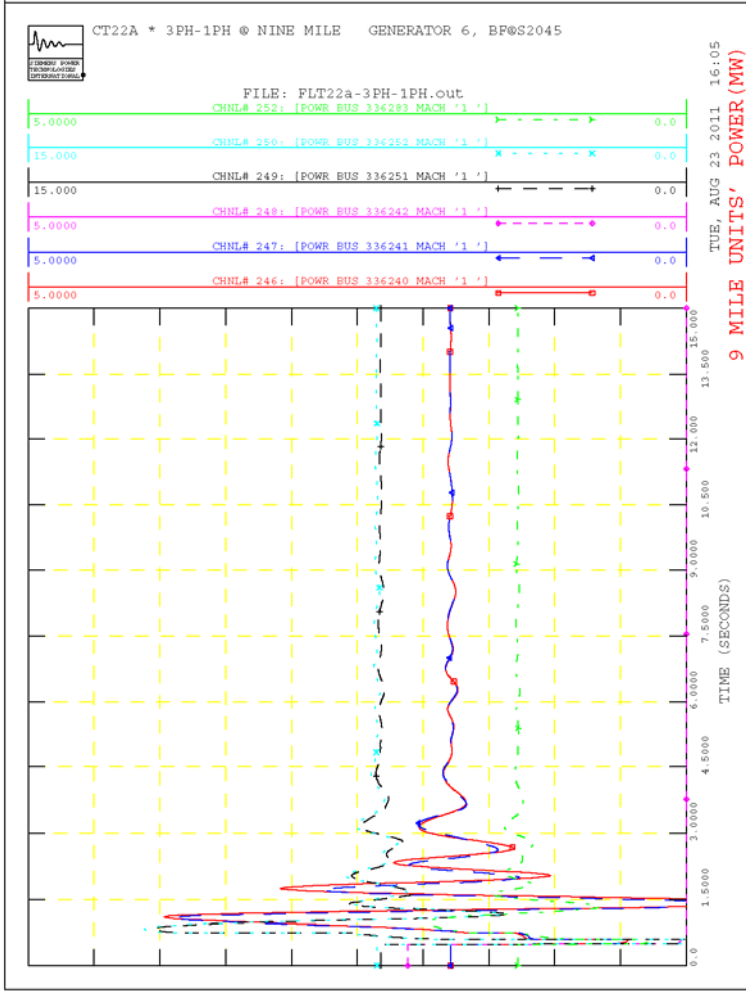
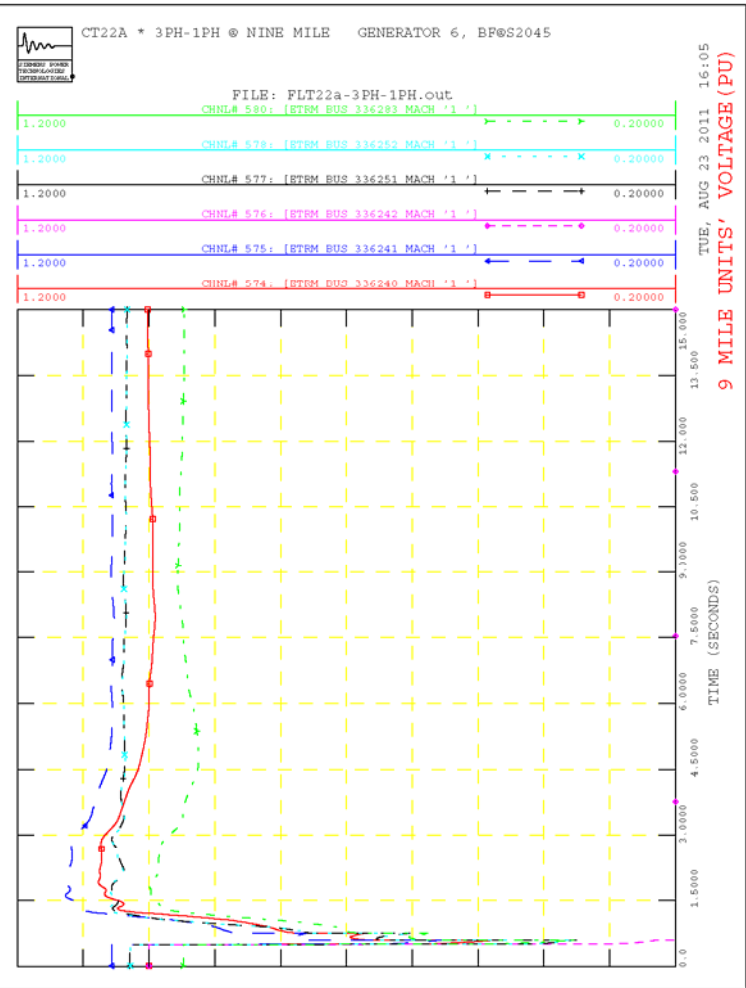
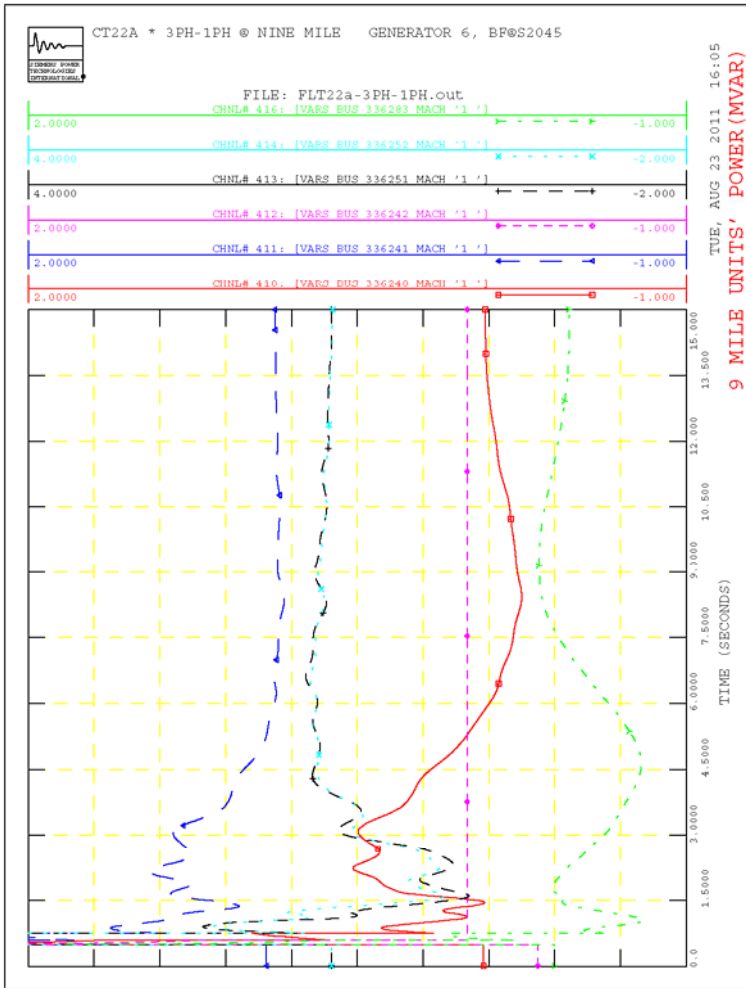
Fault 21a



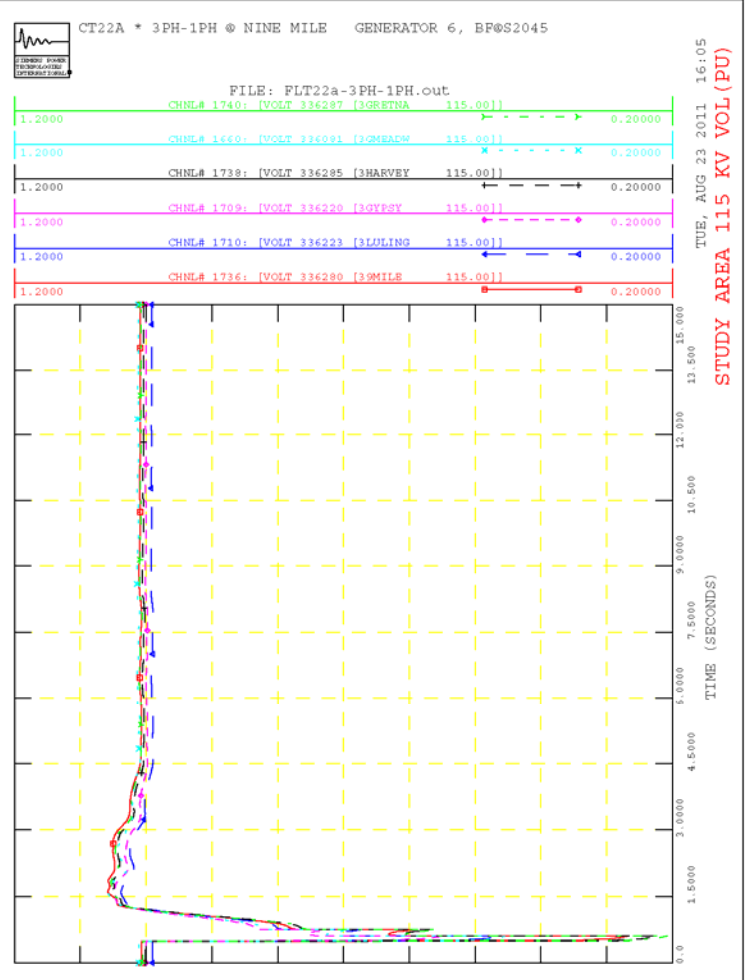
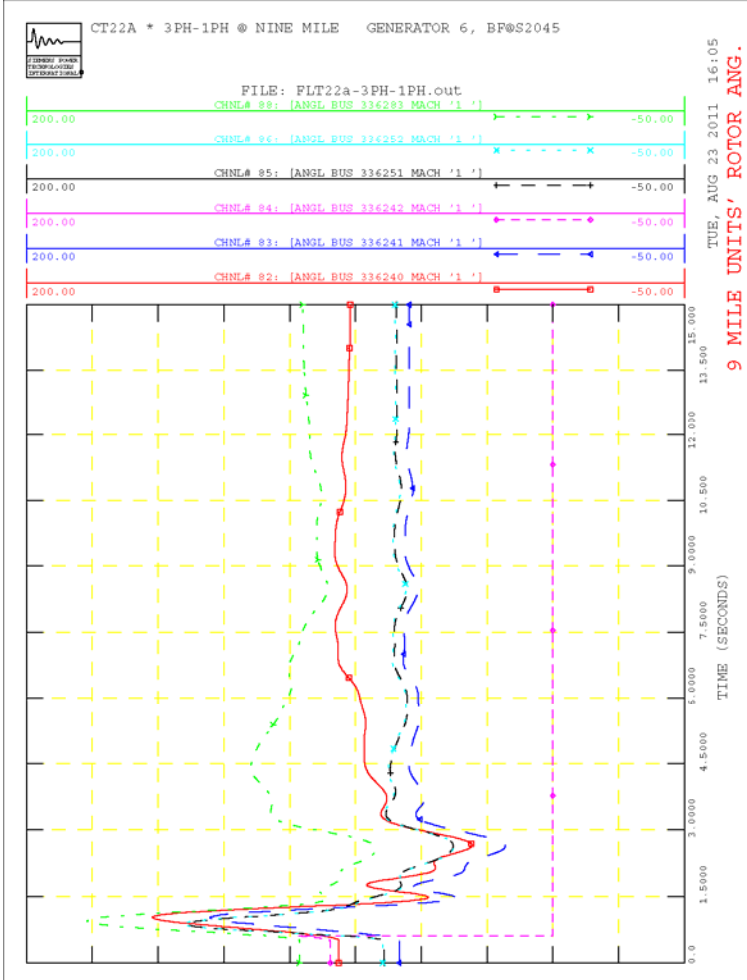
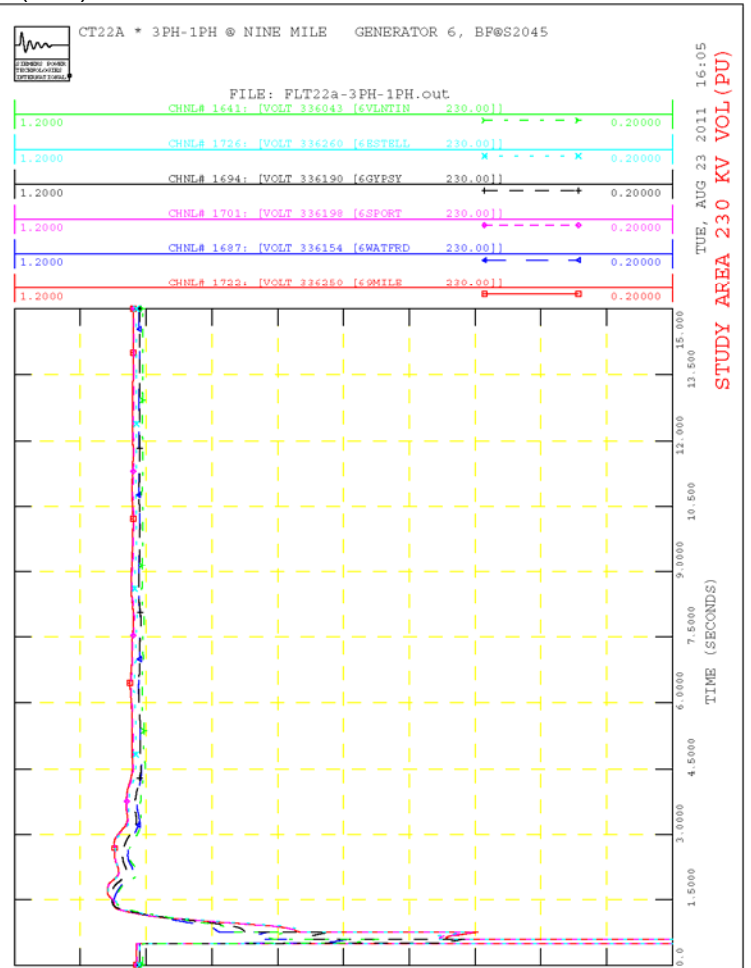
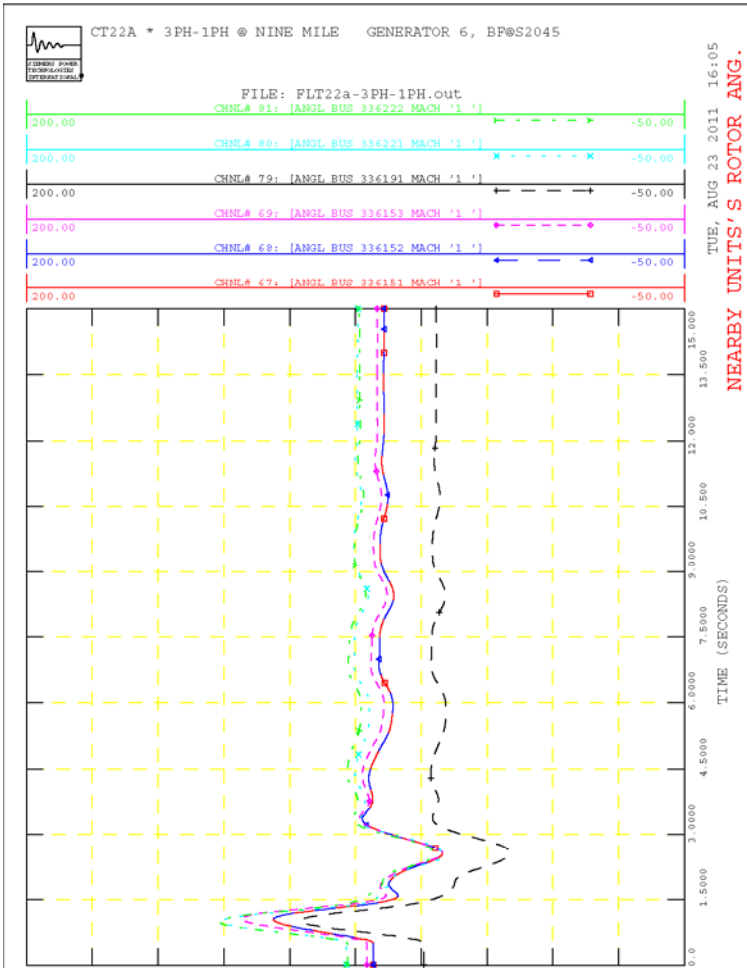
Fault 21a (cont)



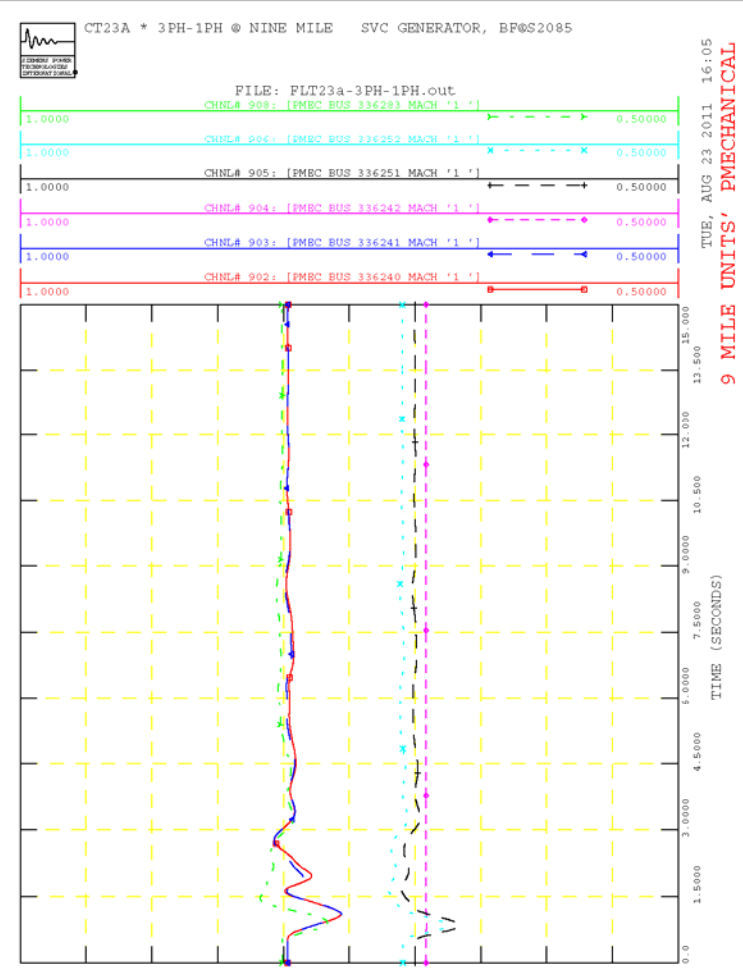
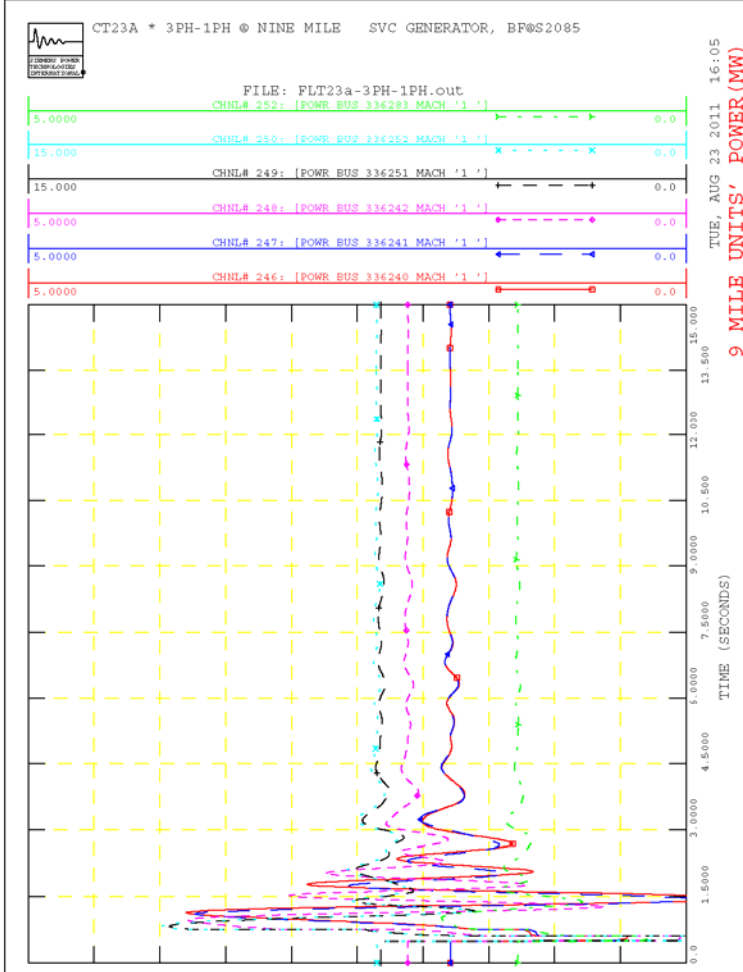
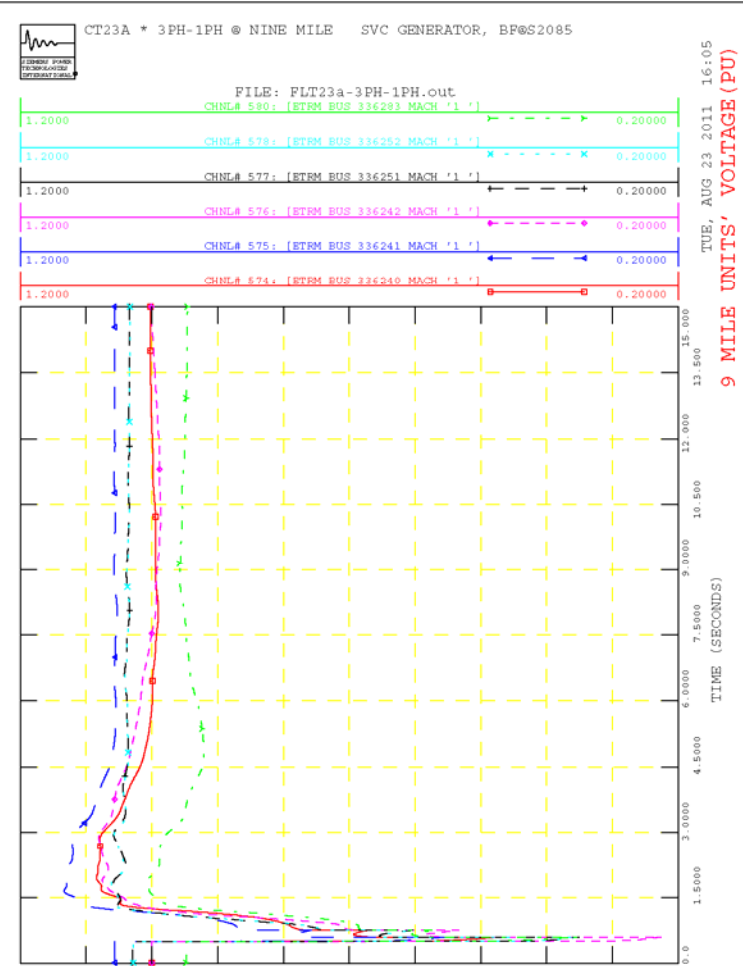
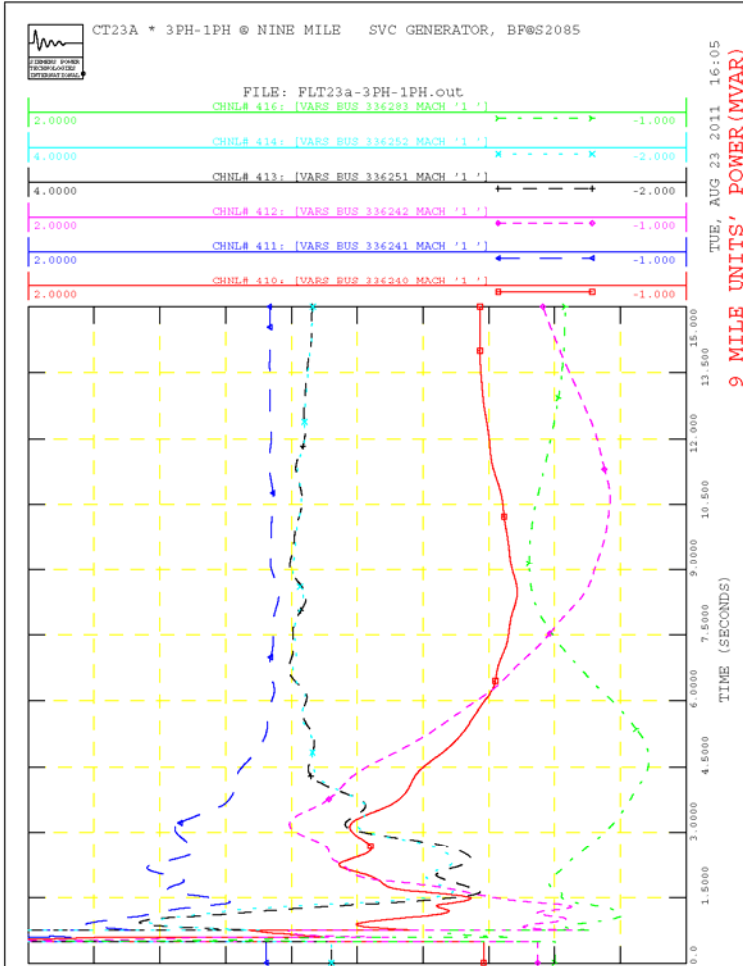
Fault 22a



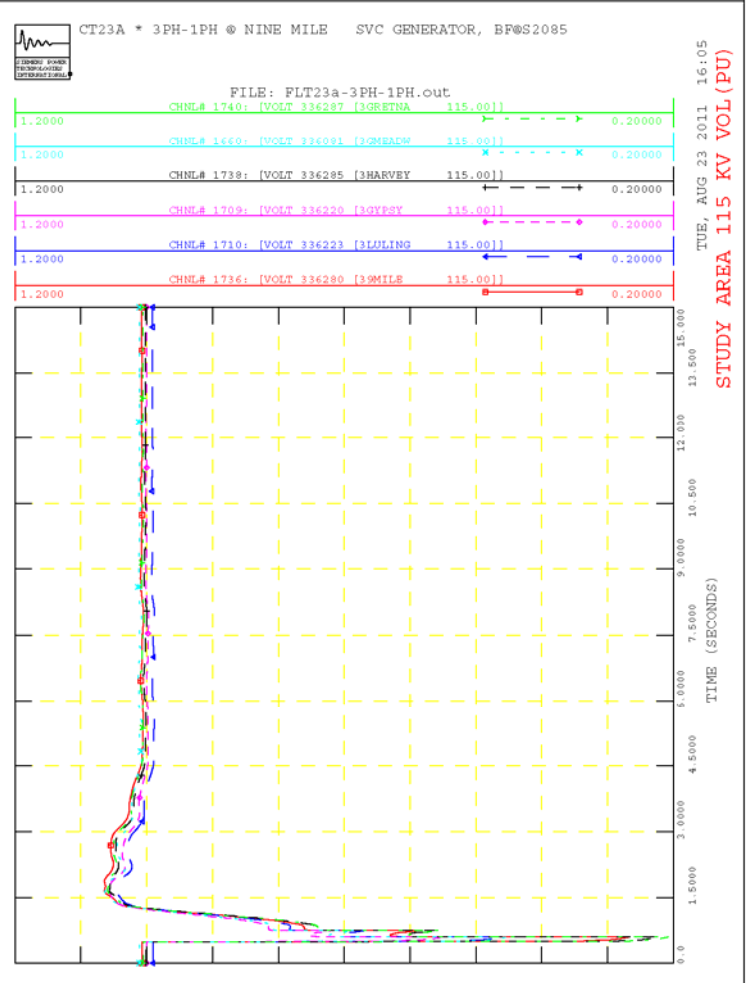
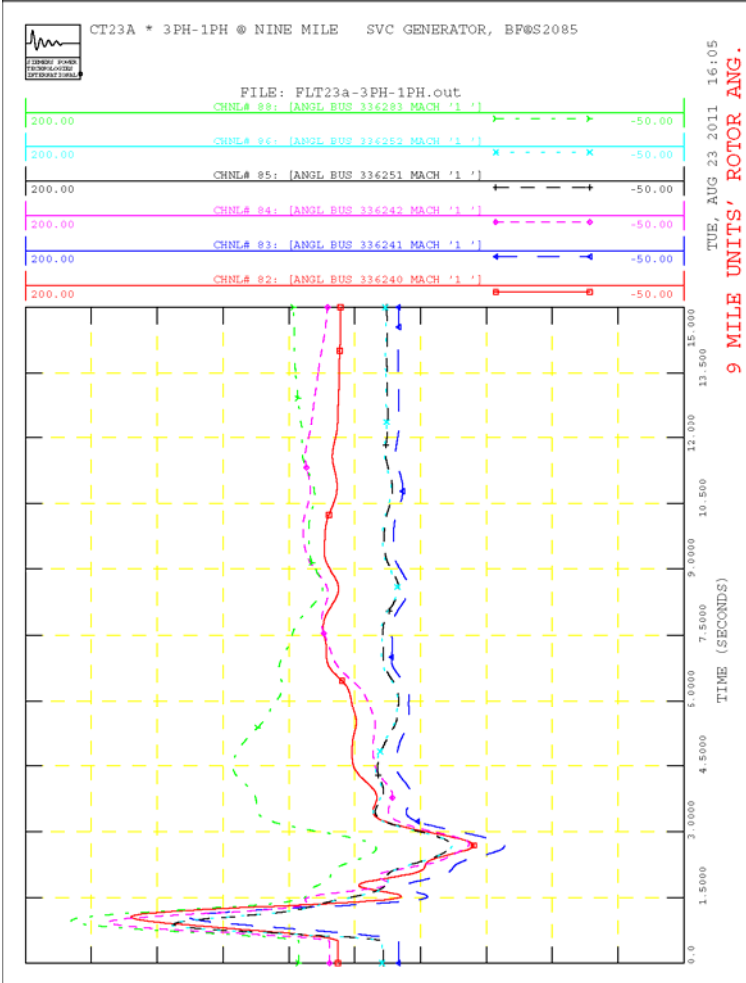
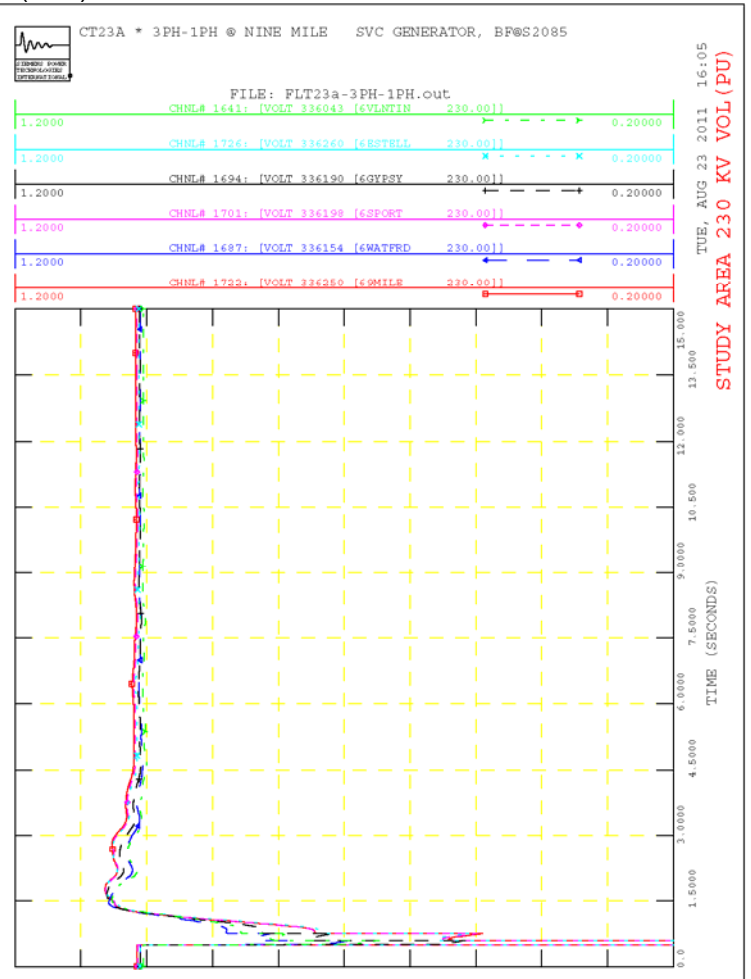
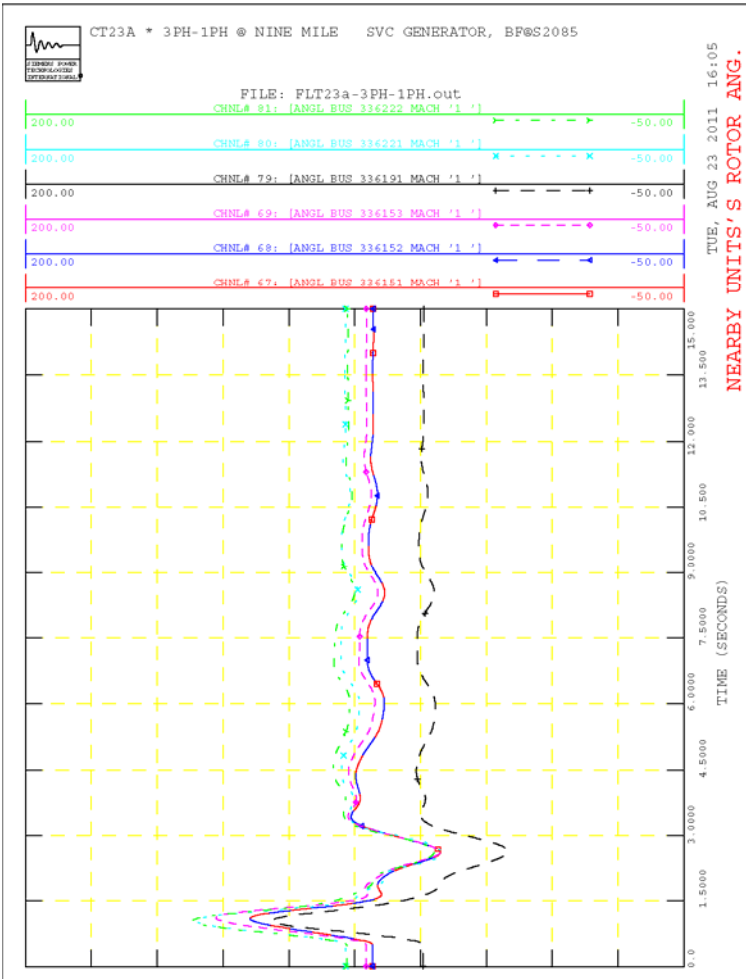
Fault 22a (cont)



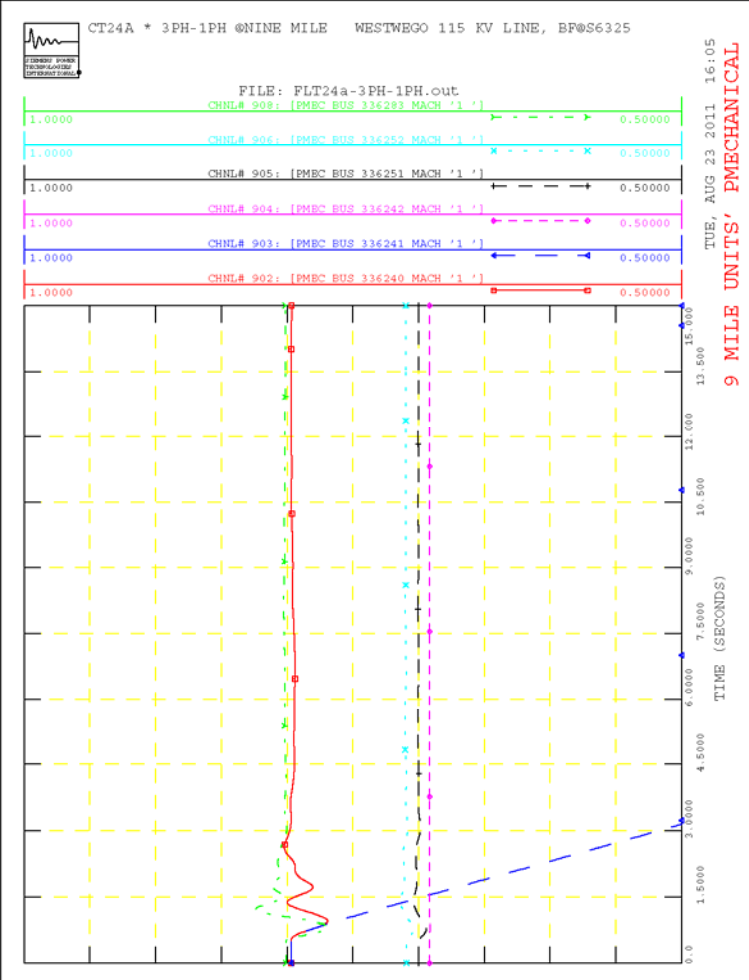
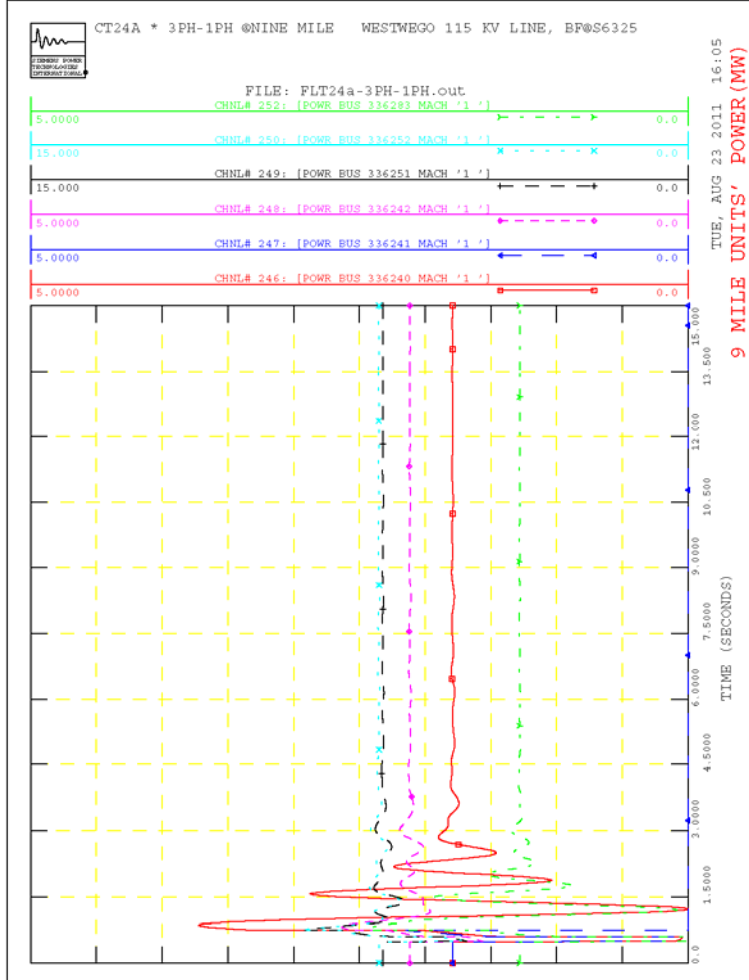
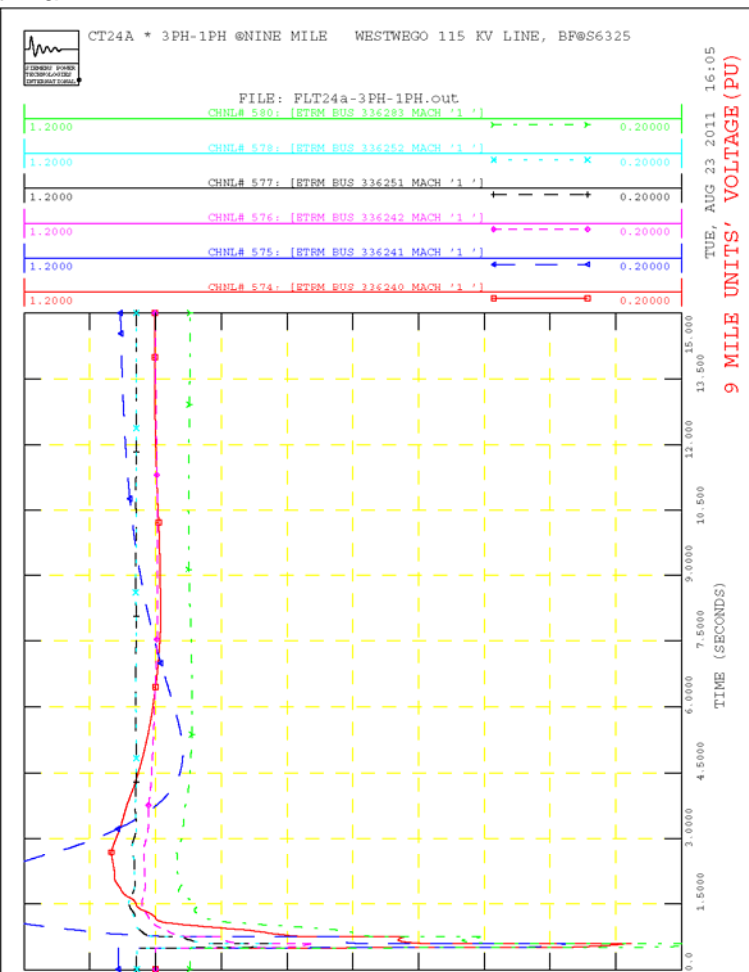
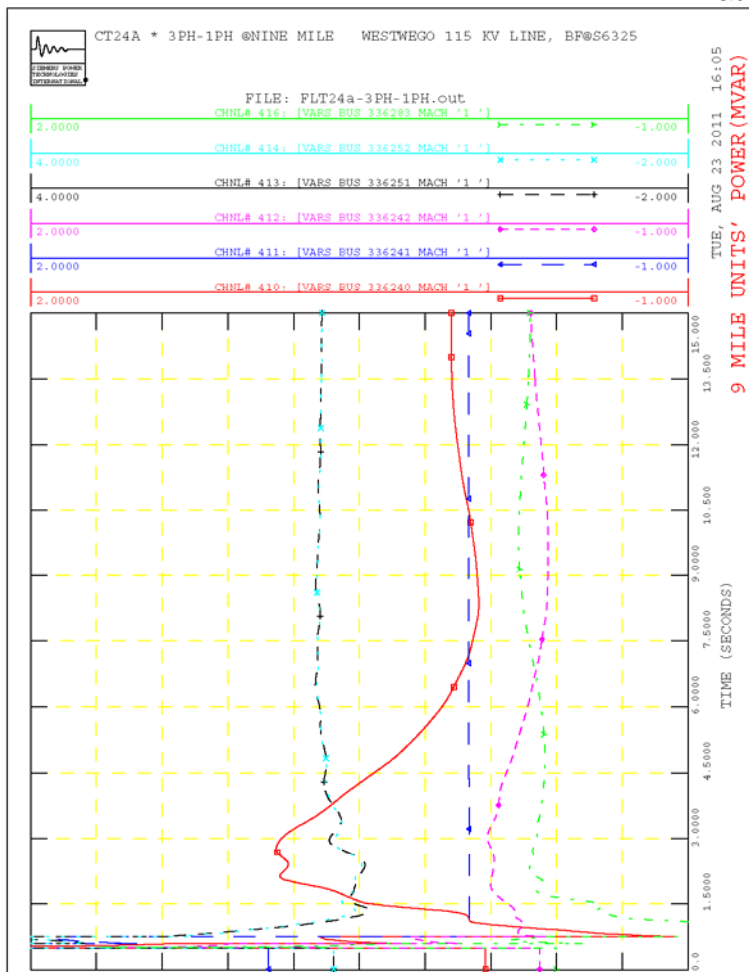
Fault 23a



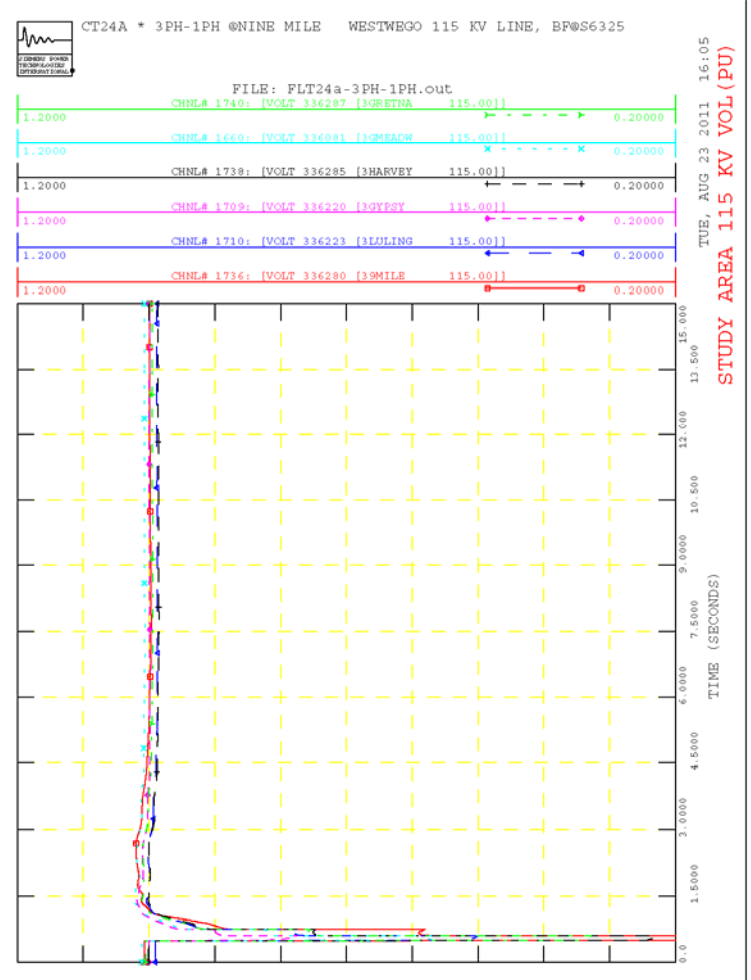
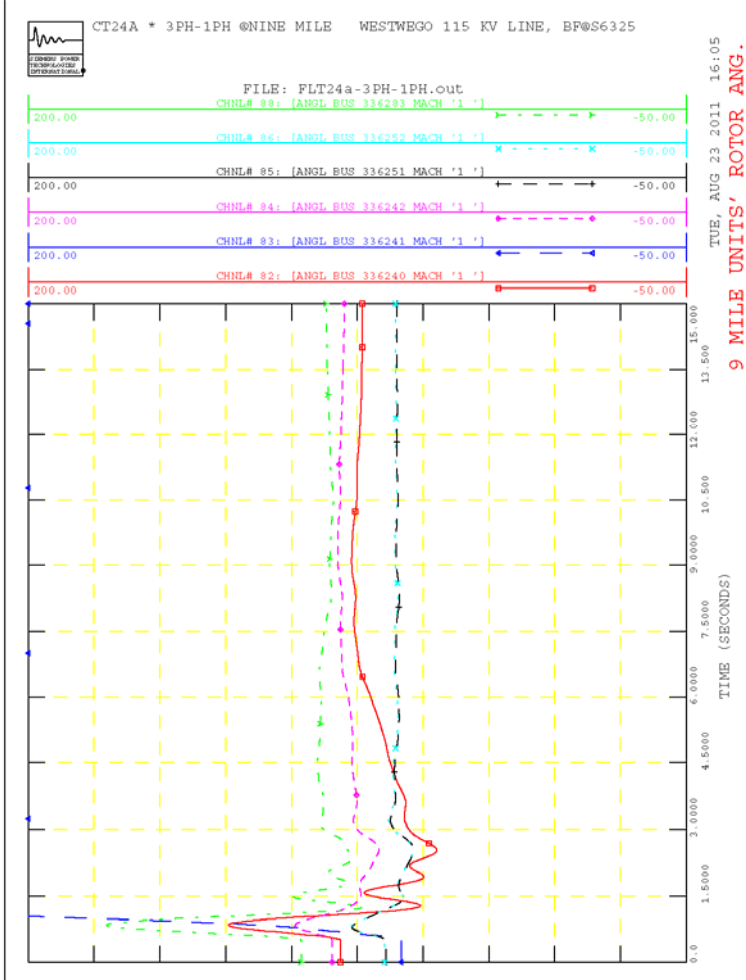
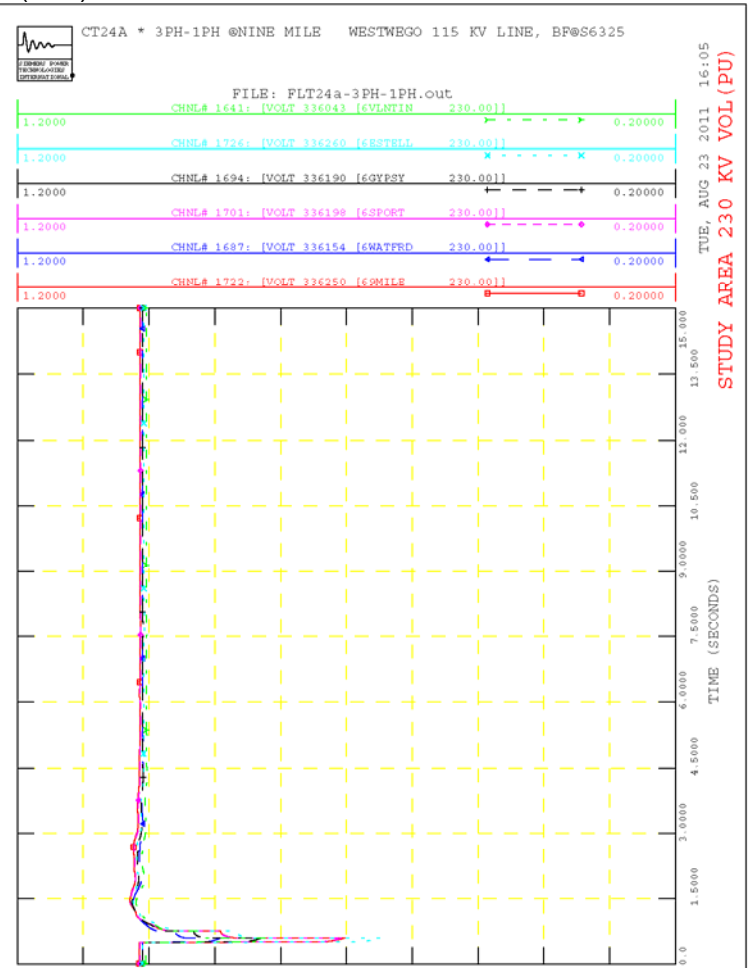
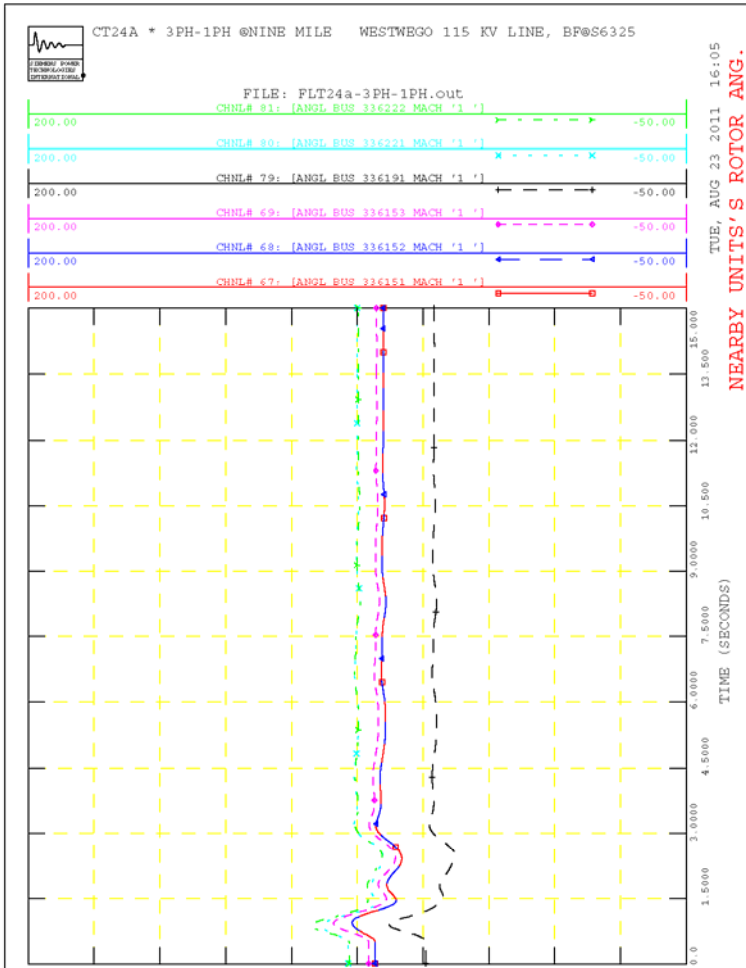
Fault 23a (cont)



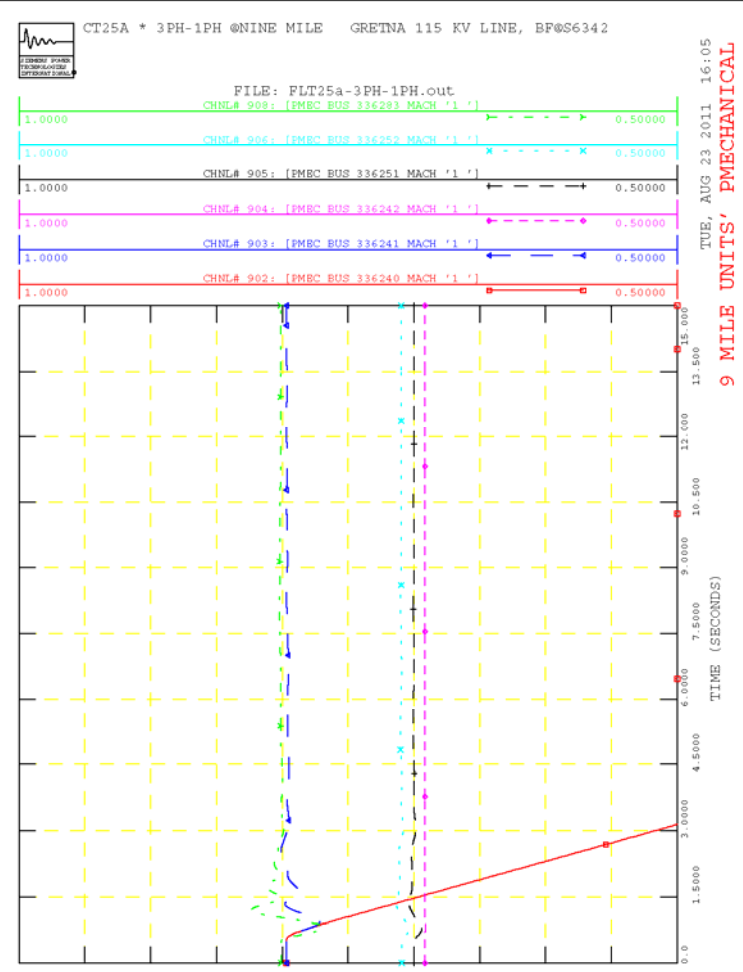
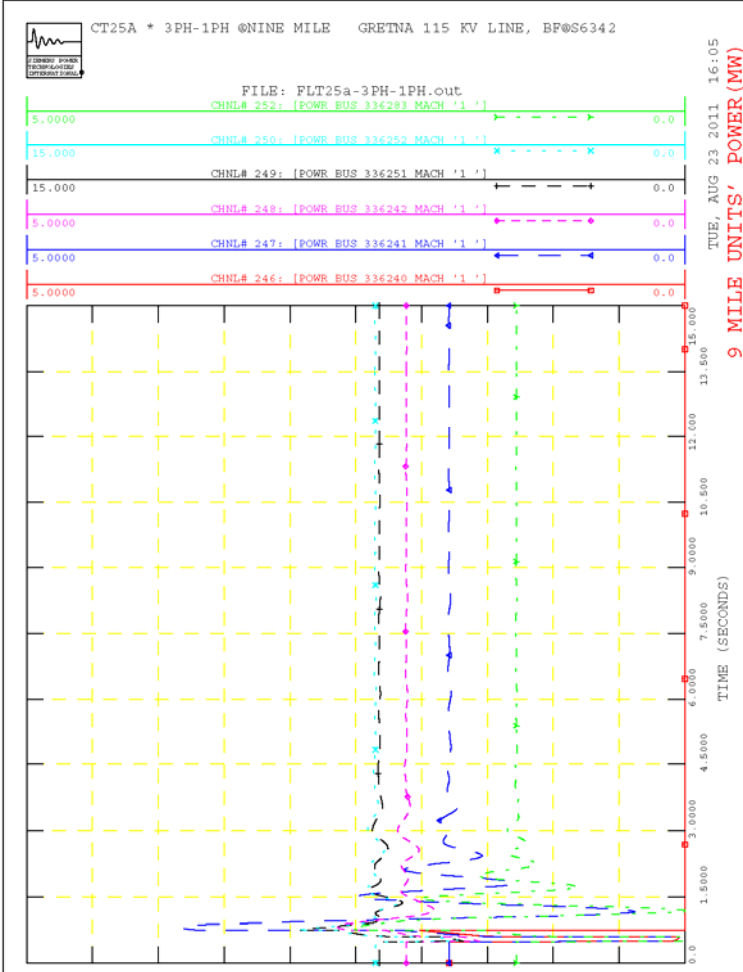
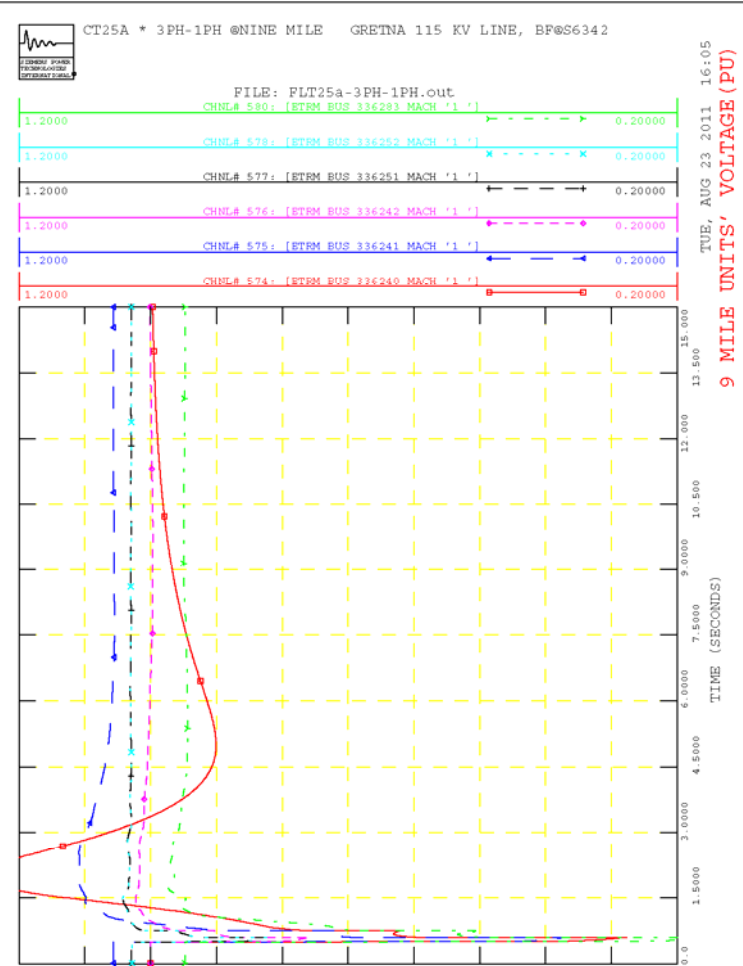
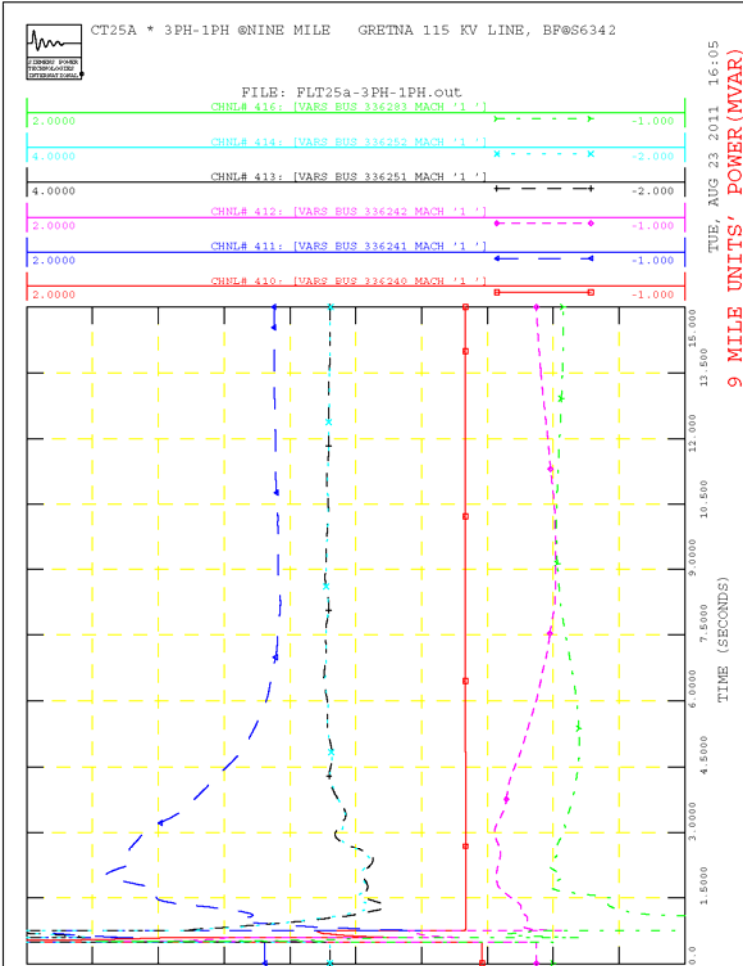
Fault 24a



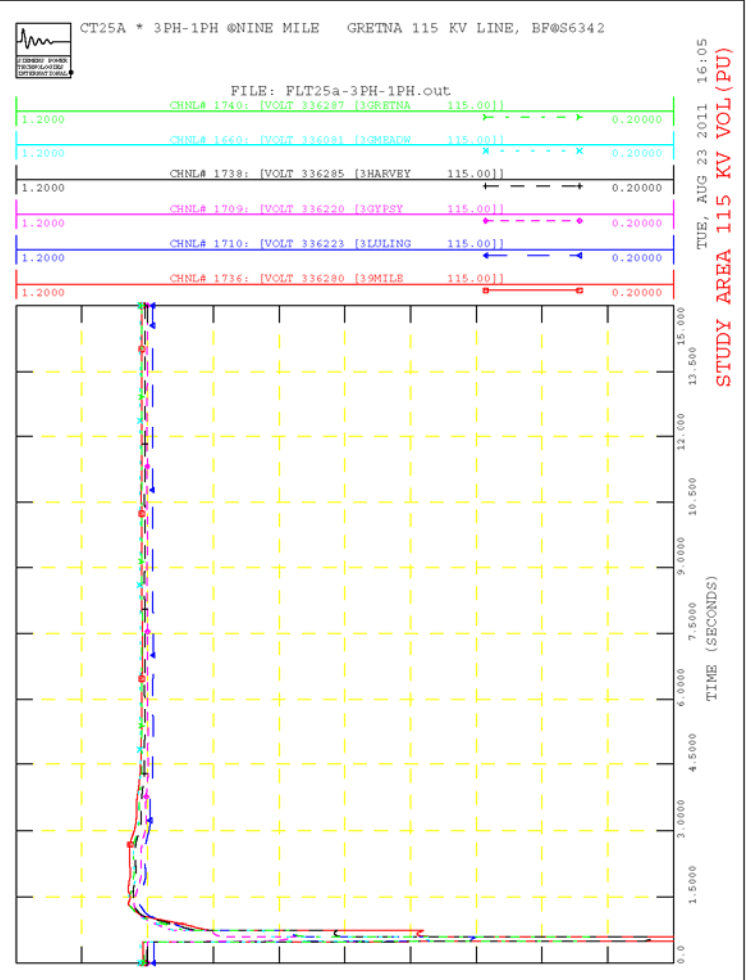
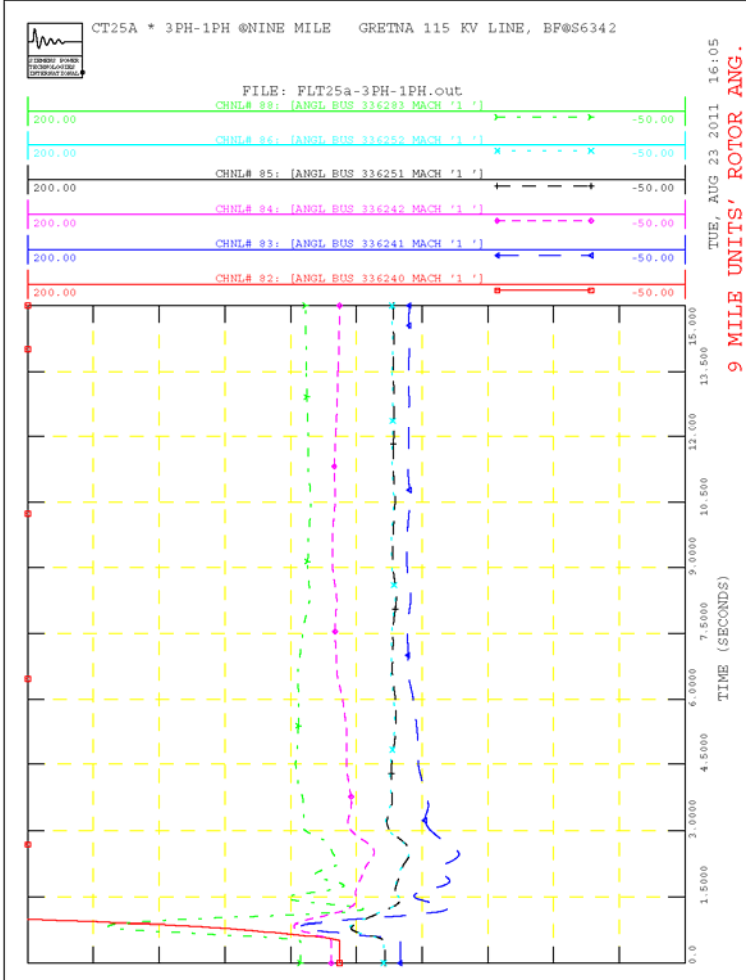
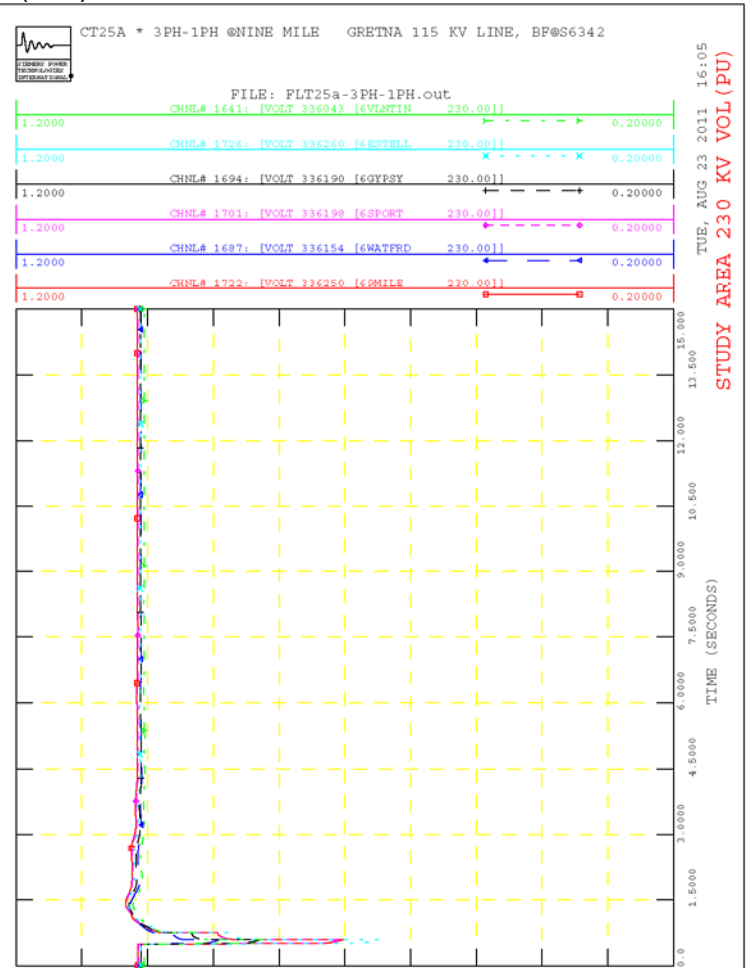
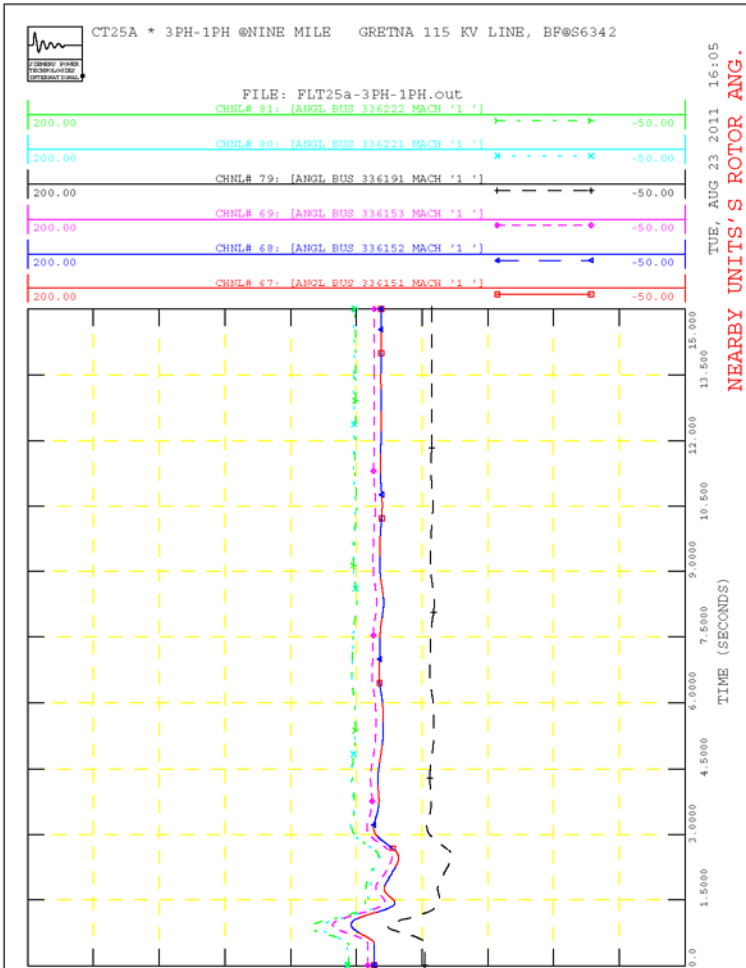
Fault 24a (cont)



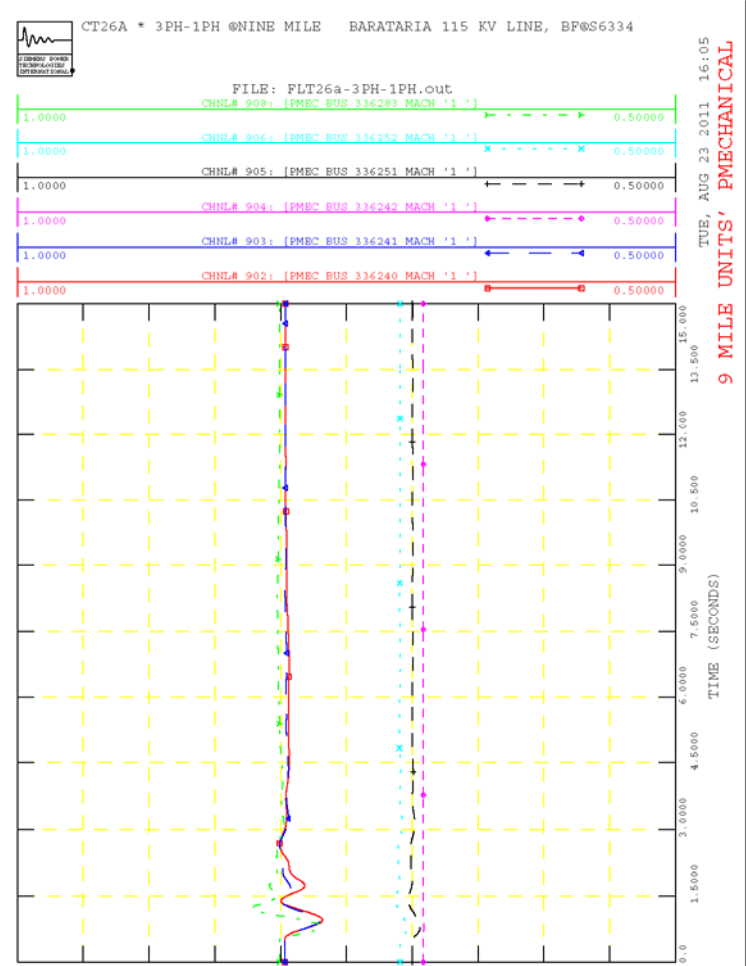
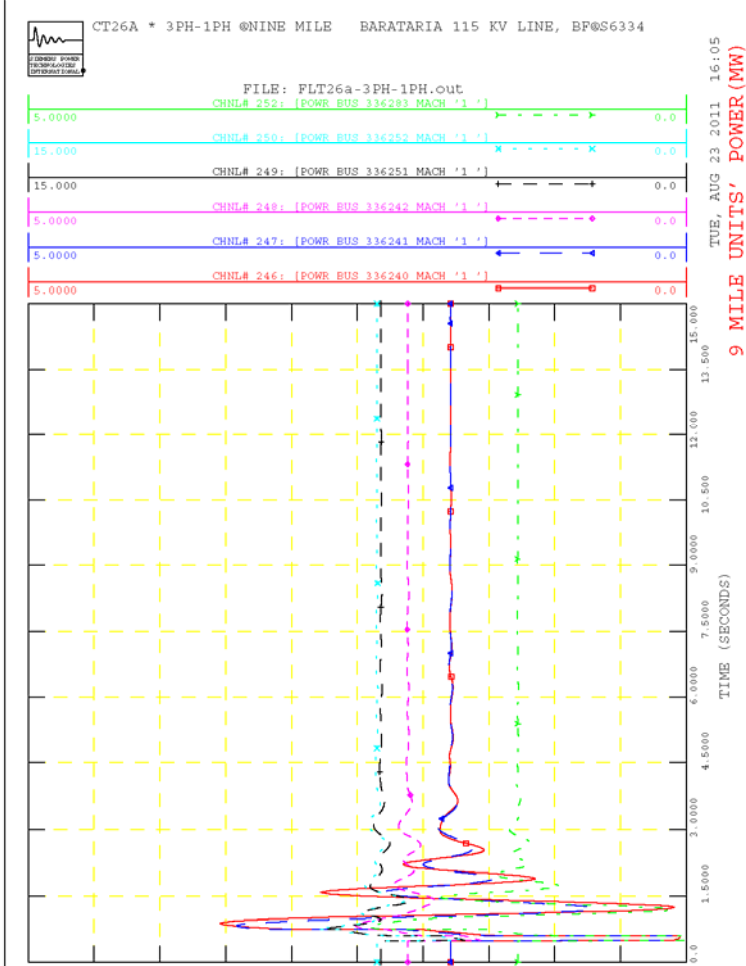
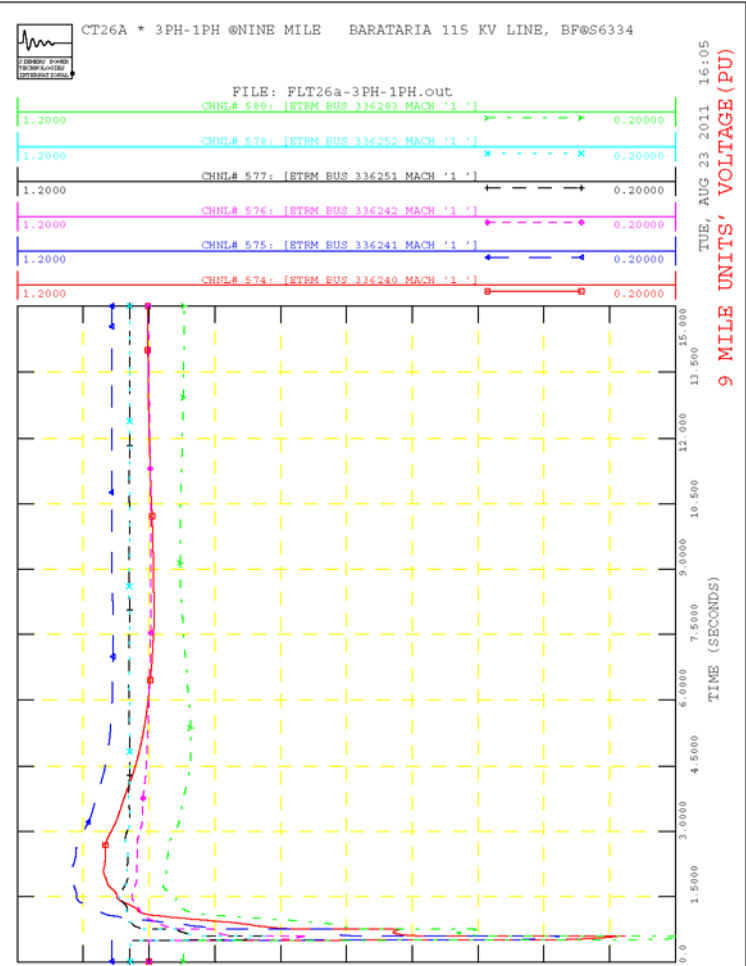
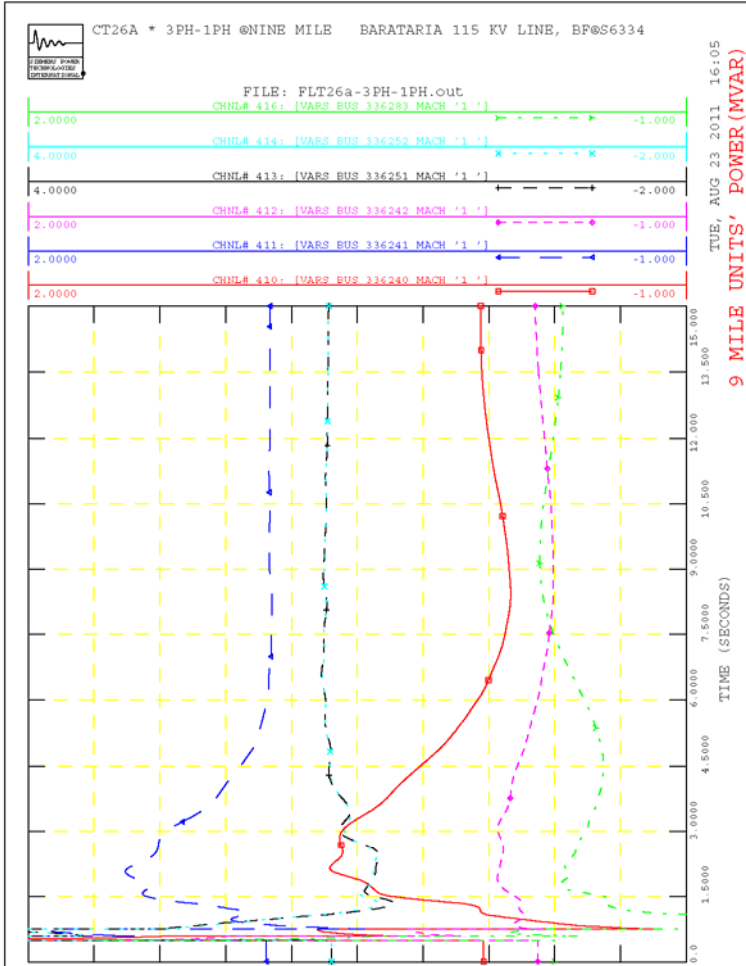
Fault 25a



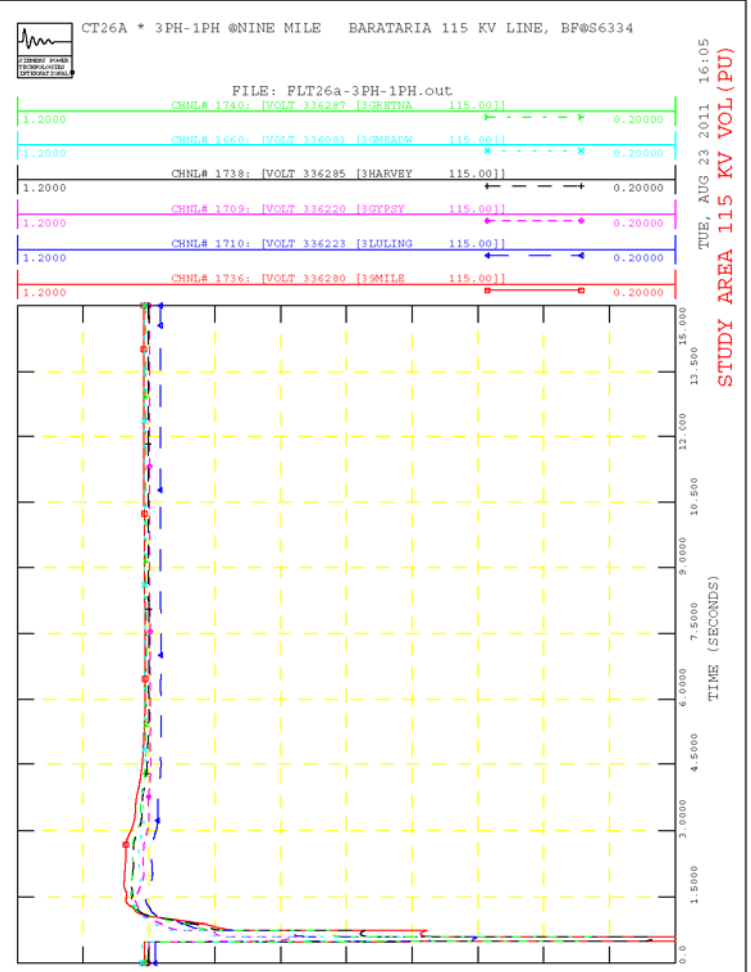
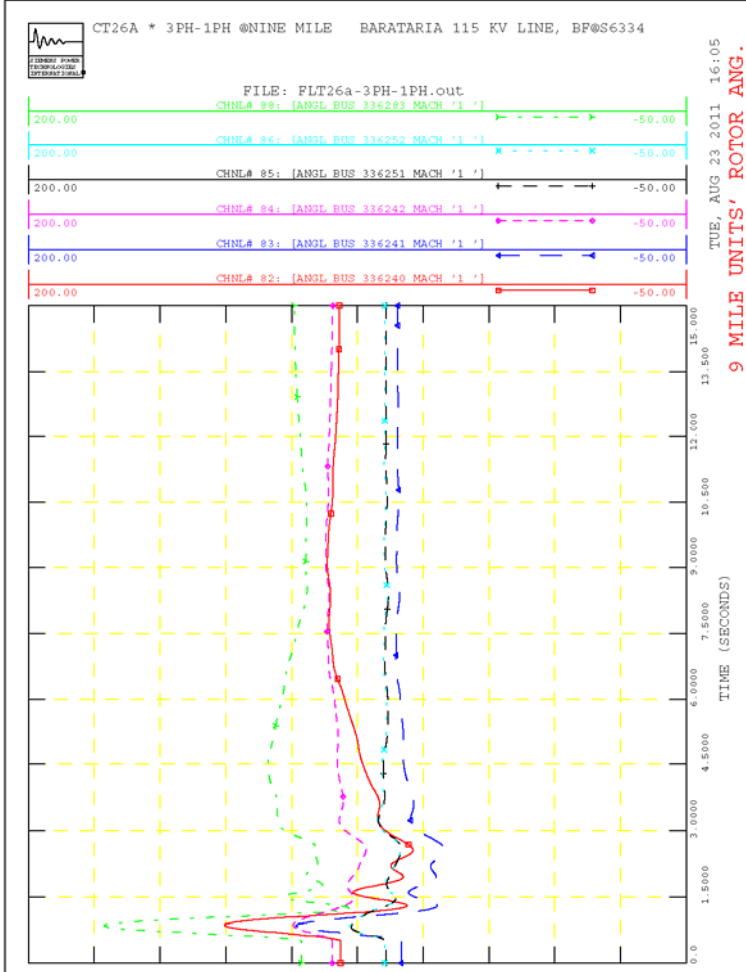
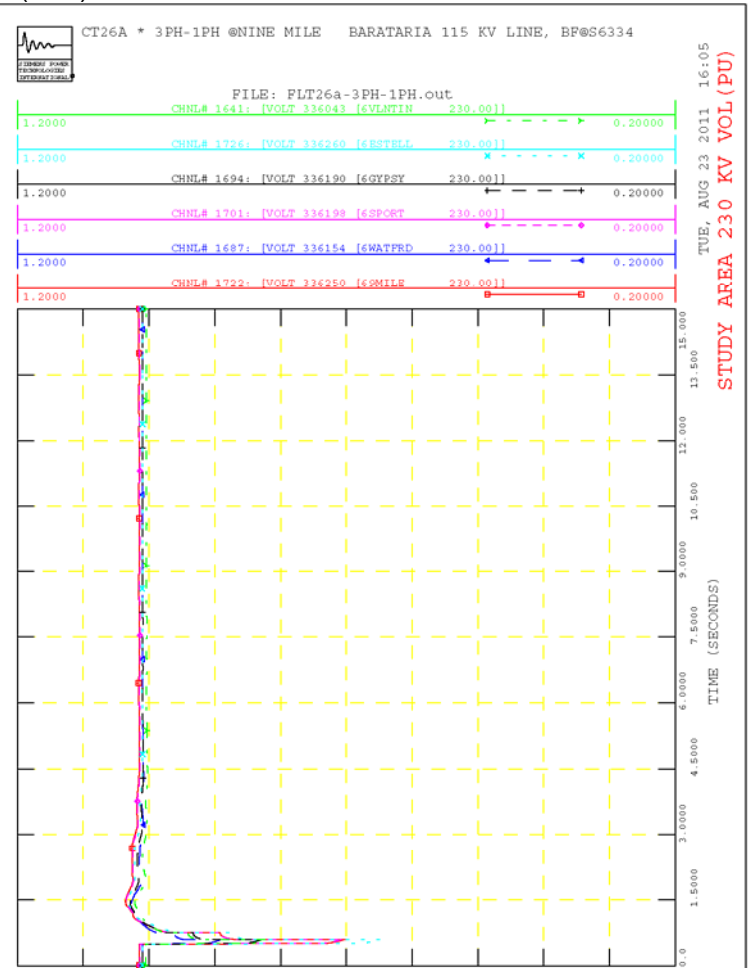
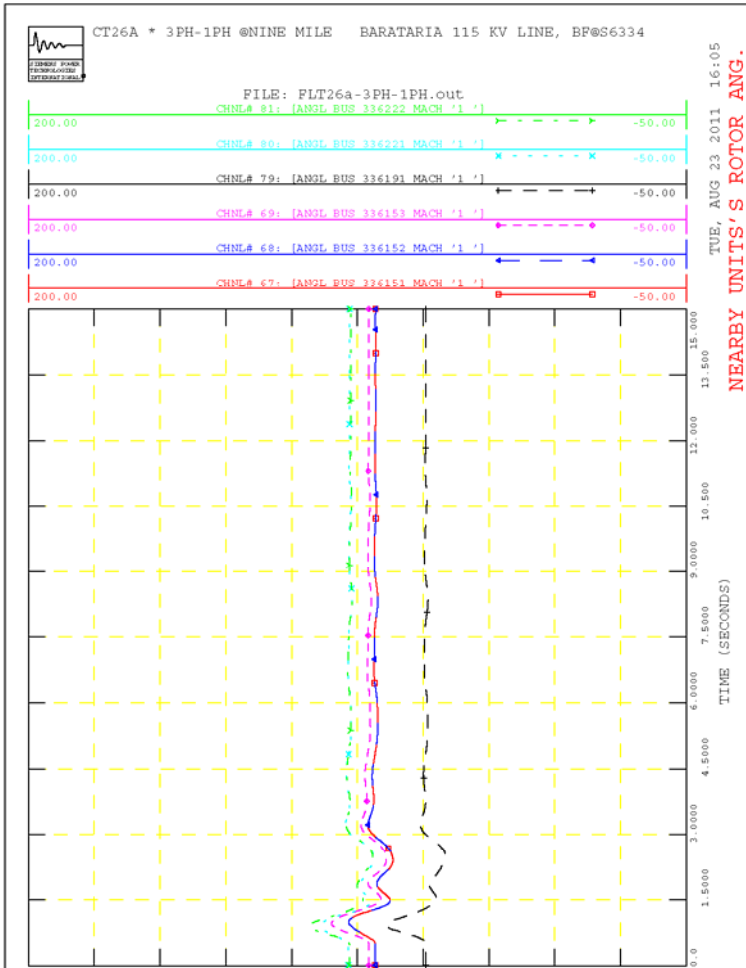
Fault 25a (cont)



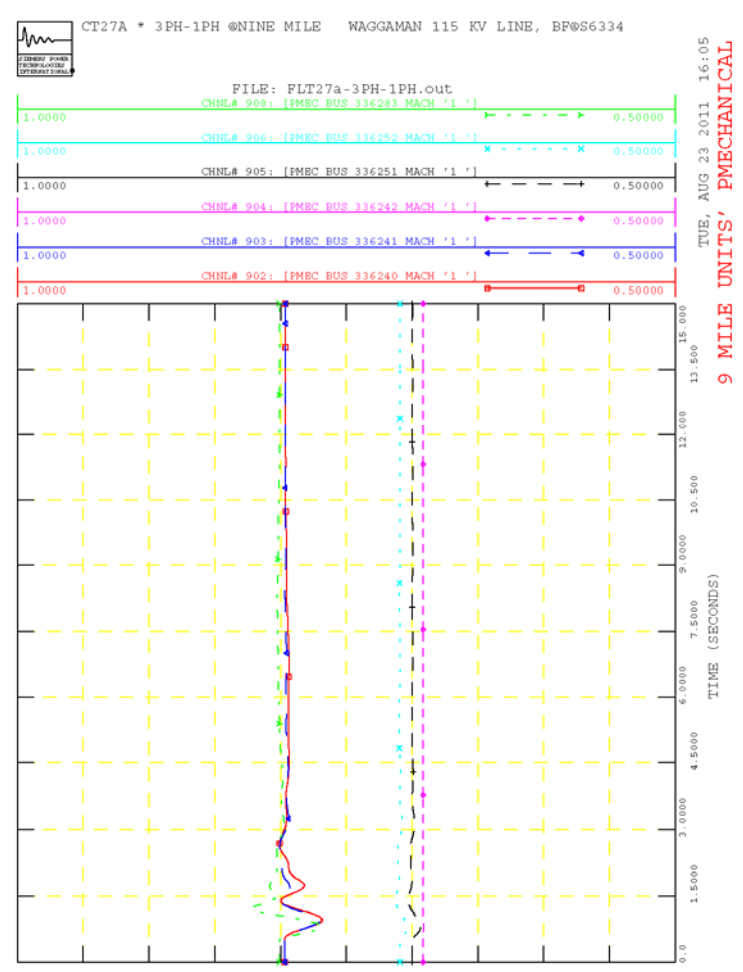
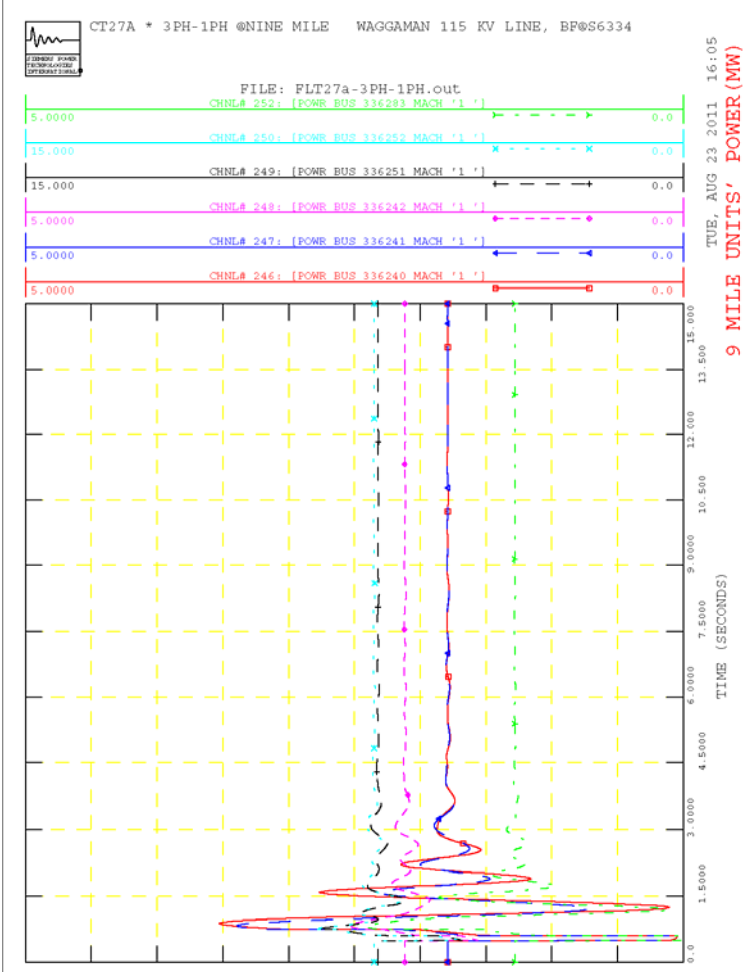
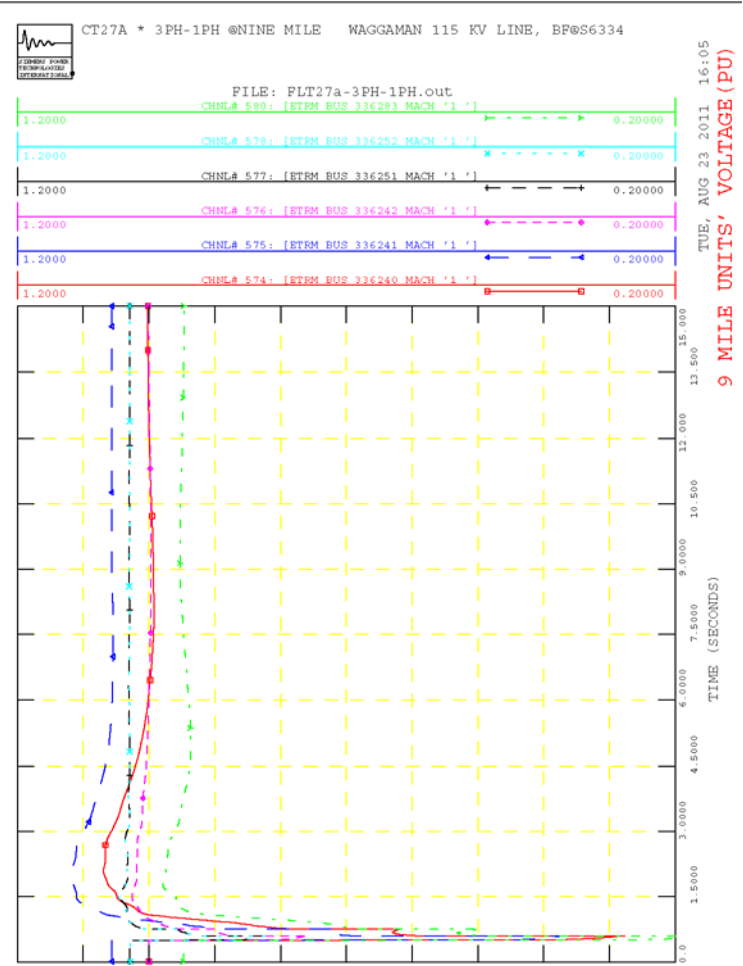
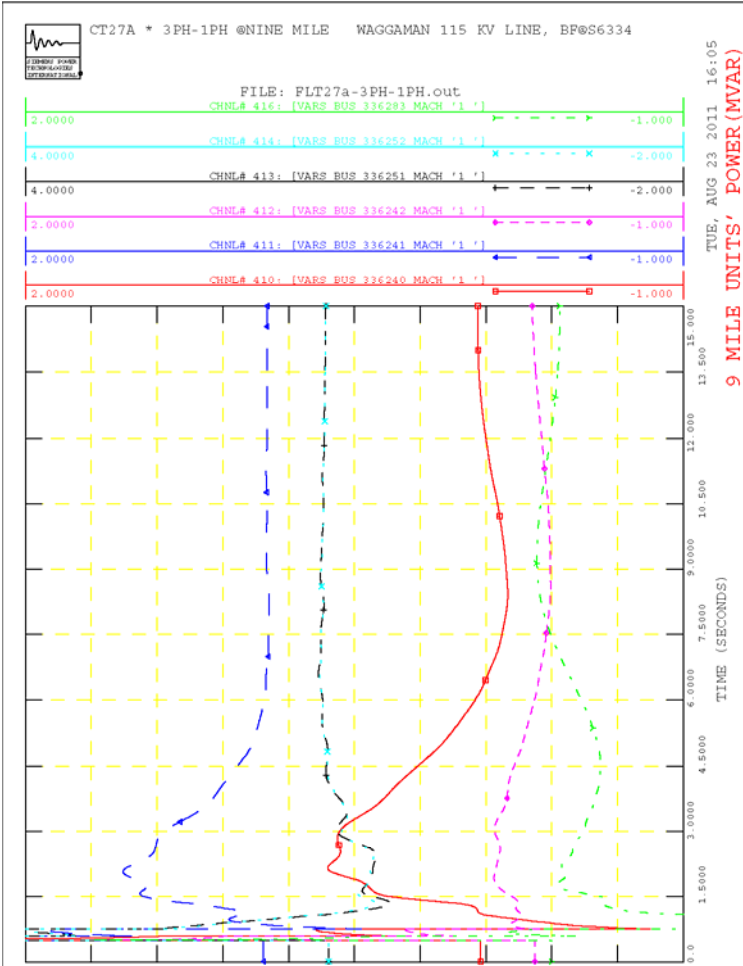
Fault 26a



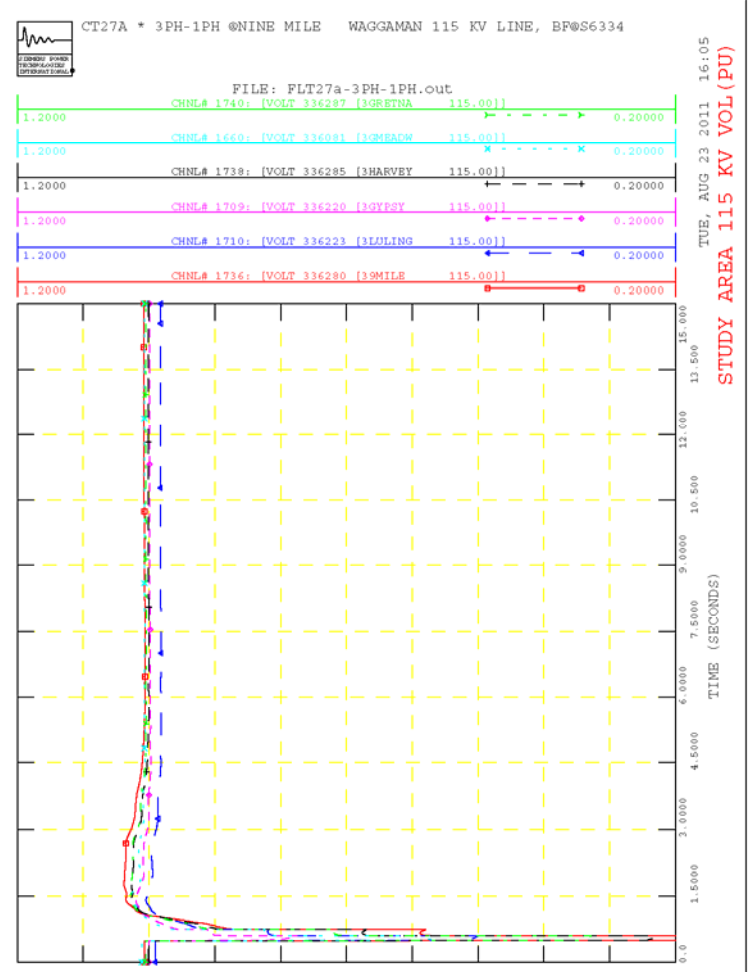
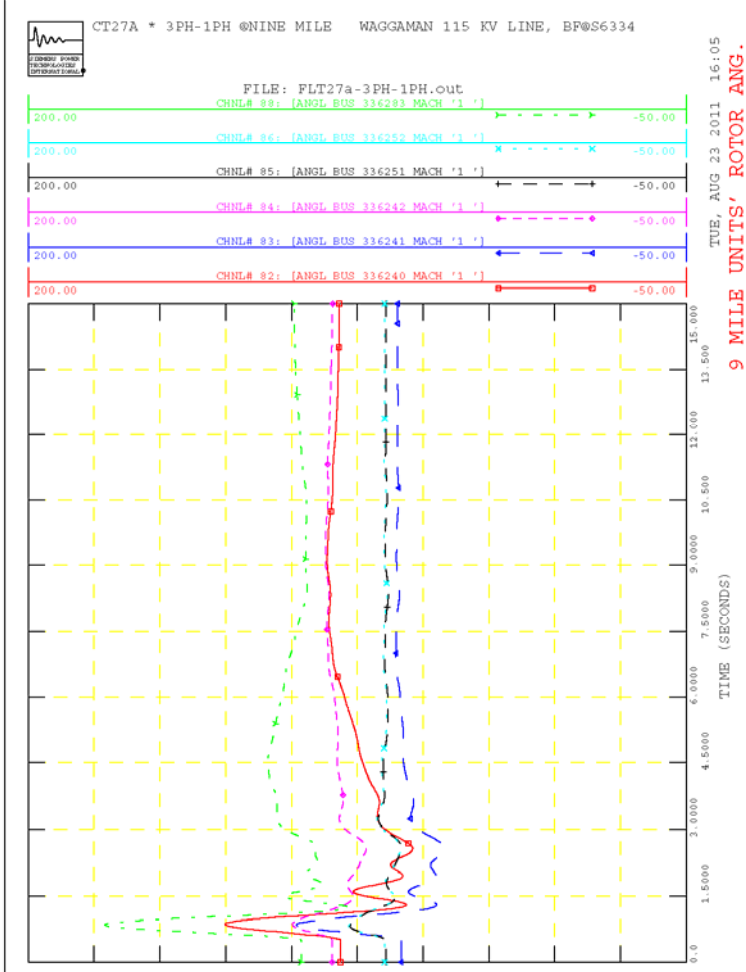
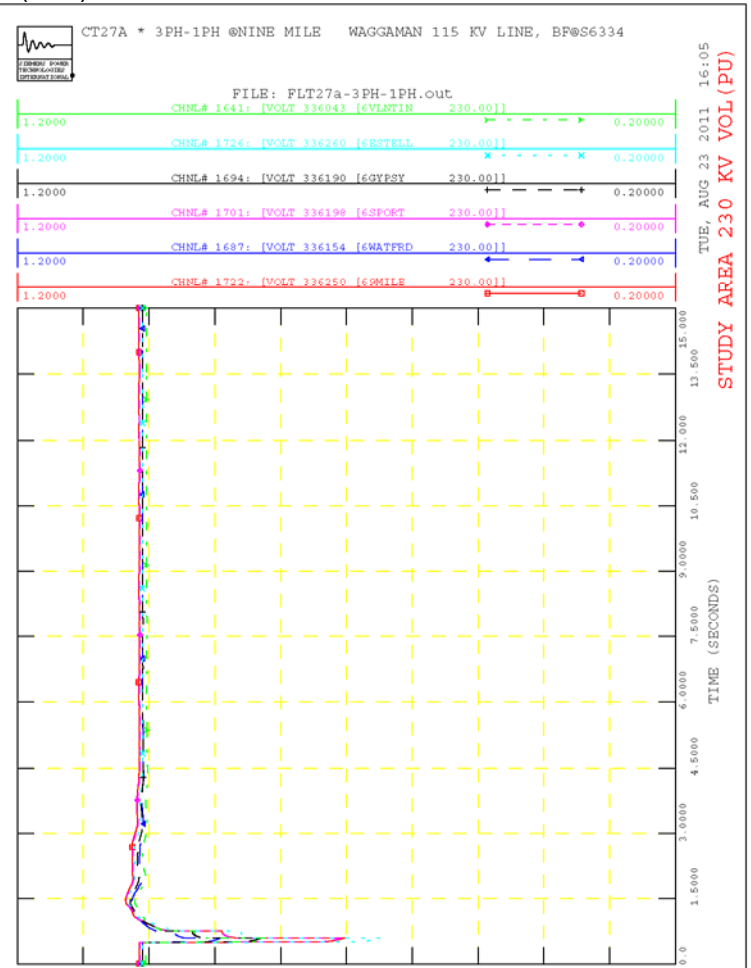
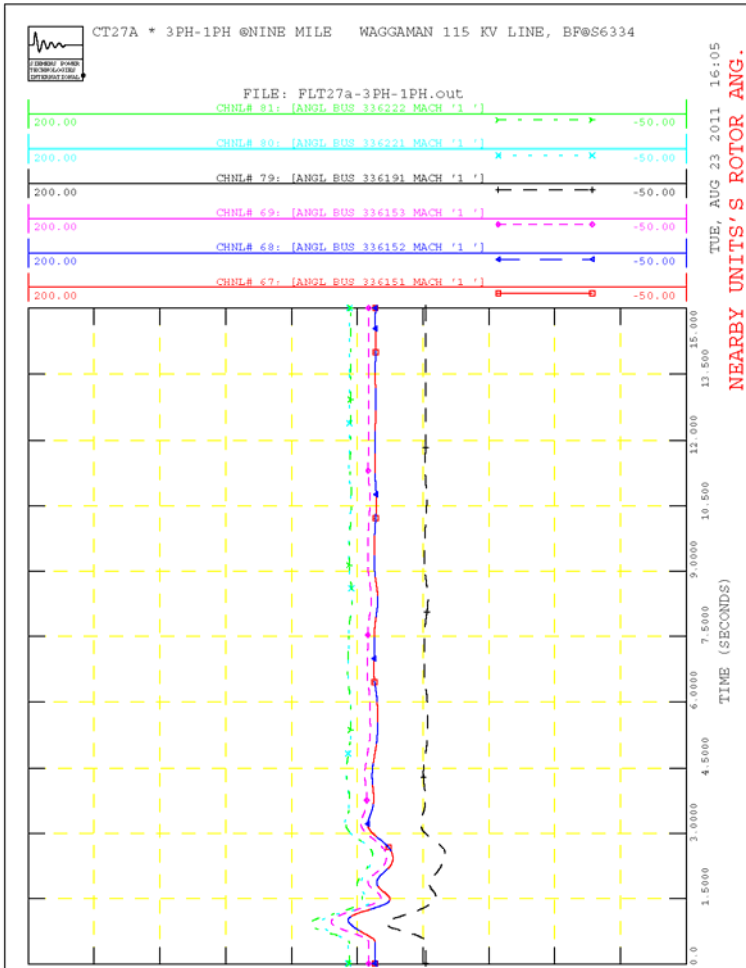
Fault 26a (cont)



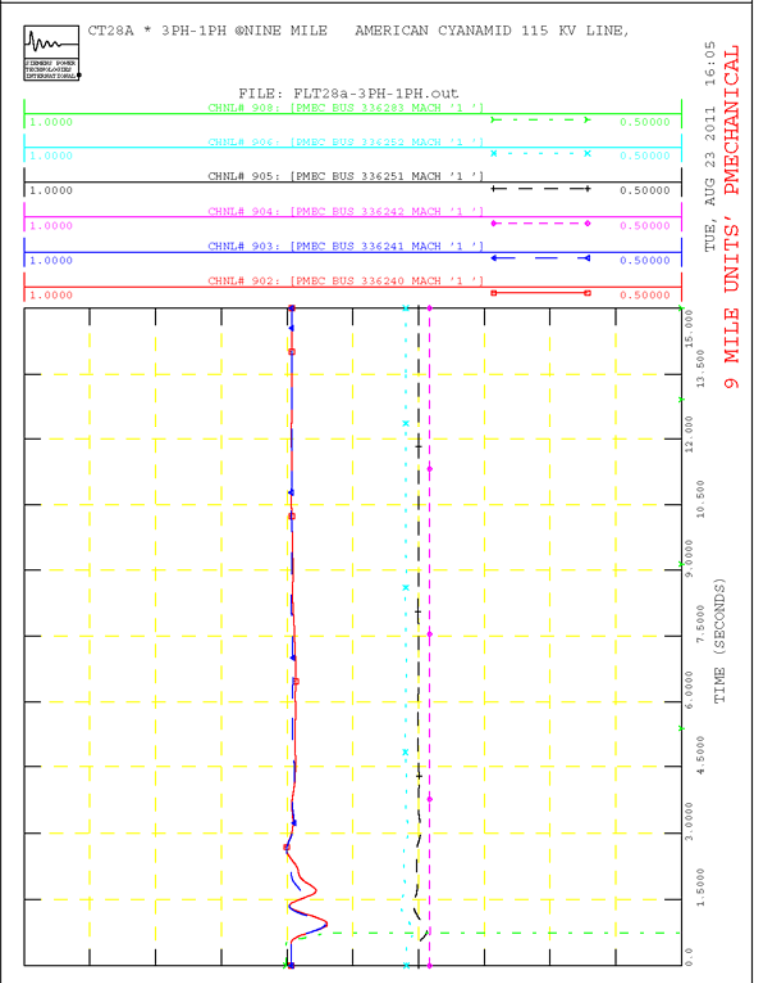
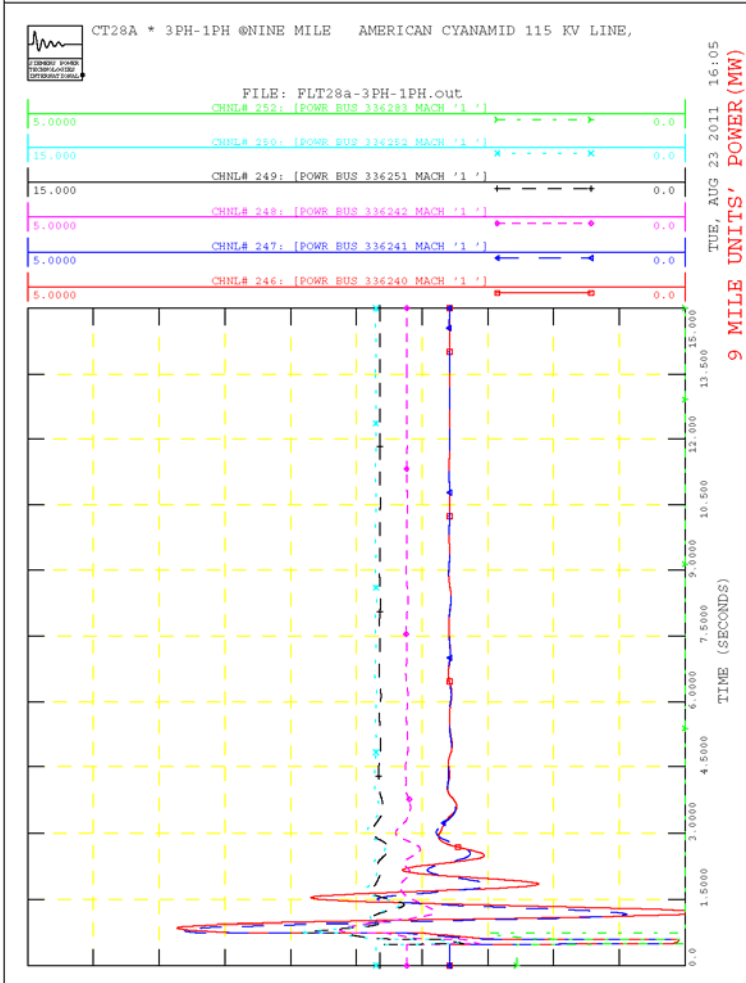
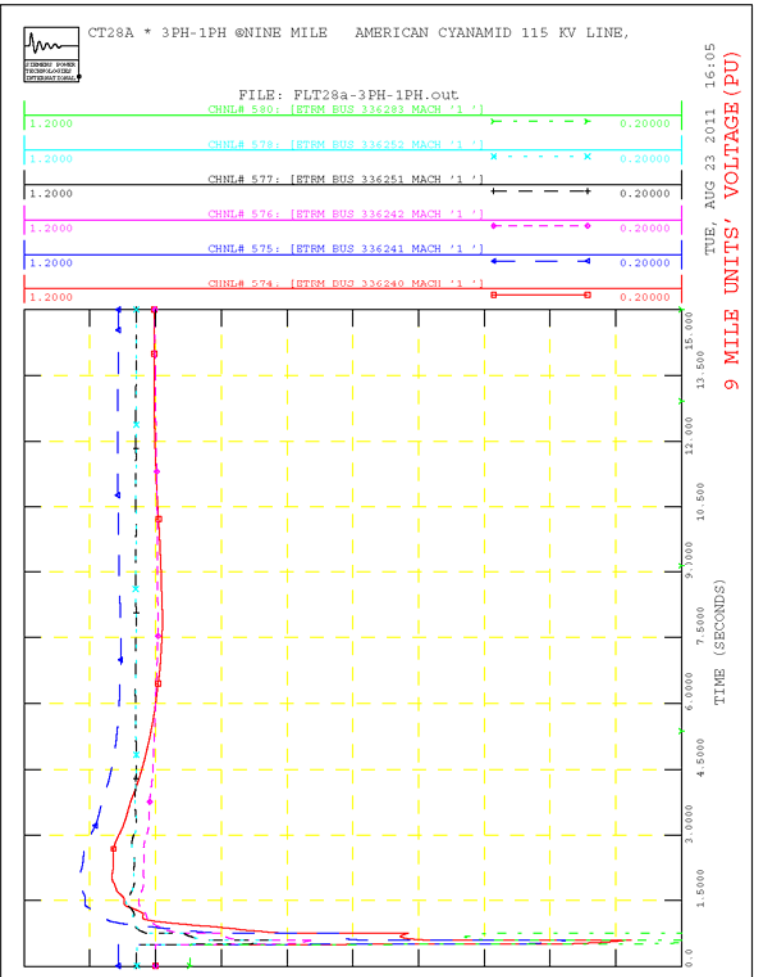
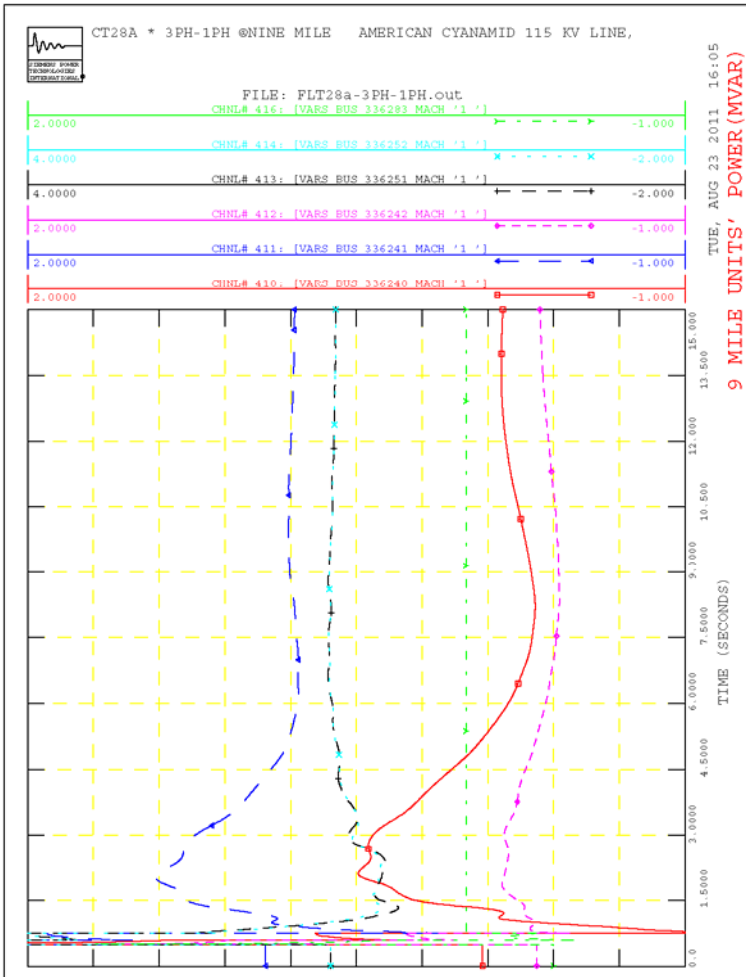
Fault 27a



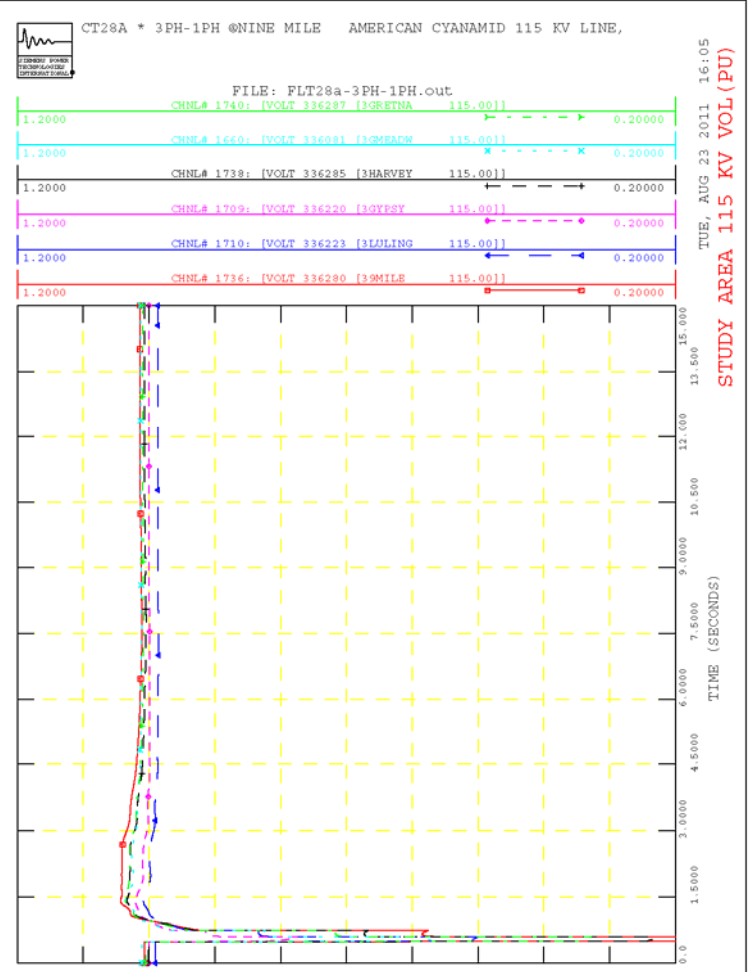
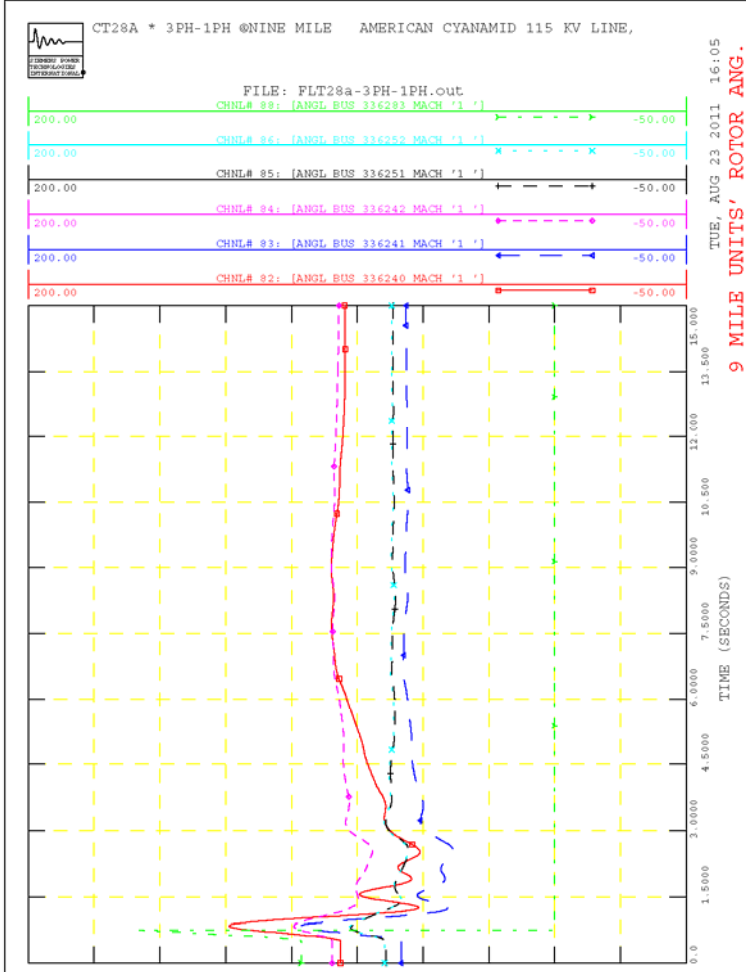
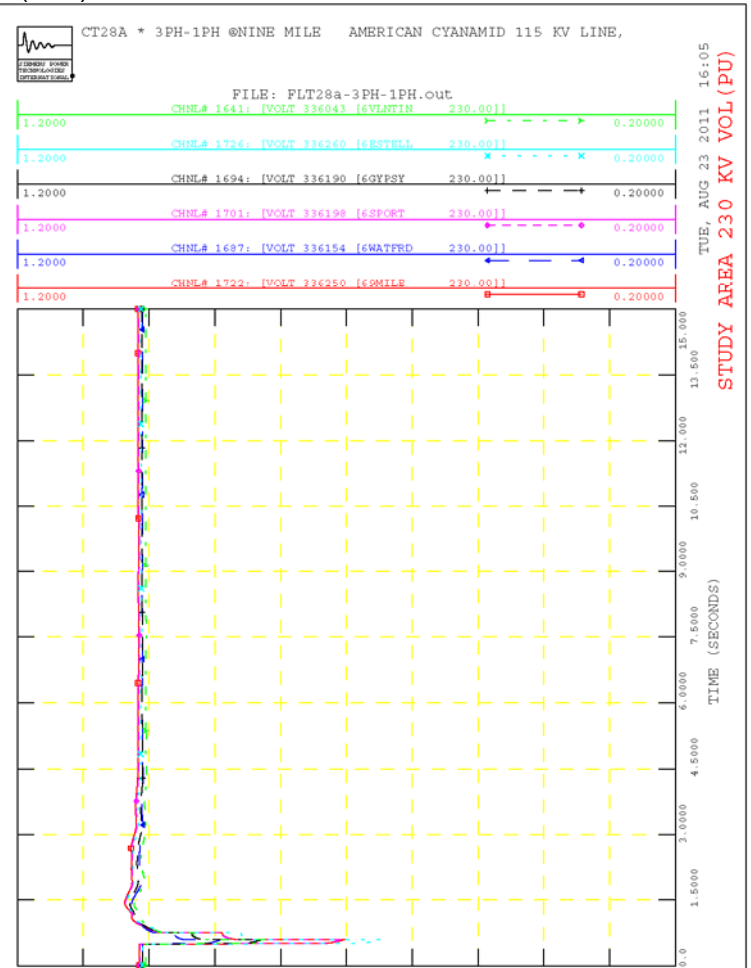
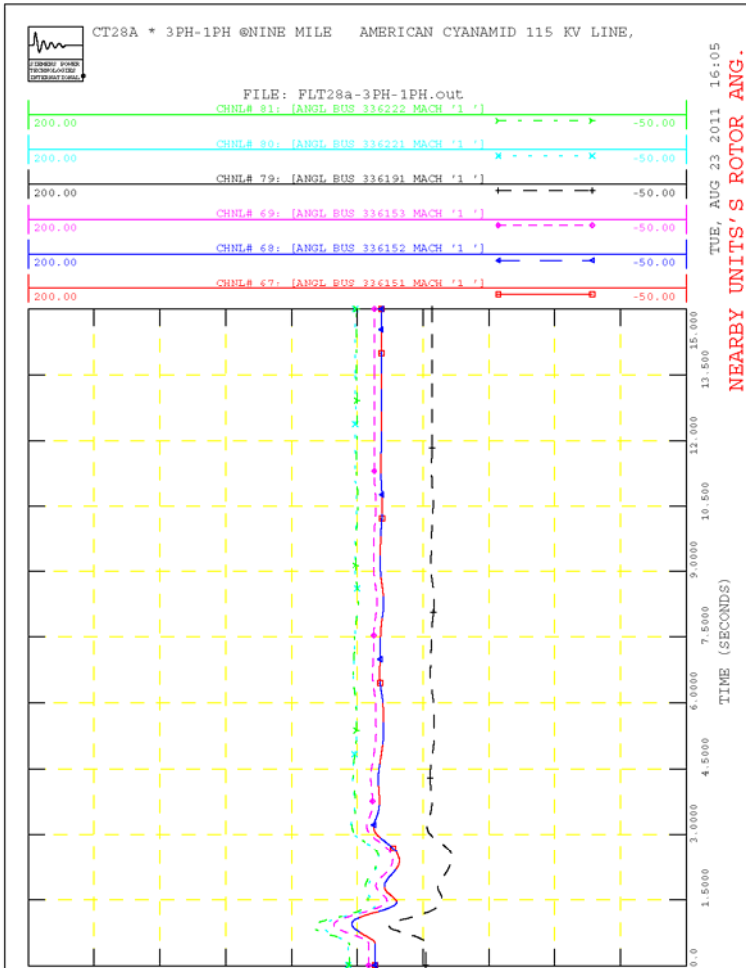
Fault 27a (cont)



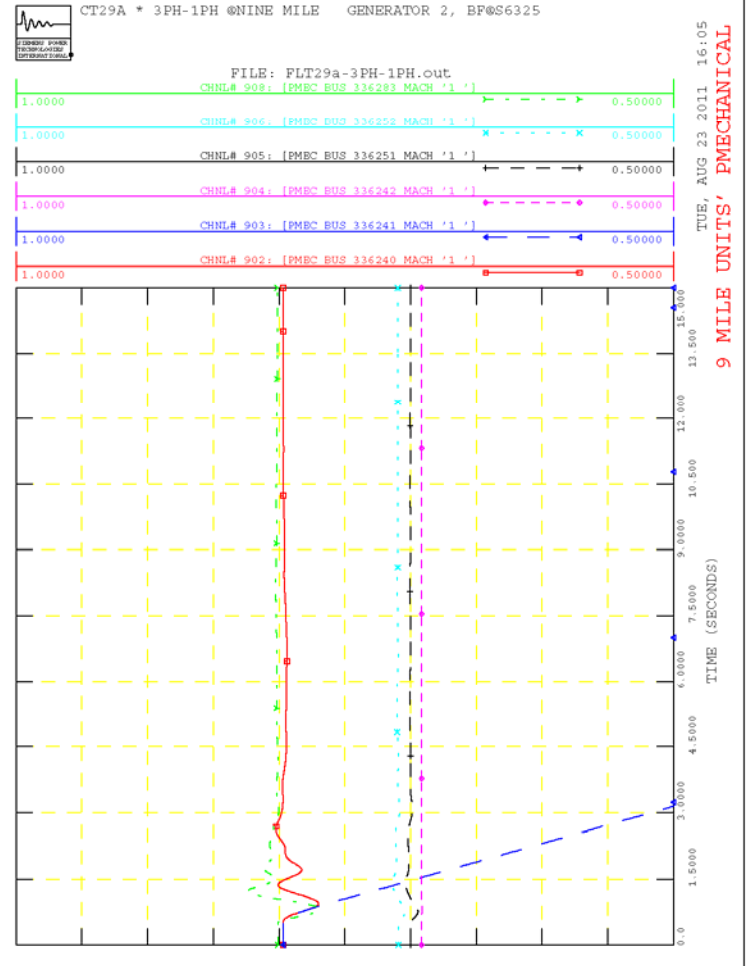
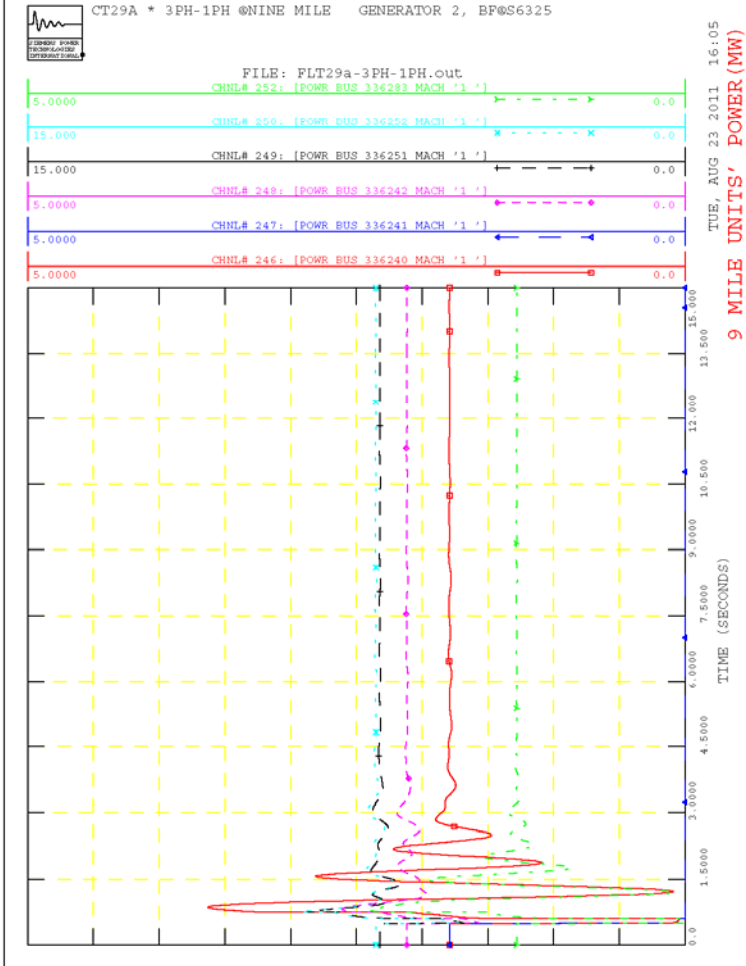
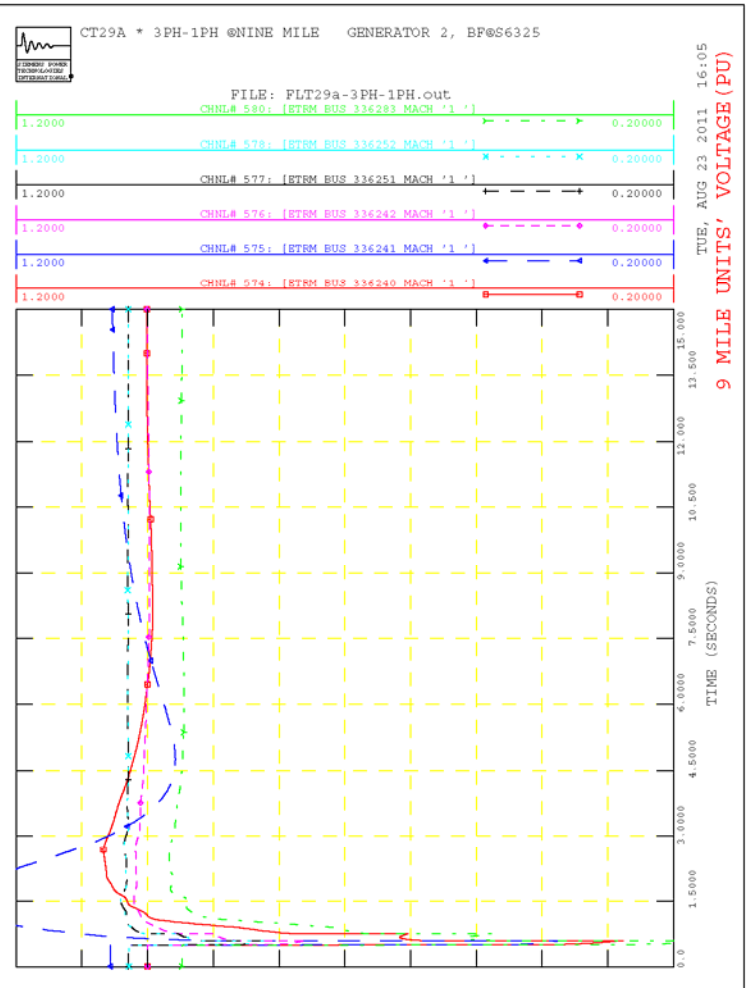
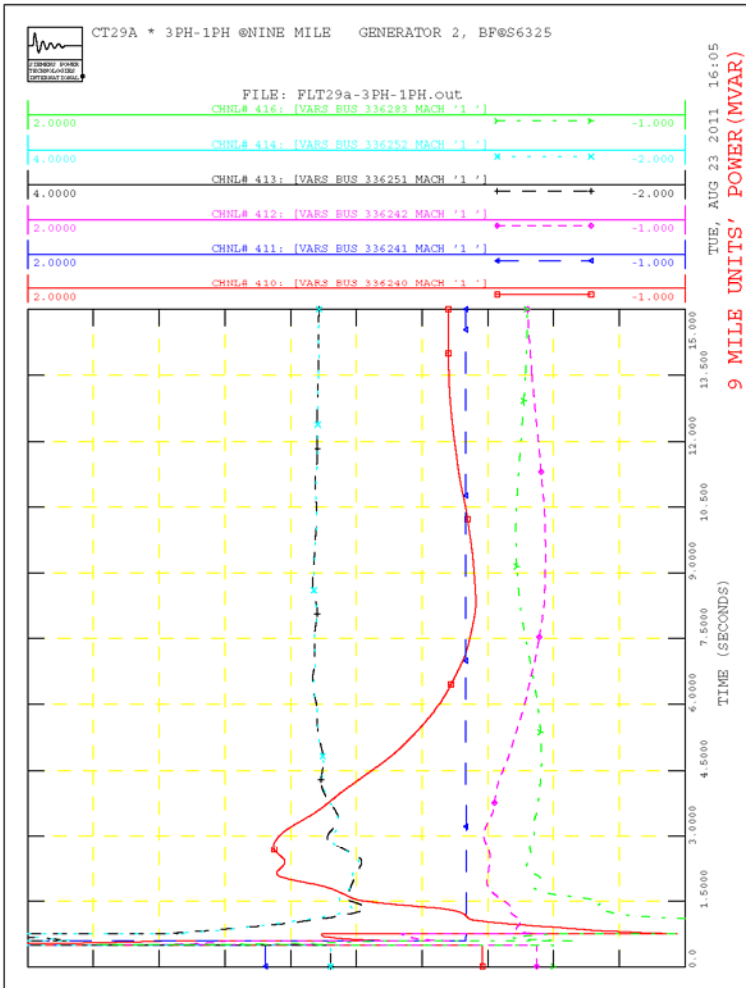
Fault 28a



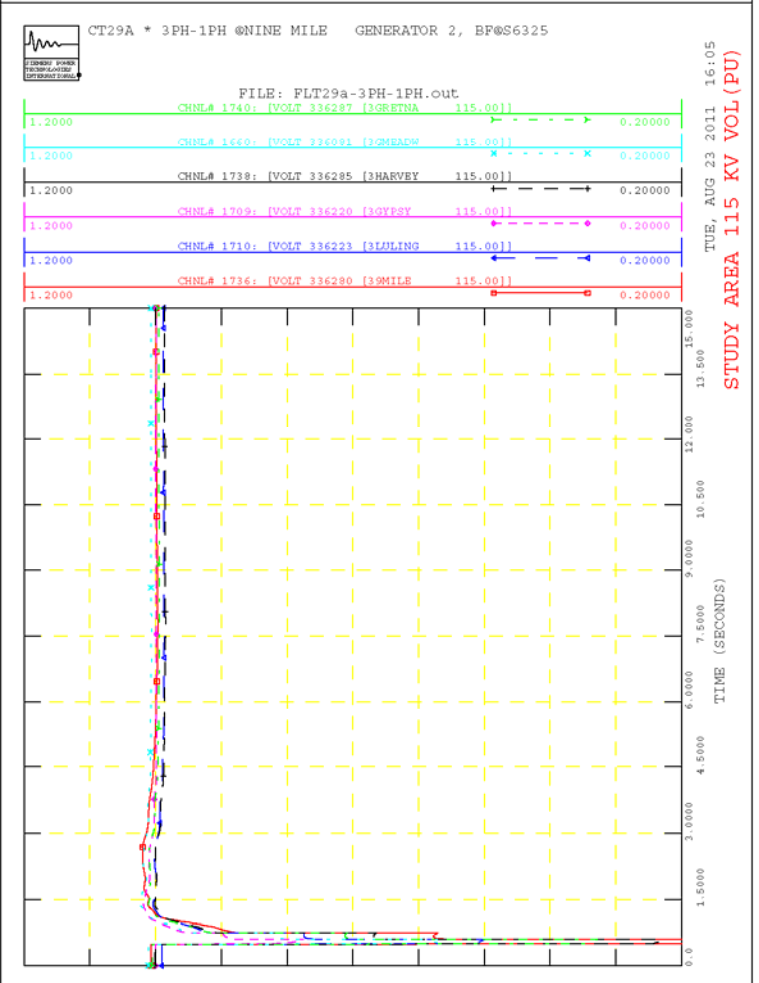
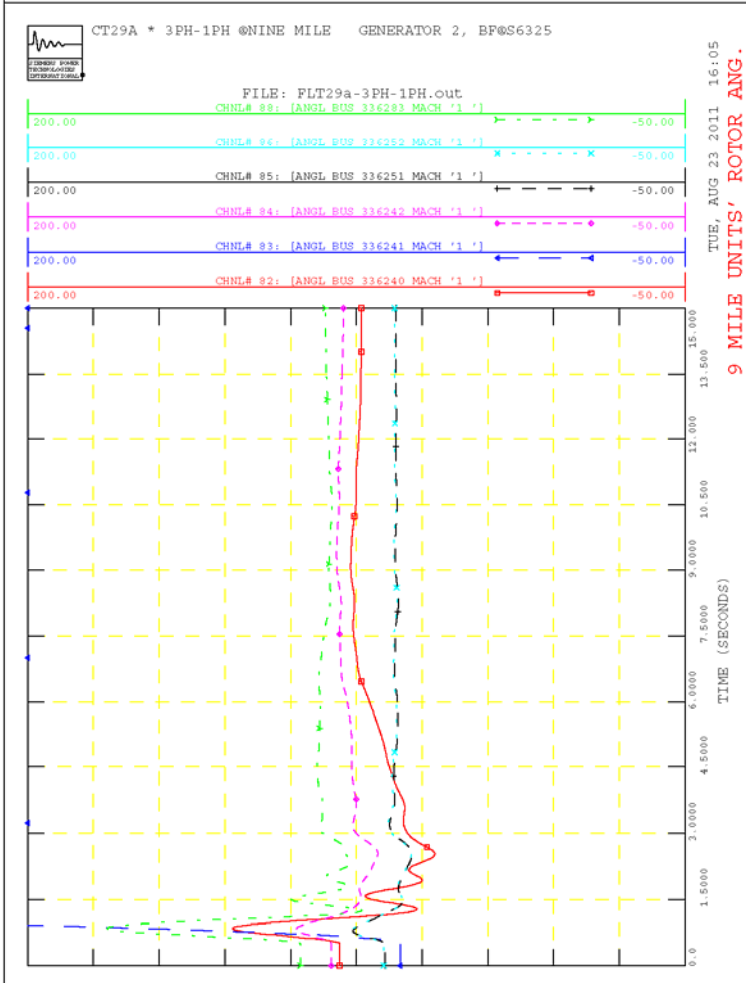
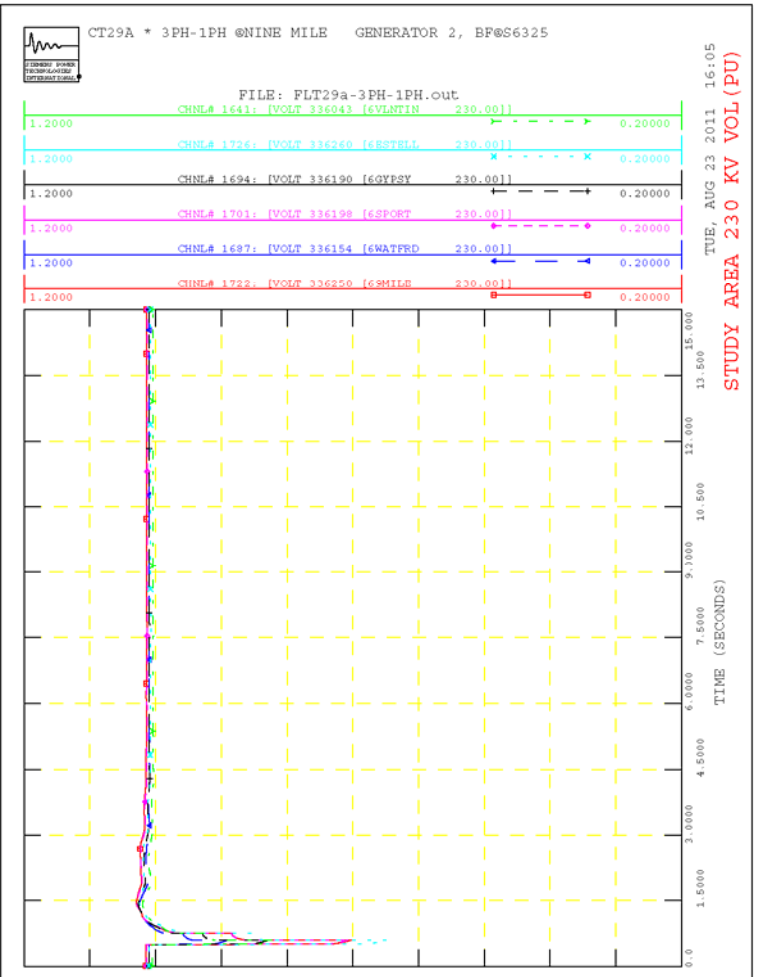
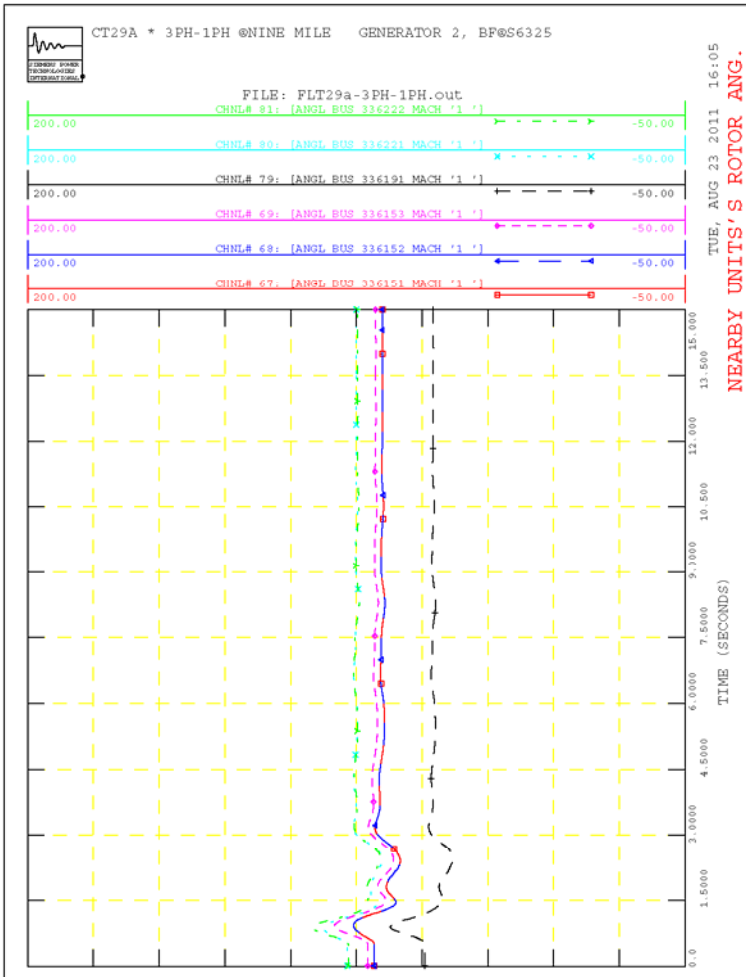
Fault 28a (cont)



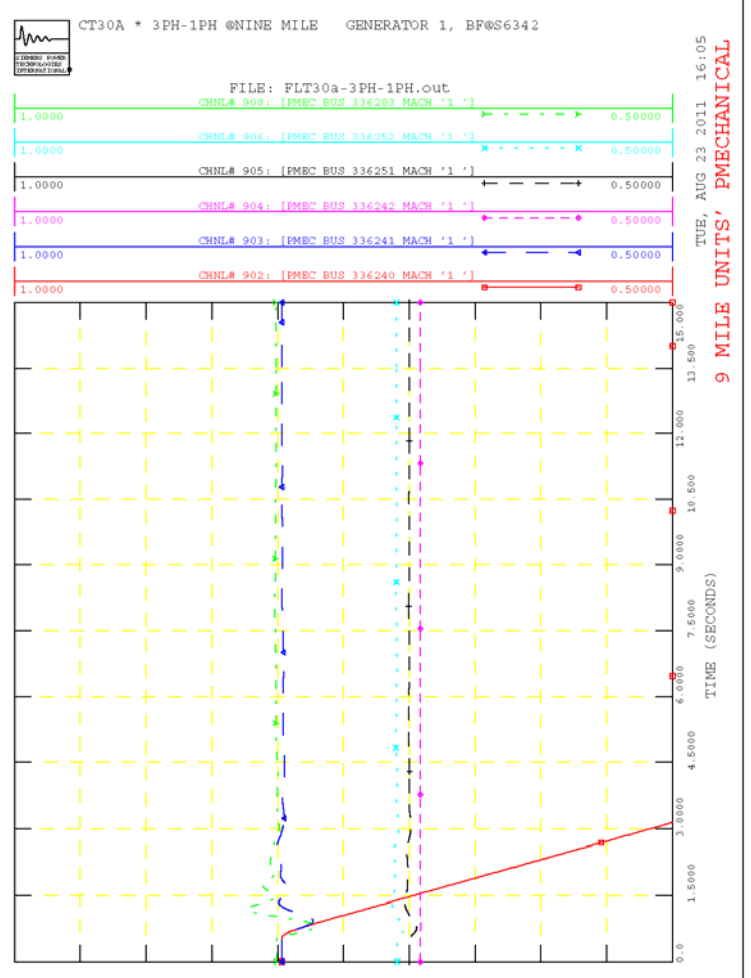
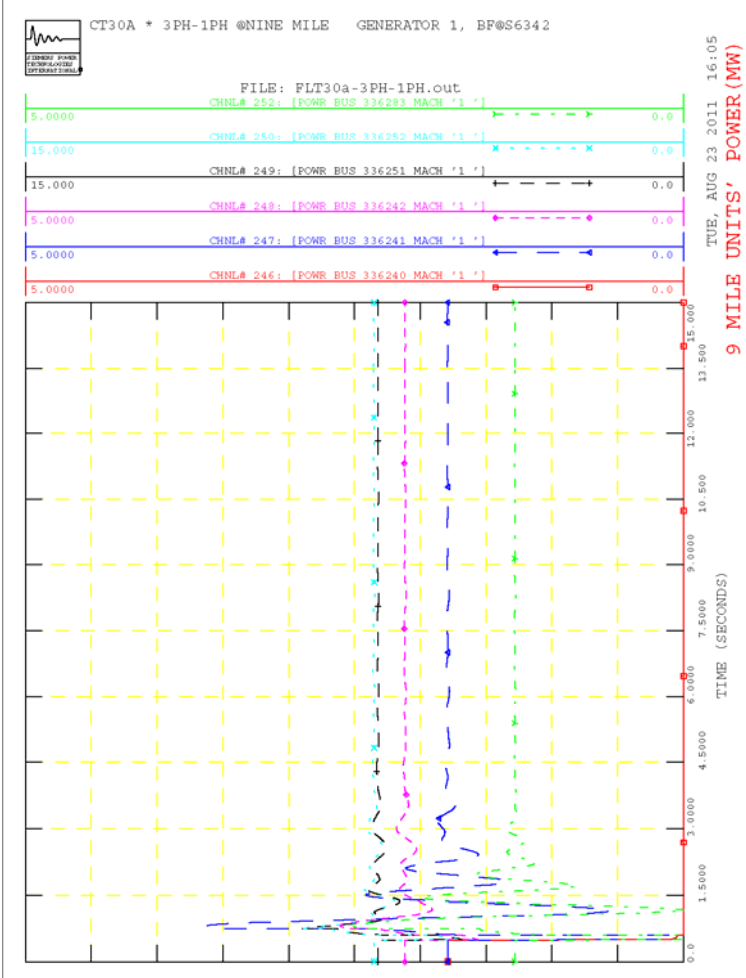
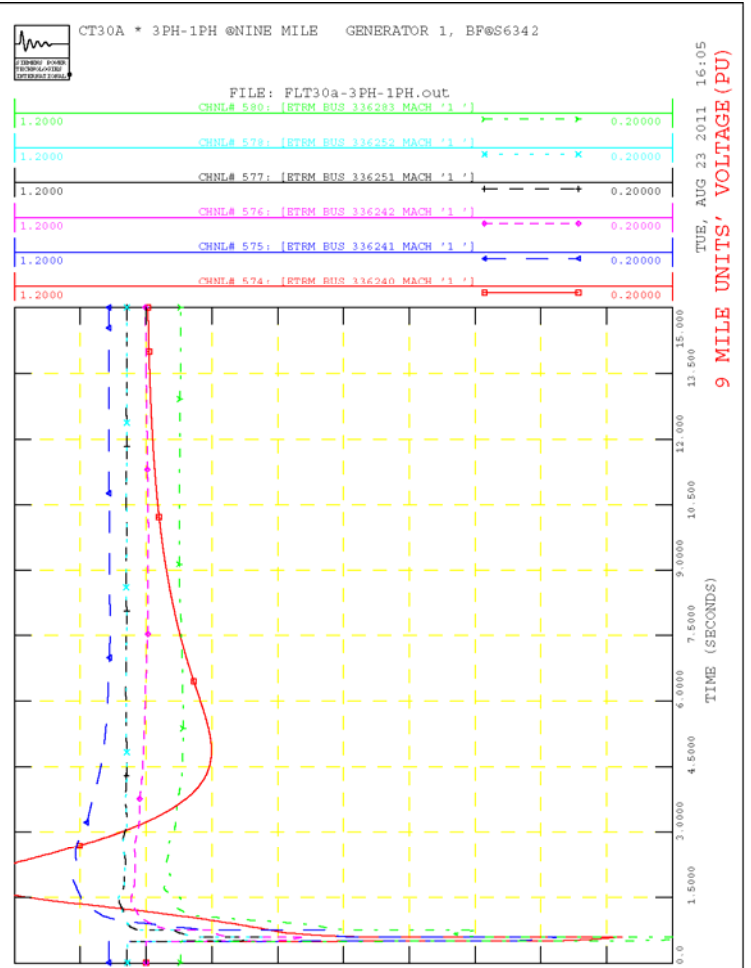
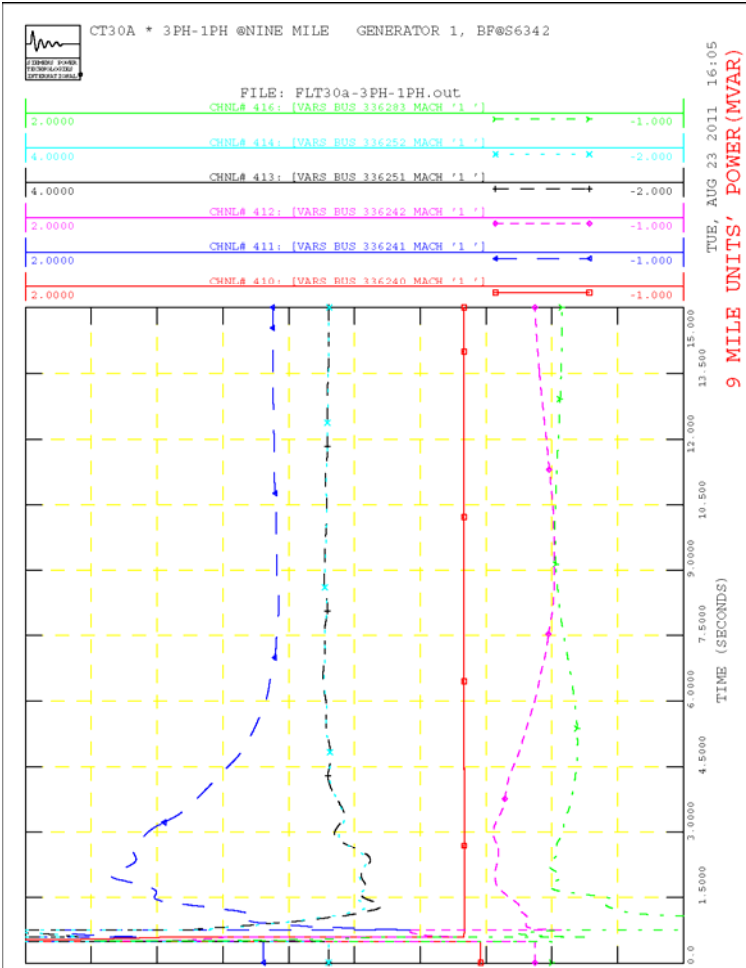
Fault 29a



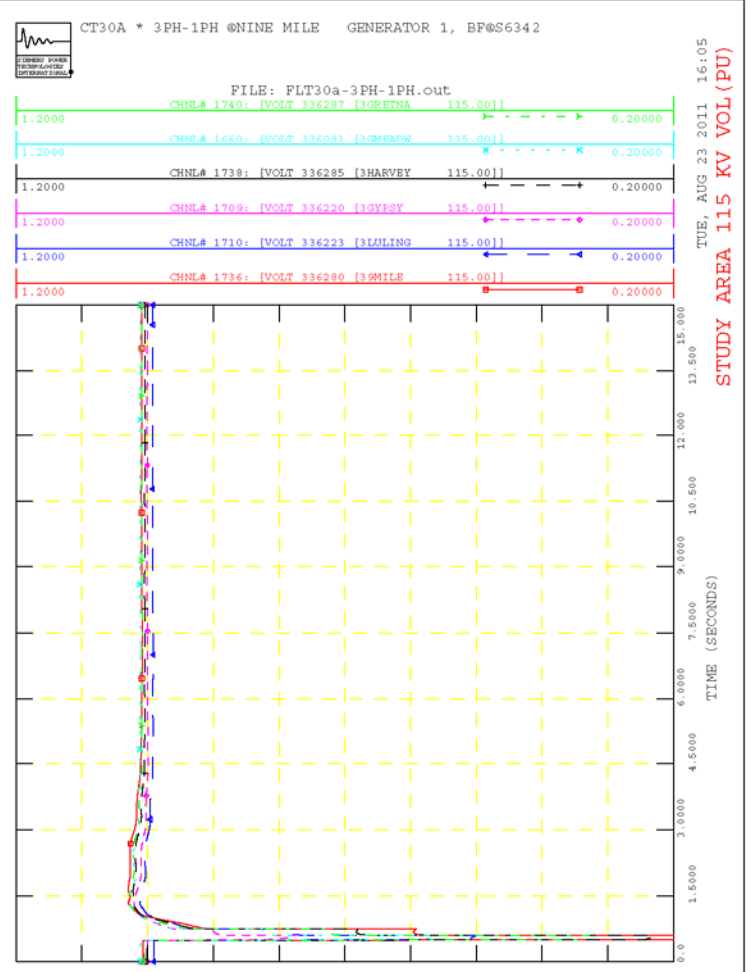
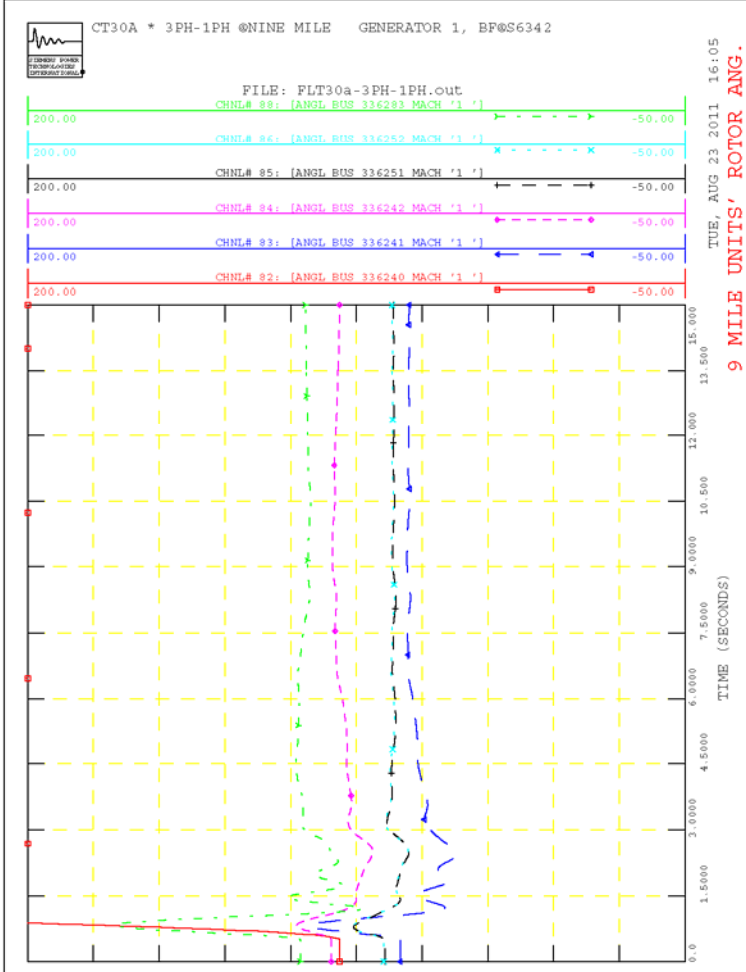
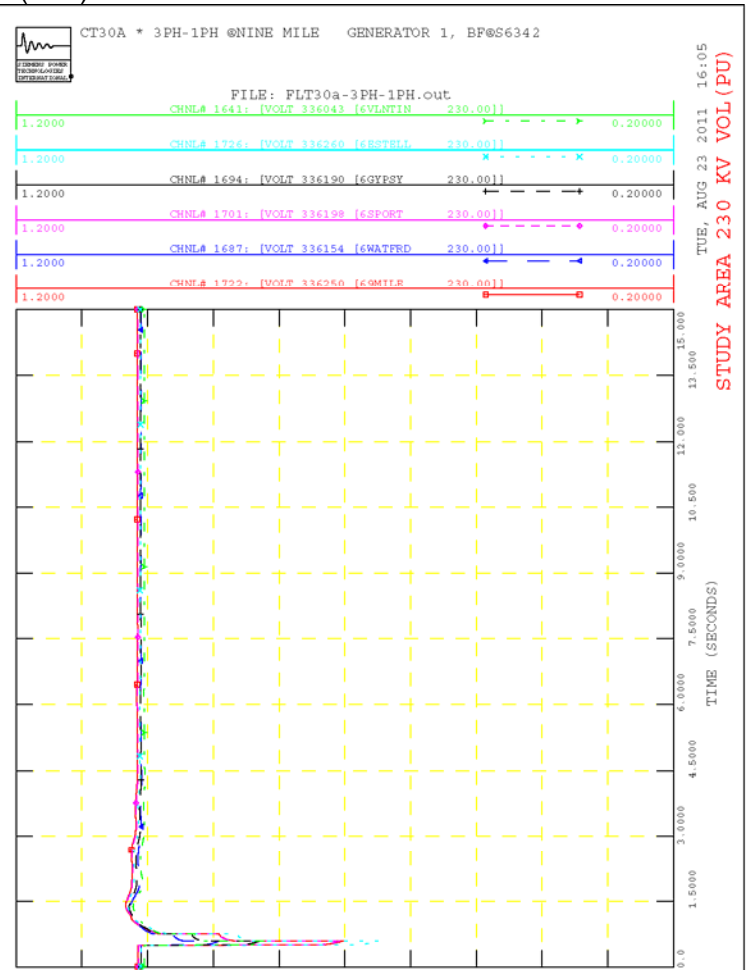
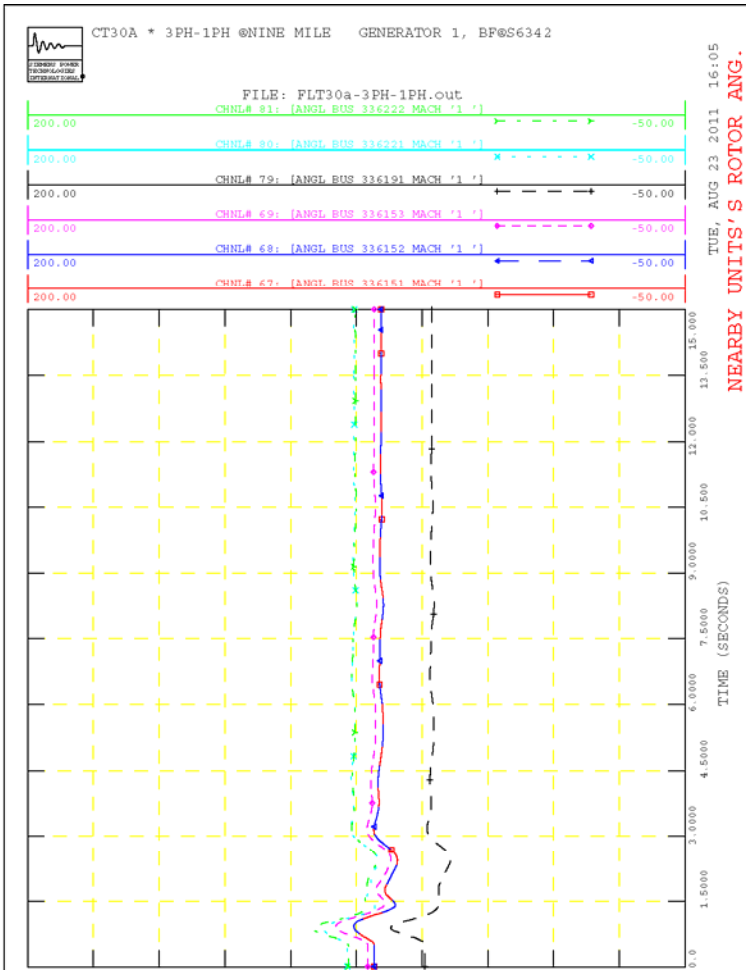
Fault 29a (cont)



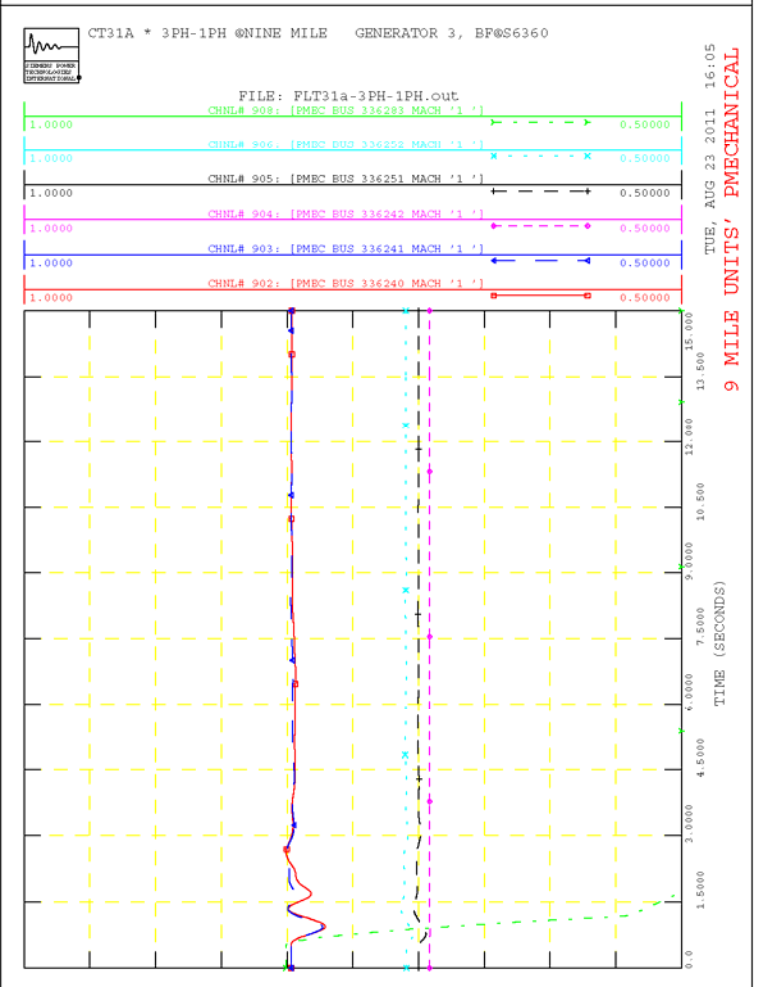
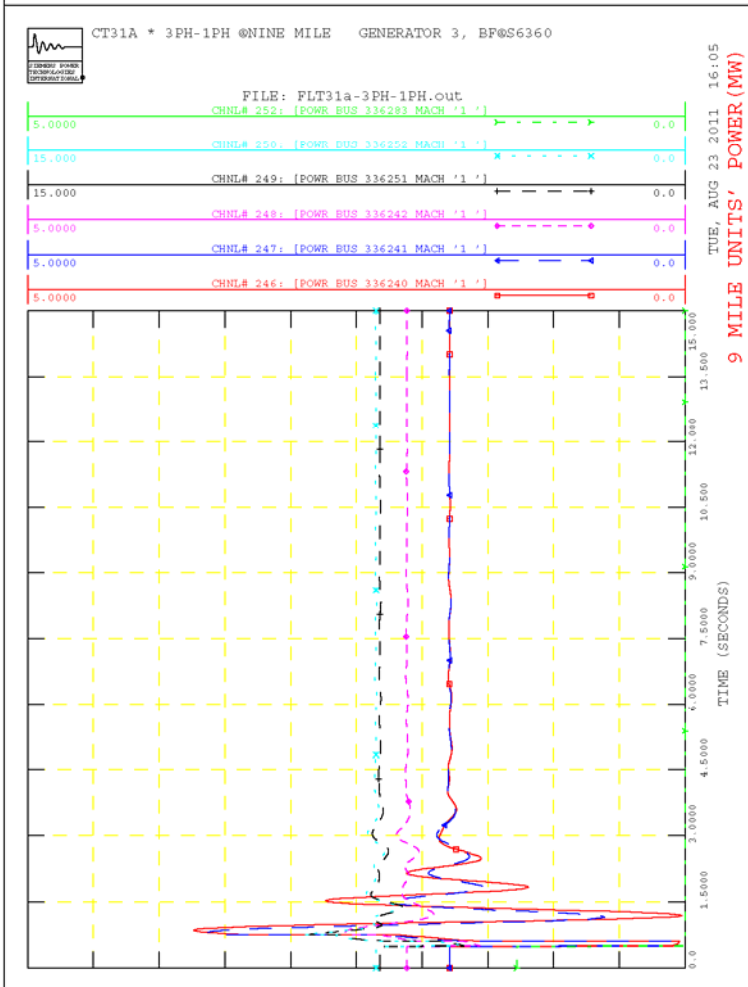
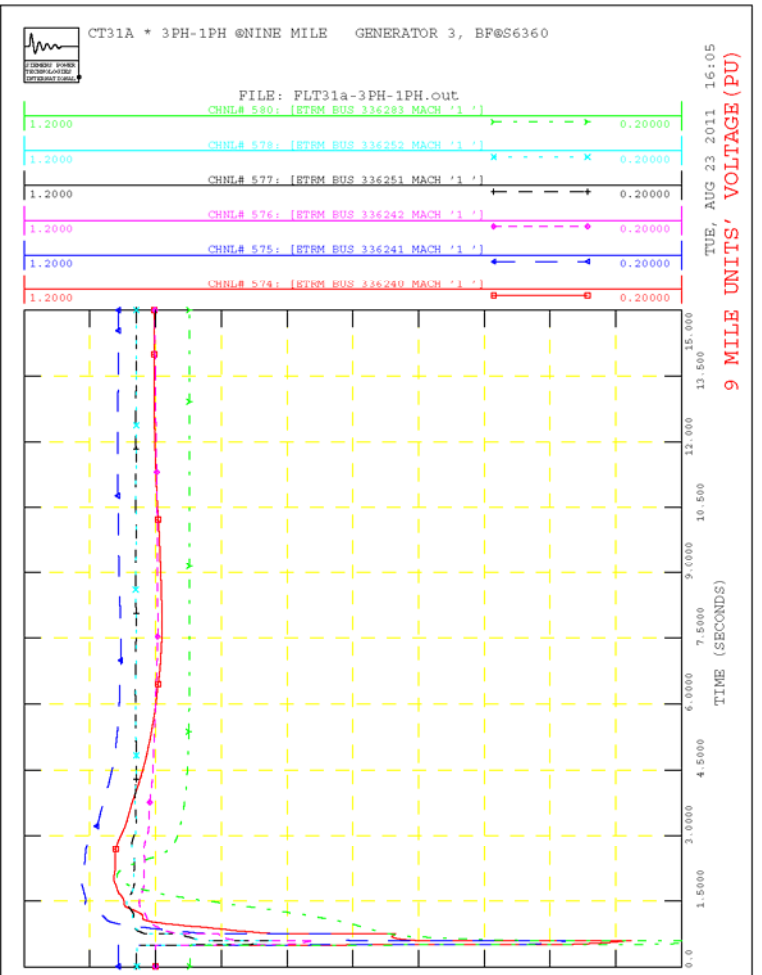
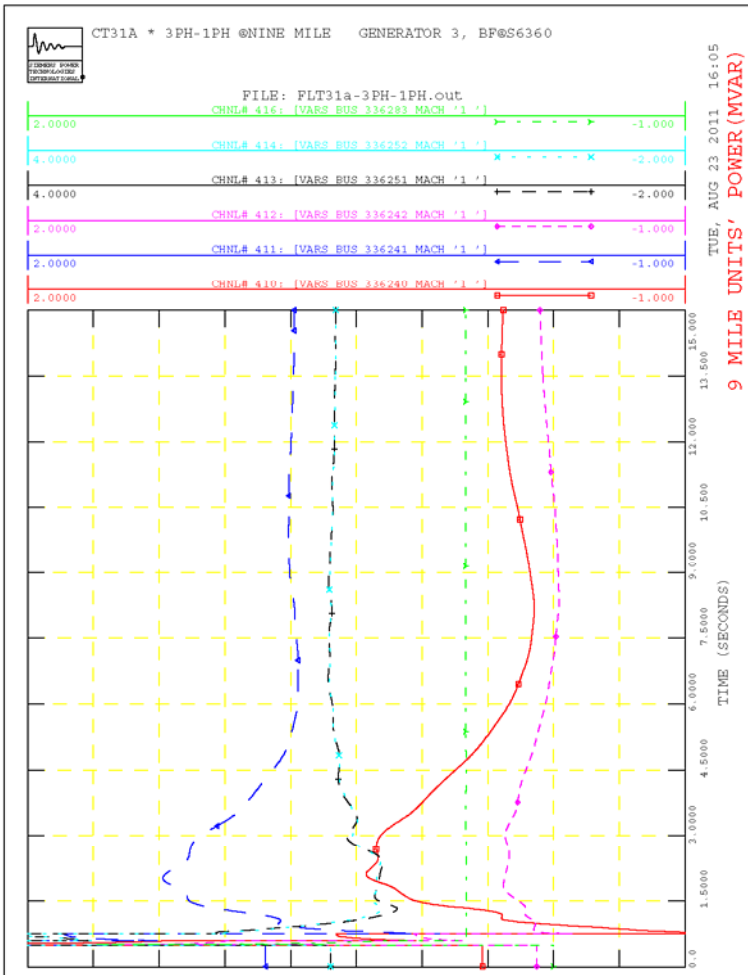
Fault 30a



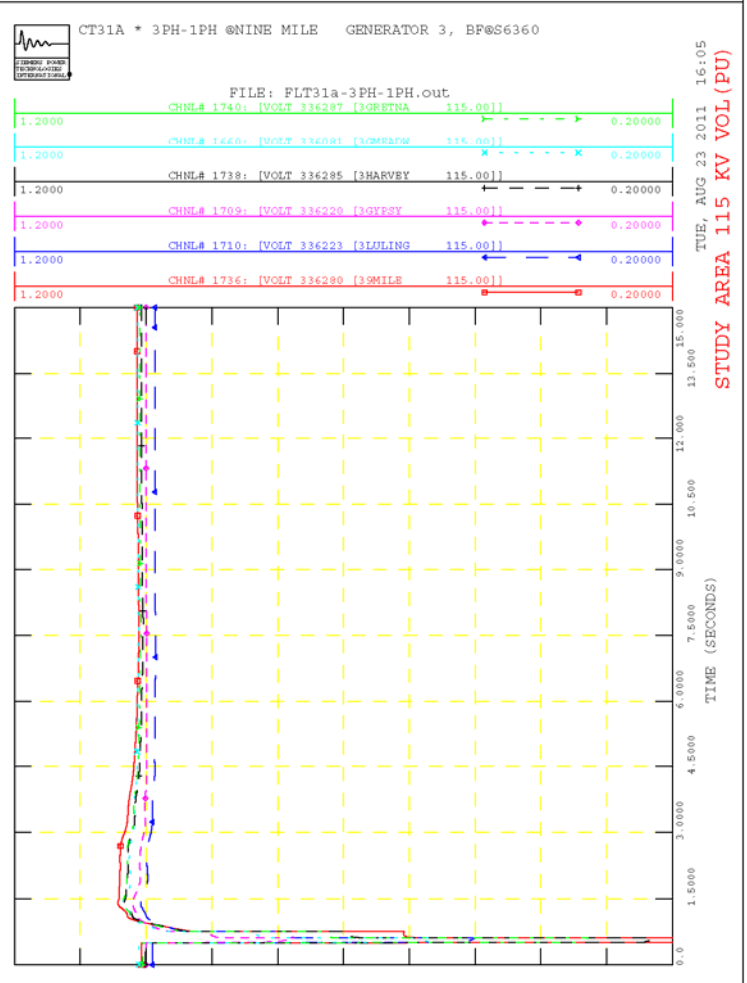
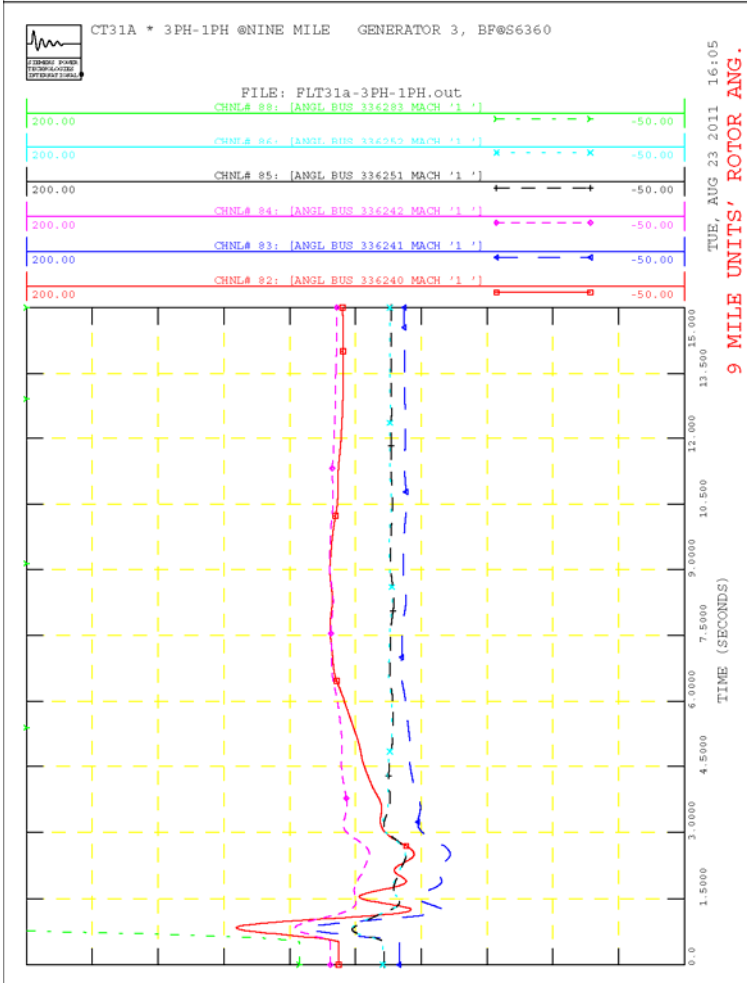
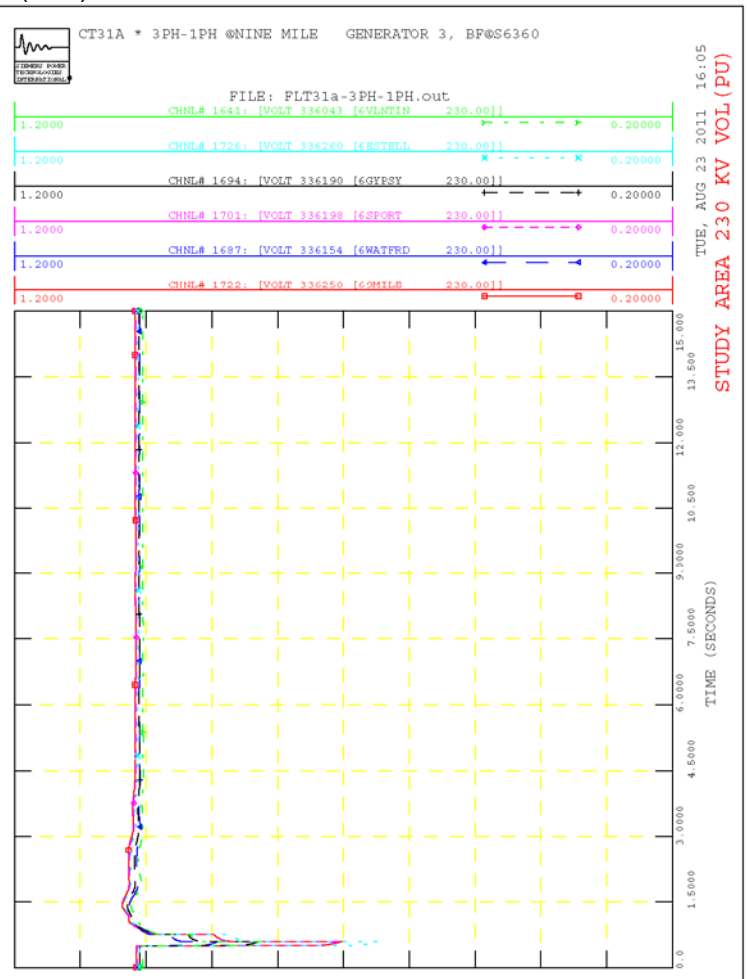
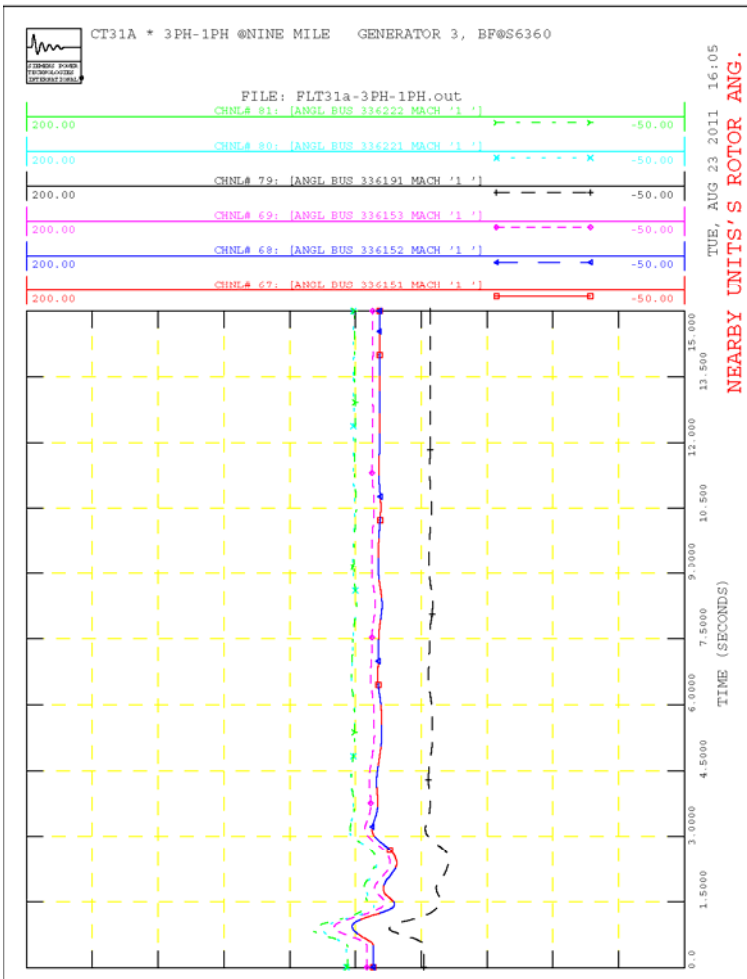
Fault 30a (cont)



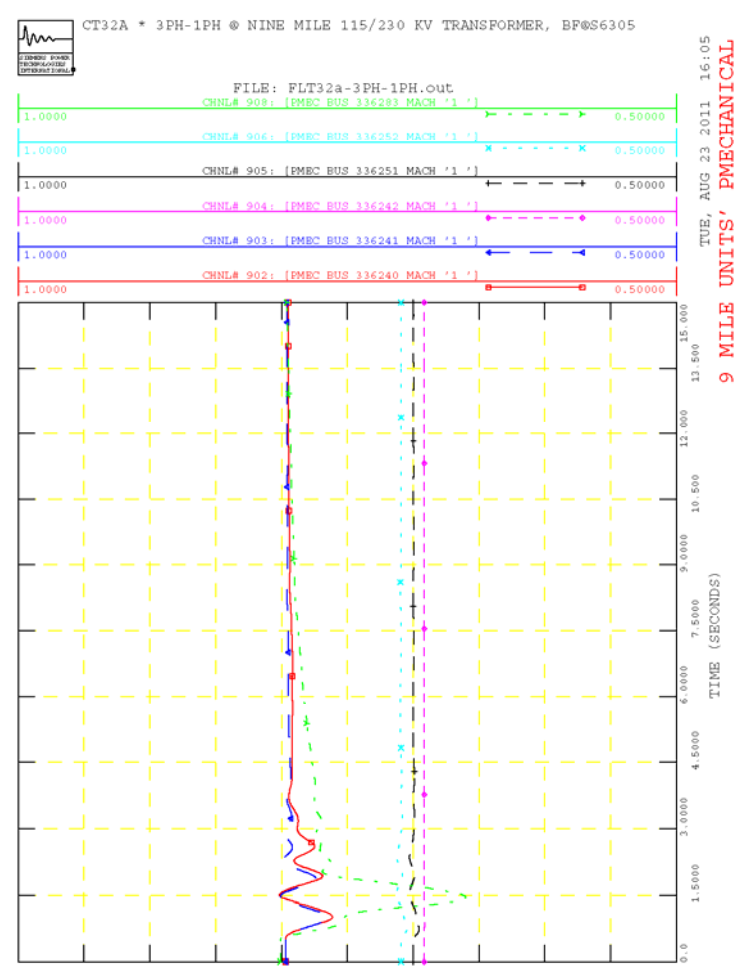
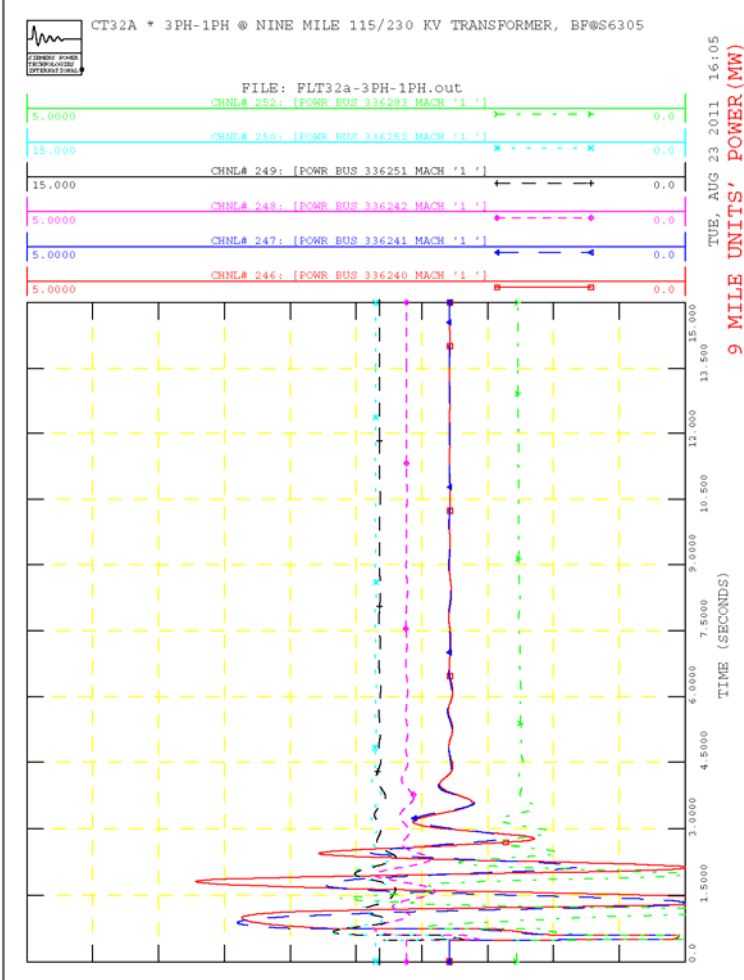
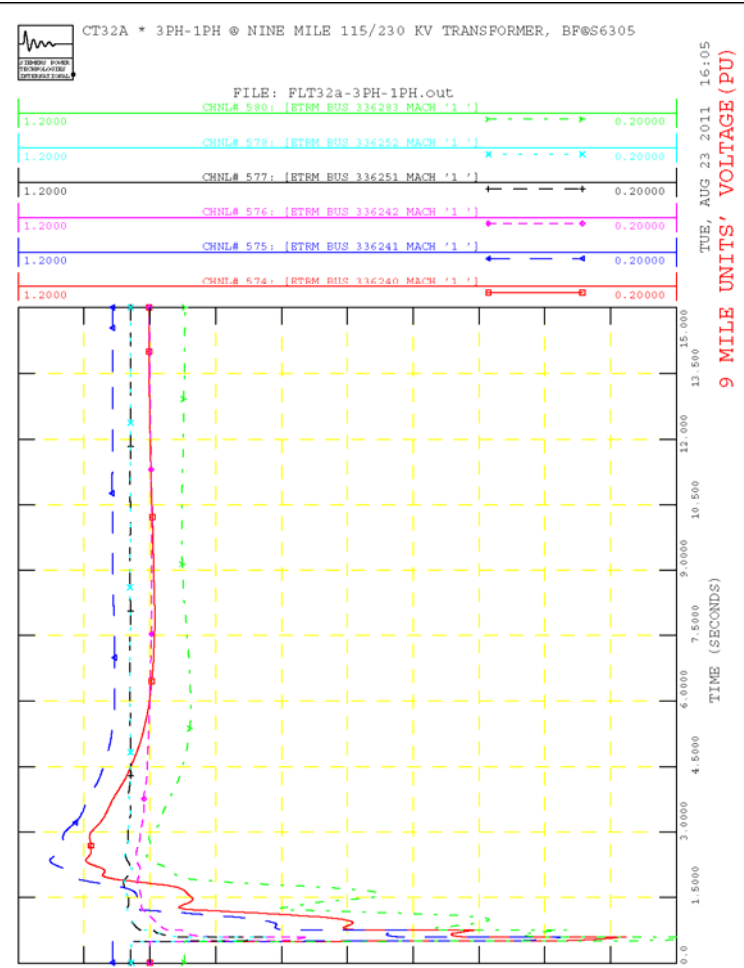
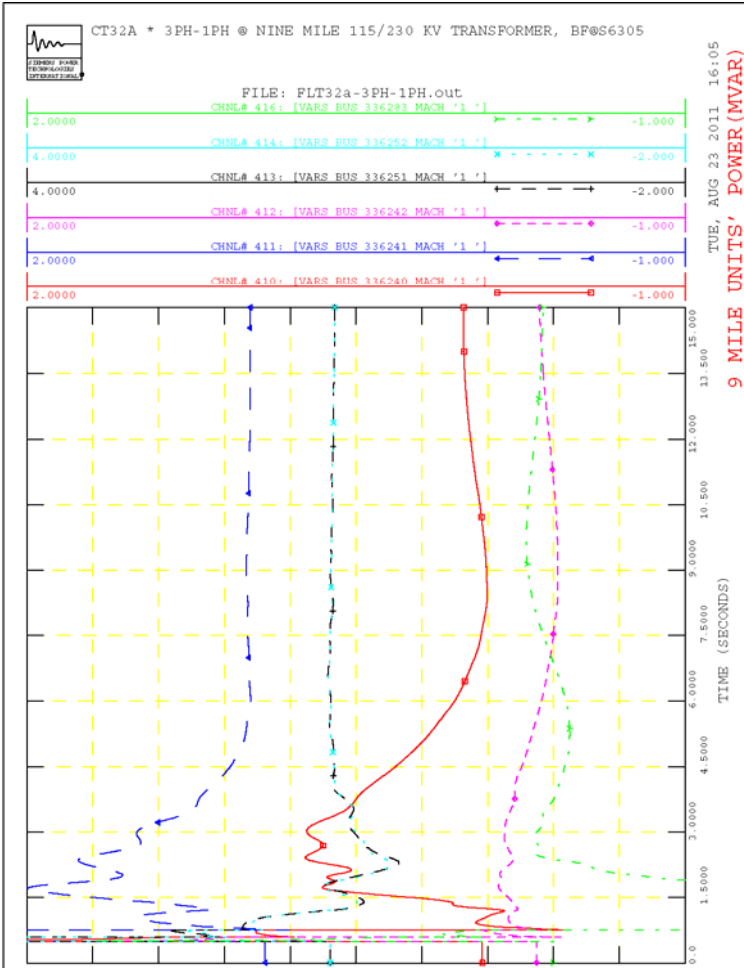
Fault 31a



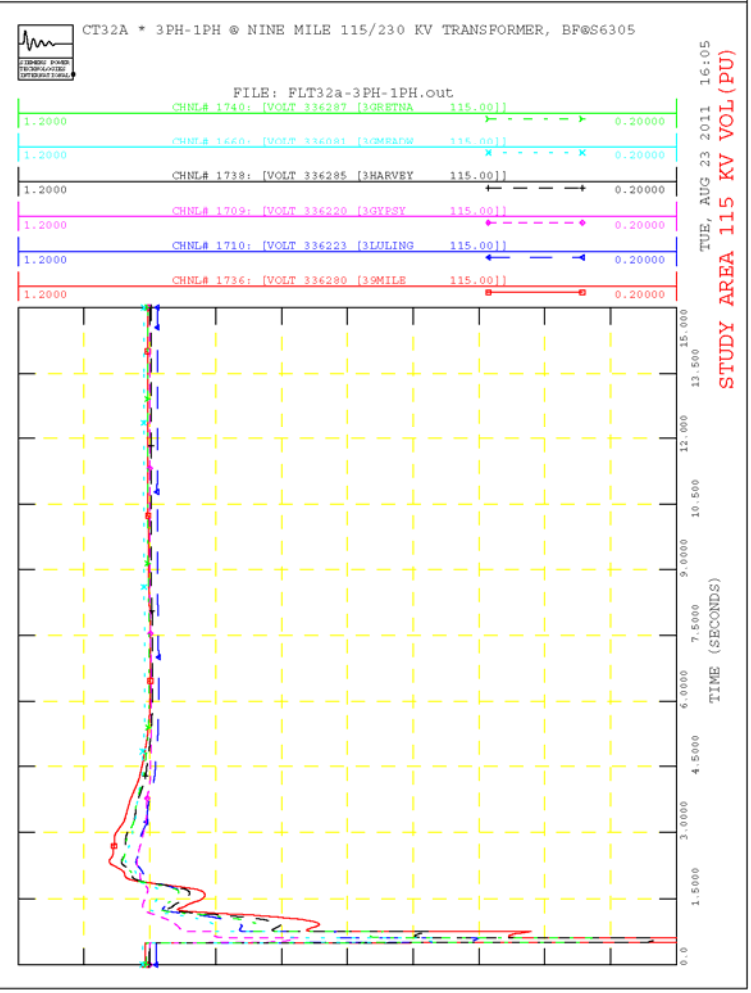
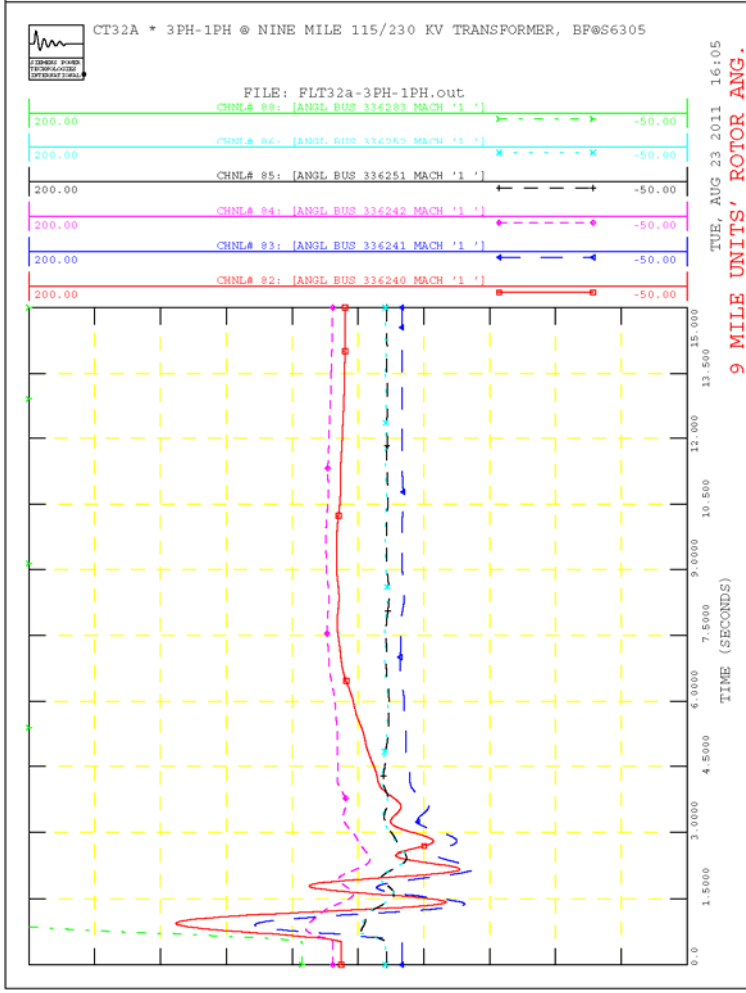
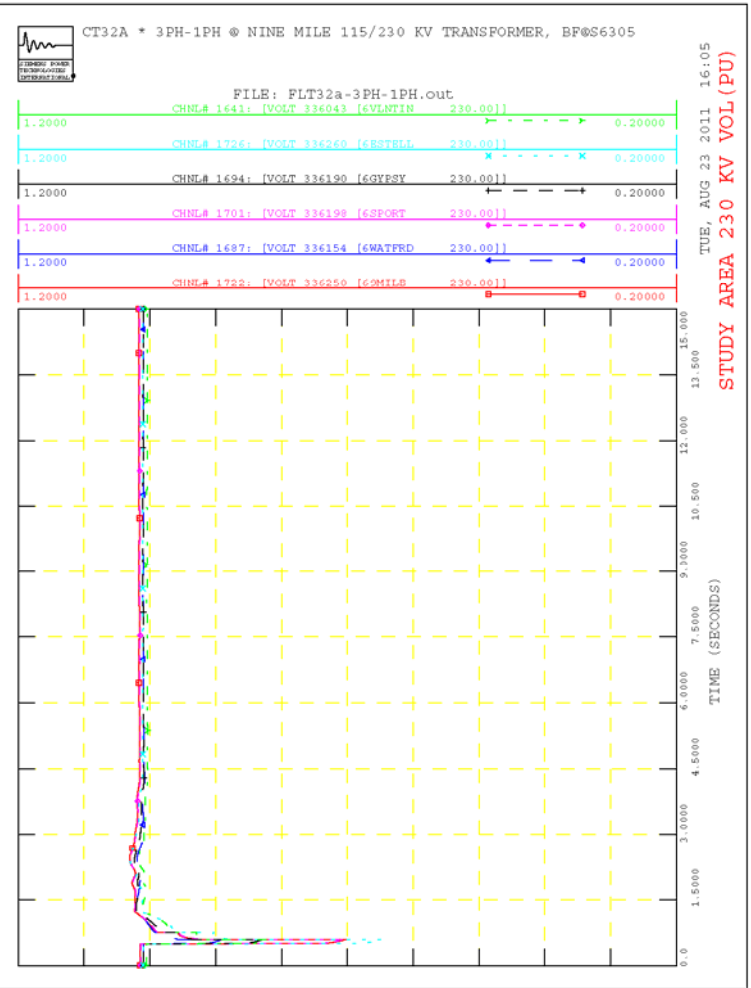
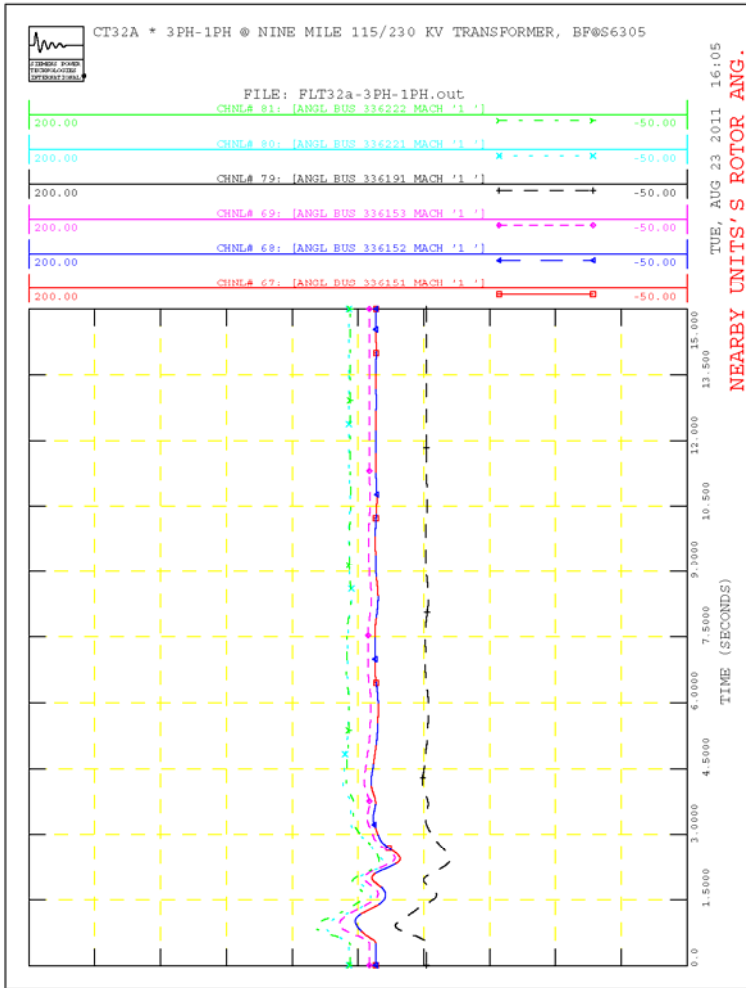
Fault 31a (cont)



Fault 32a

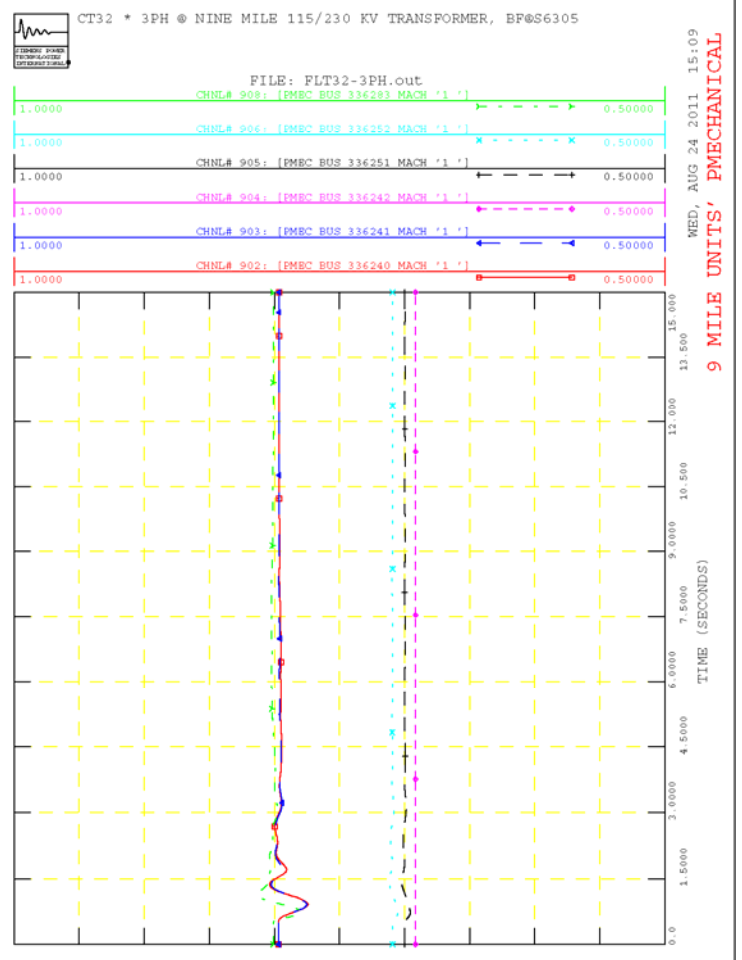
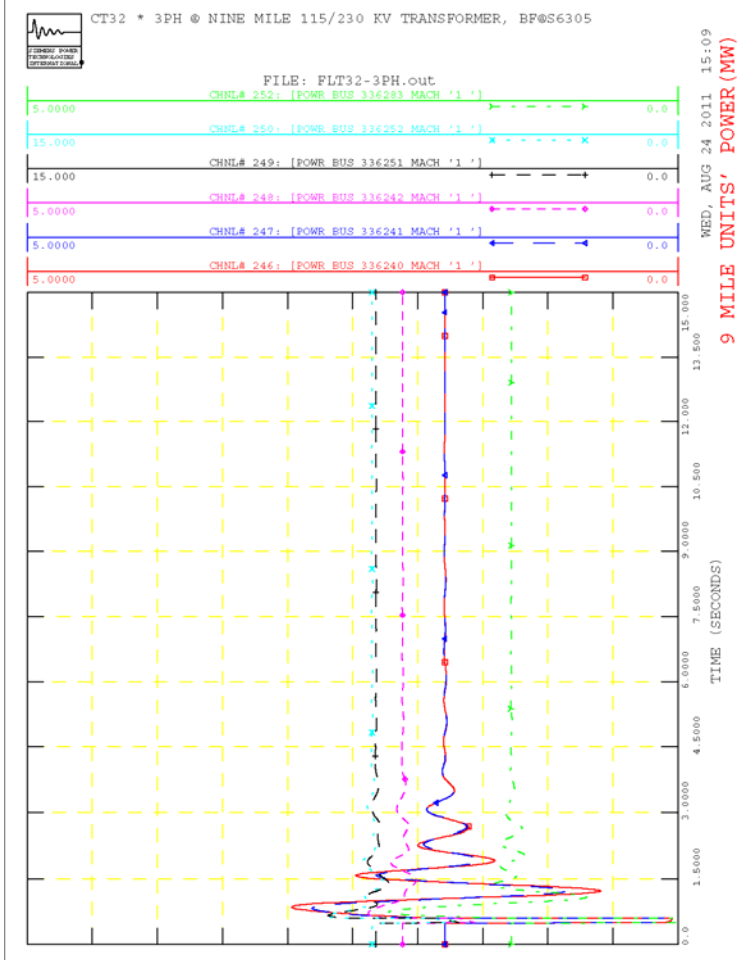
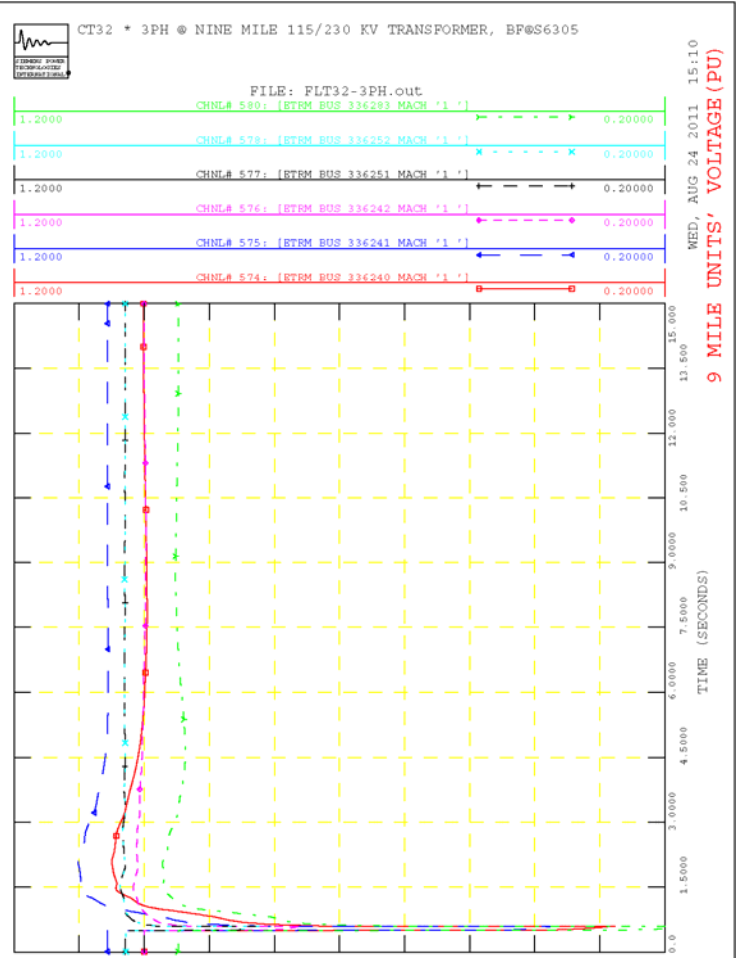
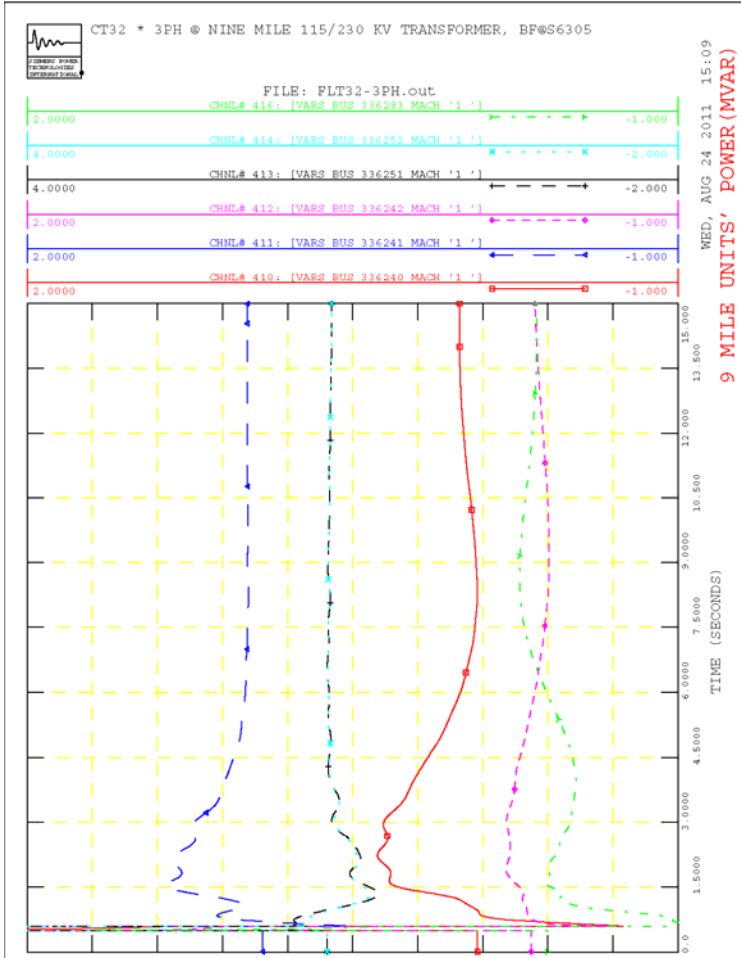


Fault 32a (cont)

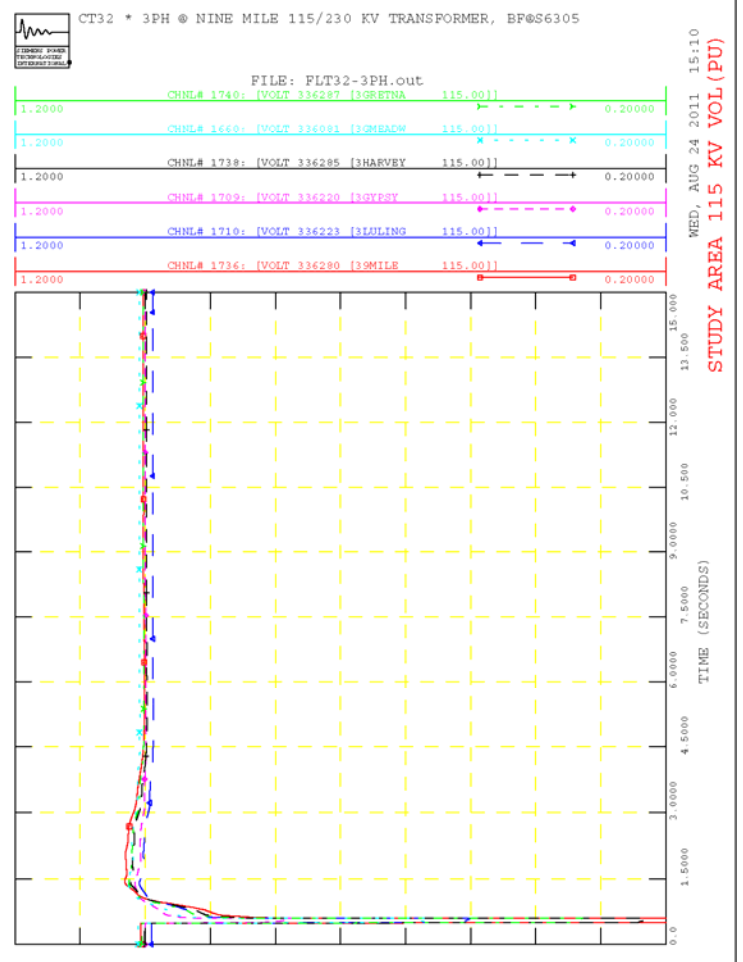
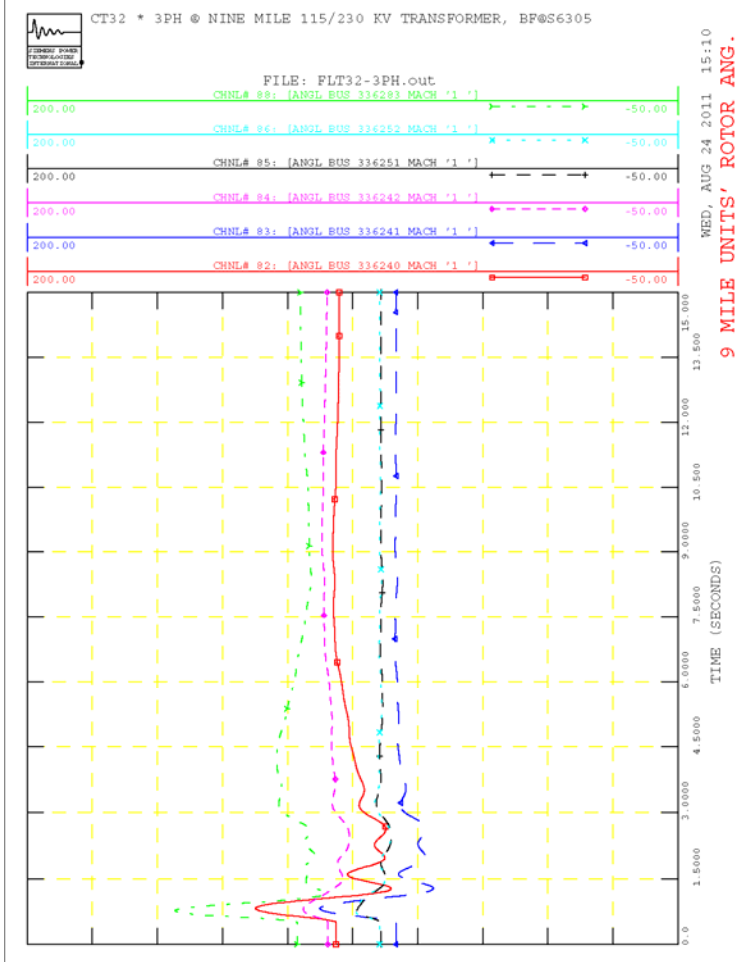
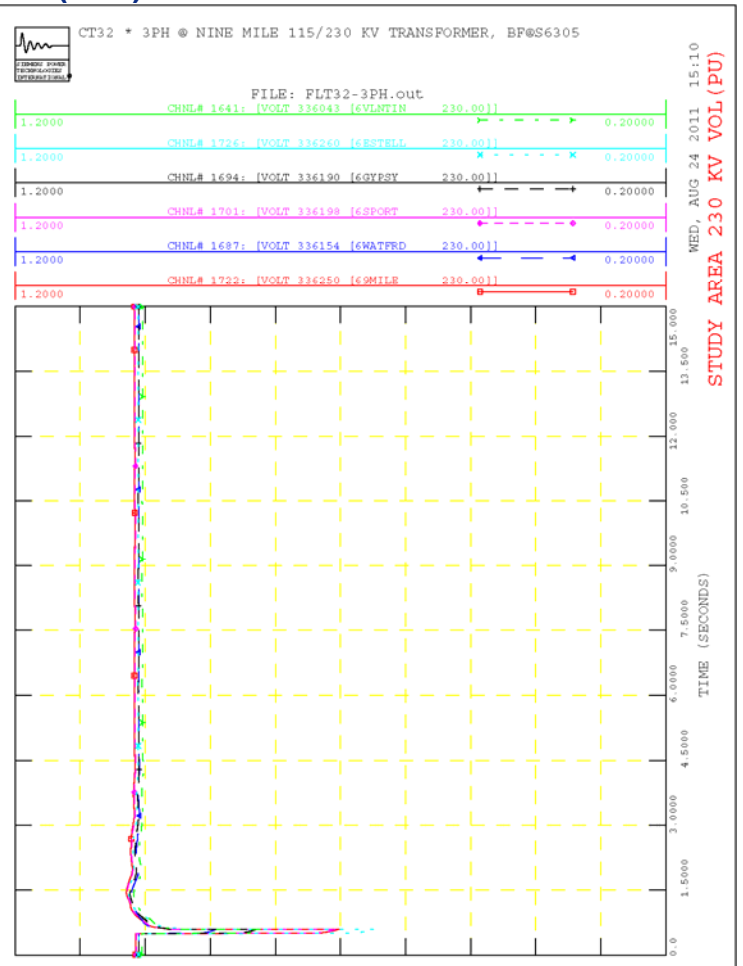
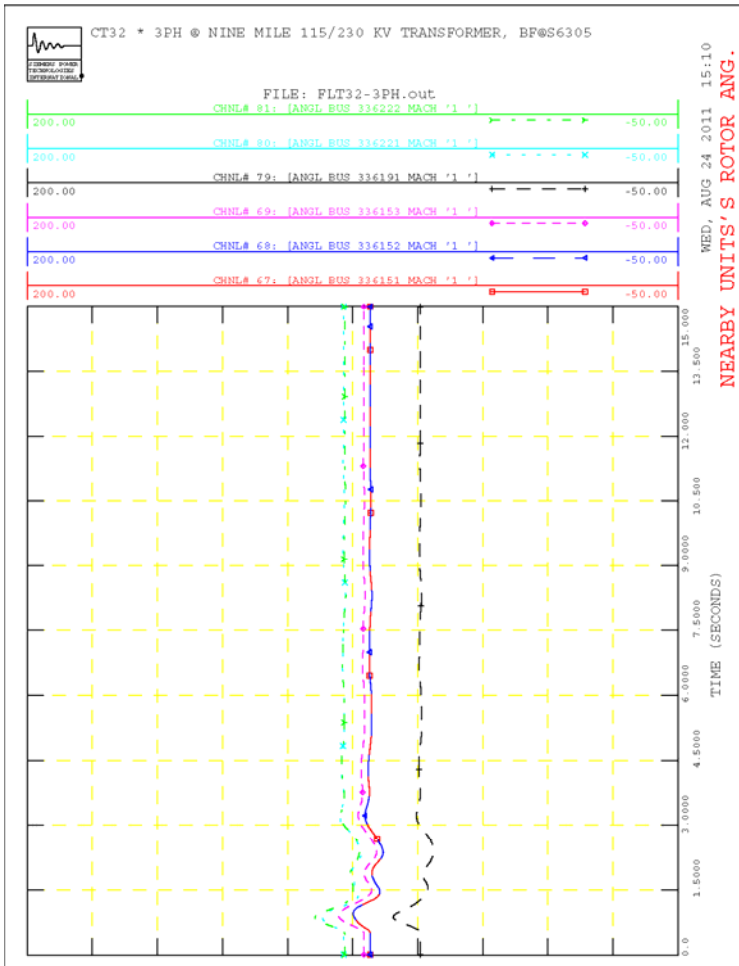


C.2.2 Fault_32a – Three Phase Fault with Normal Clearing

Fault 32a - 3PH

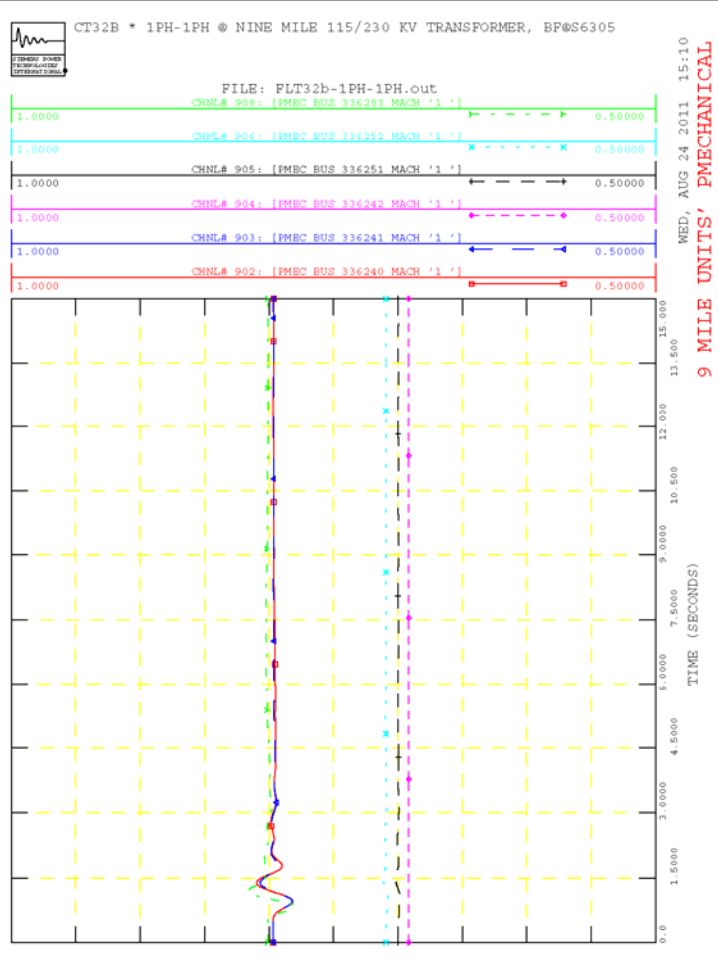
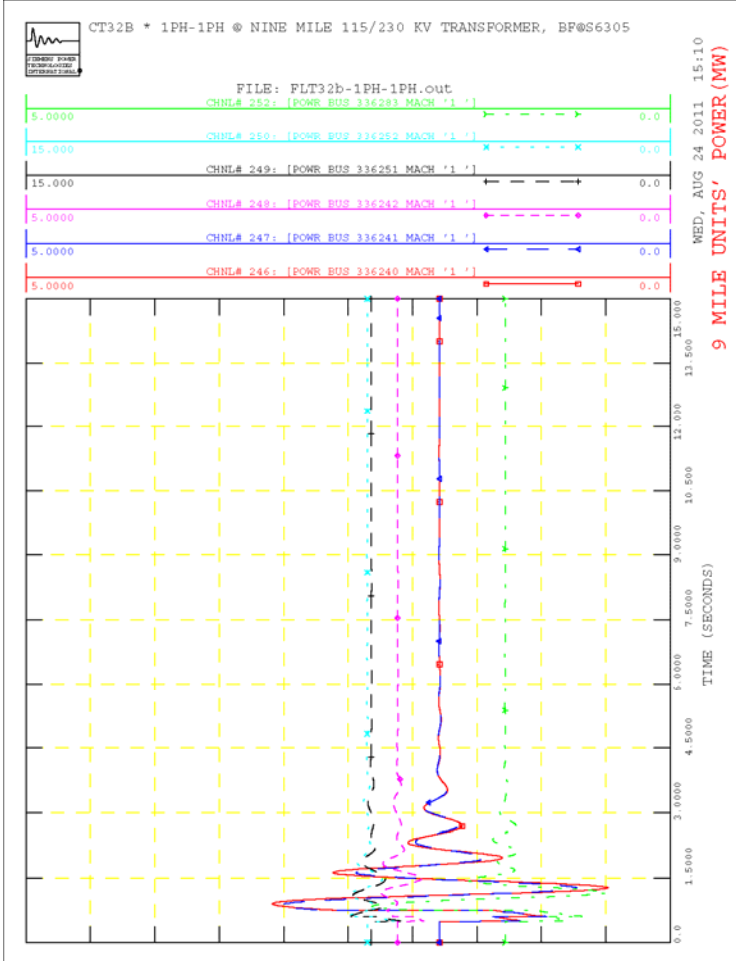
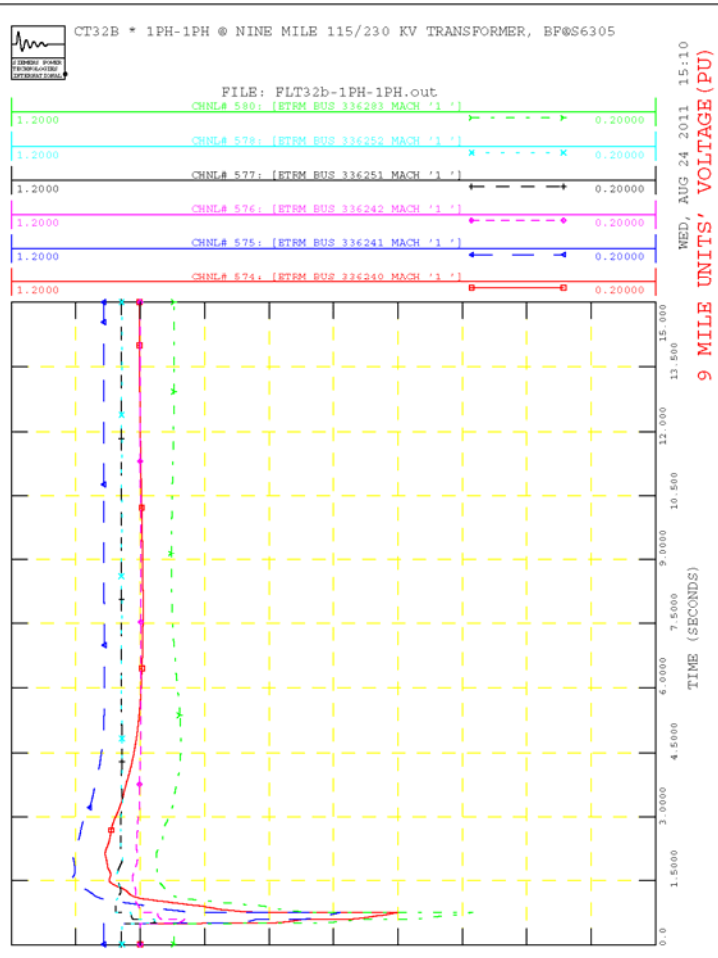
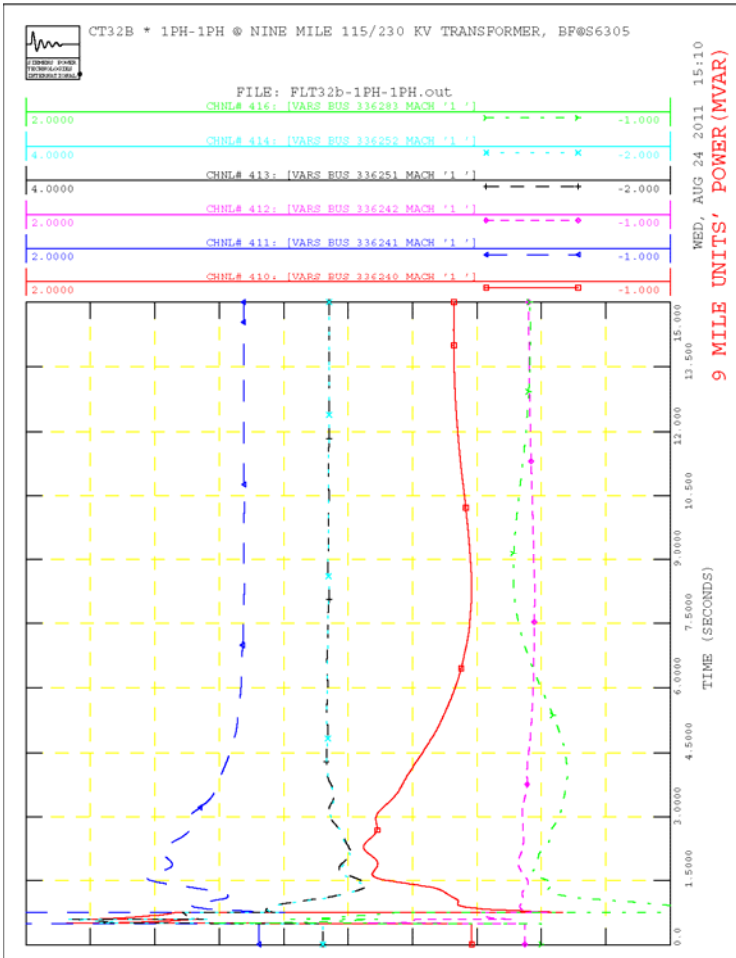


Fault 32a - 3PH (cont)

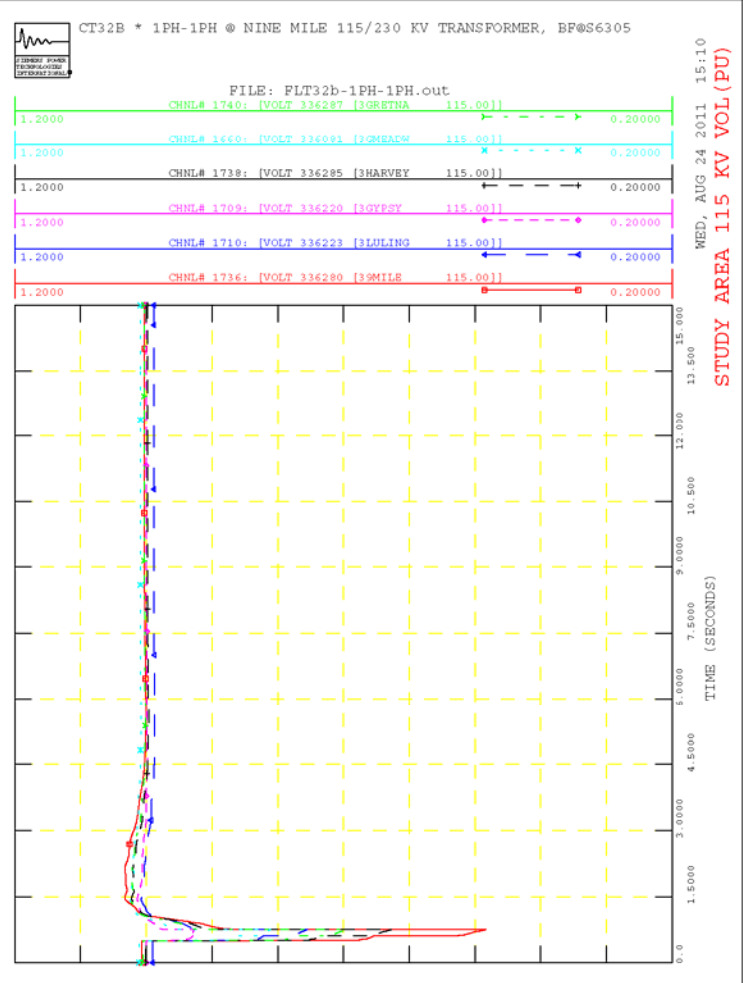
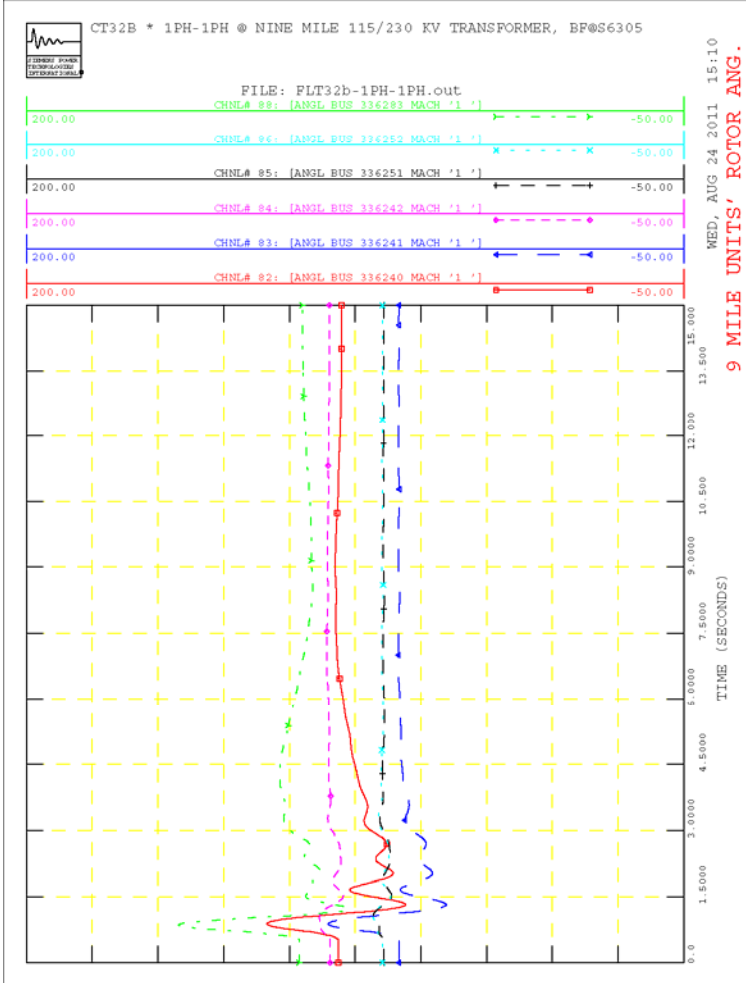
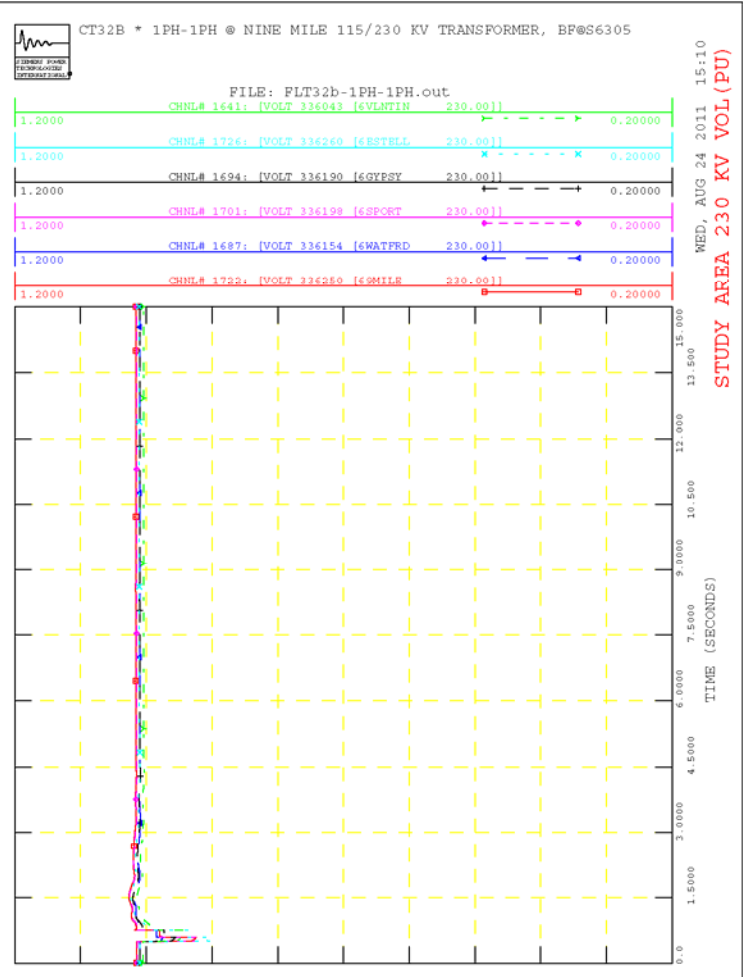
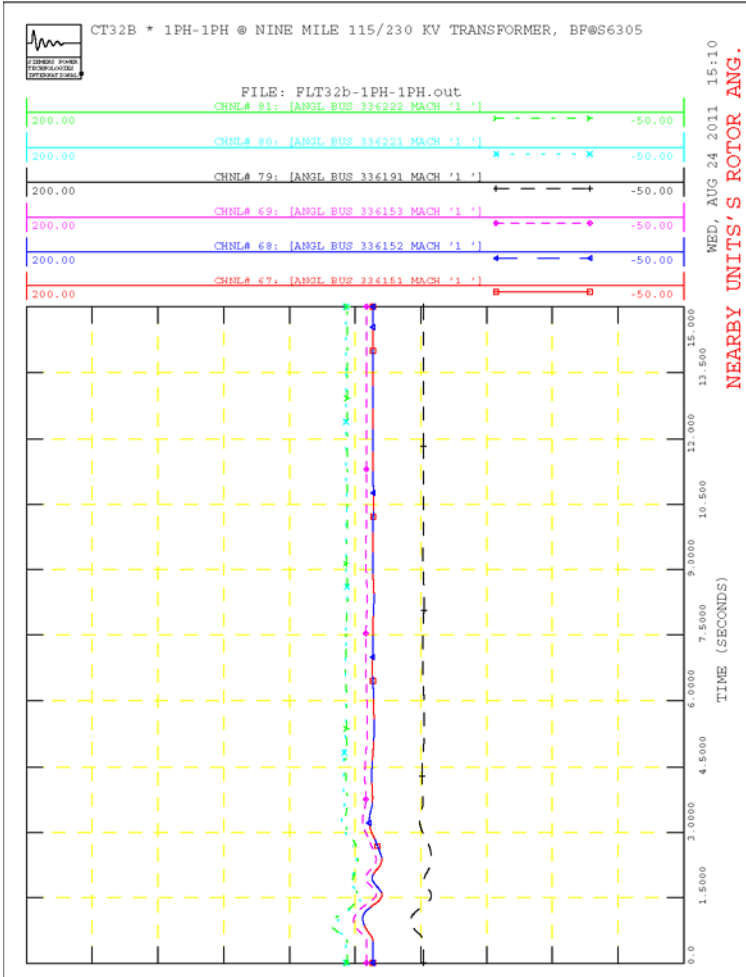


C.2.3 Fault_32a – Single Line to Ground Fault with Stuck Breaker

Fault 32a – SLG SB



Fault 32a – SLG SB



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Critical Clearing Time – Stability Plots

This Appendix shows the critical clearing time plots. Each plot has two traces representing a given generator maintaining and losing synchronism for 1 cycle increase in the fault applied time at Waterford 230 kV substation.

D.1 Phase 1– Original Load Flow Model (2015 Summer Peak)

D.1.1 Without PID 222 Project

D.1.2 With PID 222 Project

D.2 Phase 2 – 2014 Summer Peak Load Flow Model with PID 228

D.2.1 Without PID 222 Project

D.2.2 With PID 222 Project

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