



Interconnection System Impact Study Report

Request # GI-2013-5

200 MW Wind Powered Generation
Near Limon, Colorado

Public Service Company of Colorado
Transmission Planning
March 31, 2014

A. Executive Summary

Public Service Company of Colorado (PSCo) received an interconnection request (GI-2013-5) for a 200 MW wind generation facility on July 16, 2013. The facility will consist of one hundred and eighteen GE 1.7 MW Wind Turbine Generators (WTGs) with Zero Voltage Ride Through (ZVRT) capability. This facility will be an extension of the existing wind plant at Limon windpark located approximately 40 miles from the Missile Site Substation. GI-2013-5 will be located 9.5 miles east of the existing Limon II wind plant and connect to the Missile Site 345 kV Substation using the existing 345 kV tie line and the existing point of interconnection (POI).

The purpose of the System Impact Study is to determine the potential system impacts on the PSCo transmission infrastructure as well as that of neighboring utilities associated with the connection of the proposed GI-2013-5. The requested in-service date is December 2014, so the studies were performed for 2015 heavy summer conditions.

The transient stability study results show:

- The proposed GI-2013-5 project did not trip during any of the contingencies tested, that is, no trips occurred due to LVRT or frequency protection.
- Furthermore, no trips were identified in the other wind generating facilities in the area.
- All synchronous generators in the areas 70 and 73 were stable and remained in synchronism after the contingencies simulated.
- Acceptable damping and voltage recovery was observed, within applicable standards.

The study demonstrates that the GI-2013-5 wind generating facility has no adverse impact on the stability of the PSCo system, for the conditions tested.



B. Introduction

Public Service Company of Colorado (PSCo) received an interconnection request (GI-2013-5) for a 200.6 MW wind facility on July 16, 2013. The new generating facility will consist of one hundred and eighteen GE 1.7 MW Wind Turbine Generators (WTGs) with Zero Voltage Ride Through (ZVRT) capability. This facility will be an extension of the existing Limon wind farm.

The Point of Interconnection (POI) is the Missile Site 345 kV bus. The wind farm is connected to the 345 kV bus at GI-2011-7 through an 8 mile 345 kV transmission line that is part of the GI-2011-7 and then connected to the 345 kV bus at GI-2011-2 through an 4.5 mile 345 kV transmission line and then connected to the 345 kV bus at Missile Site through the 40 mile 345 kV transmission line that is part of the GI-2011-2 project.

The purpose of this report is to present the results of the stability analysis performed to evaluate the impact of the proposed project on the PSCo system dynamic performance.

C. Summary of the Feasibility Study

A feasibility study was performed by PSCo and documented in the report dated October 24, 2013. The analyses were performed using a 2015 heavy summer power flow case and included steady state and short circuit analyses. The base case was stressed to simulate heavy wind generation in the Pawnee and Missile Site areas, and heavy North to South flows in the system. The TOT3 path flow has been set at 896 MW.

The GI was requested to be studied as both a Network Resource and Energy Resource. The feasibility studies results show that the proposed GI did not cause voltage violations in the PSCo system and the thermal violations identified can be mitigated. The short circuit study results showed that there are no new circuit breakers overdutied due to the proposed generation facility.

No additional system upgrades were required for the GI to deliver its full output to the PSCo system, so it is concluded that the Energy resource capability of the proposed generation is 200 MW and the Network Resource capability of the proposed generation is 200 MW.

D. System Impact Study Scope and Analysis

The stability analysis was performed to determine the ability of the proposed GI to remain on-line and within applicable planning standards following system disturbances, which consisted of a number of three-phase faults and single line to ground faults near the GI-2013-5 including Missile Site 345 kV and Pawnee 230 kV.



Stability simulations were also performed to determine the ability of the wind project to meet FERC Order 661A (low voltage ride through and wind farm recovery to pre-fault voltage) without additional reactive support.

E. Voltage Regulation and Reactive Power Capability

Interconnection Customers are required to interconnect their Large Generating Facilities with Public Service of Colorado's (PSCo) Transmission System in conformance to the *Xcel Energy Interconnection Guidelines for Transmission Interconnected Producer-Owned Generation Greater Than 20 MW* (available at <http://www.xcelenergy.com/staticfiles/xe/Regulatory/Transmission-Interconnection-Guidelines-Great-20MW.pdf>). Wind generating plant interconnections must also conform to the performance requirements in FERC Order 661-A. Accordingly, the following voltage regulation and reactive power capability requirements (at the POI) are applicable to this interconnection request:

- To ensure reliable operation, all Generating Facilities interconnected to the PSCo transmission system should adhere to the Rocky Mountain Area Voltage Coordination Guidelines. Accordingly, since the POI for this interconnection request is located within Northeast Colorado Region 7; the applicable ideal transmission system voltage profile range is 1.02 – 1.03 per unit at regulated buses and 1.0 – 1.03 per unit at non-regulated buses.
- Xcel Energy's OATT requires all Interconnection Customers to have the reactive capability to achieve ± 0.95 power factor at the POI, with the maximum “full output” reactive capability available at all output levels. Furthermore, Xcel Energy requires all Interconnection Customers to have dynamic voltage control and maintain the voltage specified by the Transmission Operator within the limitation of ± 0.95 power factor at the POI, as long as the generating plant is on-line and producing power.
- It is the responsibility of the Interconnection Customer to determine the type (switched shunt capacitors and/or switched shunt reactors, etc.), the size (MVAR), and the locations (34.5 kV or 345 kV bus) of any additional static reactive power equipment needed within the generating plant in order to have the reactive capability to meet the ± 0.95 power factor and the 1.02 – 1.03 per unit voltage range standards at the POI. Further, for wind generating plants to meet the LVRT performance requirements specified in FERC Order 661-A, appropriately sized and located reactive power compensation devices (capacitor, DVAR, SVC, etc.) may need to be installed within the generating plant.
- The Interconnection Customer is required to demonstrate to the satisfaction of PSCo Transmission Operations prior to the commercial in-service date of the generating plant that it can safely and reliably operate within the required power factor and voltage ranges (noted above).

The analysis was performed with the wind turbine outputs set to various power levels from full power down to 10% of rated capacity. Two scenarios were evaluated



considering the two existing 20 MVar reactors either in or out of service. The scenario with reactors out of service was created to evaluate the wind farm maximum lagging capacity. The scenario with the reactors in service was created to determine the wind farm maximum leading capacity. A voltage set point of 0.98 was considered at the POI to determine the Limon wind farm maximum capacity to provide reactive power since of the supply of the reactive power to the system is most needed when voltages are low. In a similar manner, the absorption of reactive power from the system is most needed when voltages are high and thus a POI voltage of 1.05 p.u. was tested for maximum leading capacity.

With all facilities in service and 600 MW of generation from the wind generators, and 579MW delivered at the POI, the wind farm is able to deliver 170 Mvar at the POI without the installation of any additional shunt compensation. At 0.95 power factor, the required Mvar injection for 579 MW is 190.34 Mvar. Thus additional reactive support is needed to meet the power factor requirement. A 20 Mvar capacitor bank will be installed at the Limon I main 34.5 kV bus for power factor requirements. With this 20 Mvar capacitor bank in service, the wind farm is able to deliver 190.34 Mvar, thereby maintaining 0.95 power factor at the POI.

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F. Dynamic Stability Analysis – Base Case Set Up

The stability database used for the GI-2011-7 SIS studies (in PSS[®]E v30.3) was utilized as a starting point for the stability studies of GI-2013-5. Based on the load flow model used for the feasibility studies (2015 heavy summer power flow case), the 2012 database was updated to include all relevant projects in area 70 (PSCOLORADO) and 73 (WAPA R.M.). A short description of all projects added to the base case is given below.

F.1 Modeling GI-2013-5 Wind Generating Plant Expansion

GI-2013-5 (200.6 MW) is comprised of 118 GE 1.7 MW wind turbine generators (WTGs) equipped with Zero Voltage Ride-Through (ZVRT) capability. The proposed facility was modeled in detail with each GE WTG represented as an individual generator. Each generator was modeled at 0.69 kV and connected through a padmount transformer to the 34.5 kV collector system, which connects to the main collector substation through a 34.5 kV/345 kV park transformer. The wind farm is connected to the 345 kV bus at GI-2011-2 through a 4.5 mile 345 kV transmission line that is part of the GI-2011-7 and then connected to the 345 kV bus at Missile Site through the 40 mile 345 kV transmission line that is part of the GI-2011-2 project. A 20 Mvar capacitor bank is installed (and modeled as in-service) at the Limon I main 34.5 kV bus for power factor requirements.



F.2 Modeling Other Relevant Generating Facilities in the Area

Note that due to availability and/or data problems associated with proprietary models for certain wind turbine manufacturers, the stability models used to represent the Cedar Creek wind farm are similar models selected to be representative of the type of turbines installed at this wind farm (Type 3).

- GI-2011-2 (200 MW) – comprised of 125 GE 1.6 MW wind turbine generators (WTGs) equipped with Zero Voltage Ride-Through (ZVRT) capability. The wind farm is connected to the 345 kV bus at Missile Site through a 40 mile 345 kV transmission line. A 20 Mvar reactor is installed (but modeled out of service) at the 34.5 kV main collector bus.
- GI-2011-7 (200 MW) – comprised of 125 GE 1.6 MW wind turbine generators (WTGs) equipped with Zero Voltage Ride-Through (ZVRT) capability. The wind farm is connected to the GI-2011-2 345 kV bus a 4.5 mile 345 kV transmission line. A 20 Mvar reactor is installed (but modeled out of service) at the 34.5 kV main collector bus
- Peetz Logan Wind Energy Plant (575 MW) – consists of GE 1.5 MW WTGs with LVRT 2 (Peetz Table and Logan), and GE 1.5 MW WTGs with ZVRT and Siemens SMK 2.03 2.3 MW WTGs with LVRT. The same models were used in this analysis as those used in the dynamic stability analysis for the GI-2006-2 project (Siemens PTI report R96-09, Peetz–Logan Wind Farm Expansion Request # GI-2006-2 Dynamic Analysis – Restudy with Siemens and GE WTGs, July 02, 2009.)
- Cedar Point Wind Energy Plant (250 MW) – consists of 139 Vestas V90 1.80 MW WTGs with LVRT. This wind farm was modeled using the proprietary model with LVRT as two lumped generators in the dynamic stability analysis. A 10 Mvar DSTATCOM was modeled at the main 34.5 kV collector substation.
- Cedar Creek Wind Energy – Phase 1 (CCWE-1) Plant (300 MW) – consists of GE 1.5 MW WTGs (with LVRT 2) and Mitsubishi WTGs. This wind farm was modeled with GE 1.5 MW WTGs as two lumped generators in the dynamic stability analysis.
- Cedar Creek Wind Energy – Phase 2 (CCWE-2) Plant (250 MW) – consists of GE 1.5 MW WTGs (with LVRT 2) and Nordex WTGs. This wind farm was modeled with GE 1.5 MW WTGs as two lumped generators in the dynamic stability analysis.

From the updated base case described above, two cases were developed for the stability studies:

1. **Benchmark Case:** base case with all the relevant projects in the area in service with full output and with the GI-2013-5 project off-line.



2. **GI-2013-5 ON:** Benchmark Case with the GI-2013-5 project on-line.

G. Dynamic Stability Analysis – Results

The transient stability analysis evaluates the power system response to disturbances such as the occurrences of faults, tripping of generator units, or tripping of either transmission lines or loads. This study evaluates system quantities such as frequency, synchronous generator rotor angles, bus voltages and power flows before, during and after a given disturbance to determine whether the system remains stable and in synchronism in a post-disturbance condition. In addition, FERC 661A Order requires the wind farms to remain on-line during a disturbance up to the time periods and voltage levels set in the Low Voltage Ride-Through (LVRT) capability standard.

Transient stability analysis was performed for a number of three-phase faults and single line to ground faults near the GI-2013-5 including Missile Site 345 kV and Pawnee 230 kV, as shown in [Table 5](#)~~Table 5~~. Normal fault clearing times of 6 cycles for 230 kV facilities and 5 cycles for 345 kV facilities were used in this study. For each of these contingencies, a specific fault type was applied and cleared by tripping the appropriate system element. For simulations that including breaker failure, the clearing time considered was 20 cycles. For protection system failure simulations, the clearing time was 21 cycles. This procedure was performed for both cases, with and without the proposed GI-2013-5 generation

The results of the stability analysis are shown in [Table 5](#)~~Table 5~~. The system remains stable and in synchronism after each contingency studied. The results also indicate that none of the wind generating facilities in the area trip due to LVRT or frequency protection. Furthermore, the post-disturbance voltages are within the 0.95 to 1.05 pu range and the system oscillations show satisfactory damping.

H. Short Circuit

For the Customer proposed interconnection at the Missile Site 345 kV POI, no new circuit breakers on the PSCo system are expected to exceed their capabilities following installation of the new generation. The calculated short circuit parameters for the POI at the Missile Site 345 kV substation are shown in Table 1 below.

Please note that for the breaker duty calculations, the wind plant was modeled as a generator with an $X_d'' = 0.14586$ pu at the 34.5 kV low side of the main 345/34.5 kV step up transformer.



Table 1 – Short Circuit Parameters at the Missile Site 345 kV POI

System Condition	Three-Phase Fault Level (Amps)	Single-Line-to-Ground Fault Level (Amps)	Thevenin System Equivalent Impedance ($R + j X$) (ohms)
All Facilities in Service w/ GI-2013-5	11881.0	11311.1	$Z1(\text{pos})= 1.25317 + j 16.7182$ $Z2(\text{neg})= 1.28279 + j 16.7147$ $Z0(\text{zero})= 2.36003 + j 19.1689$
All Facilities in Service w/o GI-2013-5	11346.9	10911.2	$Z1(\text{pos})= 1.26415 + j 17.5087$ $Z2(\text{neg})= 1.29665 + j 17.505$ $Z0(\text{zero})= 2.30268 + j 19.5353$
Missile Site – Smoky Hill 345 kV out w/o GI-2013-5	6150.90	6450.11	$Z1(\text{pos})= 2.07483 + j 32.3167$ $Z2(\text{neg})= 2.08657 + j 32.3285$ $Z0(\text{zero})= 3.8335 + j 27.6522$
Missile Site – Pawnee 345 kV out w/o GI-2013-5	7659.92	8060.49	$Z1(\text{pos})= 1.76347 + j 25.9438$ $Z2(\text{neg})= 1.81086 + j 25.9329$ $Z0(\text{zero})= 2.46167 + j 22.0114$
Missile Site 345/230 kV Auto out w/o GI-2013-5	7568.78	7291.62	$Z1(\text{pos})= 1.51291 + j 26.2733$ $Z2(\text{neg})= 1.55646 + j 26.2701$ $Z0(\text{zero})= 3.96921 + j 29.1051$



I. Costs Estimates and Assumptions

Scoping level cost estimates for Interconnection Facilities and Network/Infrastructure Upgrades for Delivery (+/- 30% accuracy) were developed by Xcel Energy/PSCo Engineering. The cost estimates are in 2014 dollars with escalation and contingencies applied (AFUDC is not included) and are based upon typical construction costs for previously performed similar construction. These estimated costs include all applicable labor and overheads associated with the siting support, engineering, design, material/equipment procurement and construction of these new PSCo facilities. This estimate does not include the cost for any other Customer owned equipment and associated design and engineering.

The estimated total cost for the required upgrades for is **\$150,000**. These estimates do not include costs for any other Customer owned equipment and associated design and engineering. The following tables list the improvements required to accommodate the interconnection and the delivery of the Project generation output. The cost responsibilities associated with these facilities shall be handled as per current FERC guidelines. System improvements are subject to change upon a more detailed and refined design.



Table 2 – PSCo Owned; Customer Funded Transmission Provider Interconnection Facilities

Element	Description	Cost Est. (Millions)
PSCo's Missile Site 345kV Transmission Substation	Interconnect/Upgrade Customer to the 345kV bus (line 7103) at the Missile Site 345kV Substation. The new activities include: <ul style="list-style-type: none"> • Relay settings changes • Drawing revisions 	\$0.150
Time Frame	Design and construct	6 Months

Table 3: PSCo Owned; PSCo Funded Interconnection Network Facilities

Element	Description	Cost Estimate (Millions)
PSCo's Missile Site 345kV Transmission Substation	<ul style="list-style-type: none"> • Not Applicable 	\$0
	Total Cost Estimate for PSCo-Owned, PSCo-Funded Interconnection Facilities	\$0
Time Frame	Site, design, procure and construct	

Table 4 – PSCo Network Upgrades for Delivery

Element	Description	Cost Est. (Millions)
	Not Applicable	
	Total Cost Estimate for PSCo Network Upgrades for Delivery	\$0
Time Frame	Site, design, procure and construct	
	Total Project Estimate	\$0.150



Cost Estimate Assumptions

- Scoping level cost estimates for Interconnection Facilities and Network/Infrastructure Upgrades for Delivery (+/- 30% accuracy) were developed by Xcel Energy/PSCo Engineering.
- Estimates are based on 2014 dollars (appropriate contingency and escalation applied).
- AFUDC has been excluded.
- Engineering will be contracted out to a Design Consultant.
- Work scope is limited to Missile 345kV Substation and no evaluation of adequacy of proposed interconnection increase of 200 MW's.
- No new substation facility upgrades required.
- Changes are limited to relay settings and drawing revisions.
- The Wind Generation Facility is not PSCo's retail service territory.
- PSCo (or it's Contractor) crews will perform all construction, wiring, testing and commissioning for PSCo owned and maintained facilities.
- Labor is estimated for straight time only – no overtime included.
- The estimated time to design and construct the interconnection facilities is approximately 6 months after authorization to proceed has been obtained.
- This project is completely independent of other queued projects and their respective ISD's.
- A CPCN will not be required for the interconnection facilities construction.
- No line or substation outages will be required.
- The Customer will install a 20 MVAR capacitor bank unit on the 34.5kv bus at their Limon 1 Wind facility. No other reactive power or voltage control devices are required for this project.



Table 5. Results of Transient Stability Analysis

Contingency ID	Fault Type	Total Clearing Time	Fault Location	Tripped System Elements	Benchmark Case	GI-2013-5 ON Case
100	3ph	5 cycles	Missile Site 345 kV	Missile Site – Pawnee 345 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
101				Missile Site – Smoky Hill 345 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
102				Missile Site 345/230 kV Trf #1	System Stable No trips due to LVRT	System Stable No trips due to LVRT
110	3ph	6 cycles	Pawnee 230 kV	Pawnee – Story 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
111				Pawnee – Ft Lupton 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
112				Pawnee – Brick Center 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
200	SLG with Breaker Failure	20 cycles	Pawnee 230 kV	Pawnee – Story 230 kV with Pawnee – Missile Site 230 kV tripping due to breaker failure	System Stable No trips due to LVRT	System Stable No trips due to LVRT
201				Pawnee – Missile Site 230 kV with Pawnee – Story 230 kV tripping due to breaker failure	System Stable No trips due to LVRT	System Stable No trips due to LVRT
300	SLG with Protection System Failure	21 cycles		Pawnee – Story 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
301				Pawnee – Ft Lupton 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT
302				Pawnee – Brick Center 230 kV	System Stable No trips due to LVRT	System Stable No trips due to LVRT



Based on the study results, the GI-2013-5 wind generating facility has no adverse impact on the stability of the PSCo system.

Appendix A contains plots for each simulated contingency. There are 3 pages of plots for each contingency, showing:

- GI-2013-5 power and voltage
- GI-2011-2 and GI-2011-7 power and voltage
- Cedar Point and Cedar Creek power and voltage
- Rotor angles, P and Q, and speed deviation of the nearby synchronous generators Manchief and Pawnee
- Limon wind farm (I, II and III) Power flow (MW and Mvar) delivered at the POI
- Voltages of the POI surrounding area
 - Missile Site 230 and 345 kV
 - Pawnee 230 and 345 kV
 - Smoky Hill 345 kV
 - Comanche 345 kV

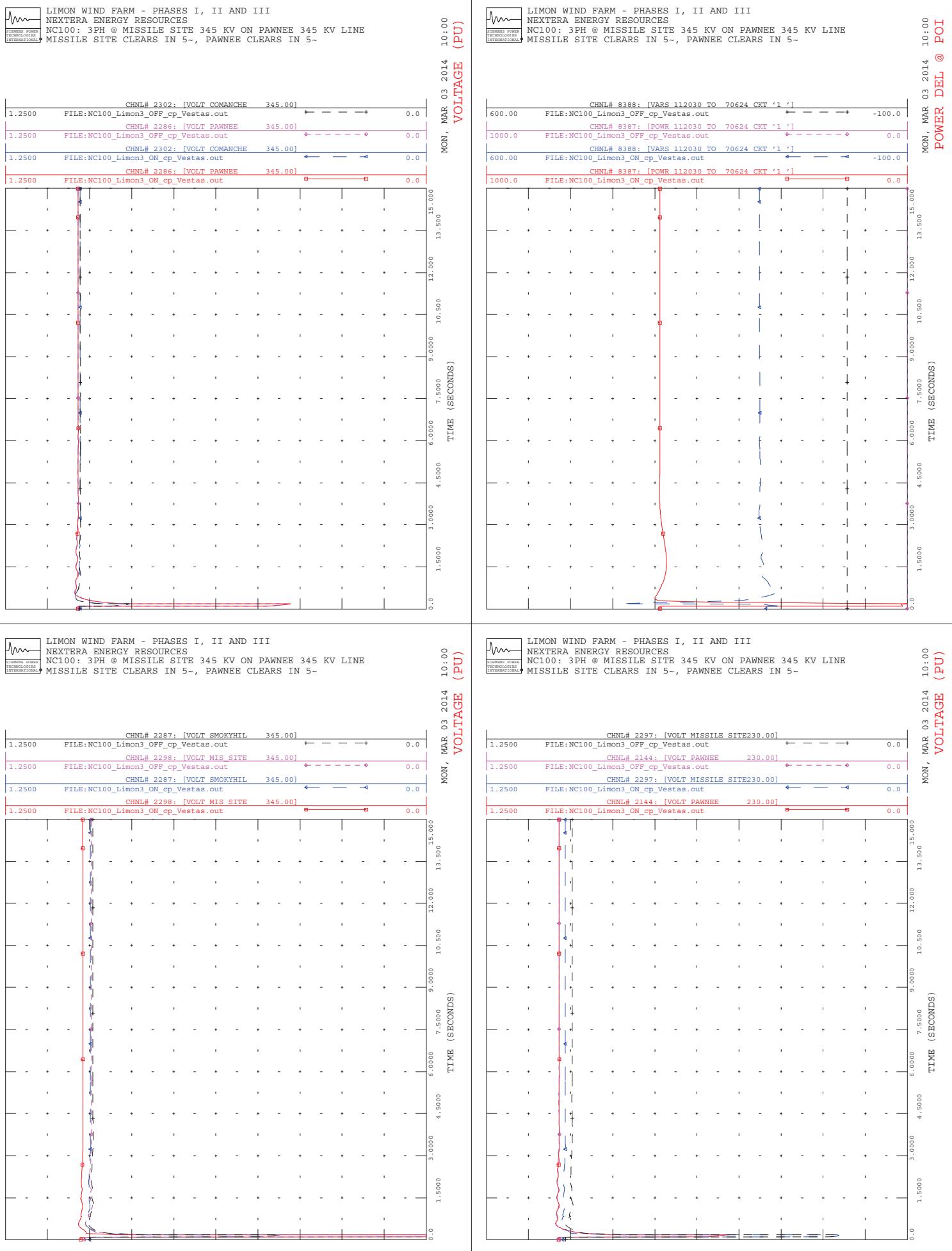
Each plot can have up to six traces, three of which show the simulation results for the benchmark case, and three which show the simulation results for the GI-2013-5 ON case. Note that in some of the contingencies, the simulation curves show a value of zero, for example, when the power output of the GI-2013-5 project is plotted for simulations where the Project is off.

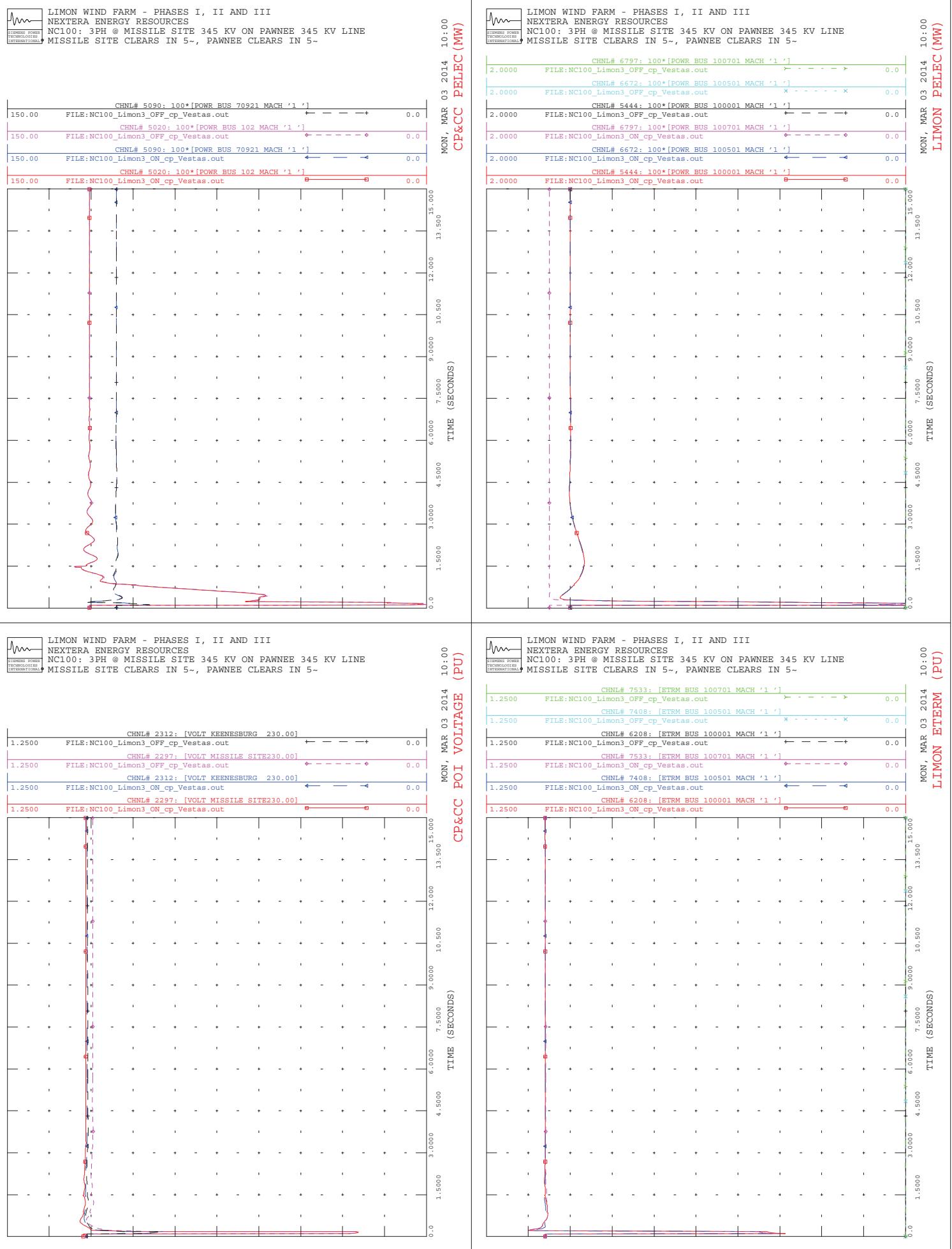
The study also analyzed the worst case contingencies 200 and 201 with increased generation at Pawnee (530 MW) and Manchief (140 MW each) units. The new analyses also included updated impedances for lines in the Pawnee and Missile Site area. The system showed stable behavior with the new modeling, so the remaining contingencies were not run with the new model. The study plots can be found in Appendix – A, and are named Contingency NC-200-Restudy and Contingency-NC-201-Restudy.

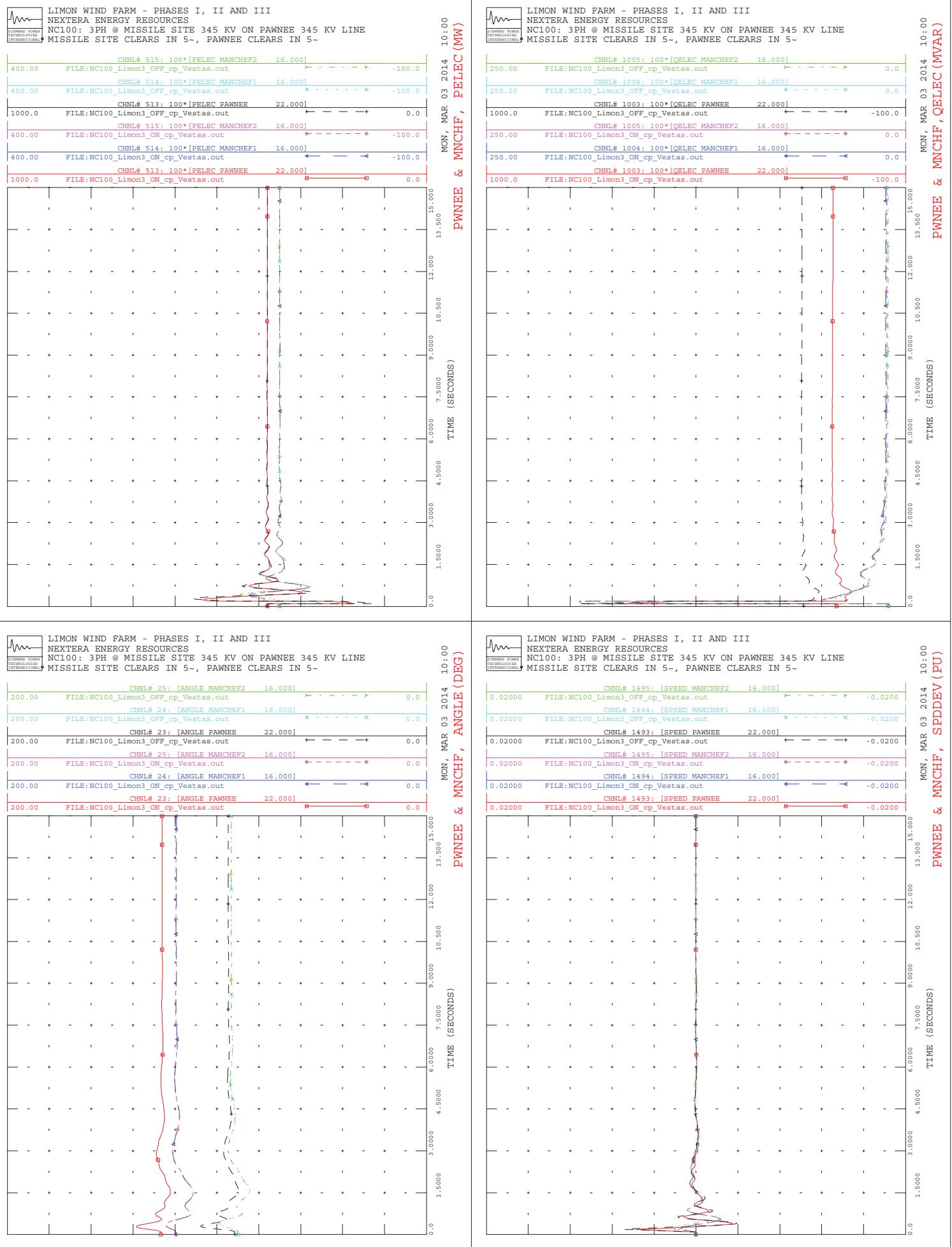


Appendix A – Simulation Plots

- Contingency NC 100

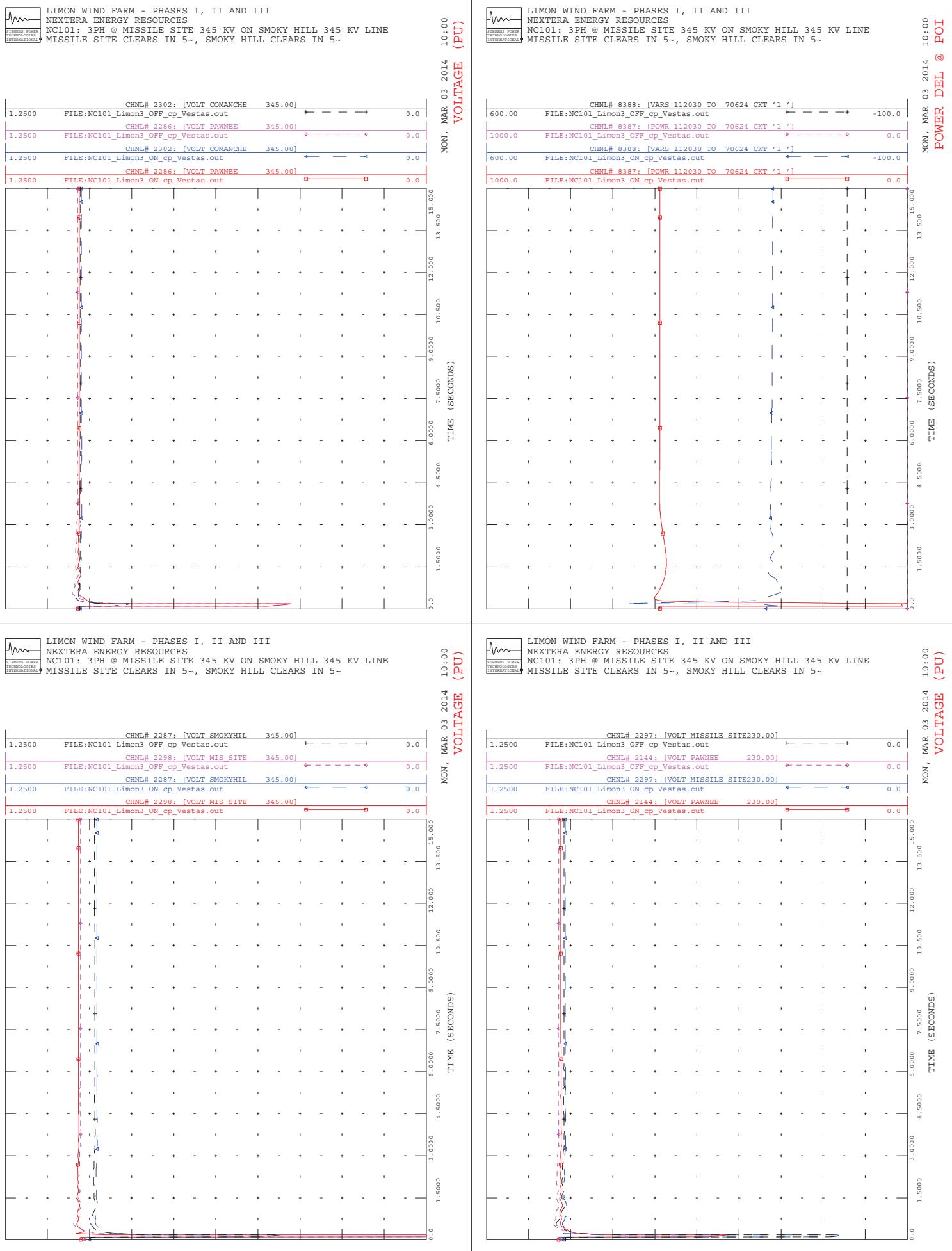


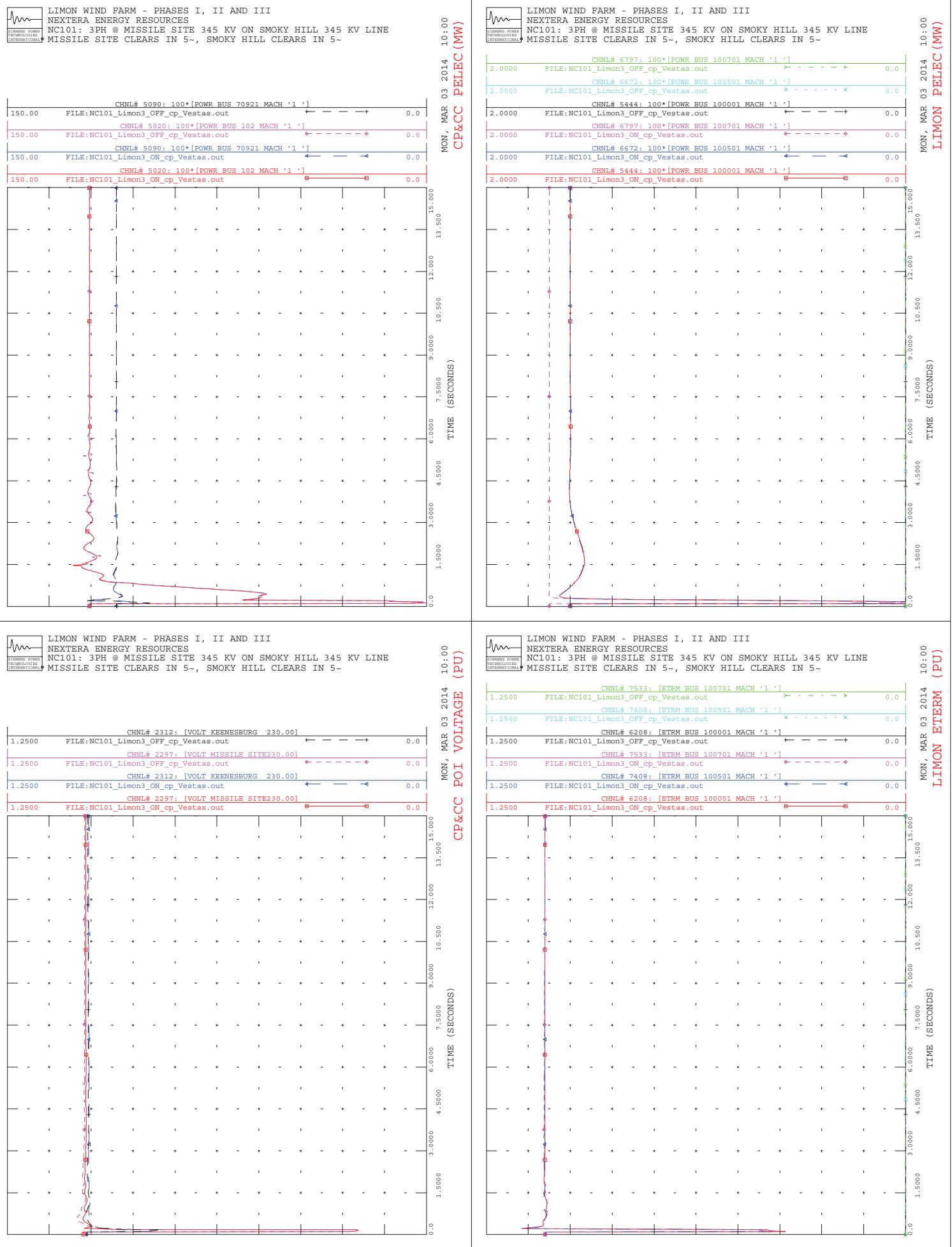


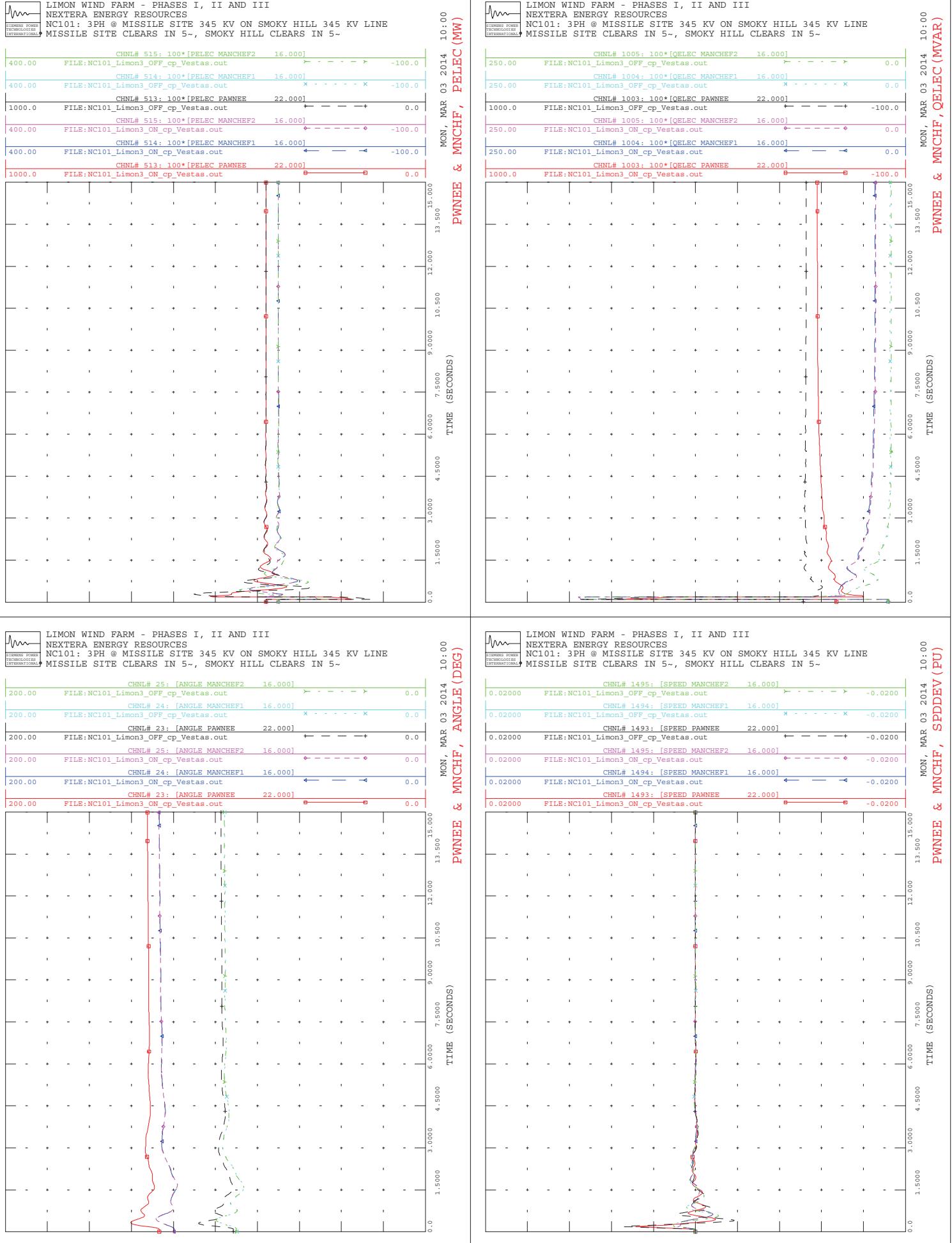




- Contingency NC 101

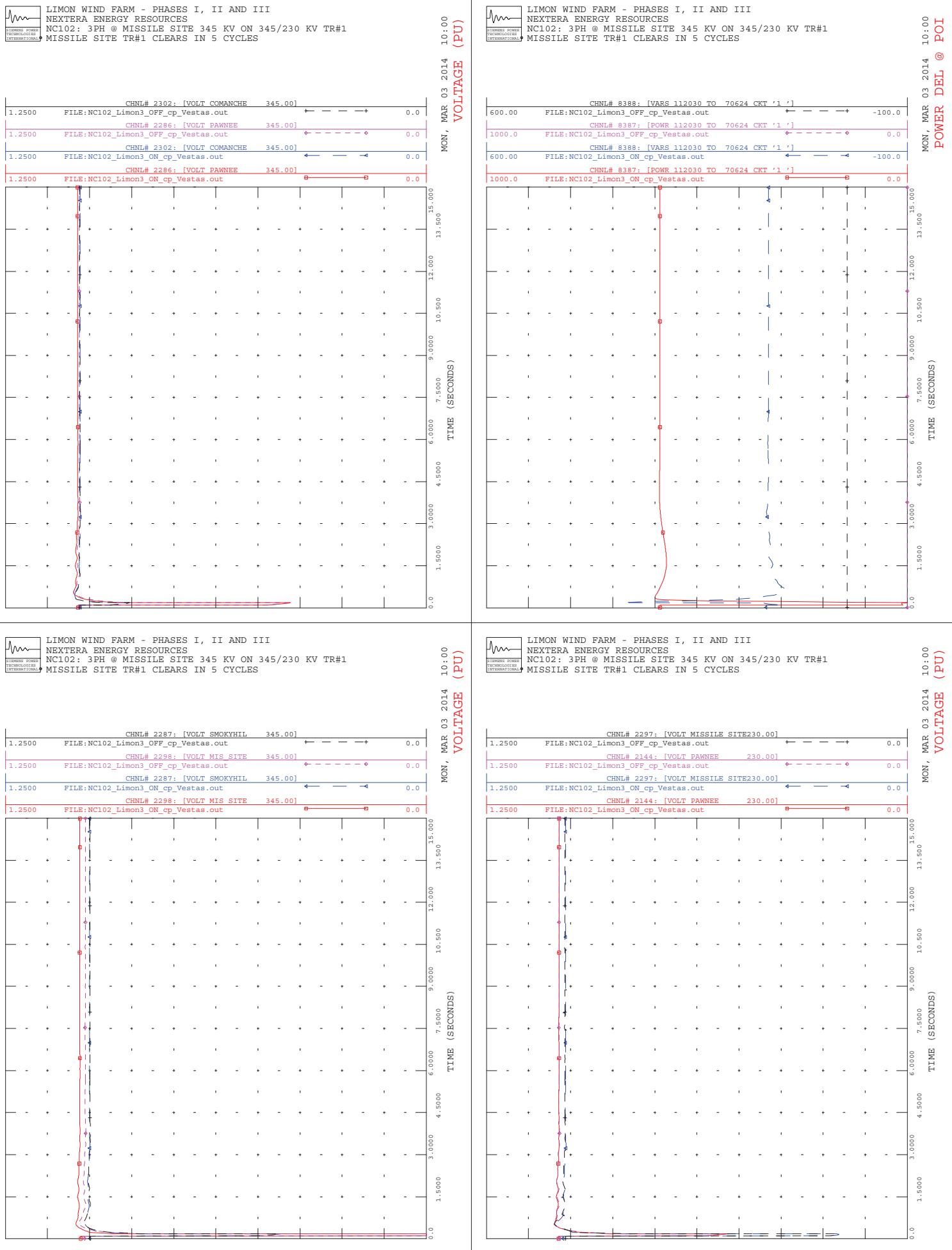


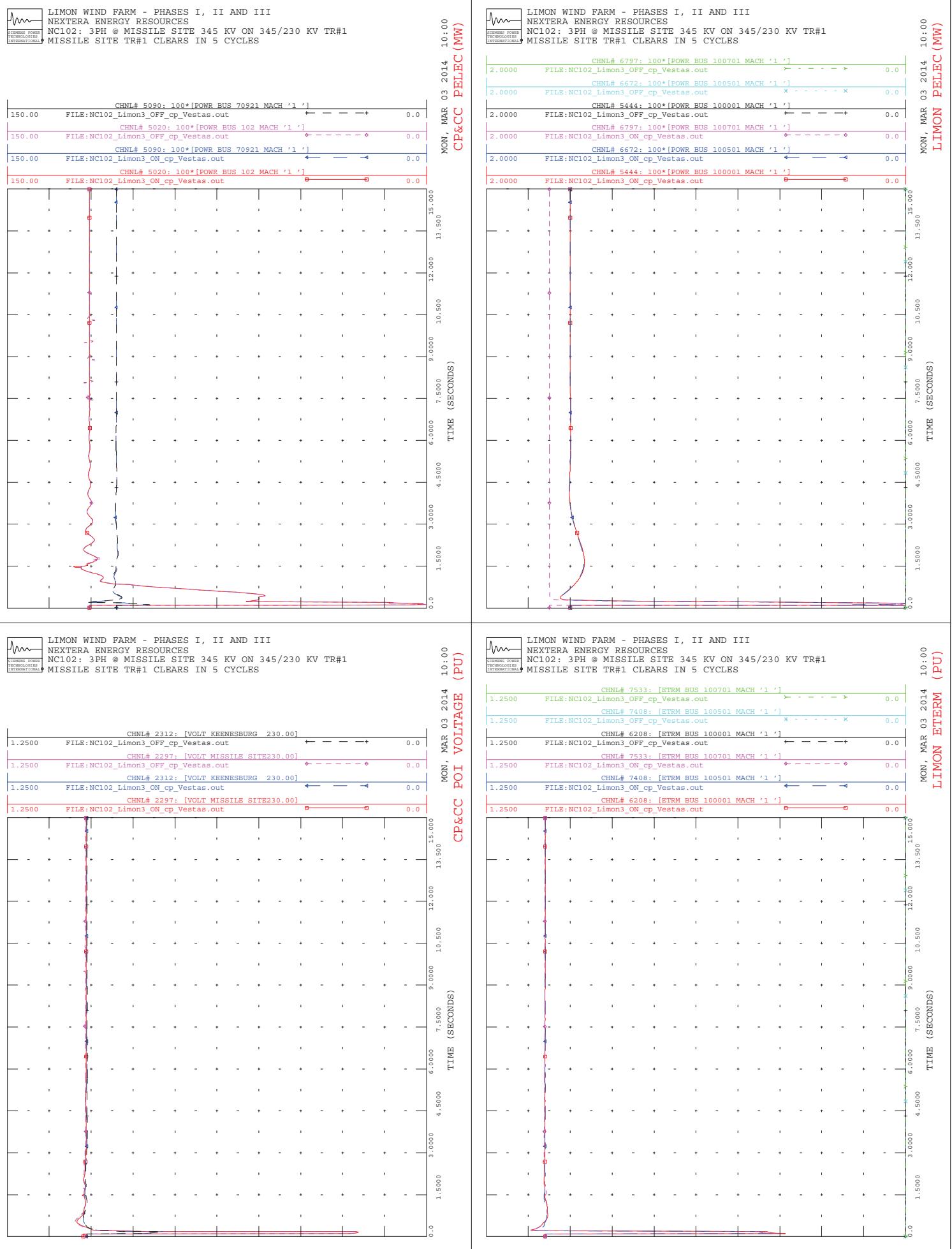






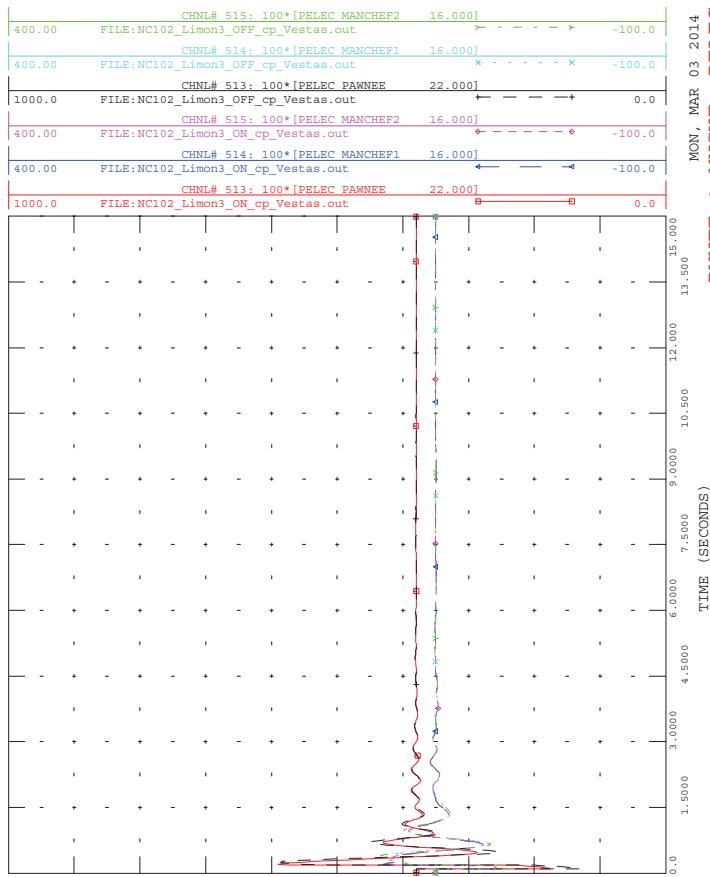
- Contingency NC 102



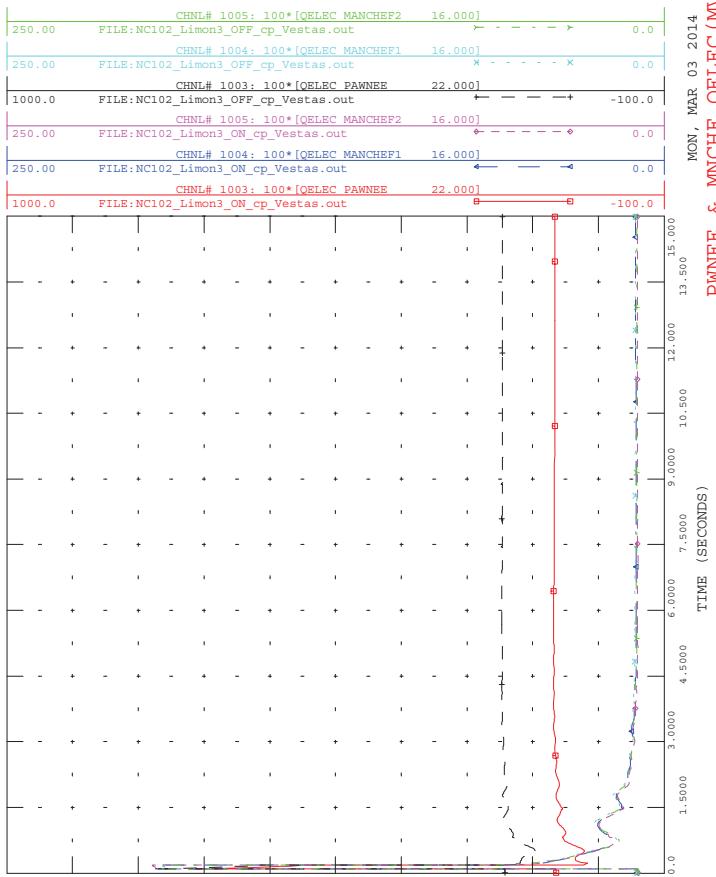




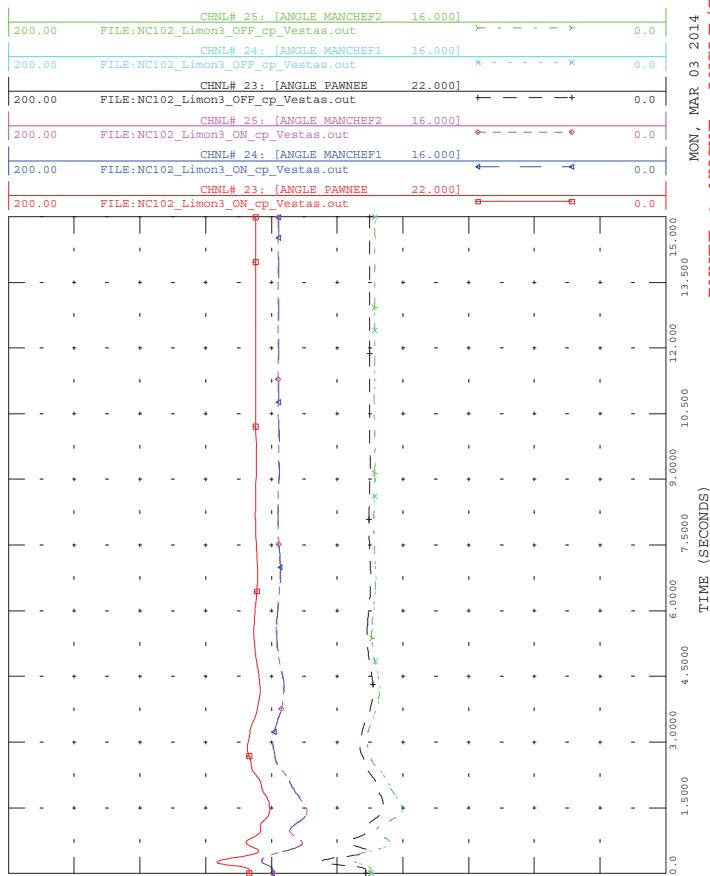
LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC102: 3PH @ MISSILE SITE 345 KV ON 345/230 KV TR#1
MISSILE SITE TR#1 CLEARS IN 5 CYCLES



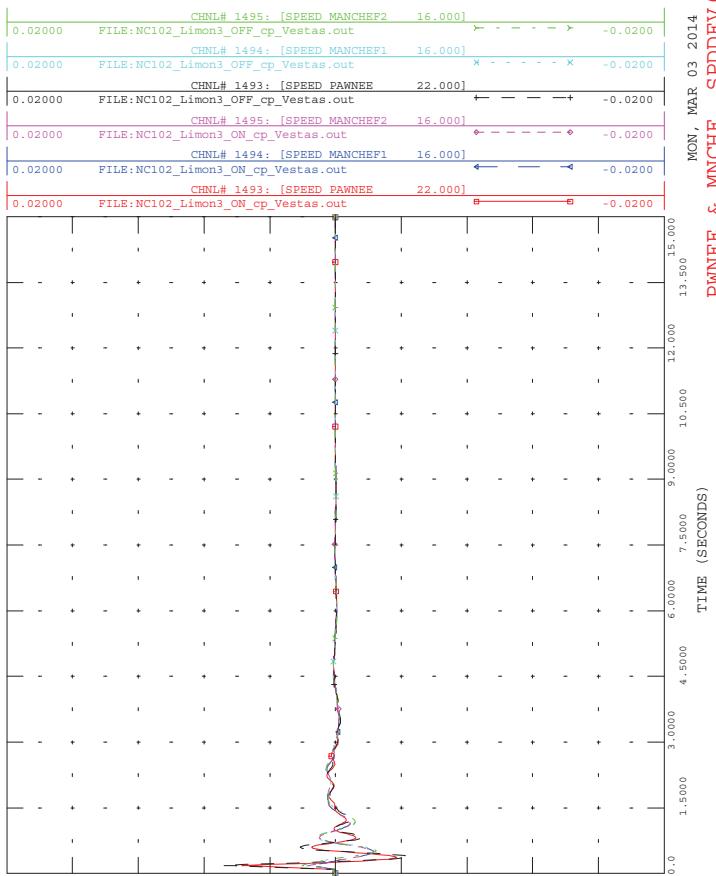
LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC102: 3PH @ MISSILE SITE 345 KV ON 345/230 KV TR#1
MISSILE SITE TR#1 CLEARS IN 5 CYCLES



LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC102: 3PH @ MISSILE SITE 345 KV ON 345/230 KV TR#1
MISSILE SITE TR#1 CLEARS IN 5 CYCLES

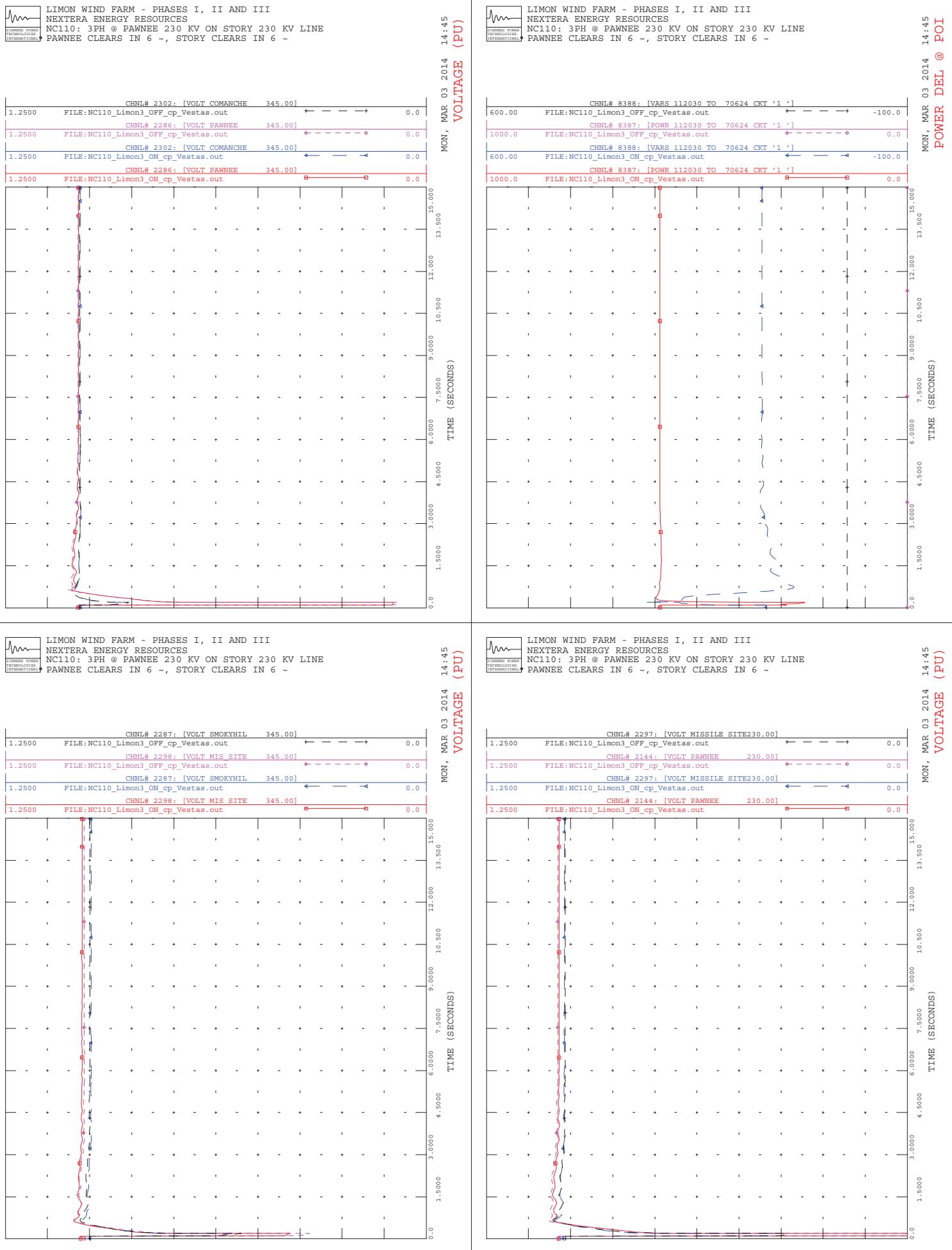


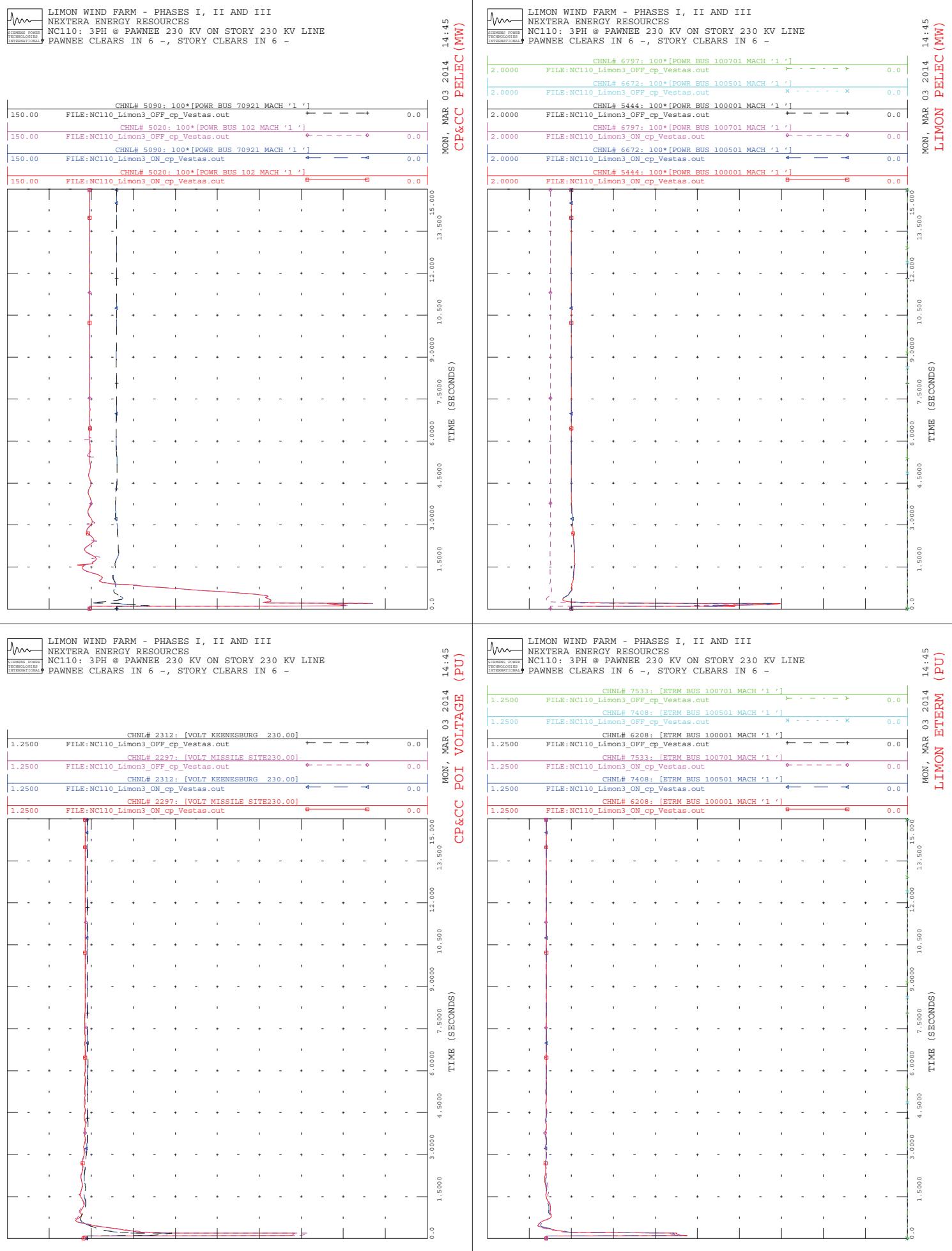
LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
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MISSILE SITE TR#1 CLEARS IN 5 CYCLES

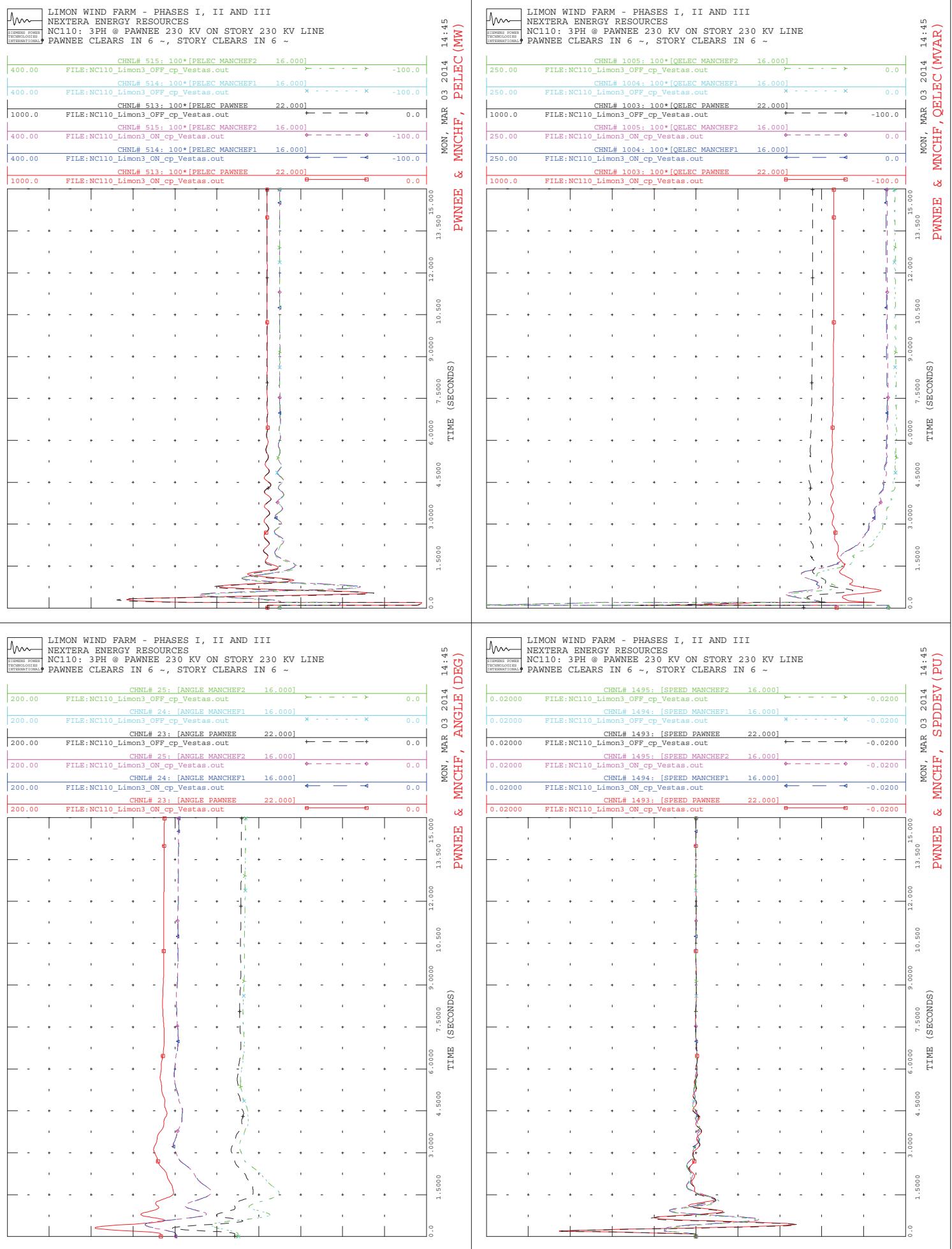




- Contingency NC 110

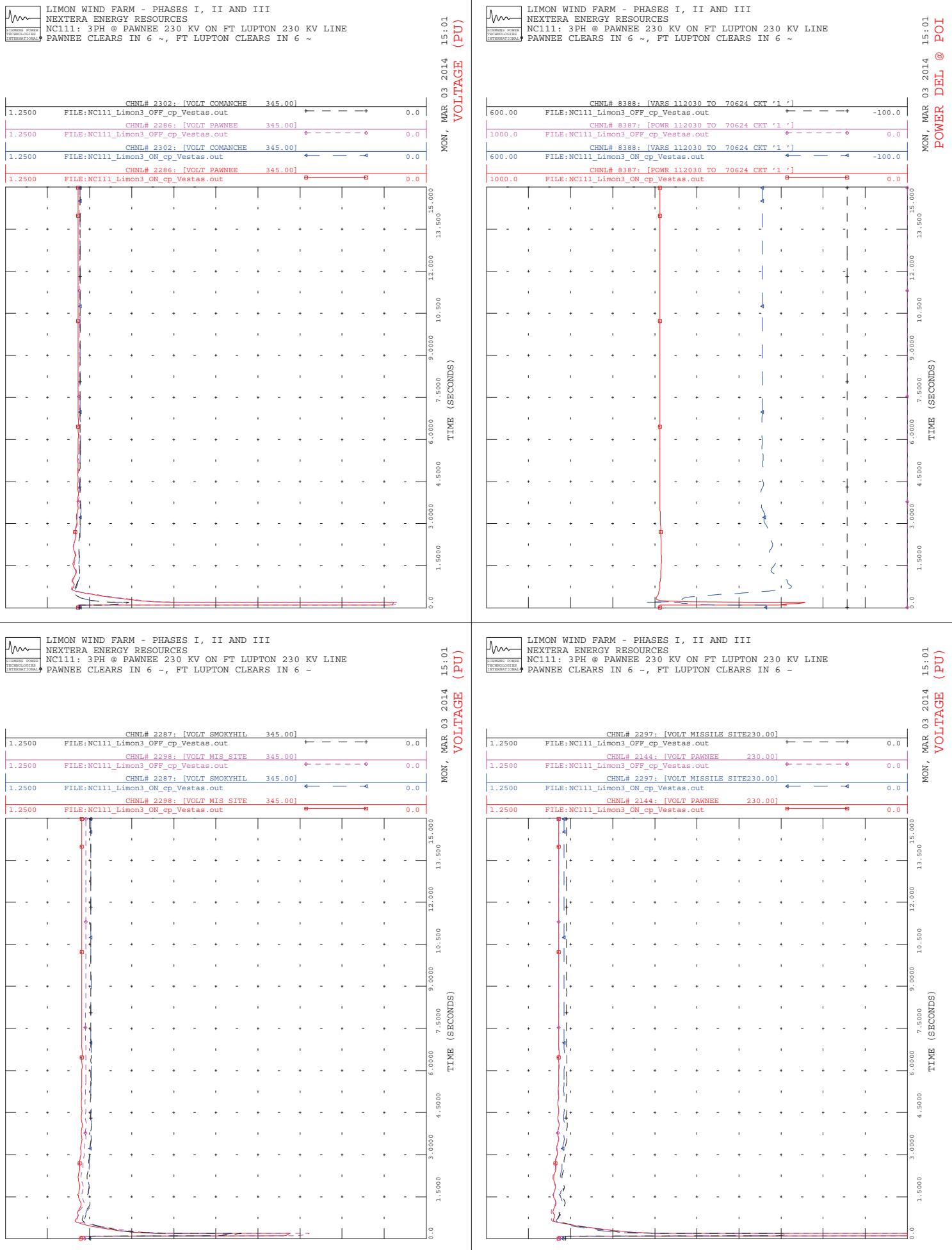


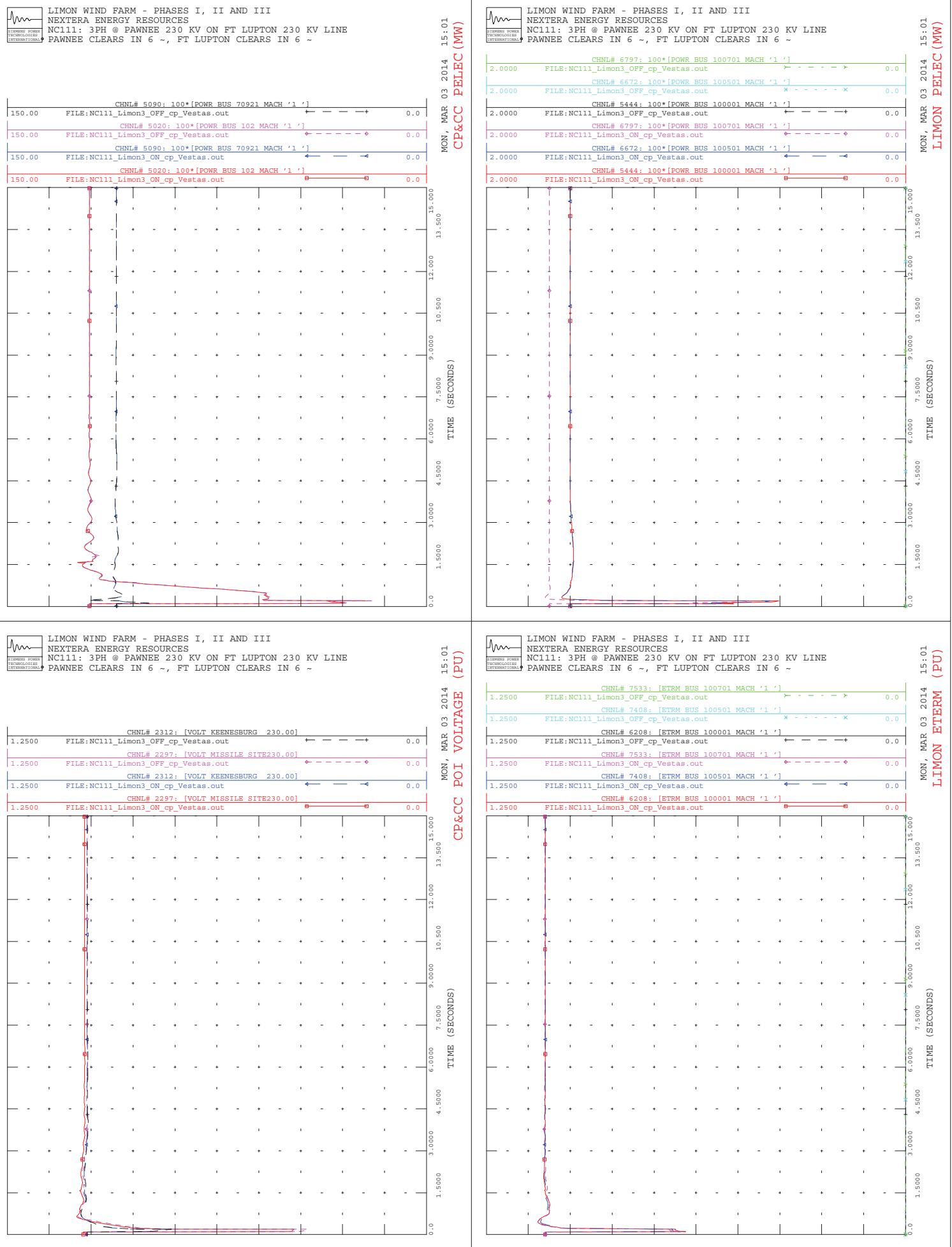


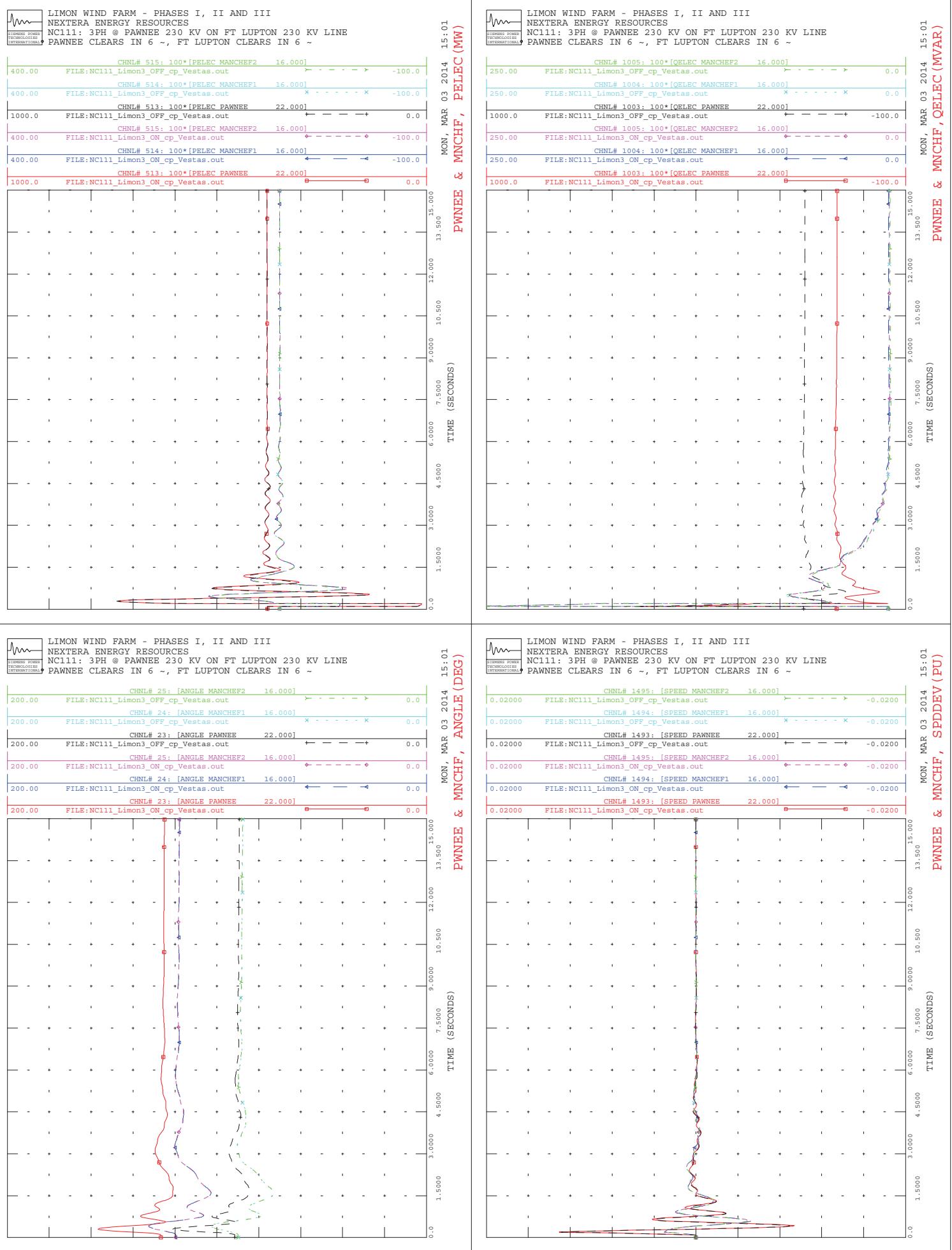




- Contingency NC 111









- Contingency NC 112



LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC112: 3PH @ PAWNEE 230 KV ON BRICK CENTER 230 KV LINE

PAWNEE CLEARS IN 6 ~, BRICK CENTER CLEARS IN 6 ~

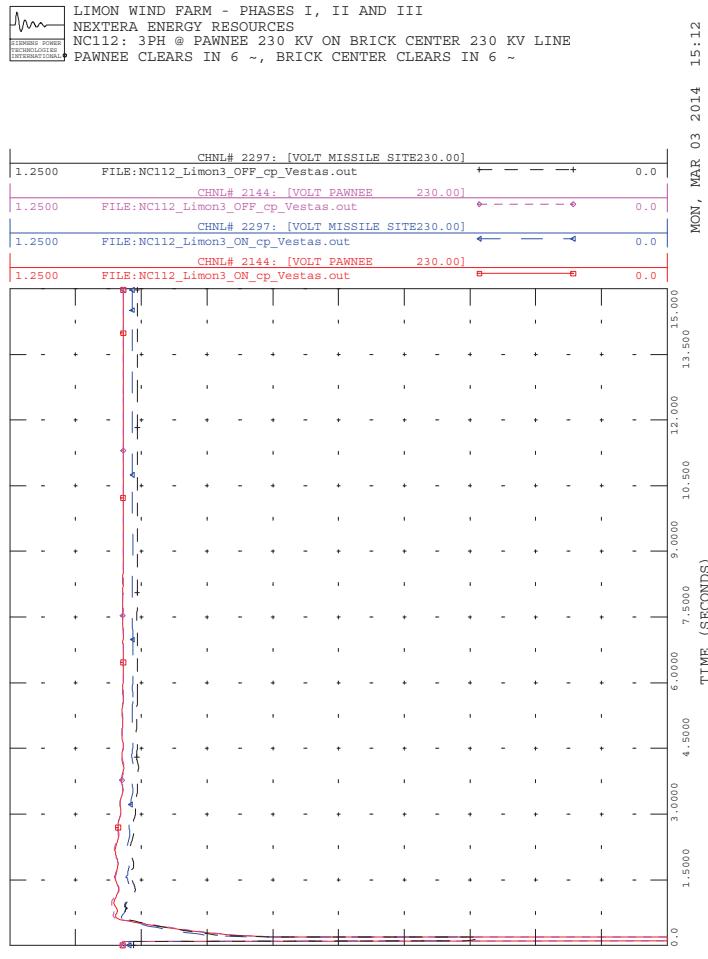
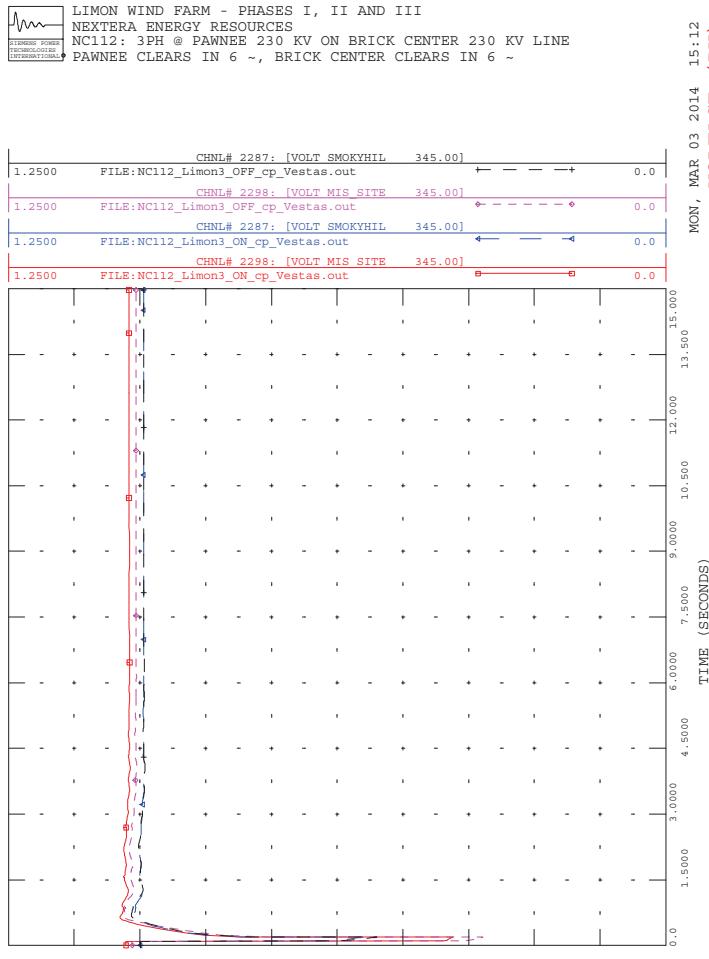
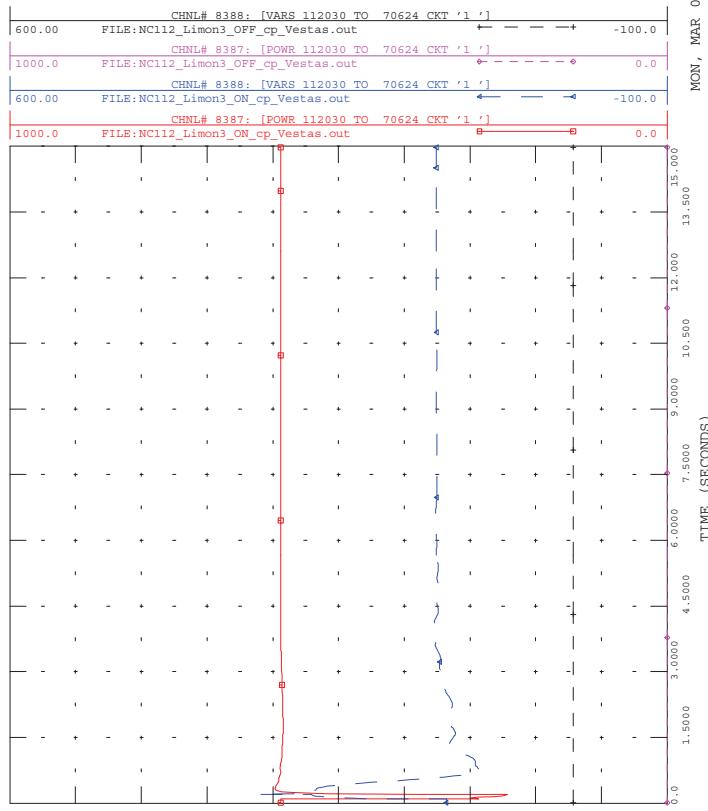
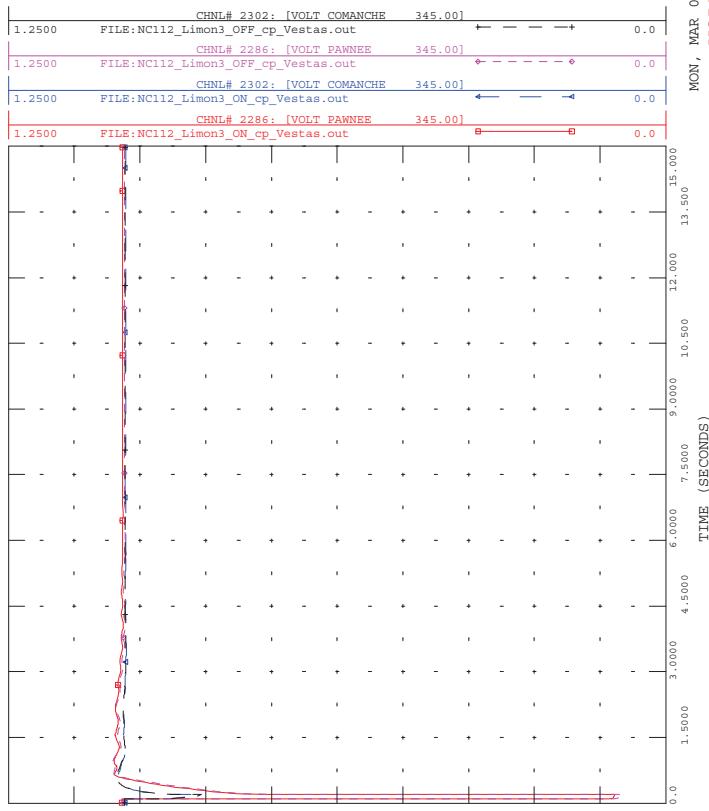


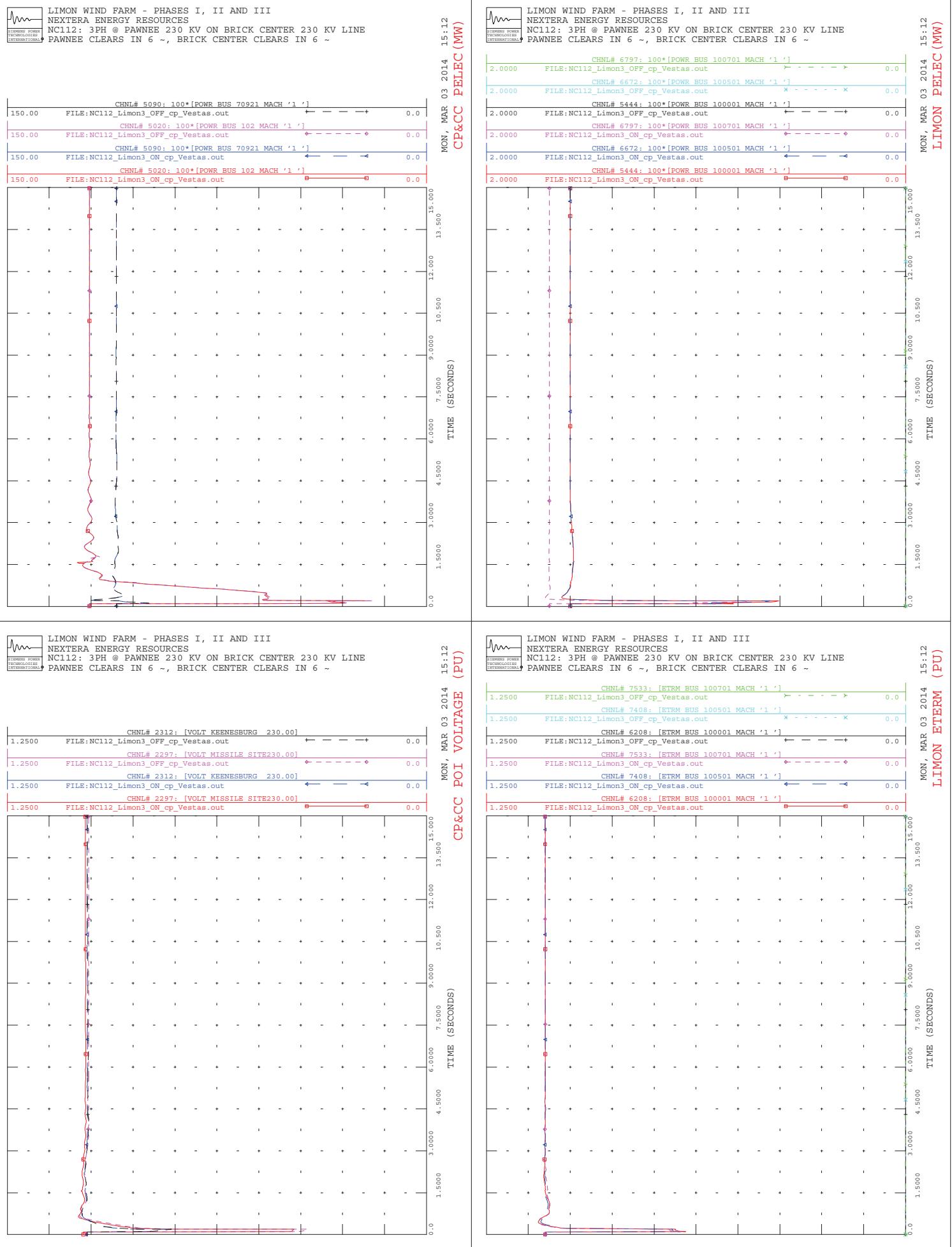
LIMON WIND FARM - PHASES I, II AND III

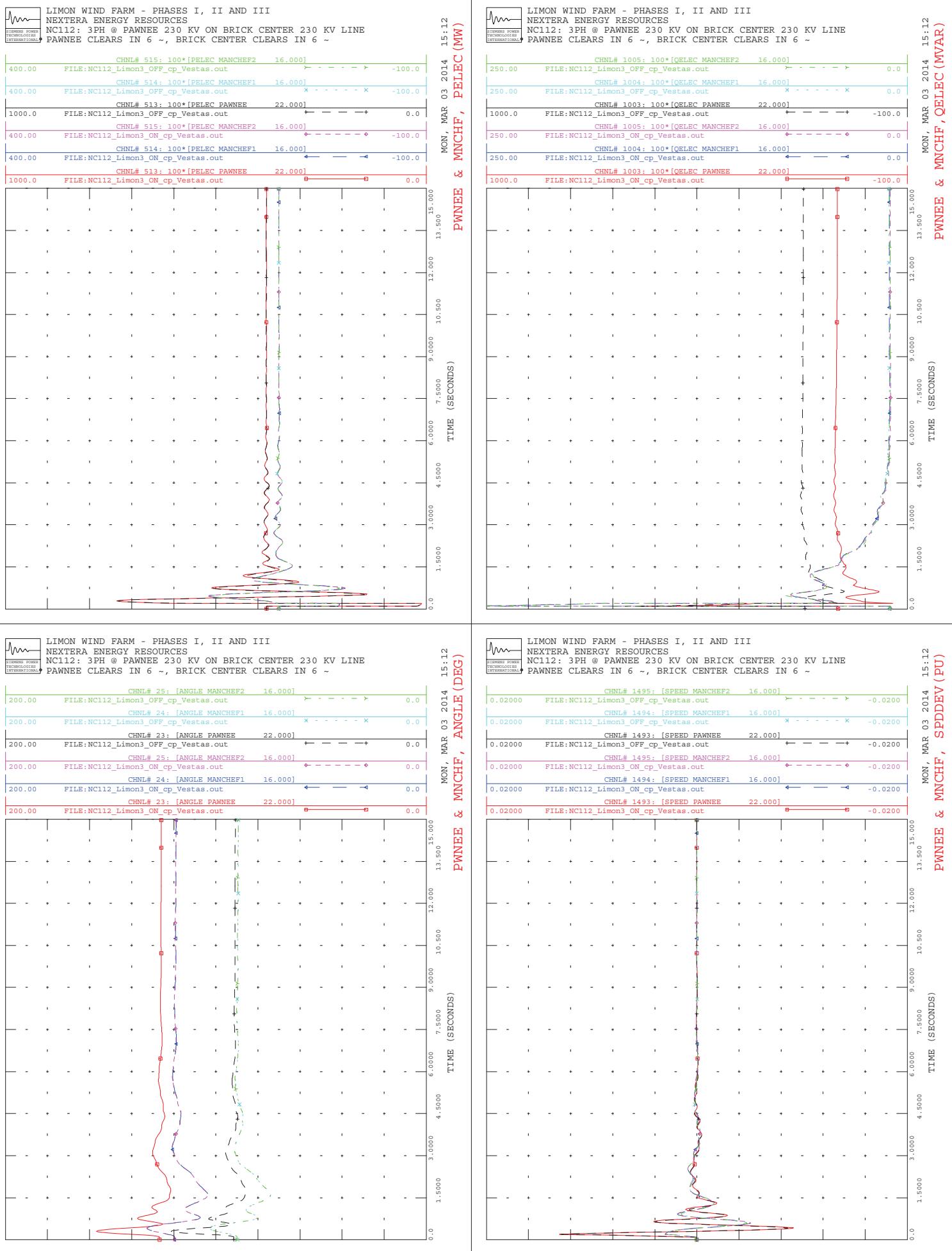
NEXTERA ENERGY RESOURCES

NC112: 3PH @ PAWNEE 230 KV ON BRICK CENTER 230 KV LINE

PAWNEE CLEARS IN 6 ~, BRICK CENTER CLEARS IN 6 ~

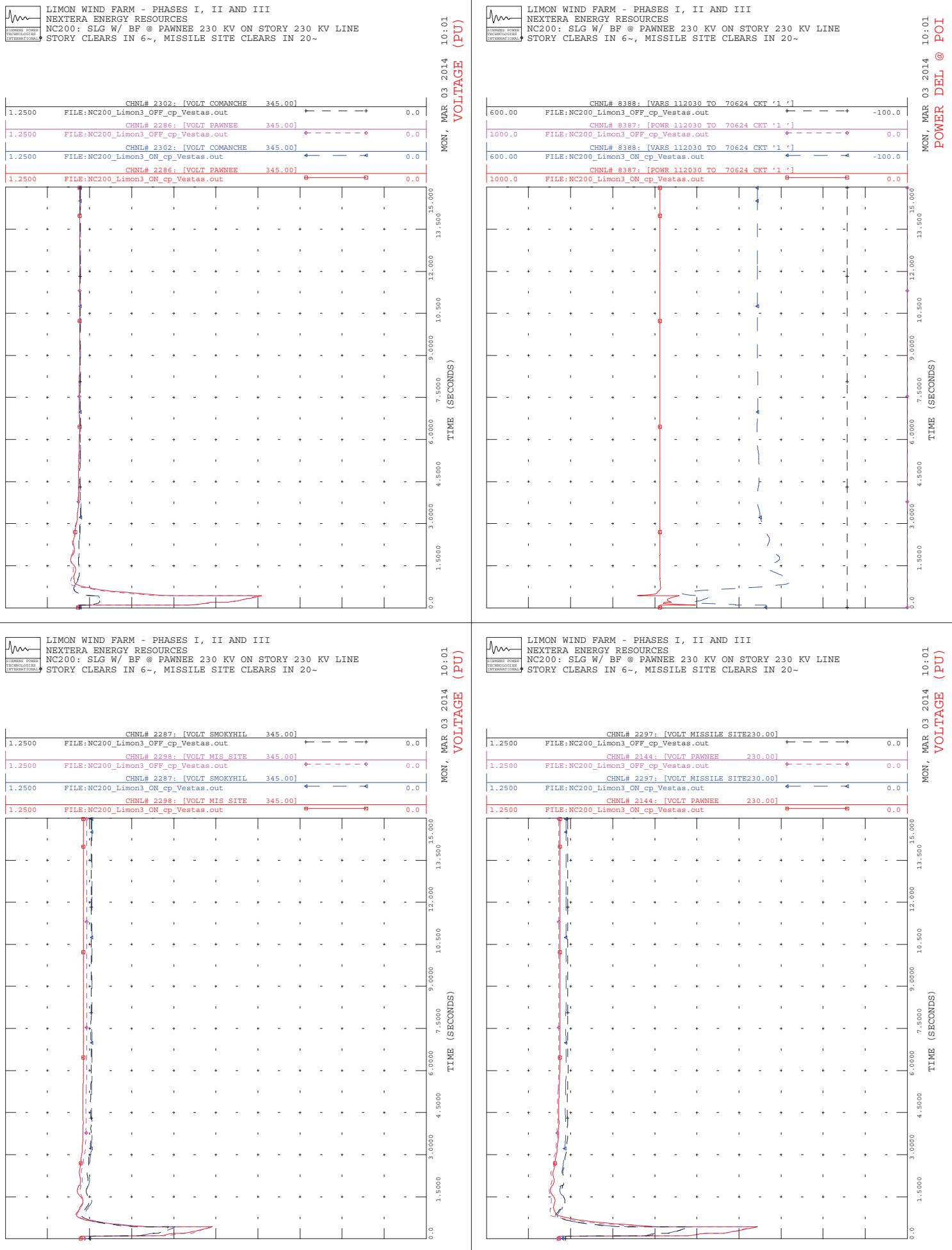


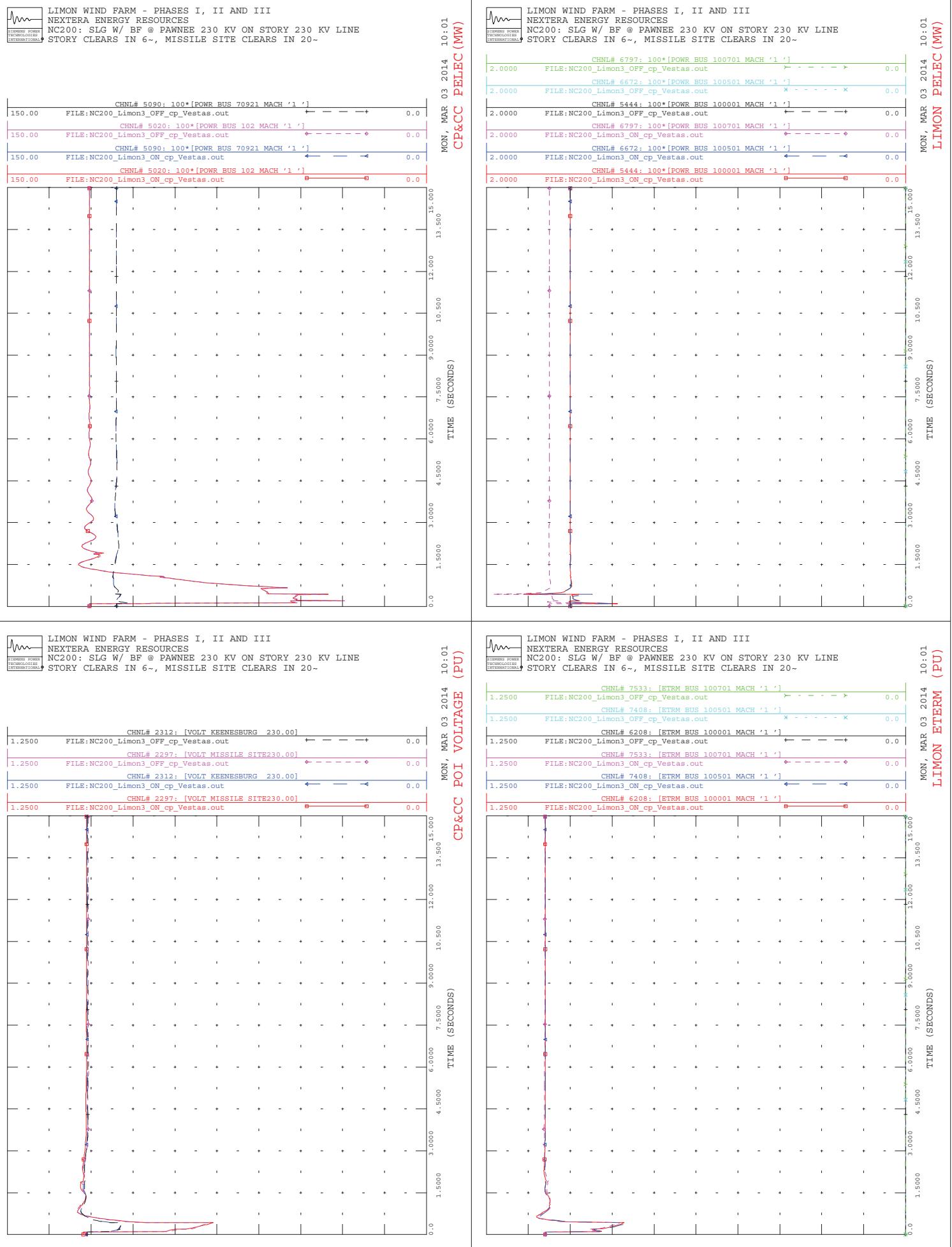


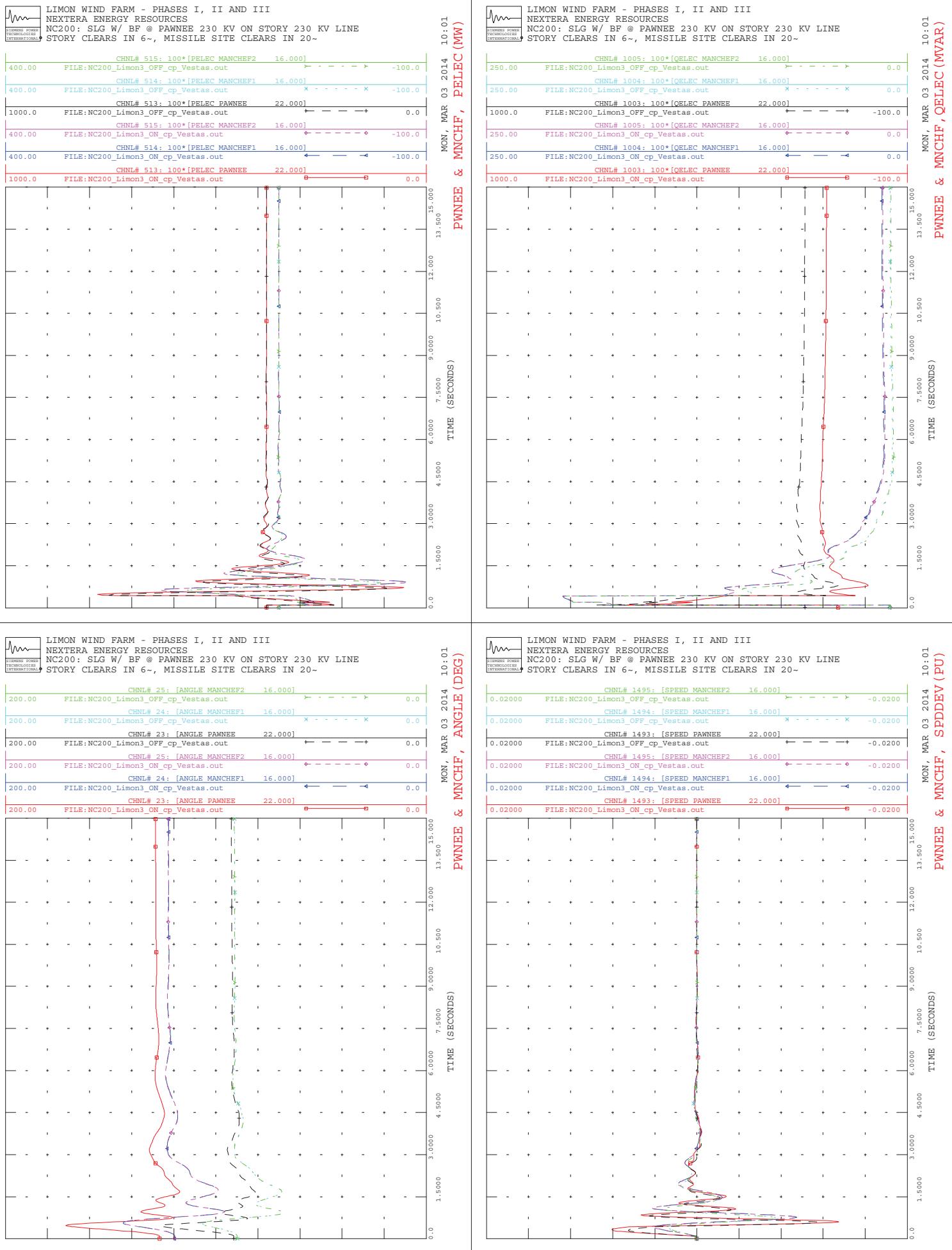




- Contingency NC 200







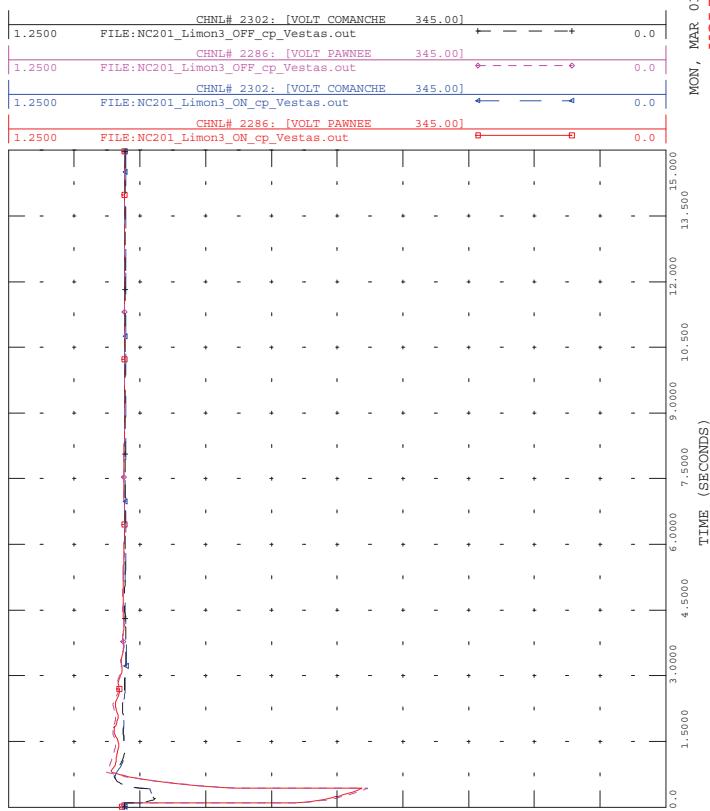


- Contingency NC 201



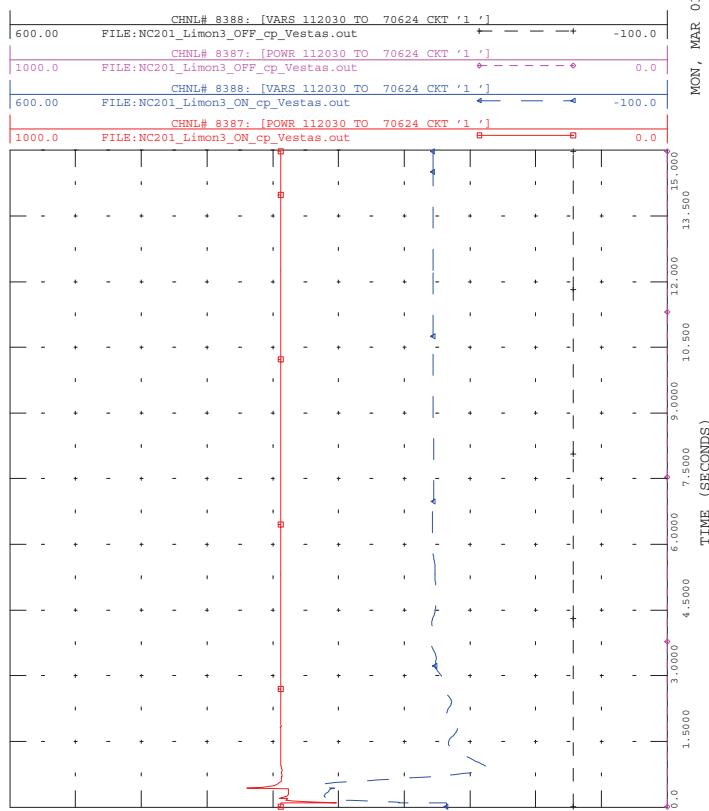
LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

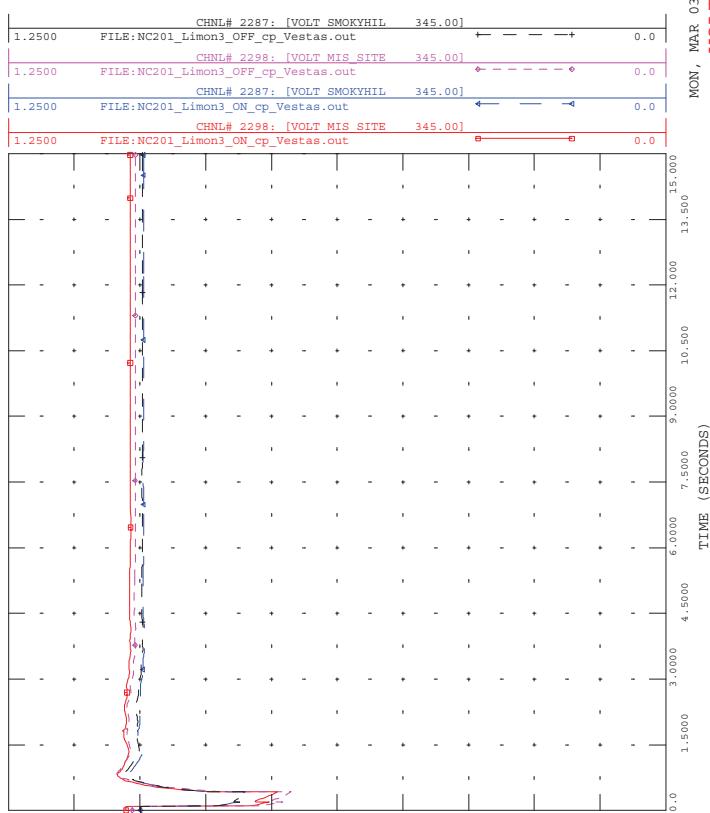
LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

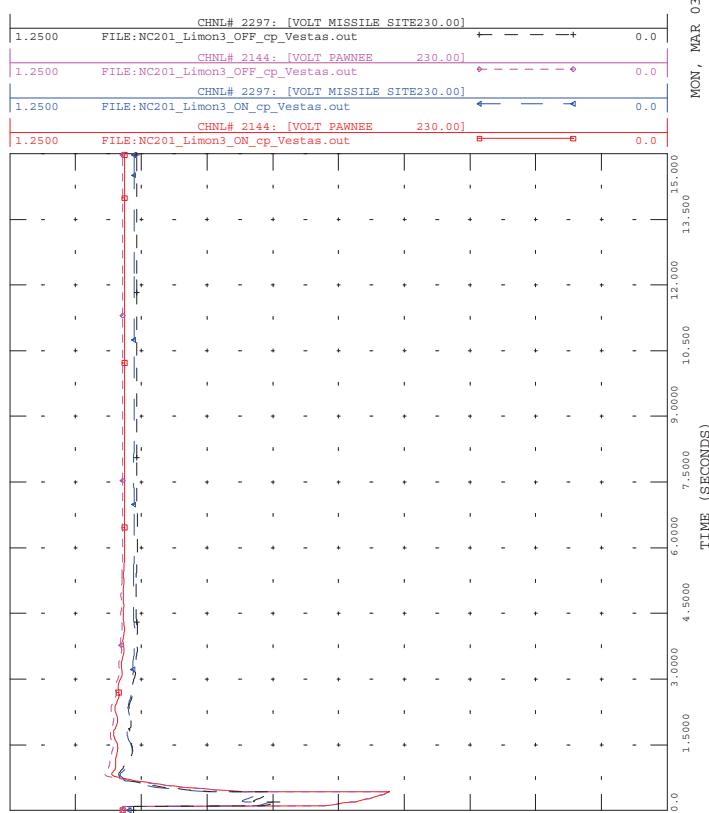
LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

LIMON WIND FARM - PHASES I, II AND III

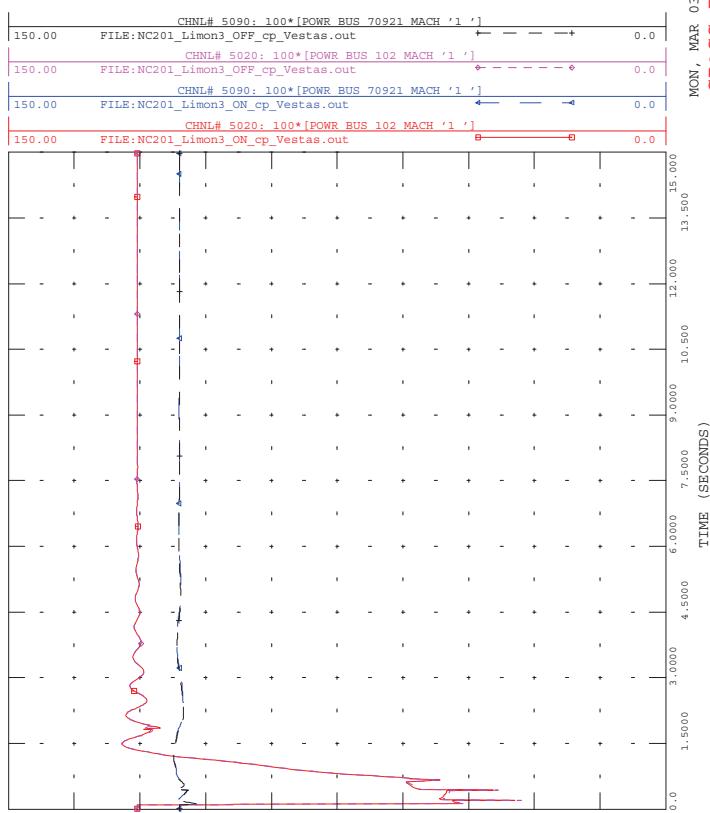
NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~



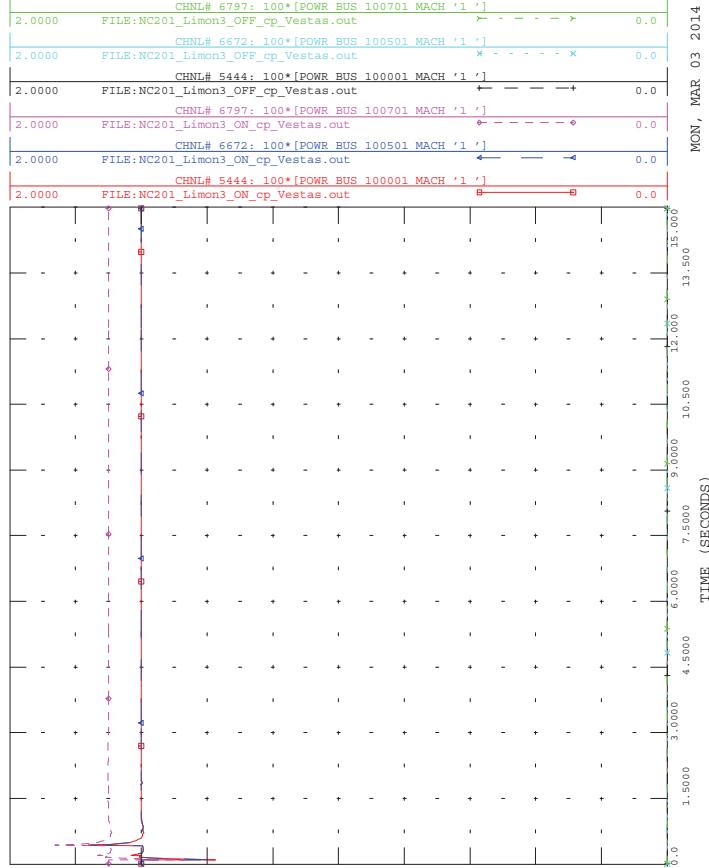
LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

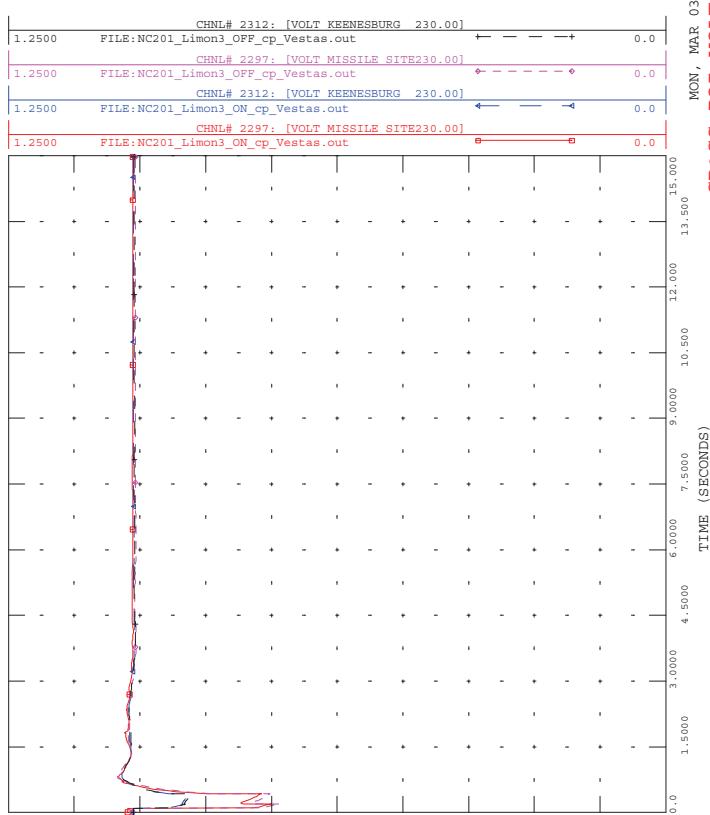
LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

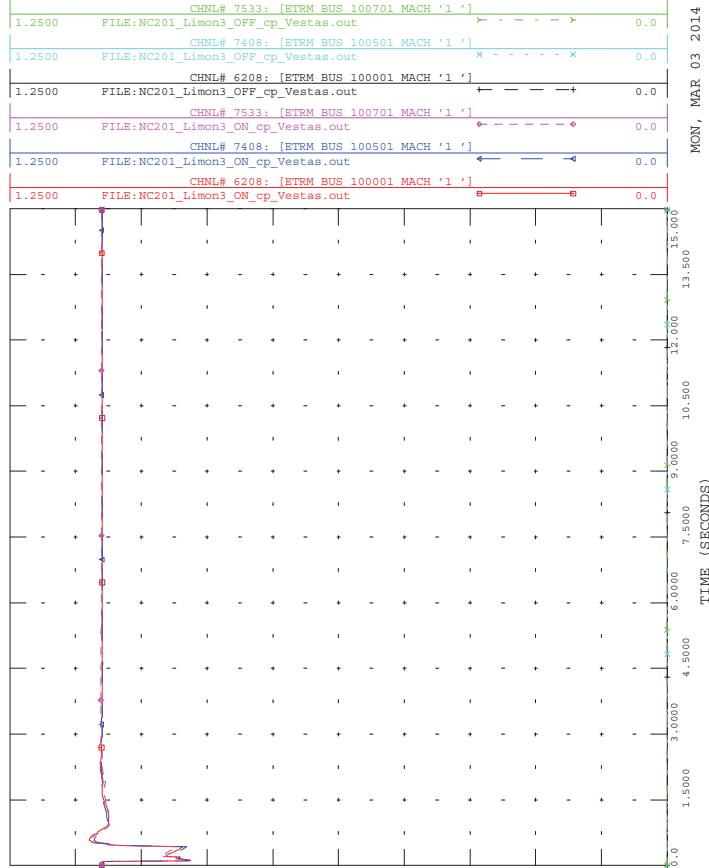
LIMON WIND FARM - PHASES I, II AND III

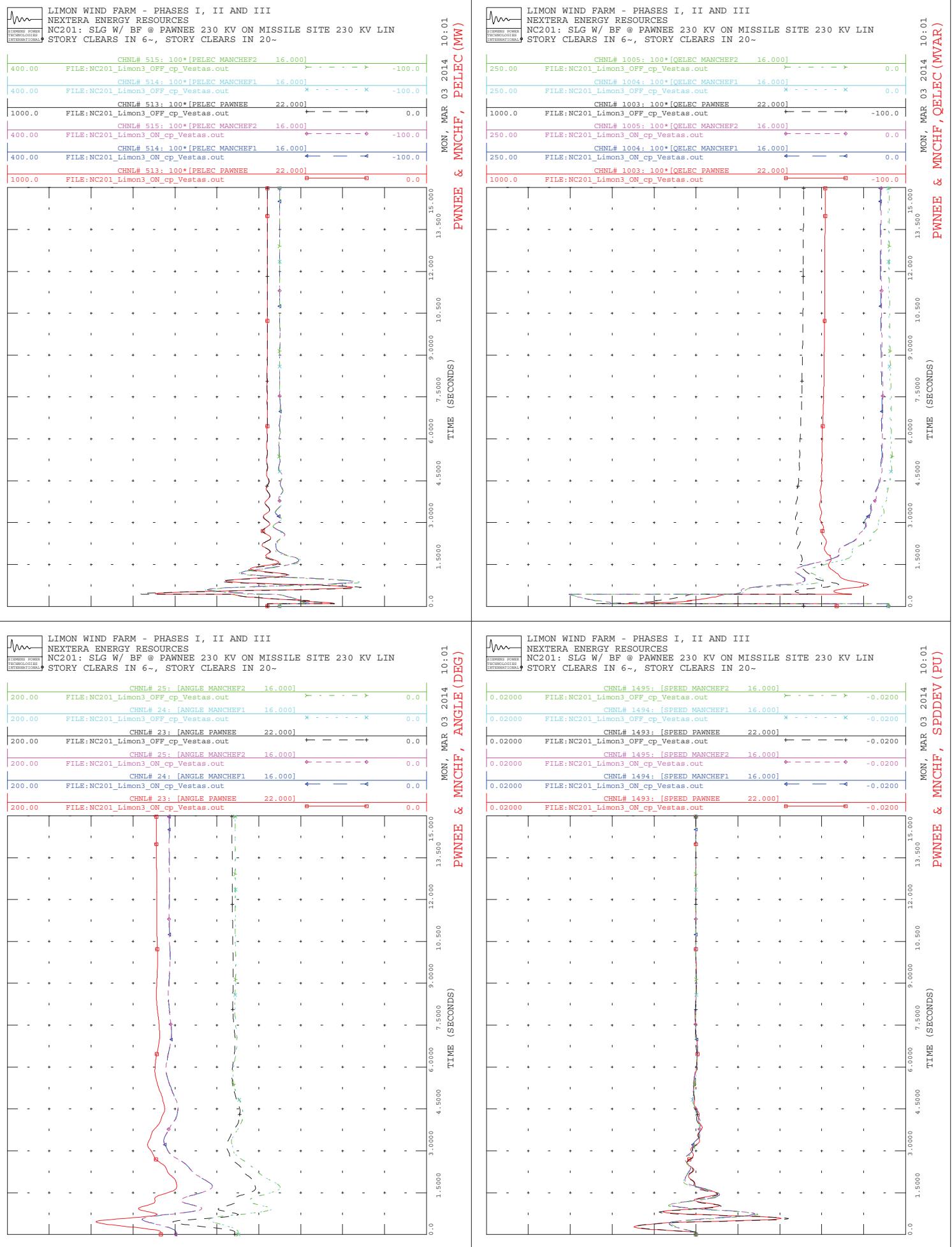
NEXTERA ENERGY RESOURCES

NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

LIMON WIND FARM - PHASES I, II AND III

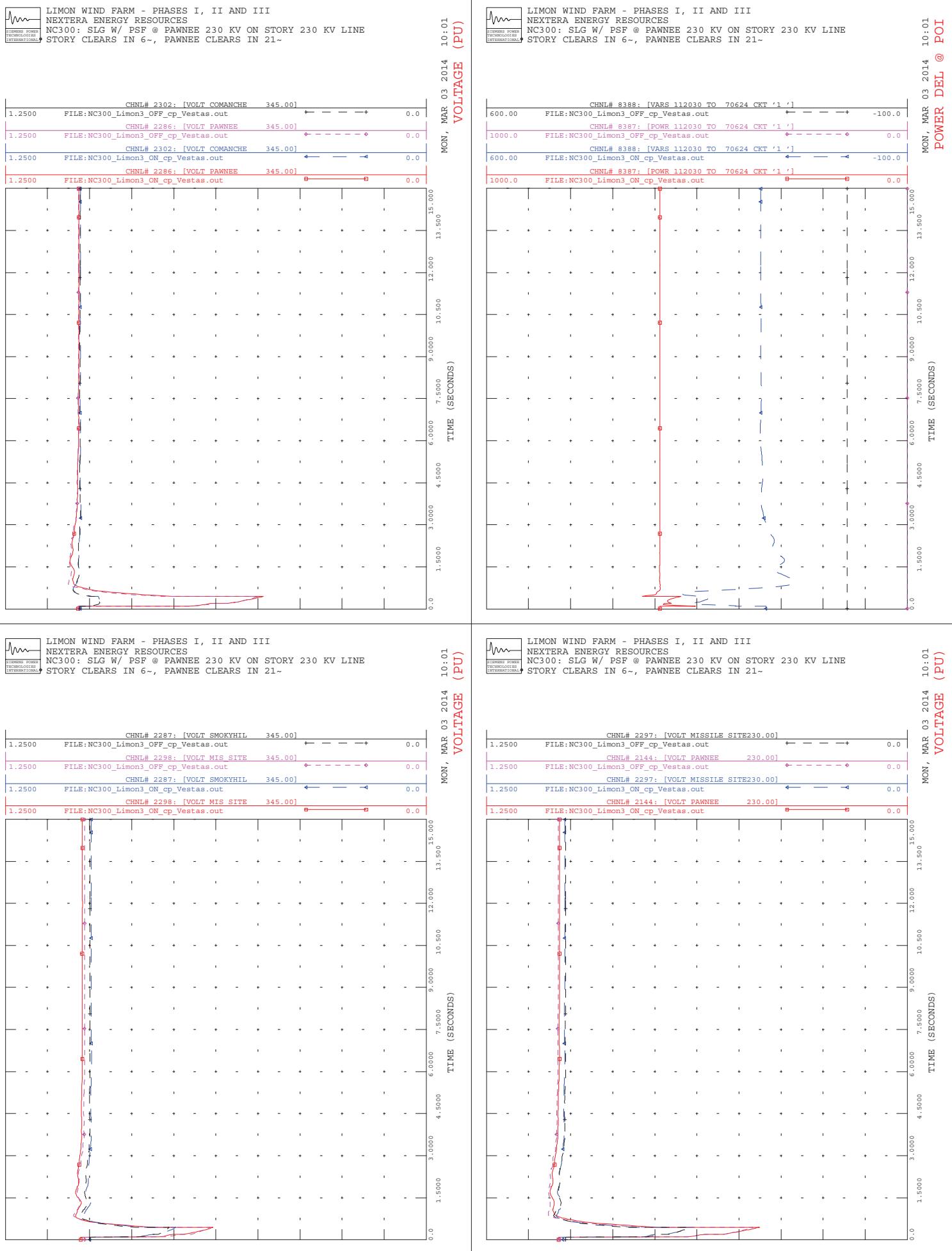
NEXTERA ENERGY RESOURCES

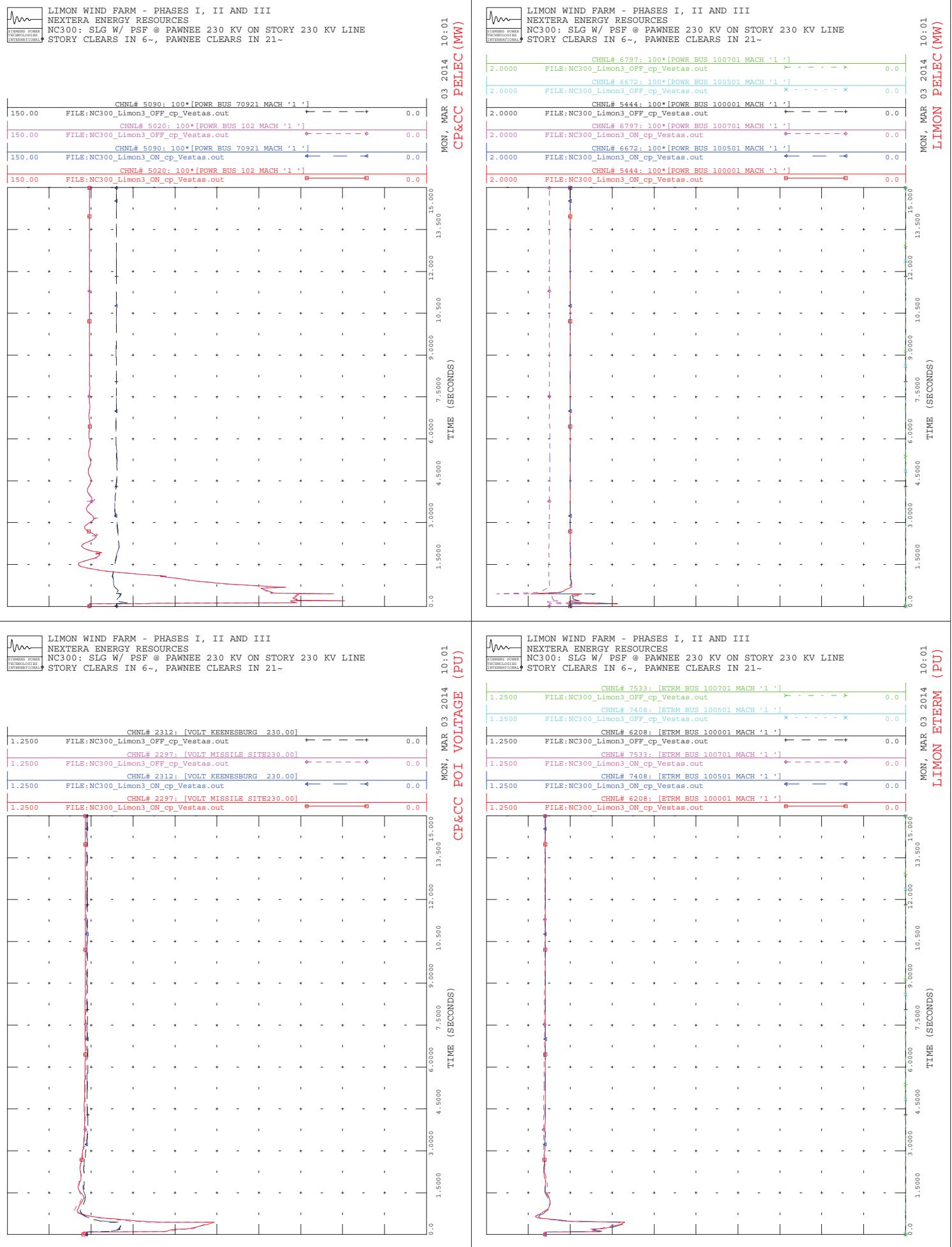
NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
STORY CLEARS IN 6~, STORY CLEARS IN 20~

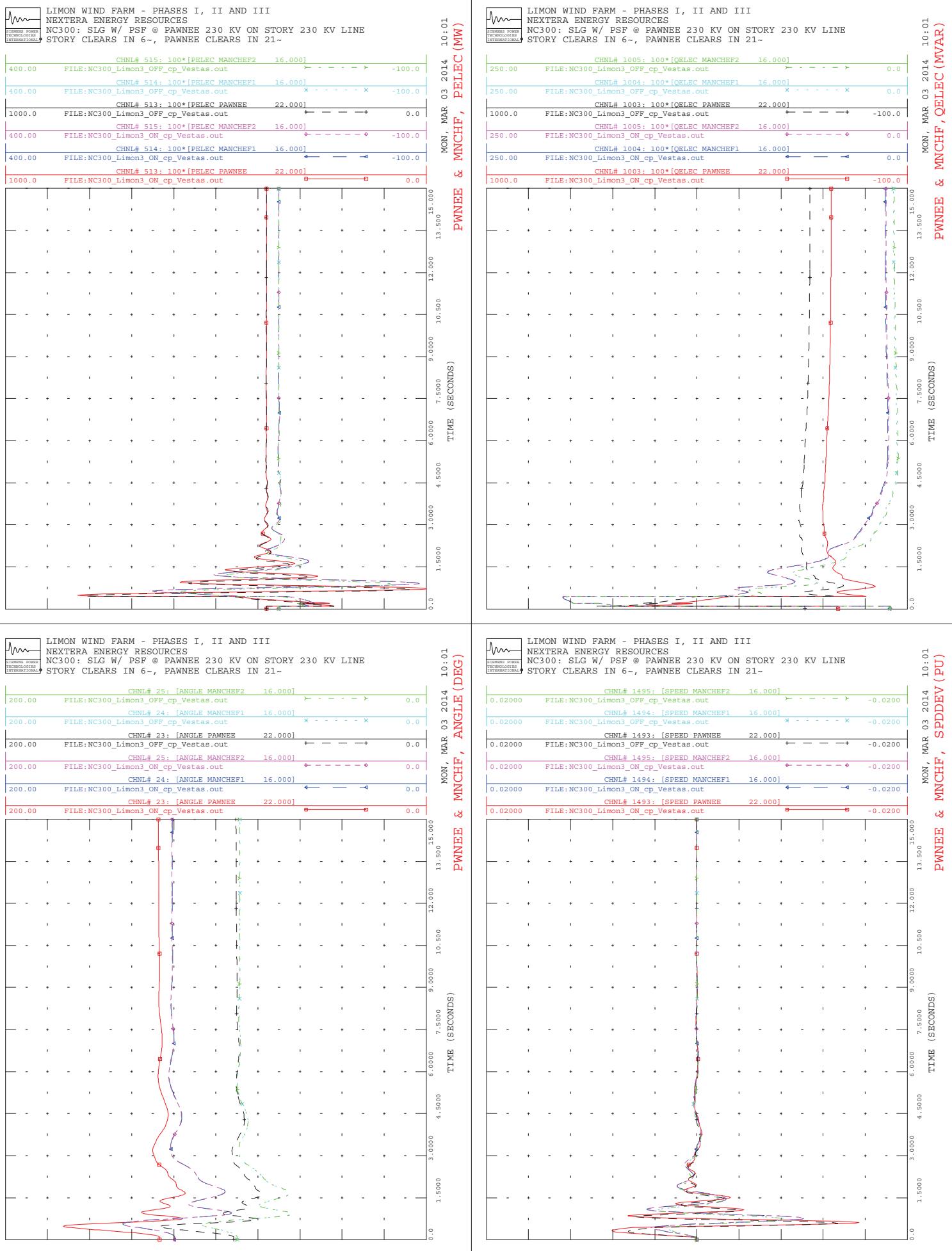




- Contingency NC 300

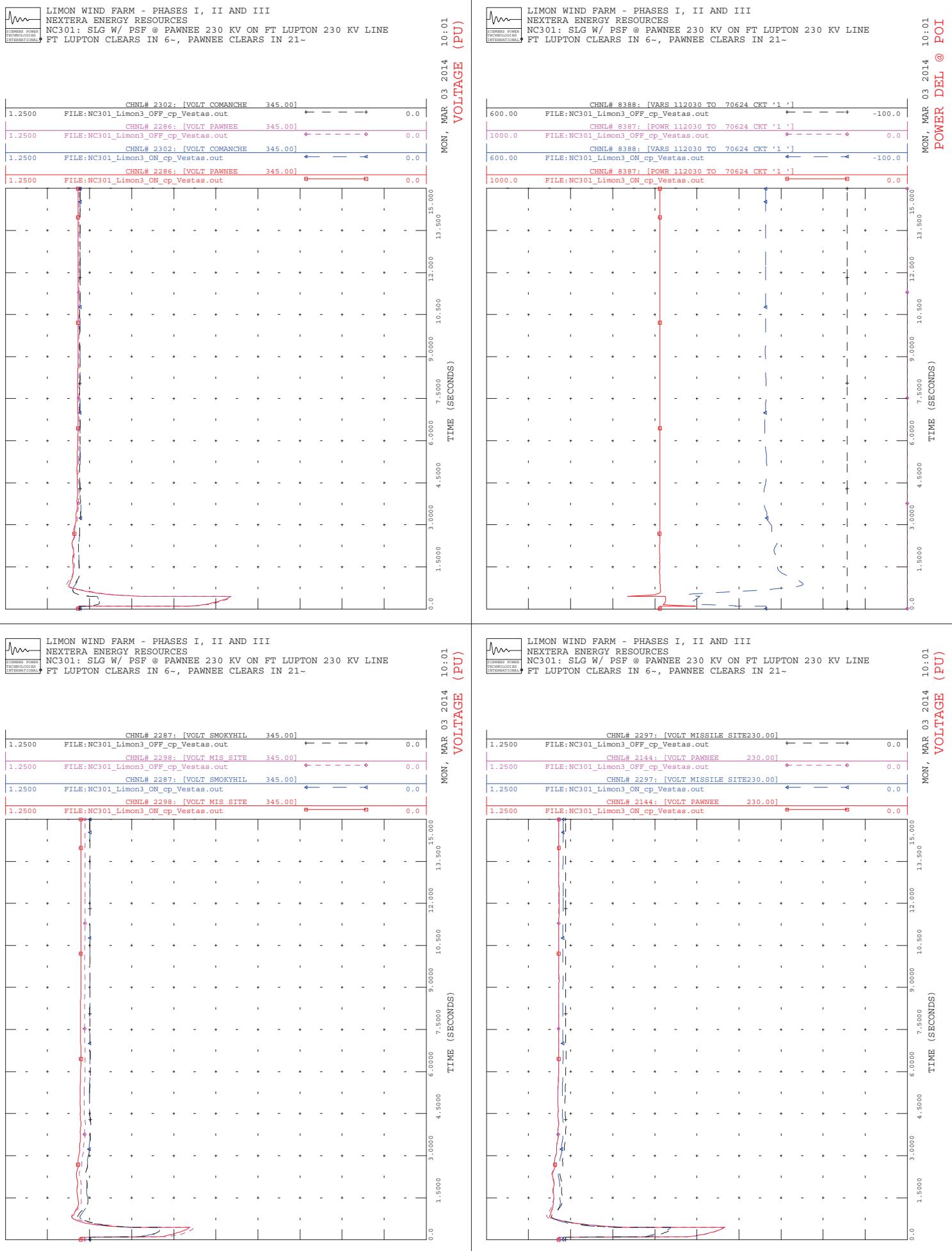


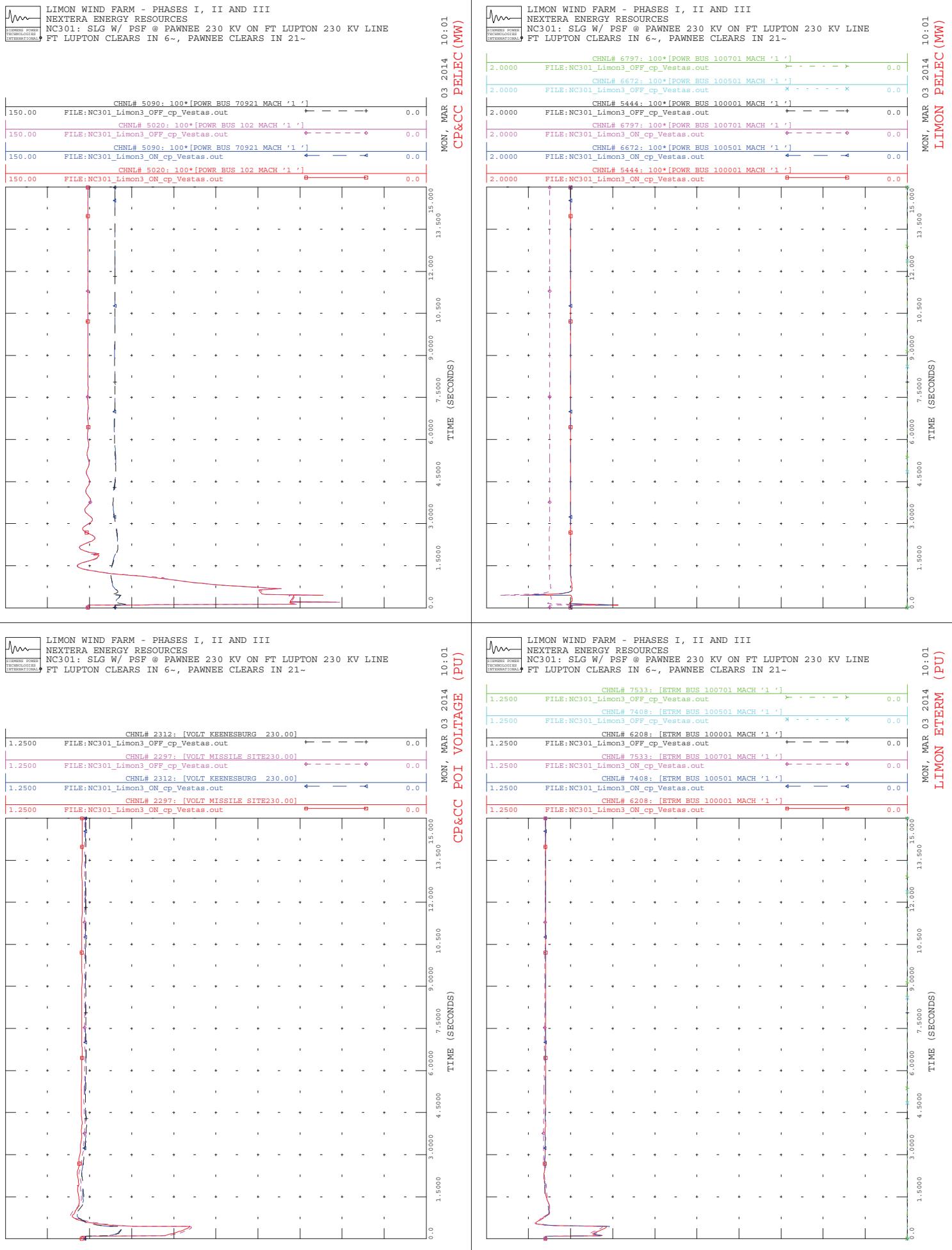


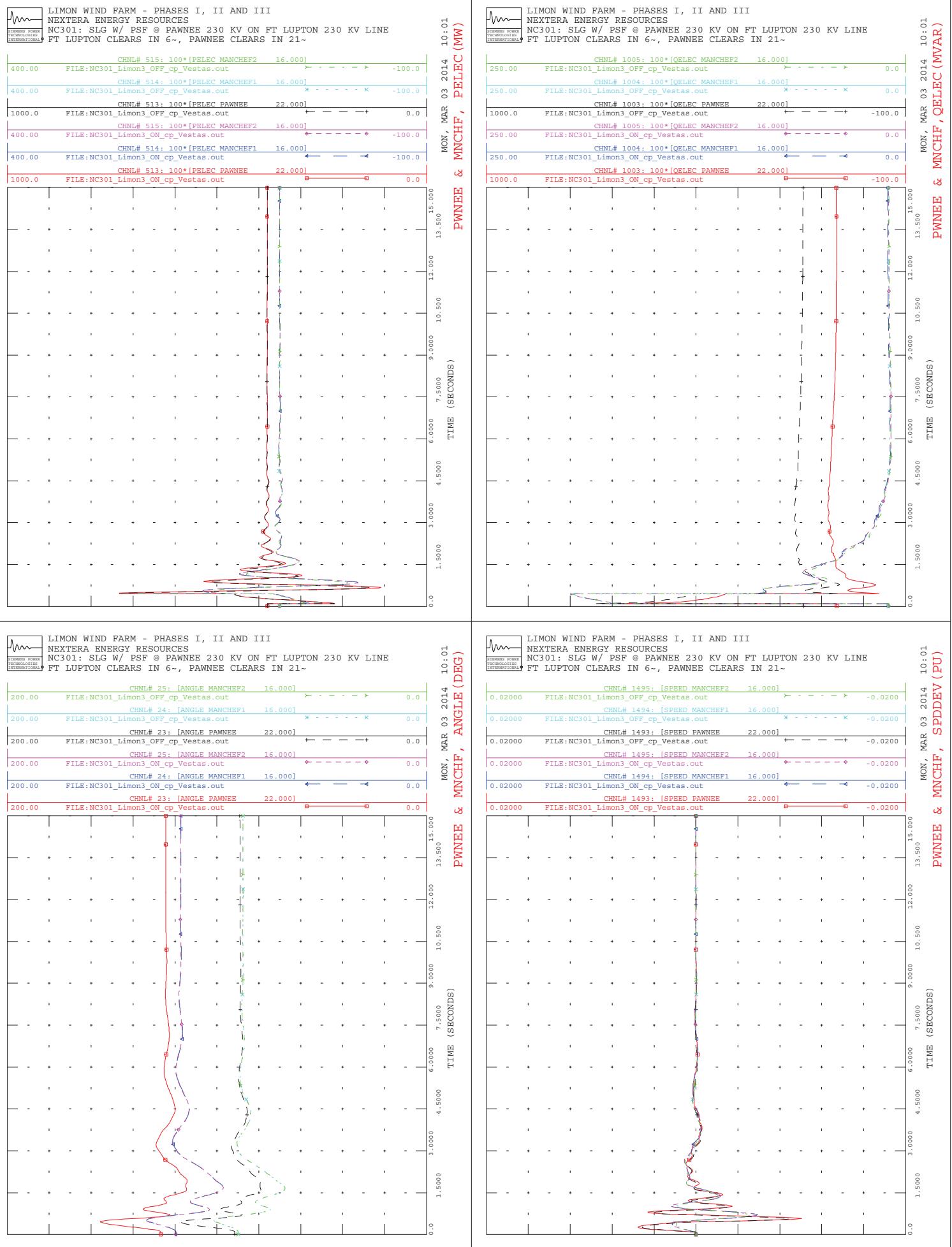




- Contingency NC 301

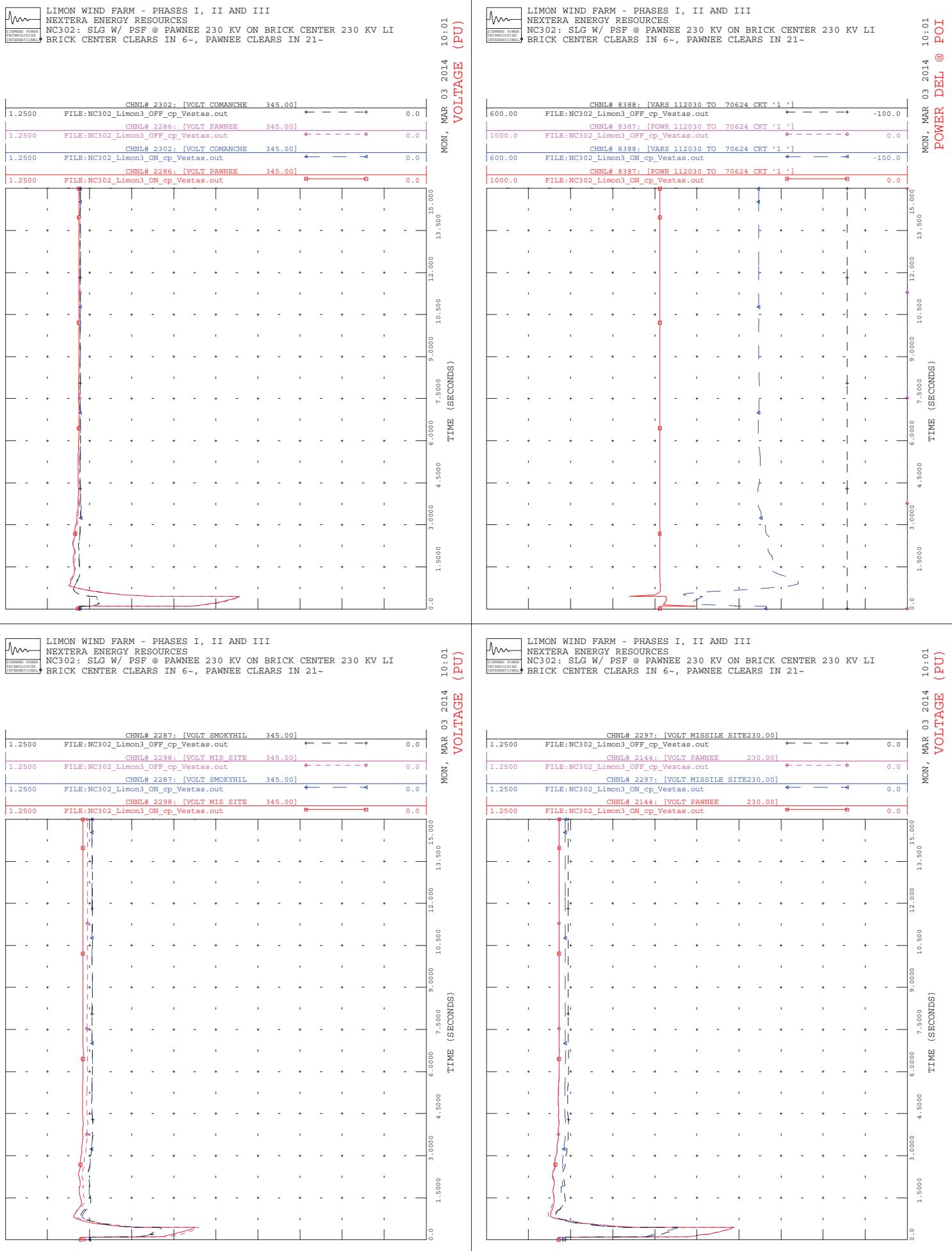


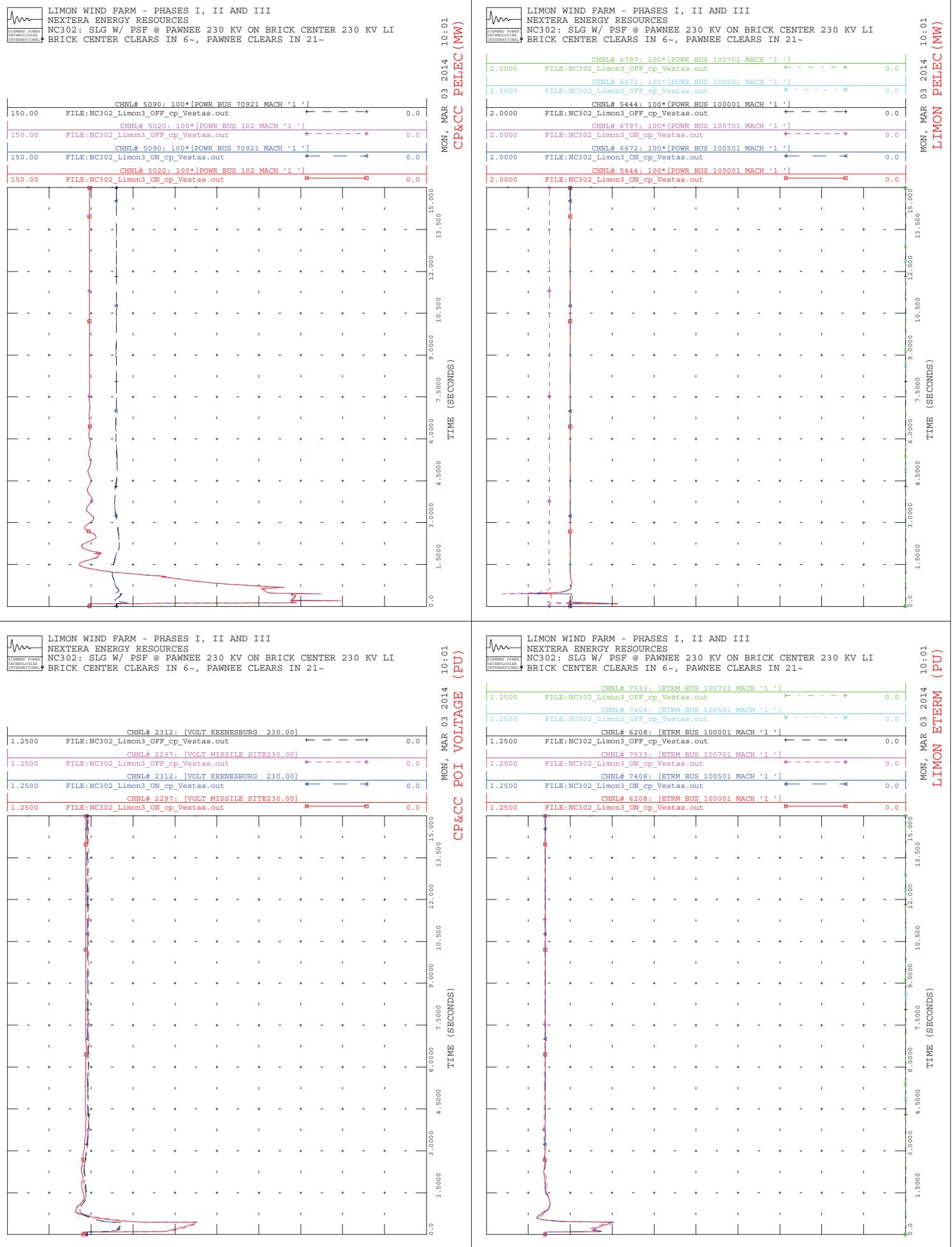






- Contingency NC 302





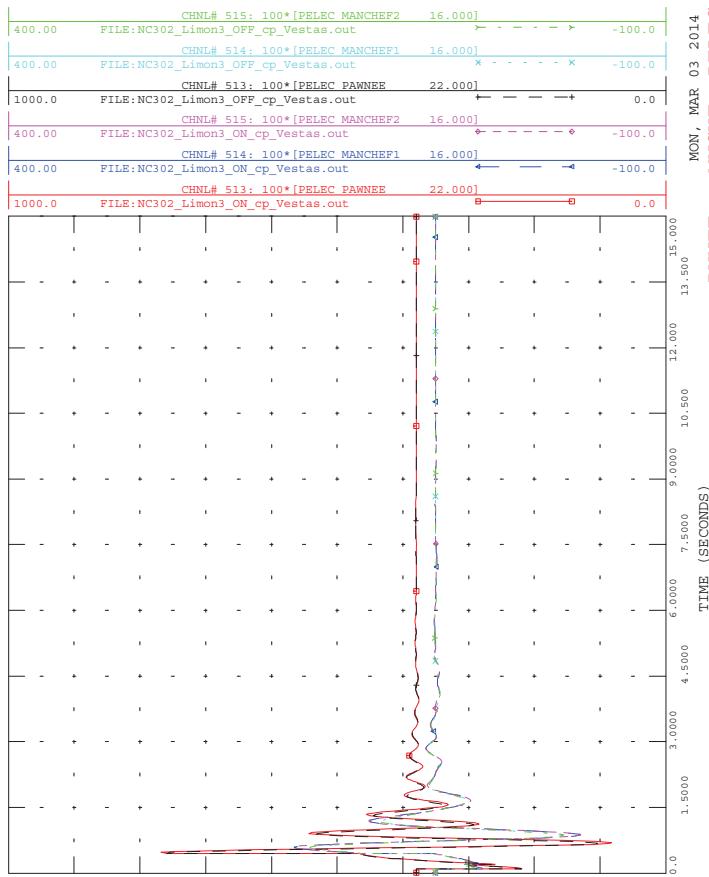


LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC302: SLG W/ PSF @ PAWNEE 230 KV ON BRICK CENTER 230 KV LI

BRICK CENTER CLEARS IN 6~, PAWNEE CLEARS IN 21~

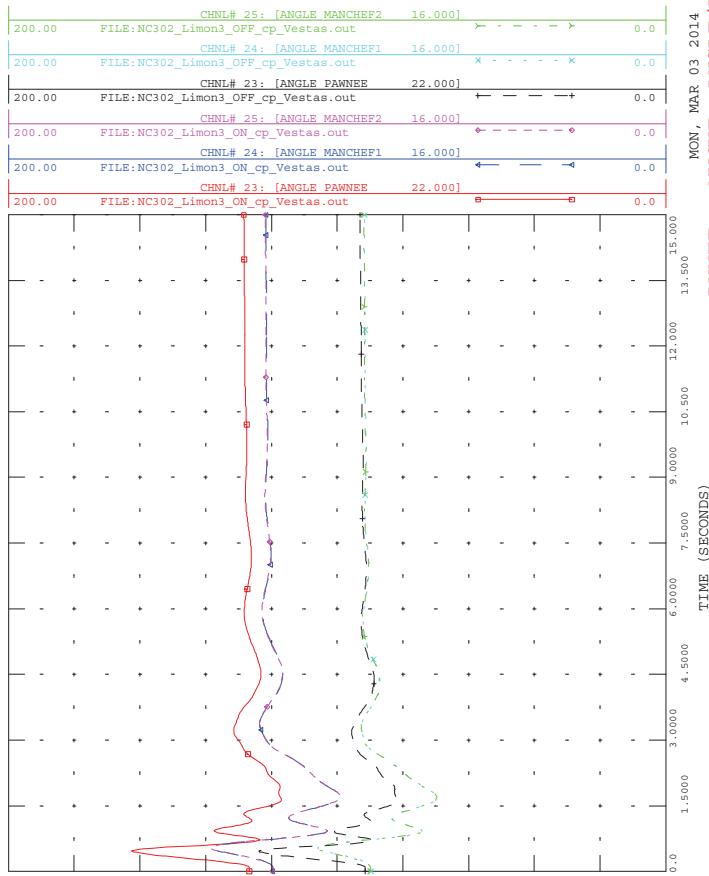


LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC302: SLG W/ PSF @ PAWNEE 230 KV ON BRICK CENTER 230 KV LI

BRICK CENTER CLEARS IN 6~, PAWNEE CLEARS IN 21~

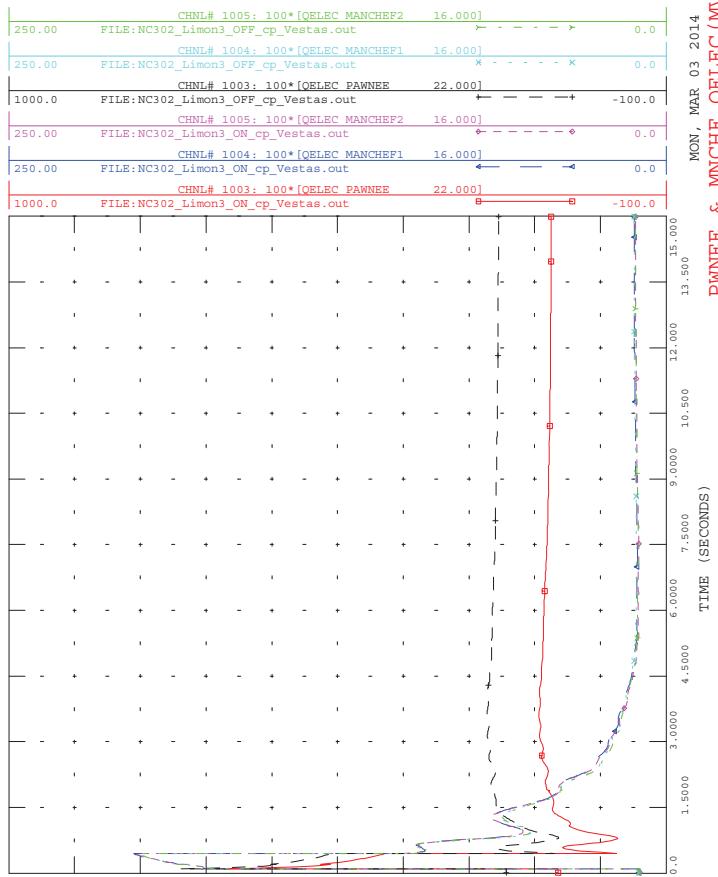


LIMON WIND FARM - PHASES I, II AND III

NEXTERA ENERGY RESOURCES

NC302: SLG W/ PSF @ PAWNEE 230 KV ON BRICK CENTER 230 KV LI

BRICK CENTER CLEARS IN 6~, PAWNEE CLEARS IN 21~

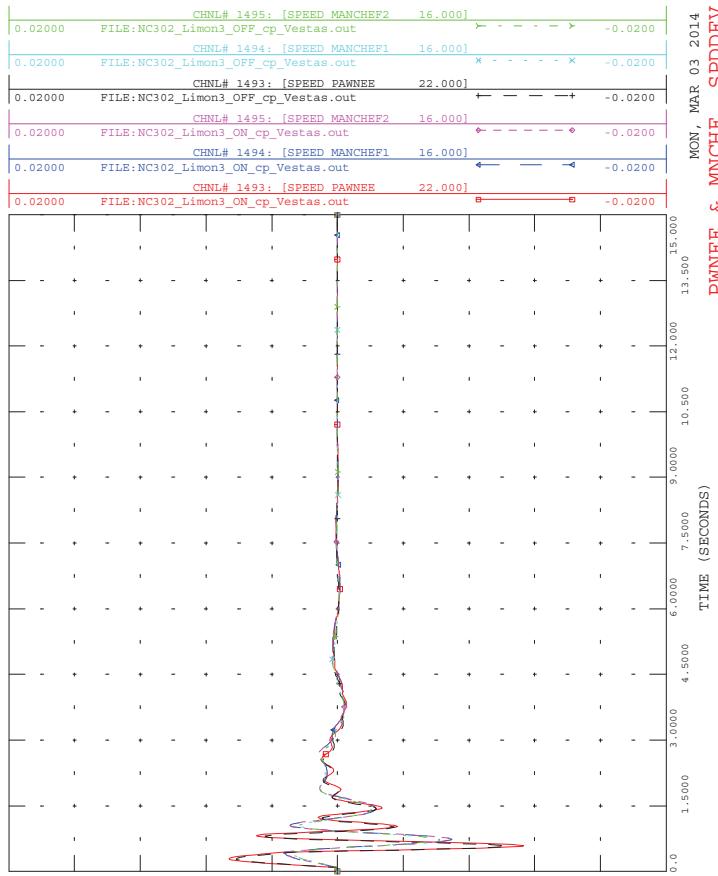


LIMON WIND FARM - PHASES I, II AND III

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NC302: SLG W/ PSF @ PAWNEE 230 KV ON BRICK CENTER 230 KV LI

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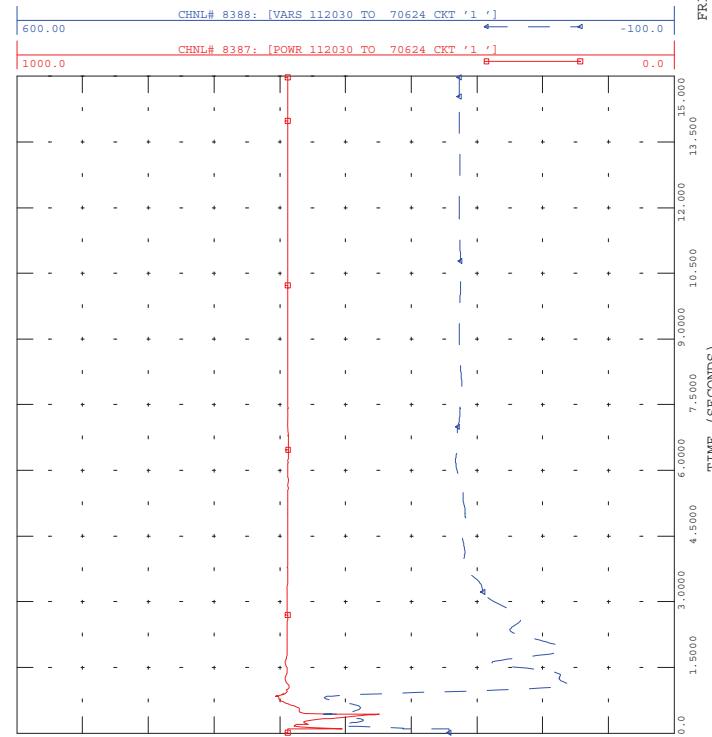
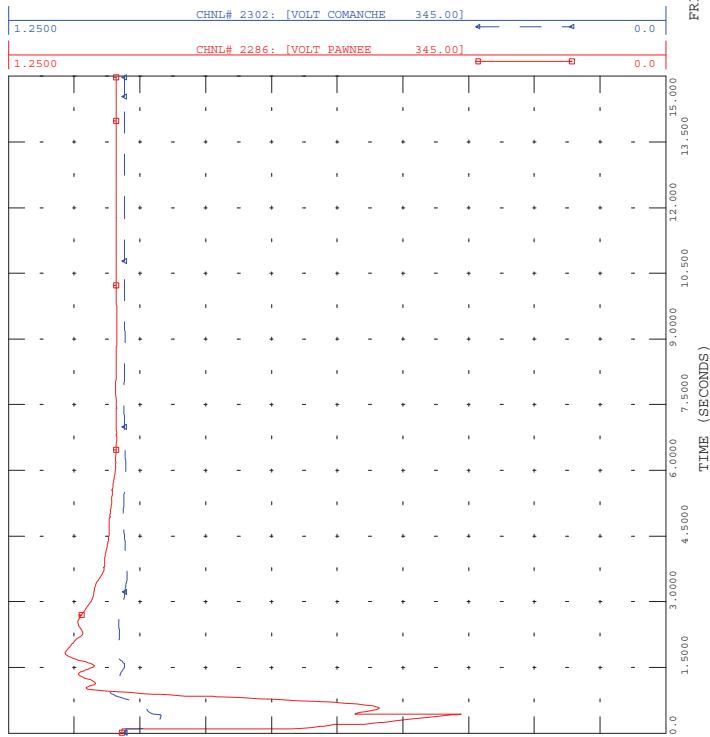
- Contingency NC 200-Restudy



LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC200: SLG W/ BF @ PAWNEE 230 KV ON STORY 230 KV LINE
STORY CLEARS IN 6~, MISSILE SITE CLEARS IN 20~
FILE: NC200_Limon3_ON_cp_Vestas_NEW.out

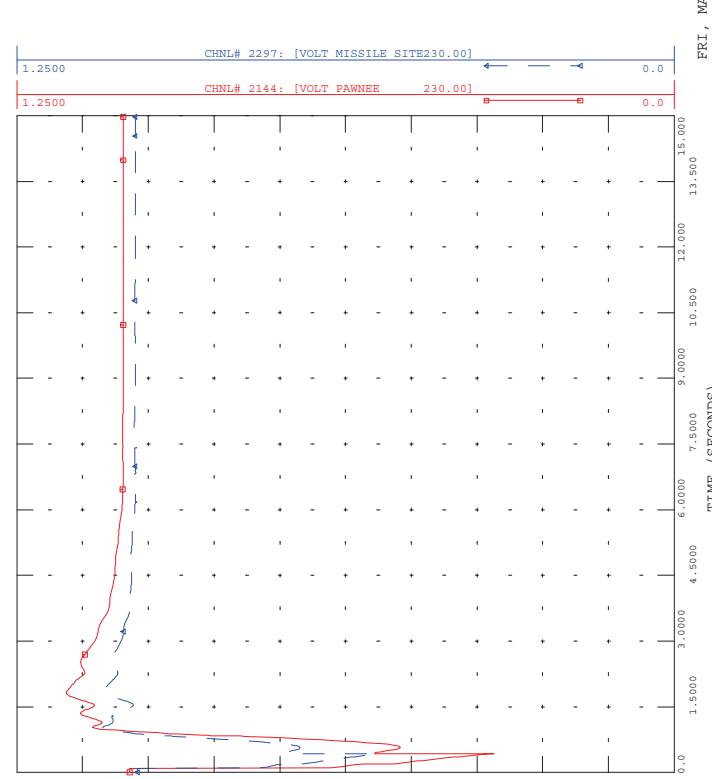
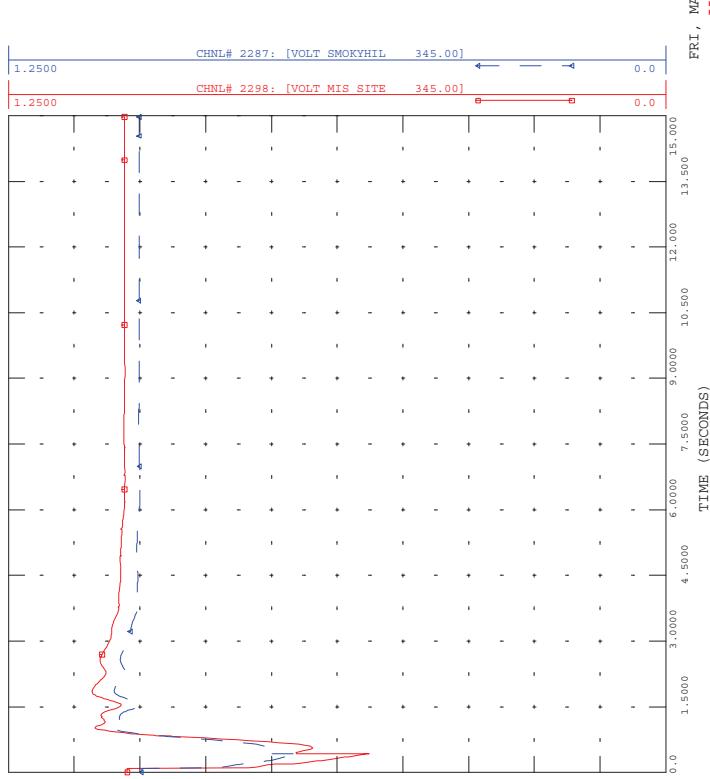


LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC200: SLG W/ BF @ PAWNEE 230 KV ON STORY 230 KV LINE
STORY CLEARS IN 6~, MISSILE SITE CLEARS IN 20~
FILE: NC200_Limon3_ON_cp_Vestas_NEW.out



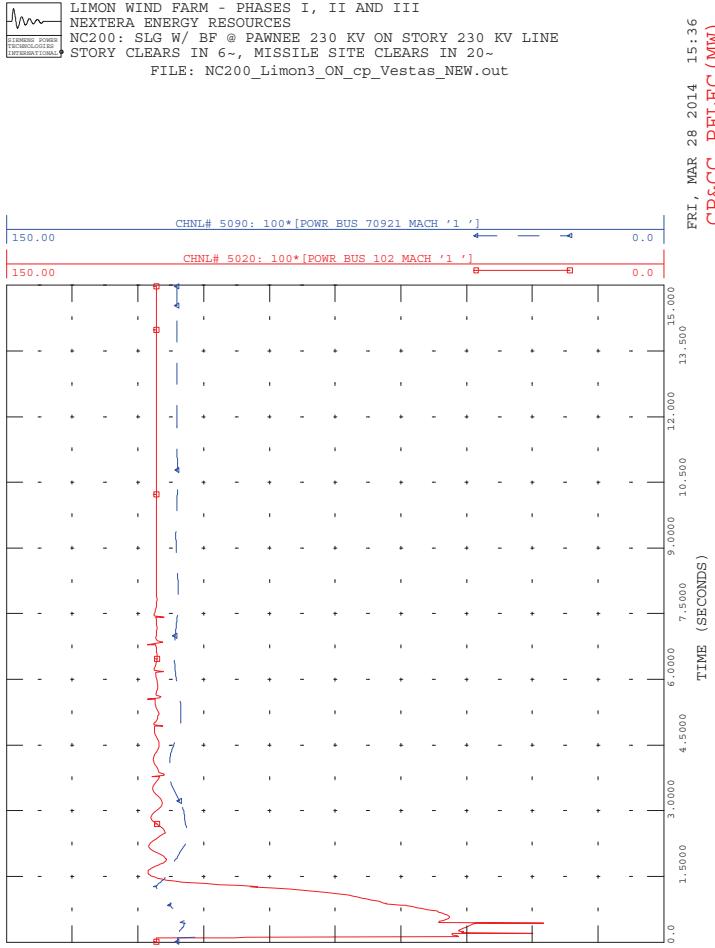
LIMON WIND FARM - PHASES I, II AND III
NEXTERA ENERGY RESOURCES
NC200: SLG W/ BF @ PAWNEE 230 KV ON STORY 230 KV LINE
STORY CLEARS IN 6~, MISSILE SITE CLEARS IN 20~
FILE: NC200_Limon3_ON_cp_Vestas_NEW.out

LIMON WIND FARM - PHASES I, II AND III
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FILE: NC200_Limon3_ON_cp_Vestas_NEW.out

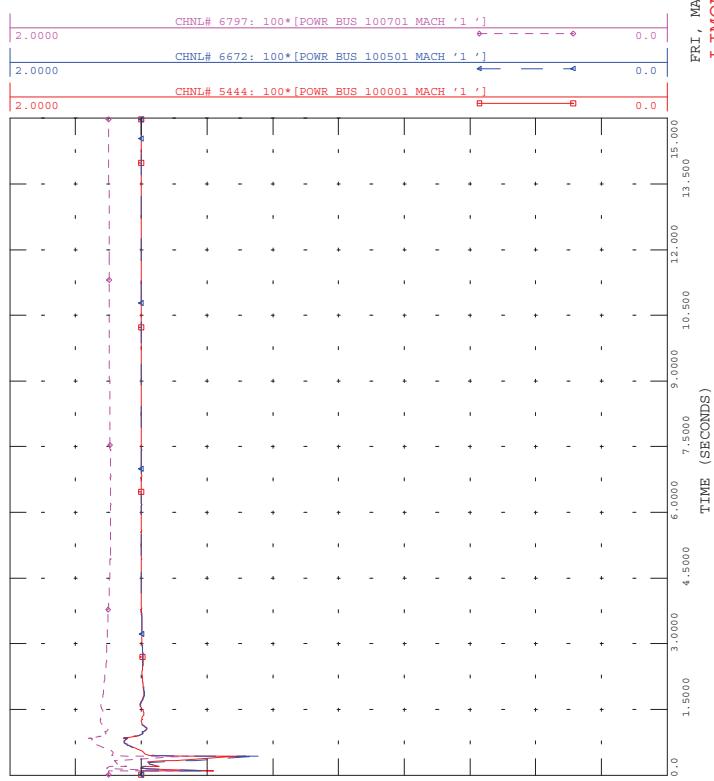




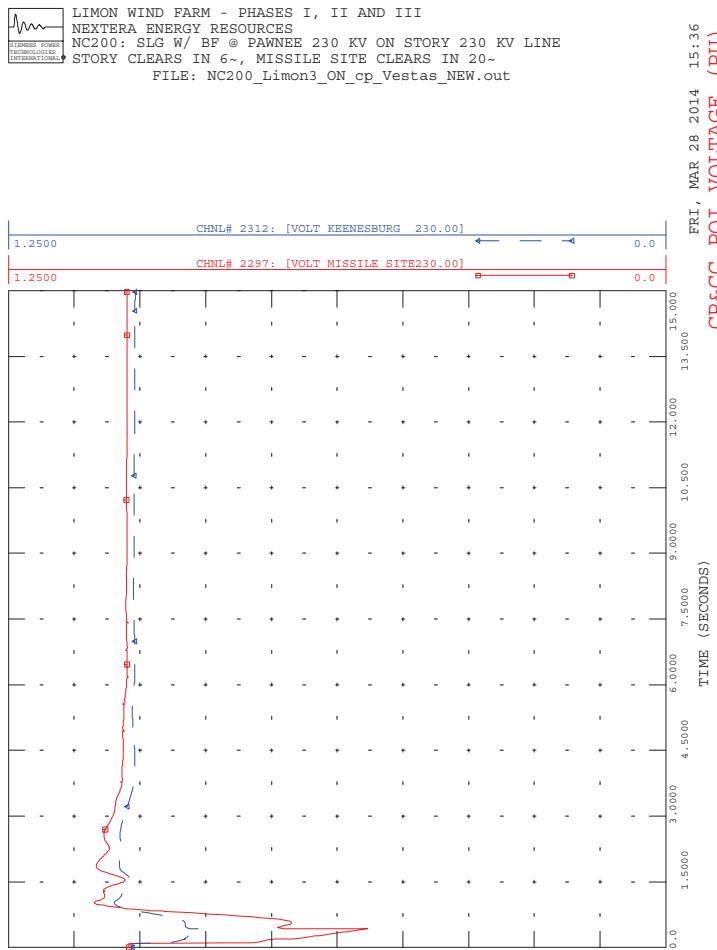
LIMON WIND FARM - PHASES I, II AND III
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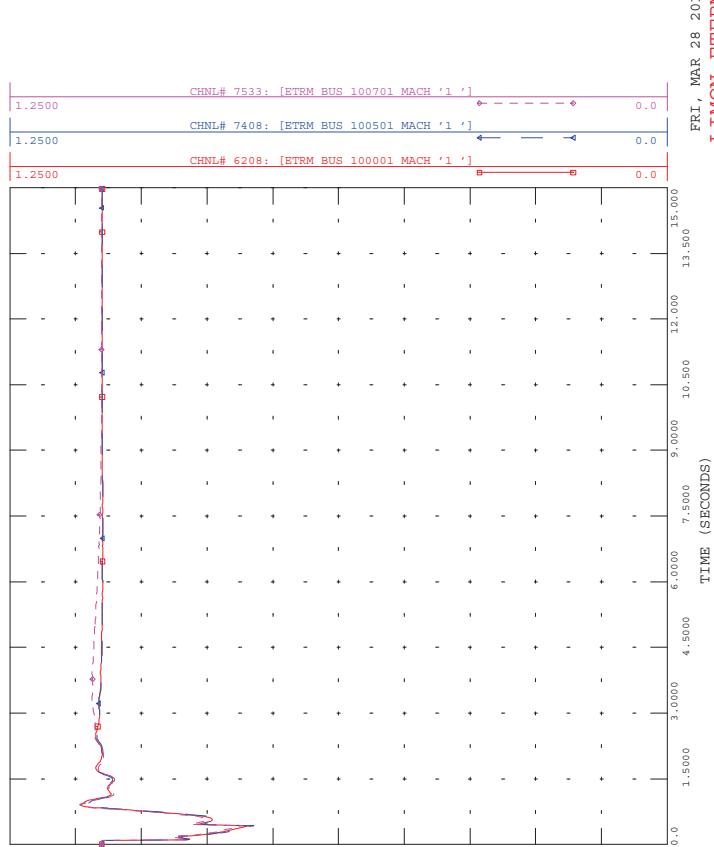
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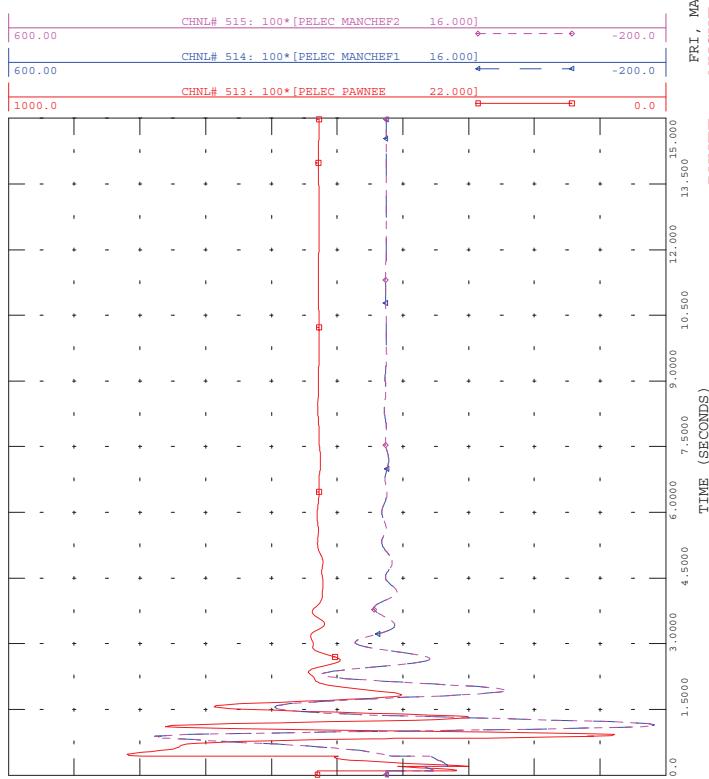


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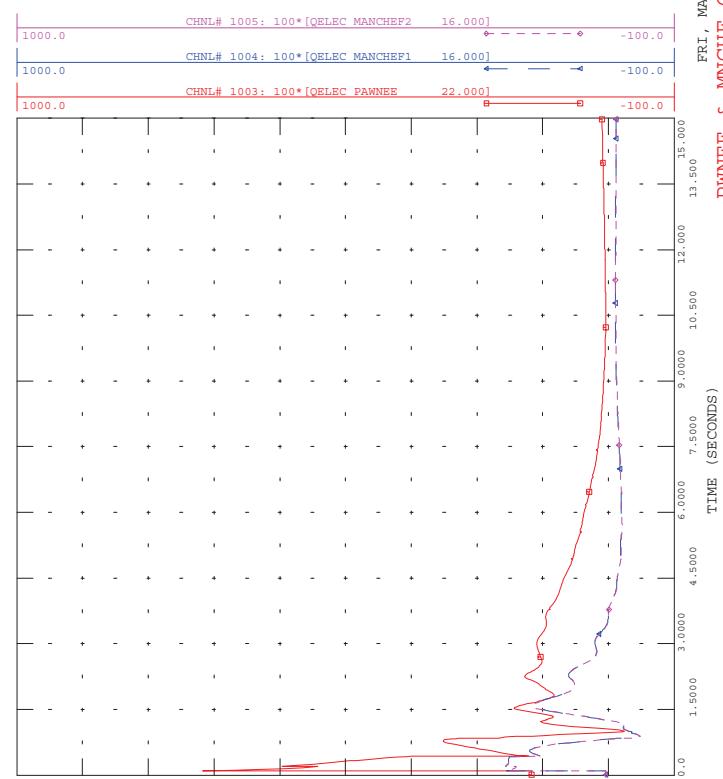




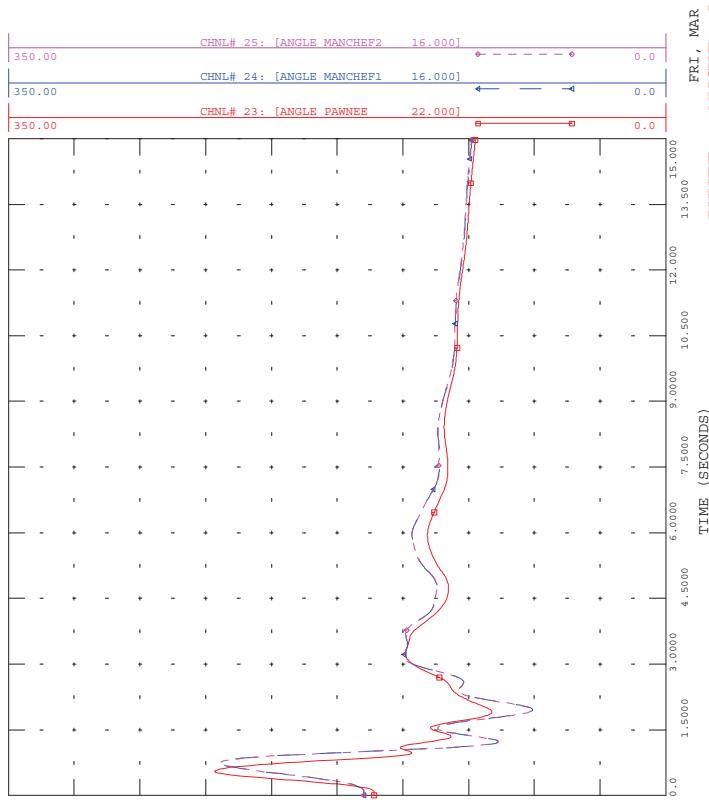
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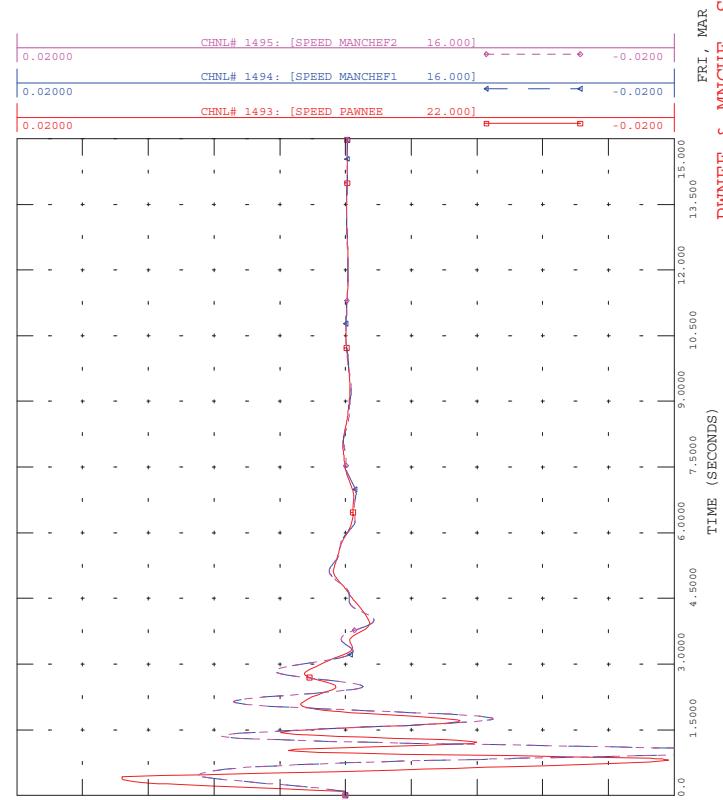
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LIMON WIND FARM - PHASES I, II AND III
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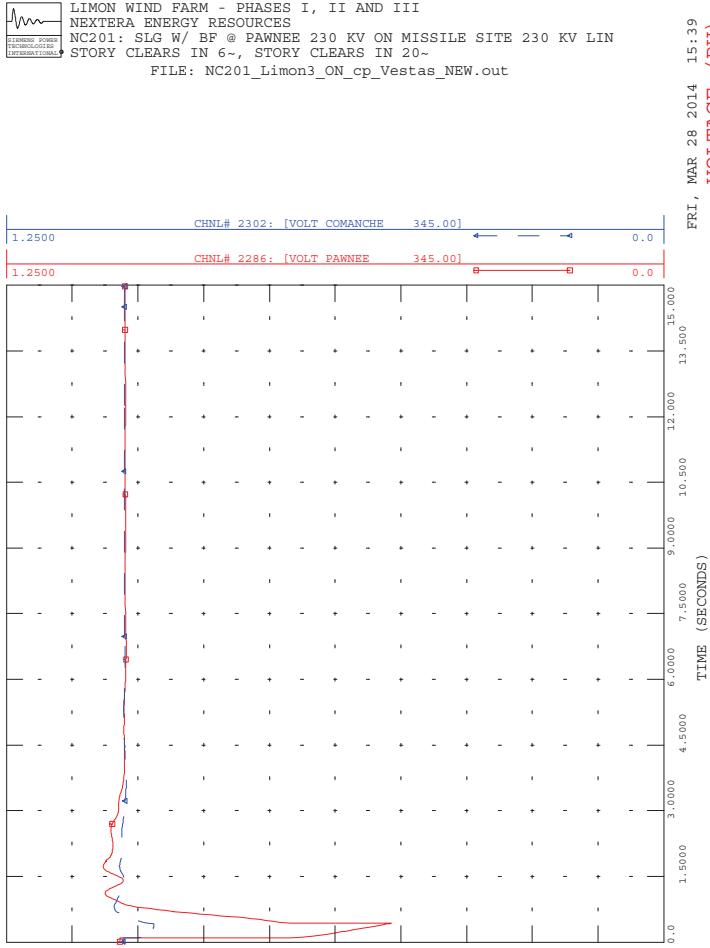




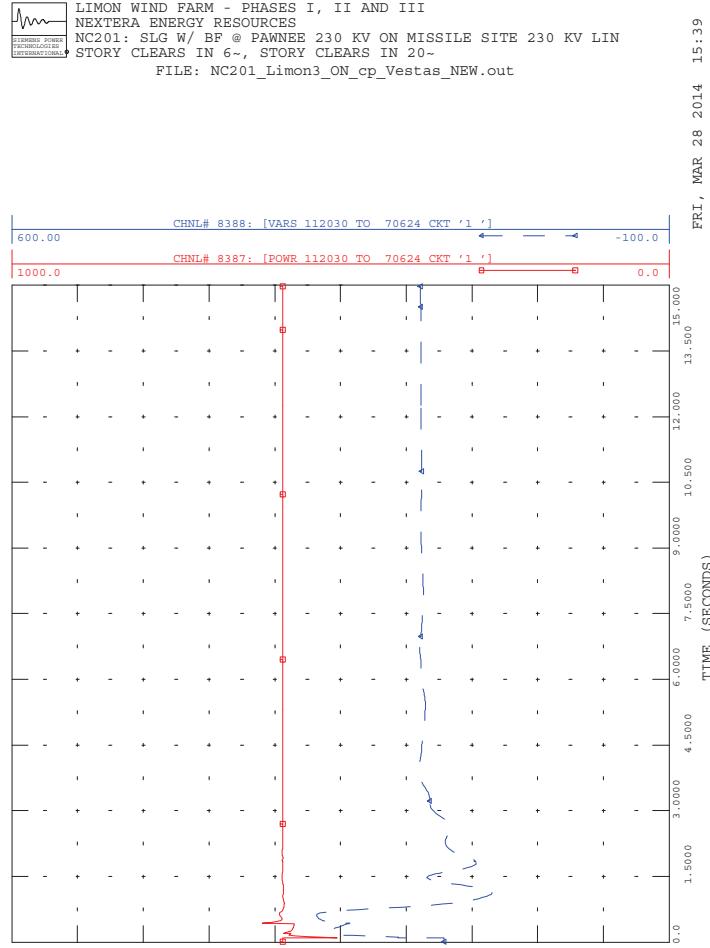
- Contingency NC 201-Restudy



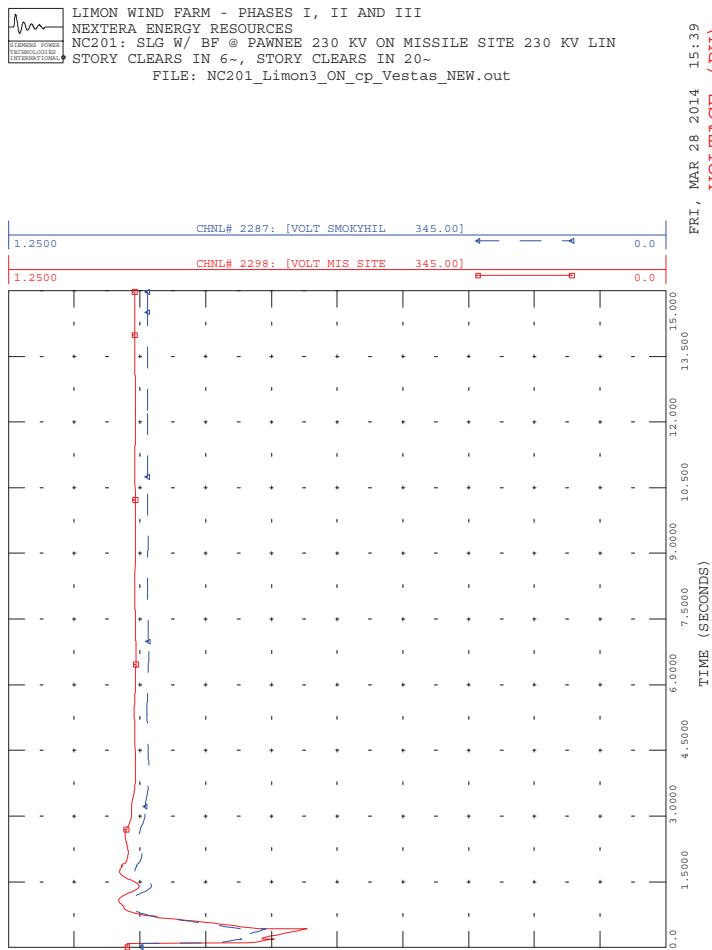
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NEXTERA ENERGY RESOURCES
NC201: SLG W/ BF @ PAWNEE 230 KV ON MISSILE SITE 230 KV LIN
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FILE: NC201_Limon3_ON_cp_Vestas_NEW.out



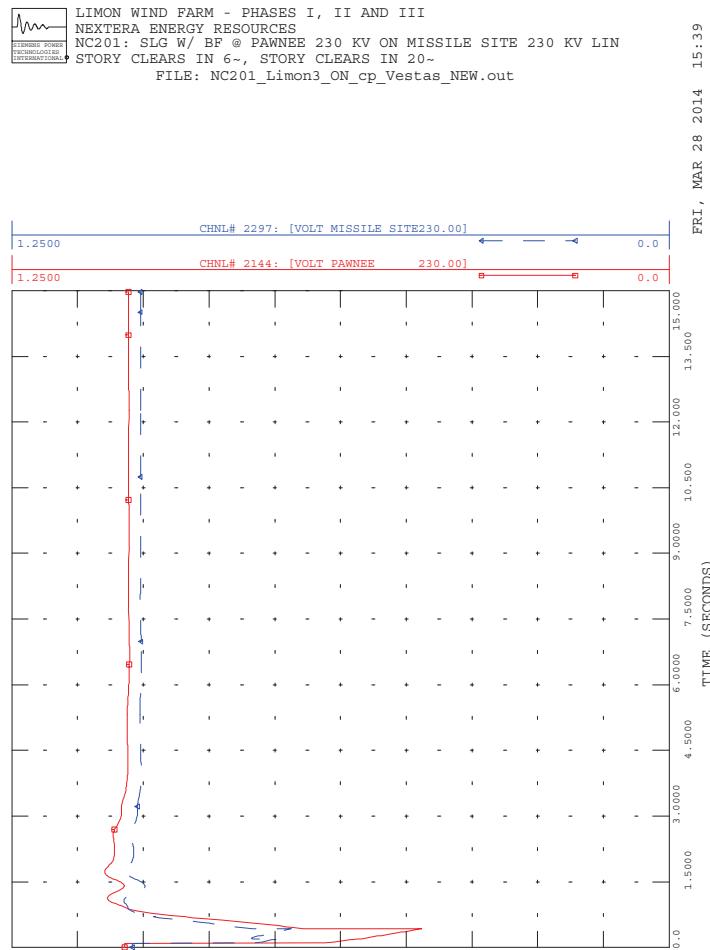
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LIMON WIND FARM - PHASES I, II AND III
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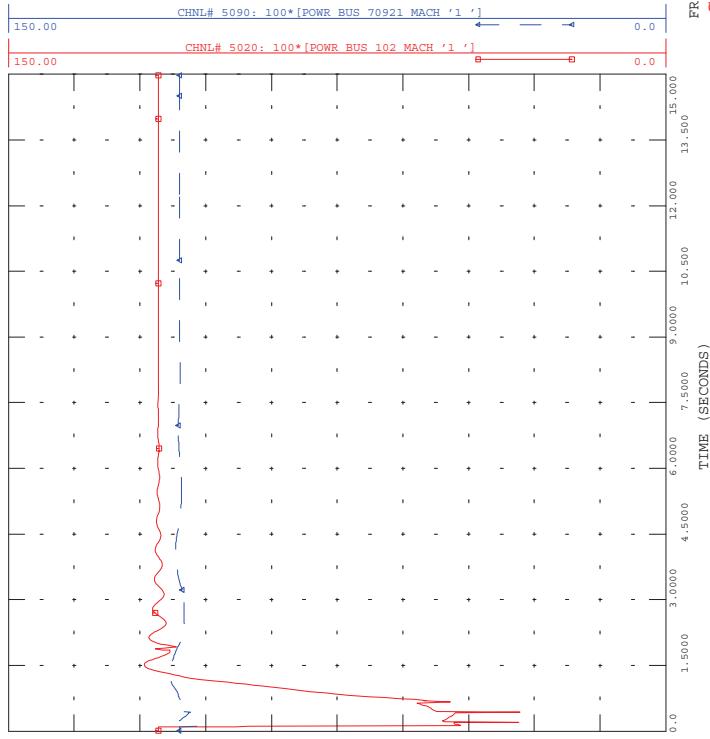


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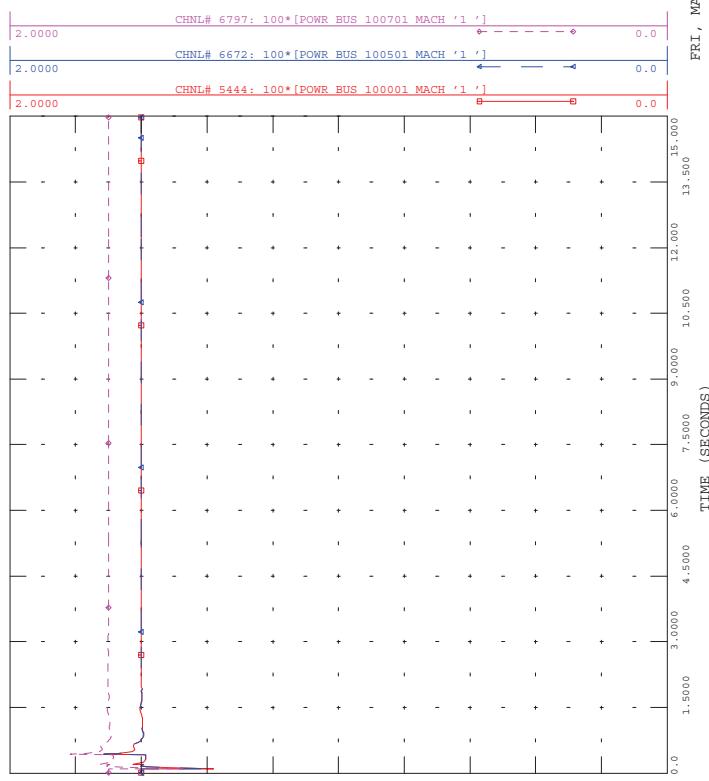




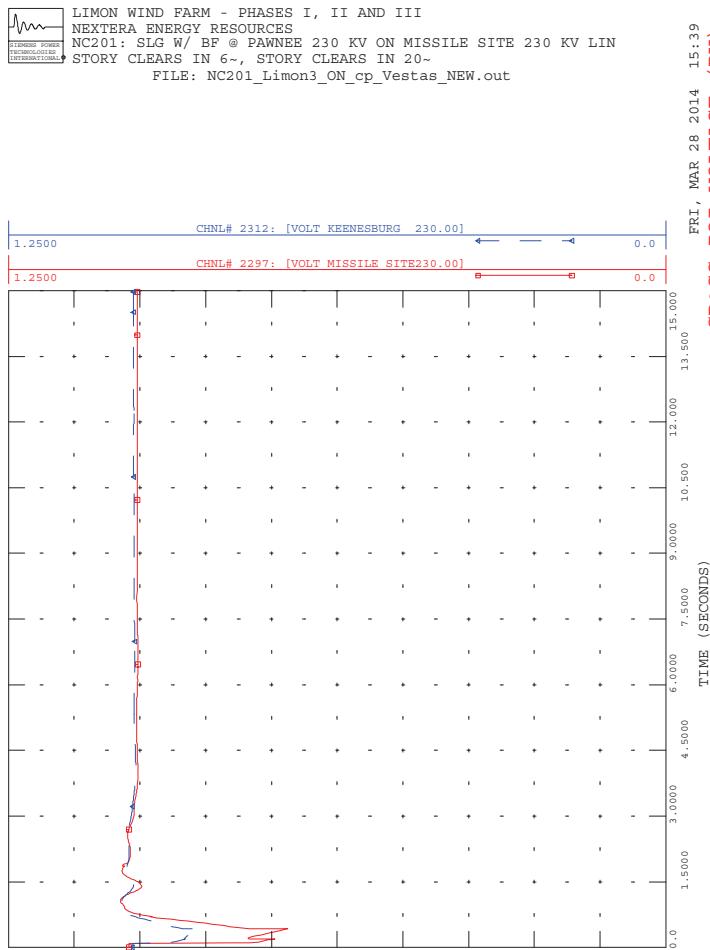
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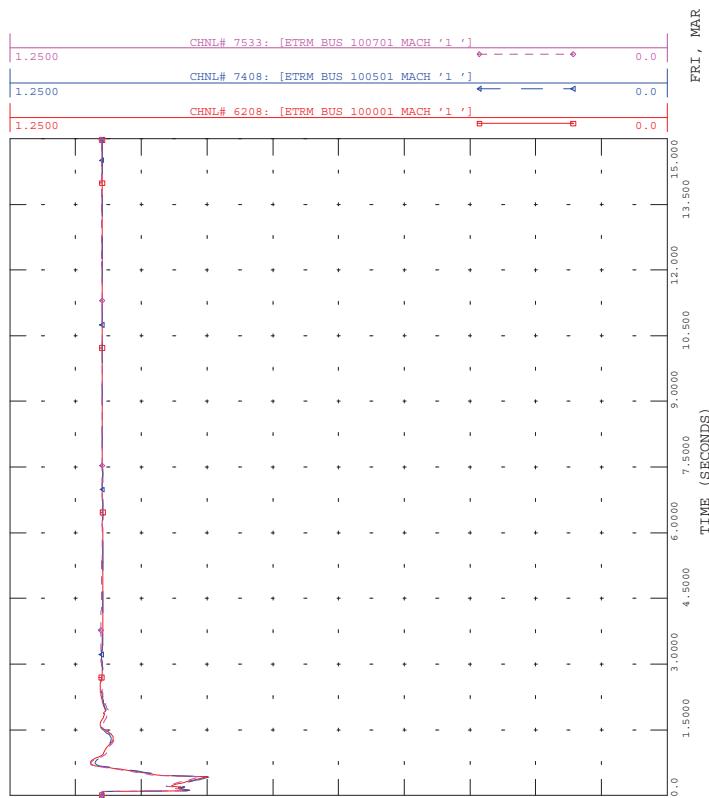
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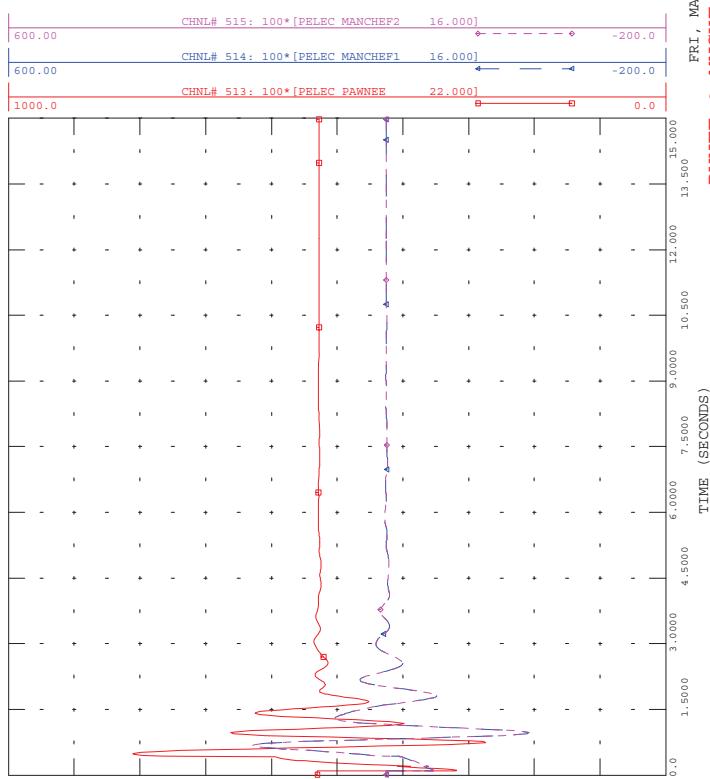


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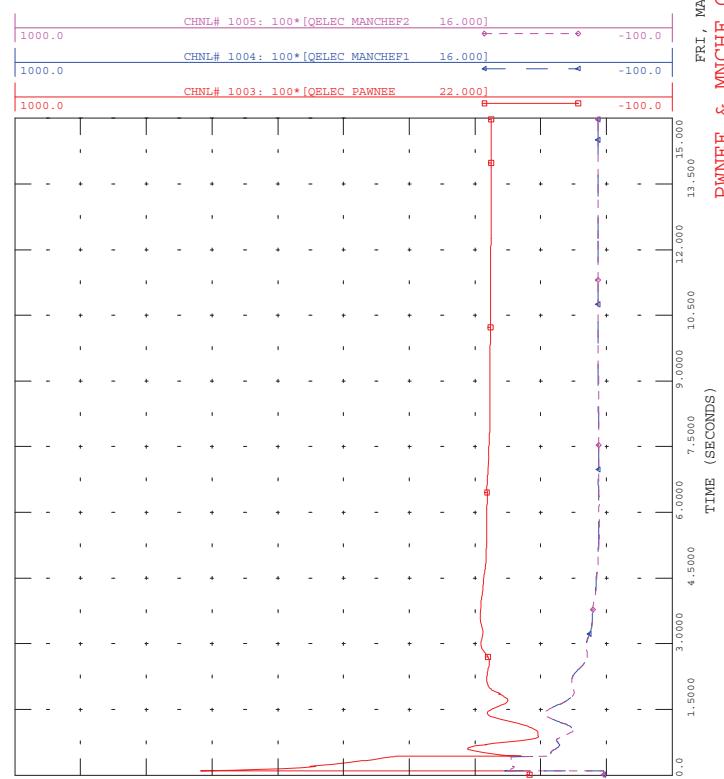




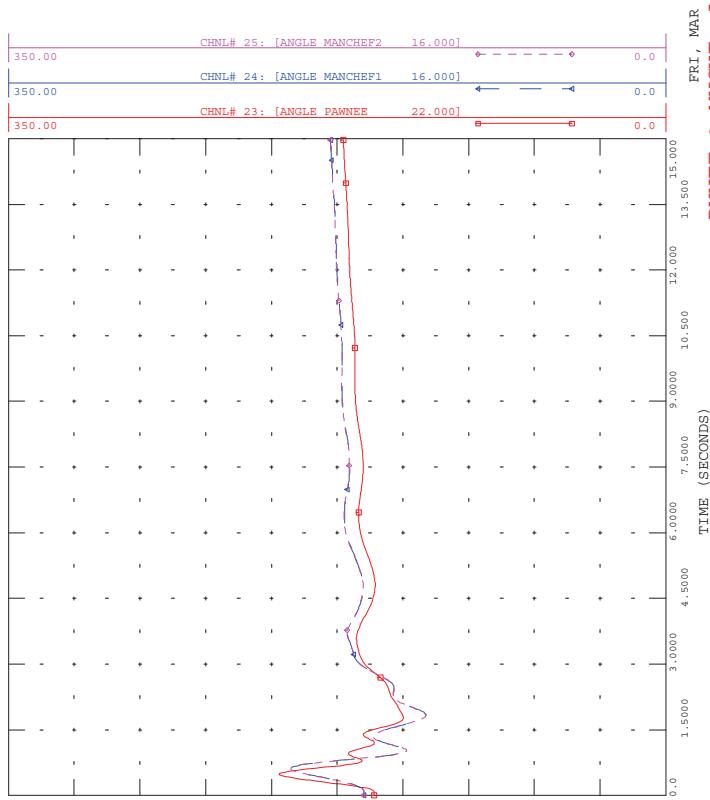
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