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CH2MHILL

April 2, 2007

338307

Dr. James Reede
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Informal Data Response, Set 1B
Vernon Power Project (06-AFC-4)

On behalf of the City of Vernon, please find attached 12 copies and one original of the Informal Data Response, Set 1B. Five hard copies and five electronic copies are being provided to the CEC staff. We are also filing copies of this data response electronically.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

c: Project File
CEC (w/attachments)
Proof of Service List (w/o attachments)

VERNON POWER PLANT
(06-AFC-4)

INFORMAL DATA RESPONSE, SET 1B

(Transmission System Engineering)

Submitted by

City of Vernon

April 2, 2007

CH2MHILL

2485 Natomas Park Drive, Suite 600
Sacramento, California 95833-2937

VERNON POWER PLANT
(06-AFC-4)
INFORMAL DATA RESPONSES, SET 1A

Technical Area: Transmission System Engineering
CEC Author: Ajoy Guha, P.E.

TSE-1 The AFC is for 914 MW net generation output from the proposed Vernon Power Plant (VPP) with a target on-line date of third quarter of 2009. Two System Impact Studies (SIS), one for 610 MW output and the other for 890 MW output (stated as incomplete study), were submitted to the Commission and the studies were conducted under 2008 system conditions instead of 2009 system conditions. Appendix B(b)(2)(C).

In order to demonstrate conformance or non-conformance with the NERC/WSCC, California Independent System Operator (Cal-ISO) and/or Utility planning standards and reliability criteria, please submit a new System Impact study for the nominal 914 MW Vernon Power Plant (VPP) under 2009 summer peak and spring system conditions.

Response: The City of Vernon has received the following document from Southern California Edison:

- 304 MW Increase Revised System Impact Study (Attachment TSE-1A2).

Five hard copies and five electronic copies of the report are being provided to the CEC staff. However, based on conversations with Mr. Guha, we have not included the Appendix D - 2011 Heavy Summer and Light Spring Stability Plots. Electronic copies will be provided to other parties upon request.

SOUTHERN CALIFORNIA EDISON®

An EDISON INTERNATIONAL® Company

ATTACHMENT TSE-1A2

Robert J. Lugo
Mgr., Grid Interconnection
& Contract Development

March 20, 2007

Mr. Donal O'Callaghan
Acting Director of Light & Power
City of Vernon
4305 Santa Fe Avenue
Vernon, California 90058

Re: Revised Interconnection System Impact Study Results for the Vernon Power Plant Project 304 MW Increase

Dear Mr. O'Callaghan:

Enclosed is a compact disc of the revised Interconnection System Impact Study ("Study"), including all appendices, related to the Vernon Power Plant Project 304 MW Increase ("304 MW VPP Project"). Also enclosed is a hard copy of the Study, excluding Appendices A and C thru G. All of the appendices except for Appendix B remain unchanged from the initial report dated January 31, 2007.

The revisions to the Study include the update of the rating of each circuit of the Laguna Bell – Vernon Power Plant 230 kV double-circuit transmission line from 1,973 amps to 2,480 amps under normal conditions and to 2,850 amps under emergency conditions. In addition, the Study report clarifies that no impacts were found on the 66 kV systems and below. Furthermore, revisions were made to clarify which upgrades were triggered by projects between the 610 MW Vernon Power Plant Project and the 304 MW VPP Project, and which were triggered by projects ahead in queue of the 610 MW Vernon Power Plant Project.

If you have any questions regarding this letter, please contact Ms. Teri T. Kondo at (626) 302-8703.

Sincerely,

Robert J. Lugo

enclosures
c: Yi Zhang (ISO) w/enclosures
Judy Nickel (ISO) w/o enclosures

P.O. Box 800
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CITY OF VERNON
VERNON POWER PLANT EXPANSION PROJECT
(304 MW INCREASE)

REVISED

SYSTEM IMPACT STUDY

MARCH 20, 2007

Prepared by
Jeffery L. Ellis, P.E.
(Consultant)

Southern California Edison Company

Approved by: Patricia L. Arons

EXECUTIVE SUMMARY

Southern California Edison Company ("SCE") performed under direction of the California Independent System Operator ("CAISO"), an Interconnection System Impact Study ("SIS") as requested by the City of Vernon for a proposed Vernon Power Plant ("VPP") pursuant to the Interconnection System Impact Study Agreement entered into by SCE and Vernon on October 13, 2005. The initial VPP request for 610 MW (net) was for a 2x1 Combined Cycle unit with particular technical parameters. The expansion by 304 MW (net) is realized by converting to a 3x1 with associated technical parameter changes. For all studies outlined below (power flow, transient stability, and short circuit) the increment due to the expansion will be determined by studying the full 914 MW (net) at the 304 MW queue position with the original 610 MW 2x1 model removed. The incremental impacts due solely to the expansion will be determined by comparing the impacts from the 610 MW study and the impacts from the 304 MW Expansion study completed as outlined above. The project is scheduled to be on line by March of 2009.

Results of the System Impact Study will be used as the basis to determine project cost allocation for facility upgrades in the Facilities Study. ***The study accuracy and the results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by the City of Vernon***. Any changes from the attached data could void the study results.

The study was performed for four system conditions: a 2009 and 2011 Heavy Summer one-in-ten load forecast and a 2009 and 2011 Light Spring load forecast (65% of the heavy summer load).

The report provides detailed study assumptions and conditions of the system in which the study was conducted. Furthermore power flow contingencies for the SCE 230-kV system, post-transient governor power flow for 500-kV line contingencies, transient stability for significant 230 and 500-kV contingencies, and short-circuit duty assessments were completed for this study and are summarized below.

The objective of the System Impact Study is to determine whether SCE's transmission system can accommodate the proposed project. The study results indicated that the SCE system could not accommodate the proposed VPP Expansion Project without system modifications.

Power Flow Analysis

Studies identified that the VPP Expansion Project aggregated overload on several SCE owned transmission facilities under N-1 and N-2 conditions. However, VPP Expansion Project did not trigger these overloads. These overloads were triggered by changes in system condition, assumptions, and projects ahead in the generation queue. The mitigation for most of the overloads has not been developed as further discussed in the report. SCE will need to assure the mitigations will have sufficient capacities to accommodate the VPP 304 MW Expansion Project.

No overloads were identified on the 66-kV and lower voltage systems with the VPP 914 MW Expansion Project in service.

Post-Transient Power Flow Analysis
There were no post-transient power flow impacts identified with addition of the VPP Expansion Project.

Transient Stability Analysis
The transmission system remained in operating equilibrium throughout all transmission contingencies with inclusion of the Project.

The VPP Expansion Project met the Low Voltage Ride-Through criterion. None of the VPP generators tripped due to adverse contingencies that were simulated. Phase-to-ground faults were not simulated in this SIS since previously studied projects that had a larger output did not reveal any problems.

Short-Circuit Analysis
Single-line-to-ground and three-phase-to-ground results indicate that thirteen (13) circuit breakers have fault duties that increased by 0.1 kA from the pre-project case and exceeded their breaker fault duty of 60%. Prior projects ahead in the queue triggered upgrade and replacement of 136 SCE owned circuit breakers.

No circuit breaker upgrades were identified to be required for the 66-kV and lower voltage systems with the VPP 914 MW Expansion Project in service as a result of the short-circuit analysis.

Cost Responsibility

The ***Nonbinding*** Cost Estimate for the Network Upgrades triggered by the VPP 304 MW Expansion Project, consisting of 230-kV circuit breaker upgrades, is $1.584 million.

The ***Nonbinding*** Cost Estimate for the Interconnection Facilities, Distribution Upgrades and Network Upgrades triggered by the 610 MW VPP Project and required for the VPP 304 MW Expansion Project is $16.057 million, which has already been identified in the VPP 610 MW SIS.

The ***Nonbinding*** Cost Estimate for additional Network Upgrades triggered by prior projects in the queue is $99.073 million, excluding the costs associated with any upgrades not yet identified for the project in ISO Queue Position 88.

Such costs identified above exclude the ITCC tax collected via credit support for the Interconnection Facilities and Distribution Upgrades.

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Appendix C – List of Power Flow Contingencies

Appendix D – 2009 Heavy Summer Stability Plots
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Appendix D – 2011 Heavy Summer Stability Plots

Appendix D – 2011 Light Spring Stability Plots

Appendix E – Transient Stability Modeling

Appendix F – Transient Stability Switching Sequences

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CITY OF VERNON
VERNON POWER PLANT EXPANSION PROJECT
(304 MW INCREASE)
REVISED
SYSTEM IMPACT STUDY
March 20, 2007

INTRODUCTION

Southern California Edison Company ("SCE") performed under direction of the California Independent System Operator ("CAISO"), an Interconnection System Impact Study ("SIS") as requested by the City of Vernon for a proposed Vernon Power Plant ("VPP") pursuant to the Interconnection System Impact Study Agreement entered into by SCE and Vernon on October 13, 2005. The initial VPP request for 610 MW (net) was for a 2x1 Combined Cycle unit with particular technical parameters. The expansion by 304 MW (net) is realized by converting to a 3x1 with associated technical parameter changes. For all studies outlined below (power flow, transient stability, and short circuit) the increment due to the expansion will be determined by studying the full 914 MW (net) at the 304 MW queue position with the original 610 MW 2x1 model removed. The incremental impacts due solely to the expansion will be determined by comparing the impacts from the 610 MW study and the impacts from the 304 MW Expansion study completed as outlined above. The project is scheduled to be on line by March of 2009.

The results of the System Impact Study will be used as the basis to determine project cost allocation for facility upgrades in the Facilities Study. ***The study accuracy and the results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by the City of Vernon***. Any changes from the attached data could void the study results.

The study was performed for four system conditions: a 2009 and 2011 Heavy Summer one-in-ten load forecast and a 2009 and 2011 Light Spring load forecast (65% of the heavy summer load).

The report provides detailed study assumptions and conditions of the system in which the study was conducted. Furthermore, power flow contingencies for the SCE 230-kV system, post-transient governor power flow for 500-kV line contingencies, transient stability for significant 230 and 500-kV contingencies, and short-circuit duty assessments were completed for this study.

STUDY CONDITIONS AND ASSUMPTIONS

A. Planning Criteria

The study was conducted by applying the CAISO Reliability Criteria. More specifically, the main criteria applicable to this study are as follows:

Power Flow Assessment

The following contingencies are considered for transmission and sub-transmission lines and 500/230-kV transformer banks ("AA-Banks"):

- Single Contingencies (loss of one line or one AA-Bank)
- Credible Double Contingencies (loss of two lines or one line and one AA-Bank) (Outages of two AA-Banks are beyond the Planning Criteria)

The following reliability criteria are used:

Transmission Lines	Base Case	Limiting Component Normal Rating
	N-1	Limiting Component Emergency-Rating
	N-2	Limiting Component Emergency-Rating
AA-Banks	Base Case	Normal Loading Rating
	Long Term & Short Term	Bank Emergency-Rating

System upgrades for transmission lines are generally recommended for all reliability criteria violations. Special Protection Schemes (SPS) may be allowed for single contingency and credible double contingencies reliability criteria violation in place of system upgrade.

Congestion Assessment

The following principles were used in determining whether congestion management, special protection schemes, or facility upgrades are required to mitigate base case, single contingency, or double contingency overloads:

- Congestion management, as a means to mitigate base case overloads, can be used if it is determined to be manageable and the CAISO concurs with the implementation.

- Facility upgrades will be required if it is determined that the use of congestion management is unmanageable as defined in the congestion management section that follows.

- SPS, in lieu of facility upgrades, will be recommended if the scheme is effective, does not jeopardize system integrity, does not exceed the current CAISO single and double contingency tripping limitations, does not adversely effect existing or proposed special protection schemes in the area, and can be readily implemented.

- Facility upgrades will be required if use of protection schemes is determined to be ineffective, the amount of tripping exceeds the current CAISO single and double contingency tripping limitations, adverse impacts are identified on existing or currently proposed special protection schemes, or the scheme cannot be readily implemented.

- Congestion management in preparation for the next contingency will be required, with CAISO concurrence, if no facility upgrades or special protection schemes are implemented.

The following study method was implemented to assess the extent of possible congestion:

a) Under Base Case with all transmission facilities in service, the system was evaluated with all existing interconnected generation and all generation requests in the area that have a queue position ahead of this request (pre-project).

b) Under Base Case with all transmission facilities in service, the system was reevaluated with the inclusion of the Vernon Expansion Project (post-project).

If the normal loading limits of facilities are exceeded in (a), the overload is identified as an existing overload that was triggered by a project in queue ahead of the Vernon Expansion Project. If the normal loading limits of facilities are exceeded in (b) and were not exceeded in (a), the overload is identified as triggered by the addition of the Vernon Expansion Project. The Vernon Expansion Project, assuming it is a market participant, and other market participants in the area may be subjected to congestion management, potential upgrade cost and/or participation of any proposed special protection systems if the project addition aggravates or triggers the overload. Additionally, the Vernon Expansion Project may have to participate in mitigation of overloads triggered by subsequent projects in queue, subject to FERC protocols and policies.

In order for congestion management to be a feasible alternative to system facilities, all of the following factors need to be satisfied:

- Time requirements for necessary coordination and communication between the CAISO operators, scheduling operators and SCE operators.

- Distinct Path/Corridor rating should be well defined so monitoring and detecting congestion and implementing congestion of the contributing generation resources can be performed when limits are exceeded.

- Sufficient amount of market generation in either side of the congested path/corridor should be available to eliminate market power.

- Manageable generation in the affected area is necessary so that operators can implement congestion management if required (i.e. the dispatch schedule is known and controllable).

Results of these studies should identify:

a. if capacity is available to accommodate the proposed Vernon Expansion Project and all projects ahead in queue without the need for congestion management, special protection schemes, or facility upgrades

b. if overloads exist in the area after the addition of all projects in queue ahead of the Vernon Expansion Project and all facilities in service

c. if congestion exists in the area with the addition of the Vernon Expansion Project and all projects ahead in queue under single and double element outage conditions assuming no new special protection schemes are in place

d. if sufficient capacity is maintained to accommodate all Must-Run and Regulatory Must-Take generation resources with all facilities in service

e. if sufficient capacity is maintained to accommodate the total output of any one generation resource which is not classified as Must-Run.

Post-Transient Governor Power Flow Analysis

The following assumptions were modeled in the studies:

a) All loads will be modeled as constant power during the first few minutes following an outage or disturbance.

b) All voltages at distribution substations will be restored to normal values by the transformer tap changers and other voltage control devices.

c) Generator VAR limits will be modeled as a single value for each generator since the reactive power capability curve will not be modeled in the power flow program.

d) There will be no manual operator intervention to increase the generator VAR output.

e) Remedial actions such as generator dropping, load shedding and blocking of automatic generation control (AGC) will not be considered.

f) Alpha min and Gamma min of the PDCI and IPPDC will be adjusted to 5 degrees and 13 degrees, respectively.

g) Shunt capacitors (132 MVAR) at Adelanto and Marketplace will be used if the post-transient voltage deviation exceeds 5% at those buses.

h) Other Assumptions
- Area Interchange: Disabled;
- Governor Blocking: Per WECC Modeling & Validation Work Group recommendations - Diablo, Palo Verde, and San Onofre;
- DC Line Transformer Tap Automatic Adjustment: Enabled;
- Generator Voltage Control set to local except for San Onofre, Palo Verde, and selected Northwest generation;
- Phase Shifter Control: Disabled;
- Switched Shunt Devices: Disabled - except in Sierra Pacific Power's system.

Voltage dips should meet the following combined SCE and WECC Reliability Criteria:

Performance Level	Disturbance	Post Transient Voltage Deviations
B	N-1	Not to exceed 7% at any bus.
C	N-2	Not to exceed 10% at any bus.
D	N-3	Cascading Not Permitted

The following system contingencies were simulated and compared between the pre and post project base cases:

N-1 Contingencies

1. BEP2500 - Devers 500-kV line
2. BEP2500 – Midpoint 500-kV line
3. BEP2500B – BEP2500 500-kV line
4. Calpine – Valley 500-kV line
5. Devers – Midpoint #1 500-kV line
6. Devers – Midpoint #2 500-kV line
7. Devers – Valley 500-kV line
8. El Dorado–Lugo 500-kV line
9. El Dorado – Mohave 500-kV line
10. Lee Lake – Serrano 500-kV line
11. Lee Lake – Valley 500-kV line
12. Lugo – Mira Loma #2 500-kV line
13. Lugo – Mira Loma #3 500-kV line
14. Lugo – Mohave 500-kV line
15. Lugo – Rancho Vista 500-kV line
16. Lugo – Victorville 500-kV line
17. Lugo – Vincent #1 500-kV line

18. Lugo – Vincent #2 500-kV line
19. Midway – Vincent #1 500-kV line
20. Midway – Vincent #2 500-kV line
21. Midway – Vincent #3 500-kV line
22. Mira Loma – Serrano 500-kV line.
23. Rancho Vista – Serrano 500-kV line
24. Rancho Vista – TOT128 #1 500-kV line
25. Rancho Vista – TOT128 #2 500-kV line

N-2 Contingencies

26. Lugo – Mira Loma #2 & #3 500-kV lines
27. Lugo – Vincent #1 & #2 500-kV lines
28. Lugo – Rancho Vista 500-kV line & Lugo – Mira Loma #2 500-kV line
29. Rancho Vista – Serrano 500-kV line & Mira Loma – Serrano 500-kV line
30. Midway – Vincent #1 & #2 500-kV lines
31. Devers – Midpoint #1 500-kV line & Devers – Valley 500-kV line
32. Lugo – Mohave 500-kV line & Lugo – Mira Loma #2 500-kV line
33. Lugo – Mohave 500-kV line & Lugo – Mira Loma #3 500-kV line
34. Lugo – Vincent #2 500-kV line & Lugo – Victorville 500-kV line
35. Lugo – Vincent #2 500-kV line & Midway – Vincent #3 500-kV line

Transient Stability Analysis

WECC currently is in the process of adopting The Generator Electrical Grid Fault Ride-Through Capability Criteria. SCE currently supports a Low Voltage Ride-Through Criteria to ensure continued reliable service. A proposed Criteria that SCE supports, is as follows:

1. Generator is to remain in-service during system faults (three phase faults with normal clearing and single-line-to-ground with delayed clearing) unless clearing the fault effectively disconnects the generator from the system.

2. During the transient period, generator is required to remain in-service for the low voltage and frequency excursions specified in WECC Table W-1 (provided below) as applied to load bus constraint. These performance criteria are applied to the generator interconnection point, not the generator terminals.

3. Generators may be tripped after the fault period if this action is intended as part of a special protection scheme.

4. This Standard will not apply to individual units or to a site where the sum of the installed capabilities of all machines is less than 10MVA, unless it can be proven that reliability concerns exist.

5. The performance criteria of this Standard may be satisfied with performance of the generators or by installing equipment to satisfy the performance criteria.

6. The performance criterion of this Standard applies to any generation independent of the interconnected voltage level.

7. No exemption from this Standard will be given because of minor impact to the interconnected system.

8. Existing generators that go through any refurbishments or any replacements are then required to meet this Standard.

In addition to the Low Voltage Ride-Through Criteria, the following criterion was applied for the transient stability analysis:

a.) All machines in the system shall remain in synchronism as demonstrated by their relative rotor angles.

b.) All stability simulation cases will be run for a minimum of 10 seconds.

c.) Generators with a base load flag of zero will not respond to contingencies.

d.) System stability is evaluated based on the damping of the relative rotor angles and the damping of the voltage magnitude swings.

Other transient voltage dips must meet the following CAISO Reliability Criteria:

Performance Level	Disturbance	Transient Voltage Dip Criteria
B	N-1	Transient Voltage Dip: Not to exceed 25% at load buses or 30% at non-load buses. Also, not to exceed 20% for more than 20 cycles at load buses. Minimum Transient Frequency: Not below 59.6 Hz for 6 cycles or more at a load bus.
C	N-2	Transient Voltage Dip: Not to exceed 30% at any bus. Also, not to exceed 20% for more than 40 cycles at load buses. Minimum Transient Frequency: Not below 59.0 Hz for 6 cycles or more at a load bus.
D	N-3	Not Specified

The following system contingencies were simulated for all Heavy Summer and Light Spring conditions:

Category "B" Contingencies

1. Full load rejection of the VPP
2. Three-phase fault at the VPP 230-kV bus followed by loss of the VPP STG.
3. Three-phase fault at the VPP 230-kV bus followed by loss of the VPP – Laguna Bell 230-kV #1 circuit.
4. Three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – Rio Hondo 230-kV #1 circuit.
5. Three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – Goodrich 230-kV #1 circuit.
6. Three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – Del Amo 230-kV #1 circuit.
7. Three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – La Fresa 230-kV circuit.
8. Three-phase fault at the Harbor Gen 230-kV bus followed by loss of the Long Beach – Harbor Gen 230-kV circuit.
9. Three-phase fault at the Lighthipe 230-kV bus followed by loss of the Long Beach – Lighthipe 230-kV circuit.
10. Three-phase fault at the Rio Hondo 230-kV bus followed by loss of the Vincent – Rio Hondo 230-kV circuit.
11. Three-phase fault at the Devers 500-kV bus followed by loss of the Midpoint – Devers 500-kV #1 circuit.
12. Three-phase fault at the Midpoint 500-kV bus followed by loss of the Midpoint – Harquahala 500-kV circuit.
13. Three-phase fault at the Midpoint 500-kV bus followed by loss of the Midpoint – Palo Verde 500-kV circuit.
14. Three-phase fault at the Valley 500-kV bus followed by loss of the Lee Lake – Serrano 500-kV circuit.
15. Three-phase fault at the Valley 500-kV bus followed by loss of the Lee Lake – Valley 500-kV circuit.

Category "C" Contingencies

16. Pre-fault outage of the Laguna Bell – Goodrich 230-kV circuit, then a three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – Rio Hondo 230-kV circuit.
17. Pre-fault outage of the Laguna Bell – Del Amo 230-kV #1 circuit, then a three-phase fault at the Laguna Bell 230-kV bus followed by loss of the Laguna Bell – La Fresa 230-kV #2 circuit.
18. Three-phase fault at the Long Beach 230-kV bus followed by loss of the Long Beach – Lighthipe 230-kV and Harbor Gen – Hinson 230-kV transmission lines.
19. Three-phase fault at the Rancho Vista 500-kV bus followed by loss of the Rancho Vista – Vincent 500-kV and Mira Loma – Walnut 230-kV transmission lines.
20. Three-phase fault at the Serrano 500-kV bus followed by loss of the Rancho Vista – Vincent 500-kV and Mira Loma – Serrano 500-kV transmission lines.

Category "D" Contingency

21. A pre-fault outage of the Laguna Bell – Rio Hondo 230-kV circuit, then a three-phase fault at the VPP 230-kV bus followed by loss of a double circuit tower removing both the Laguna Bell – Del Amo 230-kV and the Laguna Bell – La Fresa 230-kV circuits.

Short-Circuit Analysis

The following study assumptions were used for conducting the short-circuit analysis:

a) Shunt capacitor banks will be omitted at all stations. Normally, shunt capacitors produce a minimal effect on fault currents. When they are large enough to be significant, their effect is to reduce total fault current. Results are more conservative to neglect them altogether.

b) Shunt reactors will also be neglected since their contribution is minimal.

c) Reactors connected to autotransformer delta tertiary windings will be neglected since they cannot contribute fault current to the system.

d) Phase shifting transformers will be by-passed as this would be the worst case from the fault current standpoint.

e) If zero sequence data is not available, the assumption will be made that Xo=3X1 and Ro=0 or R1.

Circuit breakers exposed to fault currents in excess of 100 percent of their interrupting capacities will be replaced or upgraded, whichever is appropriate.

Sub-synchronous Resonance Analysis (SSR)

It is not anticipated that there will be any SSR impacts. Hence, the SSR studies are not required.

B. City of Vernon – Vernon Power Plant Expansion Project

The expansion project is scheduled to be on-line by March 2009.

Proposed Vernon Power Plant Expansion Project ("VPP")

The initial VPP request for 610 MW (net) was for a 2x1 Combined Cycle unit with particular technical parameters. The expansion by 304 MW (net) is realized by converting to a 3x1 with associated technical parameter changes with the full 914 MW (net) project and the original 610 MW 2x1 model removed.

Following is a summary of 2009/2011 project additions modeled in the Project base cases:

1. Three 230/16.5 kV, 225 MVA transformers were modeled at the VPP 230-kV Substation to be used for the combustion turbines.
2. One 230/19 kV, 450 MVA transformer was modeled at the VPP 230-kV Substation to be used for the steam turbine.
3. Three 220 MVA combustion turbine generators were modeled at the VPP 230-kV Substation.
4. Three 9.67 MW, 5.99 MVAR plant auxiliary loads were modeled at the combustion turbine buses for a total plant auxiliary load of 29 MW.
5. One 405 MVA steam turbine generator was modeled at the VPP 230-kV Substation.

Figure 1 illustrates the one-line schematic of the proposed VPP Expansion Project and **Figure 2** illustrates the one line diagram of transmission lines emanating from the Laguna Bell 230-kV bus.

Figure 1. One-line Vernon Power Plant Expansion ("VPP") Project bus Configuration.

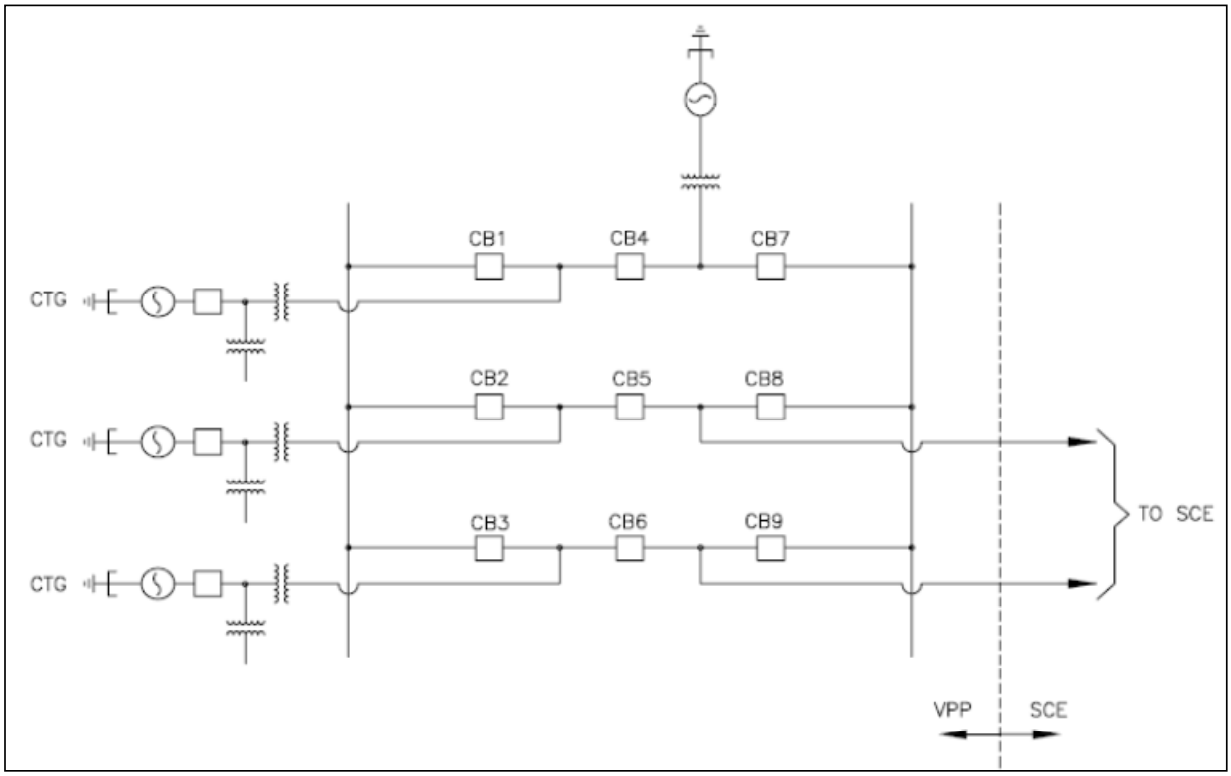
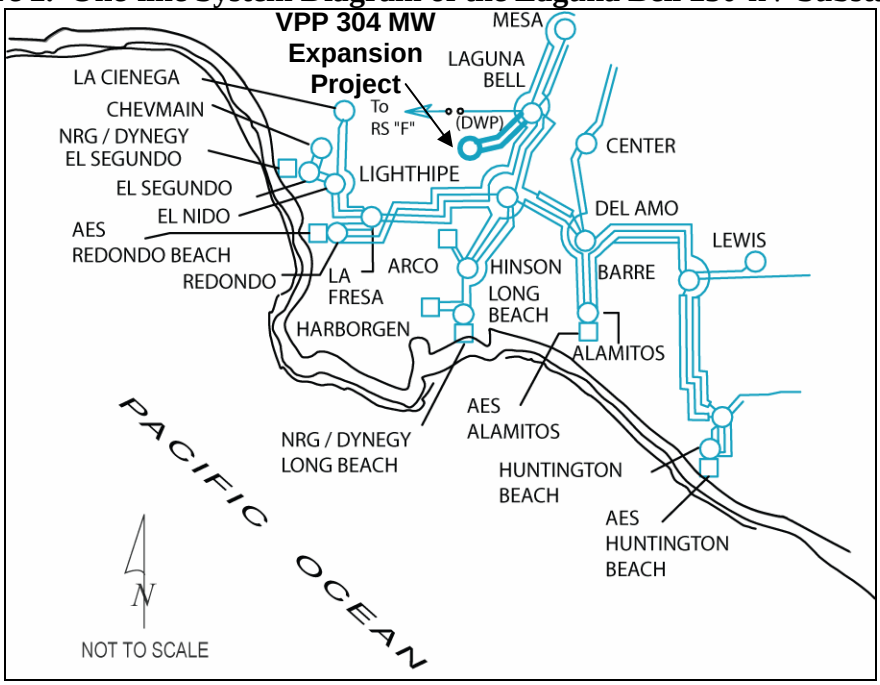


Figure 2. One-line System Diagram of the Laguna Bell 230-kV Substation.



C. System Conditions

To simulate the SCE transmission system for analysis, the study used a SCE internal planning case that modeled 2009 and 2011 Heavy Summer conditions. In addition, additional SCE internal planning cases modeled 2009 and 2011 Light Spring conditions. Starting base cases were updated to represent system conditions in 2009 and 2011. Most significantly, SCE's 2009 and 2011 Heavy Summer load levels were escalated to a one-in-ten load forecast. System generation is based upon the application queue. That is, all projects ahead in SCE's queue regardless of the in-service date of such prior projects are modeled.

The Light Spring scenarios assume 65% of the heavy summer load.

D. Load Flow Study

Load flow studies were conducted under the 2009 and 2011 Heavy Summer and Light Spring conditions. Refer to **Appendix G** for a list of SCE Queue projects modeled in all base cases. Further descriptions of each base case follow:

1) 2009 Heavy Summer Pre-VPP 304 MW Expansion Project, Case 1.

   Case 1 modified to include the VPP 610 MW Project and all projects ahead in the queue in the same vicinity. Generation connected at the TOT032 bus was reduced to accommodate

the Project.

2) 2009 Heavy Summer Post-VPP 304 MW Expansion Project with a total of 914 MW plant output, Case 2.

   Case included a 2009 Heavy Summer load level. Generation patterns were maximized in the LA Basin to fully stress the SCE 230-kV system.

3) 2009 Light Spring Pre-VPP 304 MW Expansion Project, Case 3.

   Case 3 modified to include the VPP 610 MW Project and all projects ahead in the queue in the same vicinity. Generation connected at the TOT032 bus was reduced to accommodate the Project.

4) 2009 Light Spring Post-VPP 304 MW Expansion Project with a total of 914 MW plant output, Case 4.

   Case included a 2009 Light Spring load level. Generation patterns were maximized in the LA Basin to fully stress the SCE 230-kV system.

5) 2011 Heavy Summer Pre-VPP 304 MW Expansion Project, Case 5.

   Case 5 modified to include the VPP 610 MW Project and all projects ahead in the queue in the same vicinity. Generation connected at the TOT032 bus was reduced to accommodate the Project.

6) 2011 Heavy Summer Post-VPP 304 MW Expansion Project with a total of 914 MW plant output, Case 6.

   Case included a 2011 Heavy Summer load level. Generation patterns were maximized in the LA Basin to fully stress the SCE 230-kV system.

7) 2011 Light Spring Pre-VPP 304 MW Expansion Project, Case 7.

   Case 7 modified to include the VPP 610 MW Project and all projects ahead in the queue in the same vicinity. Generation connected at the TOT032 bus was reduced to accommodate the Project.

8) 2011 Light Spring Post-VPP 304 MW Expansion Project with a total of 914 MW plant output, Case 8.

   Case included a 2011 Light Spring load level. Generation patterns were maximized in the LA Basin to fully stress the SCE 230-kV system.

Table 1 summarizes SCE area system demand and resources for the 2009 and 2011 Heavy Summer and Light Spring cases.

Table 1. Summary of case attributes.

SOUTHERN CALIFORNIA IMPORT TRANSMISSION ("SCIT"), EAST-OF-RIVER ("EOR") AND WEST-OF-RIVER ("WOR") FLOWS SCE AREA TOTAL GENERATION, IMPORT, LOAD AND LOSSES (MW)								
	2009 Heavy Summer		**2009 Light Spring**		**2011 Heavy Summer**		**2011 Light Spring**	
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
	Pre-project	Post-Project	Pre-Project	Post-Project	Pre-project	Post-Project	Pre-Project	Post-Project
SCIT	9,687	9,686	1,345	1,344	9,828	9,825	1,271	1,272
EOR	3,673	3,682	3,531	3,541	3,862	3,871	3,527	3,538
WOR	5,356	5,362	4,445	4,450	5,538	5,541	4,409	4,416
Generation*	22,267	22,259	18,493	18,495	23,135	23,136	19,250	19,253
Import	-3,339	-3,339	1,787	1,787	-3,539	-3,538	1,787	1,787
Load	25,186	25,178	16,414	16,414	26,244	26,244	17,152	17,152
Losses	420	420	293	294	430	431	312	315

*Changes in generation can be attributed to swing bus adjustments compensating for loss increases.

E. Post-Transient Governor Power Flow Study

All 500-kV contingencies were simulated with the post-transient governor power flow methodology. The governor power flow methodology utilizes Special Protection Systems ("SPS") for loss of bulk system contingencies. In addition, loss of a significant amount of generation would be spread throughout the system instead of at the system swing bus.

F. Transient Stability Study

Transient stability studies were performed for the 2009 and 2011 summer peak and light spring base cases to ensure that the transmission system remains in operating equilibrium through abnormal operating conditions after the new facility begins operation.

The "critical clearing" time for the Project will be determined based on the fault clearing time increasing for loss of the VPP – Laguna Bell 230-kV #1 circuit. The "critical clearing" time is the time during which a fault can persist without causing system instability.

G. Short Circuit Duty Study

Short circuit studies were conducted to determine fault duties on existing SCE facilities before and after proposed project additions. Fault duty results were used to identify overstressed equipment, if any, that results solely from addition of the proposed facility.

STUDY RESULTS

A. <u>Load Flow Study</u>

1. Base Case

2009 and 2011 Heavy Summer
Studies identified that with the 304 MW addition to the VPP Project, there were no base case thermal overloaded elements for the 2009 or 2011 heavy summer conditions. In addition, no bus voltages in the LA Basin violated the CAISO voltage criteria.

2009 and 2011 Light Spring
Studies identified that with the 304 MW addition to the VPP Project, there were no base case thermal overloaded elements for the 2009 or 2011 light spring system conditions. In addition, no bus voltages in the LA Basin violated the CAISO voltage criteria.

Refer to **Appendix A** for pre and post-project power flow plots for the 2009 and 2011 heavy summer and light spring cases.

2. Power Flow Contingency Results.

2009 and 2011 Heavy Summer
Studies identified that with the 304 MW addition to the VPP Project, there were two NERC/WECC Category "B" and none in Category "C" contingency affected elements for the 2009 heavy summer condition, three NERC/WECC Category "B" and three Category "C" contingency affected elements for the 2011 heavy summer condition.

2009 and 2011 Light Spring
Studies identified that with the 304 MW addition to the VPP Project, there were two NERC/WECC Category "B" and five NERC/WECC Category "C" contingency affected elements for the 2009 light spring condition, three NERC/WECC Category "B" and six NERC/WECC Category "C" contingency affected elements for the 2011 light spring conditions.

All identified overloaded elements in 2009 and 2011 Heavy Summer and Light Spring were triggered by changes in system condition and configuration and aggravated by projects ahead in the generation queue. There were no voltage violations observed with addition of the VPP Expansion Project.

Appendix B tabulates all power flow contingency results.

The study focused on identifying system thermal overloads within the SCE service territory. Reported thermal overloads were limited to the condition where a modeled transmission component was loaded over 98% of its appropriate normal rating (as entered

in the power flow database). In addition, only element loadings greater than 1% between the pre and post-project cases were reported.

B. Post-Transient Governor Power Flow Study

Results from the post-transient governor power flow analysis did not reveal any thermally overloaded elements. In addition, there were no voltage deviation violations.

C. Transient Stability Study

The transmission system remained in operating equilibrium throughout all transmission contingencies with inclusion of the Project. Refer to **Appendix D** for all simulated contingency plots.

The VPP Expansion Project met the Low Voltage Ride-Through criterion; since, none of the VPP Expansion Project generators tripped due to the adverse contingencies that were simulated. Phase-to-ground faults were not simulated in this SIS since previously studied projects that had a larger output did not reveal any problems.
In an effort to determine a "critical clearing" time for the Project during 2009 and 2011 heavy summer conditions, the clearing time for loss of the VPP-Laguna Bell 230-kV was increased from 4 cycles (typical clearing time for 230-kV transmission lines) until system instability was observed at 10 cycles. Note, the "critical clearing" time is the time during which a fault can persist without causing instability.

D. Short Circuit Duty Study

The starting short-circuit analysis case includes all projects based on their application date [Project Queue].

Single-line-to-ground and three-phase-to-ground results indicate that thirteen (13) circuit breakers have fault duties that increased by 0.1 kA from the pre-project case and exceeded their breaker fault duty of 60%. Prior projects in the queue triggered upgrade and replacement of 136 SCE owned circuit breakers.

Table 2. Summary of Short-Circuit Duties, 3-Phase-to-Ground.

		PRE CASE		POST CASE		
Bus Name	Bus KV	X/R	KA	X/R	KA	DELTA KA
MESA500	500	24.8	26.1	24.8	26.2	0.1
SERRANO	500	25.6	31.8	25.6	31.9	0.1
VINCENT	500	18.4	40.7	18.4	40.8	0.1
ALMITOSE	230	17	30.7	16.9	30.8	0.1
CENTER S	230	16	43.3	16	43.5	0.2
CHEVMAIN	230	20.4	37.8	20.3	38	0.2
CHINO	230	17	49.9	17	50	0.1
CTYVERH	230	18.1	31.8	18.3	35.7	3.9
DELAMO	230	16	45.3	16	45.8	0.5

EL NIDO	230	20.5	43.2	20.5	43.4	0.2
ELLIS	230	18	41.5	18	41.6	0.1
ELSEGNDO	230	21.7	38.5	21.7	38.6	0.1
HARBOR	230	15.4	36.5	15.3	36.6	0.1
HINSON	230	21.2	53.4	21.1	53.6	0.2
LA FRESA	230	26.2	50.4	26.2	50.7	0.3
LAGUBELL	230	18.8	40.2	19.4	42.5	2.3
LBEACH	230	15.2	34.6	15.1	34.7	0.1
LEWIS	230	21.5	44.8	21.5	44.9	0.1
LITEHIPE	230	17.2	49.9	17.2	50.1	0.2
MESA CAL	230	19.7	66.6	19.6	67	0.4
MRLOMA E	230	23.3	64.5	23.3	64.6	0.1
REDONDO	230	25.9	49	25.9	49.2	0.2
RIOHONDO	230	14.7	29.4	14.7	29.7	0.3
SERRANO	230	26	53.9	25.9	54	0.1
WALNUT	230	16.7	36.5	16.7	36.6	0.1

Table 3. Summary of Short-Circuit Duties, Single-Line-to-Ground.

		PRE CASE		POST CASE		
Bus Name	Bus KV	X/R	KA	X/R	KA	DELTA KA
Mira Loma	525	13.9	32.6	13.9	32.7	0.1
Arcogen	230	16.3	38.1	16.3	38.2	0.1
Del Amo	230	9.4	39.3	9.4	39.6	0.3
El Nido	230	17.8	40.4	17.7	40.6	0.2
El Segundo	230	21.1	36.7	21.1	36.8	0.1
Ellis	230	17.7	35.4	17.7	35.5	0.1
Hinson	230	20.9	51.5	20.8	51.6	0.1
La Fresa	230	20.6	45.8	20.6	46	0.2
Laguna Bell	230	13.6	38.8	13.9	40.4	1.6
Lighthipe	230	11.2	43.9	11.2	44	0.1
Mesa	230	18	64.2	18	64.4	0.2
Mira Loma A	230	13.1	54.3	13.1	54.4	0.1
Redondo	230	31.2	42.7	31.2	42.8	0.1
Rio Hondo	230	14.4	25.4	14.4	25.6	0.2
Santiago	230	18.4	25.2	18.4	25.3	0.1
Serrano	230	18.6	55.5	18.6	55.6	0.1
Walnut	230	15.2	28.1	15.2	28.2	0.1

CONCLUSIONS

A. Power Flow Analysis

2009 and 2011 Light Spring

Existing SCE facilities are not adequate to accommodate the City of Vernon's, Vernon Power Plant Expansion Project of 304 MW interconnecting to the SCE owned Laguna Bell 230-kV Substation for 2009 and 2011 operation. The identified NERC/WECC Category "C" affected elements will require system upgrades.

2009 and 2011 Heavy Summer

Existing SCE facilities are not adequate to accommodate the City of Vernon's, Vernon Power Plant Expansion Project of 304 MW interconnecting to the SCE owned Laguna Bell 230-kV Substation only for 2011 operation. The identified NERC/WECC Category "C" affected elements will require system upgrades.

Overloads identified in this study that had also been identified in the VPP 610 MW Sensitivity Study were triggered by changes in system condition and configuration. SCE will evaluate the risk in the Annual Transmission Expansion Plan and will propose upgrade projects as needed. The VPP Expansion Project will not be responsible for the upgrade of these facilities. Following is a list of overloaded transmission facilities.

- Del Amo-Hinson 230-kV line
- Hinson-Lighthipe 230-kV line
- Lighthipe-Long Beach 230-kV line
- Lighthipe-Mesa 230-kV line
- Mesa-Redondo 230-kV line
- Alamitos West-Barre 230-kV No. 2 line

The studies for a project ahead of the VPP Expansion Project in queue (ISO Queue Position 88) have not yet been completed, and the associated overloads triggered by such project and mitigation measures have not been identified.

No overloads were identified on the 66-kV and lower voltage systems with the VPP 914 MW Expansion Project in service.

B. Short-Circuit Analysis

Single-line-to-ground and three-phase-to-ground results indicate that thirteen (13) circuit breakers have fault duties that increased by 0.1 kA from the pre-project case and exceeded their breaker fault duty of 60%. Several SCE replacement/upgrade circuit breakers were identified by generation projects ahead in the queue. Studies indicated that 85 SCE owned circuit breakers require replacement and 51 SCE owned circuit breakers require upgrade.

It is estimated that the maximum exposure of circuit breaker replacement/upgrades will yield a total cost of $42.651 million, with the Vernon Power Plant Expansion only triggering $1.584 million in circuit breaker replacement/upgrades.

No circuit breaker upgrades were identified to be required for the 66-kV and lower voltage systems with the VPP 914 MW Expansion Project in service in the short-circuit analysis.

Facilities Study

1. Develop a detail cost estimate for SCE system and direct assignment facilities that are required to interconnect the VPP Expansion project.

SCOPE OF WORK

The scope of upgrades required to accommodate the City of Vernon Power Expansion Project interconnection on the SCE network is listed below. The non-binding estimated costs specified below are in 2008 dollars and exclude ITCC.

A. Upgrades Triggered by VPP Expansion Project:

The following elements are required exclusively for the Additional 304 MW interconnection:

Element	Interconnection Facilities	Reliability Upgrades	Distribution Upgrades	Total Cost
Substations:				
Lighthipe Sub. – Upgrade thirteen 220 kV CBs	-	$1,584,000	-	$1,584,000

B. Upgrades Triggered by Prior Projects in the Queue:

1. Projects Between the 610 MW VPP Project and the VPP Expansion Project:

Element	Interconnection Facilities	Reliability Upgrades	Distribution Upgrades	Total Cost
Substations:				
Center Sub. - Replace six 220kV CBs	-	$2,856,000	-	$2,856,000
El Nido Sub. - Replace five 220kV CBs	-	$2,380,000	-	$2,380,000
Hinson Sub. - Replace four & Upgrade six 220kV CBs	-	$3,056,000	-	$3,056,000
La Fresa Sub. - Upgrade one 220kV CBs	-	$144,000	-	$144,000
Lewis Sub. - Replace two 220kV CBs	-	$952,000	-	$952,000
Mesa Sub. - Replace twenty-three 220kV CBs	-	$7,548,000	-	$7,548,000
Vincent Sub. - Replace four 500kV CBs	-	$7,792,000	-	$7,792,000
Mesa Sub. - Upgrade 220kV Switchyard to 80kA Rating *	-	$15,000,000	-	$15,000,000
TOTAL	-	**$39,728,000**	-	**$39,728,000**

* The cost of upgrading the Mesa Sub 220kV Switchyard to 80kA Rating is only an approximately value based on an existing estimated prepared for a similar facility.

Load flow studies for the project in ISO Queue Position 88 have not yet been completed. Mitigation measures for overloads triggered by such project and the associated estimated costs will be determined upon completion of the studies and included in the VPP Expansion Facilities Study.

2. Facilities and Upgrades Triggered by the 610 MW VPP Project (As Identified in the 610 MW VPP Project Facilities Study):

Element	Interconnection Facilities	Reliability Upgrades	Distribution Upgrades	Total Cost
Substations:				
Laguna Bell Sub – reconfigure 220kV Switchyard & Install two 220kV Line Positions	$500,000	$3,302,000	-	$3,802,000
Laguna Bell – Replace sixteen 66kV CBs	-	-	$3,008,000	$3,008,000
Laguna Bell Sub – Replace two 220kV CBs	-	$952,000	-	$952,000
Mesa Sub – Upgrade four 220kV CBs	-	$864,000	-	$864,000
Transmission Lines:				
Laguna Bell – VPP No.1 & No.2 220kV T/L's – Install Inside Laguna Bell Sub	$1,966,000	-	-	$1,966,000
Goodrich – Laguna Bell 220kV T/L – Relocated within Laguna Bell Sub	-	$808,000	-	$808,000
Sub-Transmission Lines:				
Underground eight Segments Inside Laguna Bell Sub	-	-	$4,138,000	$4,138,000
Telecommunications:				
I.T. Channels for Line Protection	$413,000	-	-	$413,000
I.T. Channels for RTU	$40,000	-	-	$40,000
Power System Control:				
RTU at VPP Gen. Facility – New Installation	$49,000	-	-	$49,000
RTU at Laguna Bell Sub. - Upgrade	-	$17,000	-	$17,000
TOTAL	**$2,968,000**	**$5,943,000**	**$7,146,000**	**$16,057,000**

3. Facilities and Upgrades Triggered by Projects Ahead of the 610 MW VPP Project (As Identified in the 610 MW VPP Project Facilities Study):

Element	Interconnection Facilities	Reliability Upgrades	Distribution Upgrades	Total Cost
Substations:				
Mesa - Upgrade one 220kV Line Position	-	$89,000	-	$89,000
Etiwanda Gen. Sta. - Replace twenty four 220kV CBs	-	$15,096,000	-	$15,096,000
La Fresa Sub. - Upgrade four 220kV CBs	-	$576,000	-	$576,000
Laguna Bell Sub. - Upgrade fourteen 220kV CBs	-	$1,296,000	-	$1,296,000
Lugo Sub. - Replace three & Upgrade two 220kV CB's	-	$2,004,000	-	$2,004,000
Mira Loma Sub. - Replace twelve 220kV CBs	-	$7,548,000	-	$7,548,000
Pardee Sub. - Upgrade seven 220kV CBs	-	$1,296,000	-	$1,296,000
Redondo Gen. Sta. - Upgrade twelve 220kV CB's	-	$1,152,000	-	$1,152,000
Vincent Sub. - Upgrade one 220kV CB	-	$288,000	-	$288,000
Etiwanda Gen. Sta. - Upgrade 220kV Switchyard to 80kA Rating*	-	$15,000,000	-	$15,000,000
Mira Loma Sub. - Upgrade 220kV Switchyard to 80kA Rating*	-	$15,000,000	-	$15,000,000
TOTAL	-	**$59,345,000**	-	**$59,345,000**

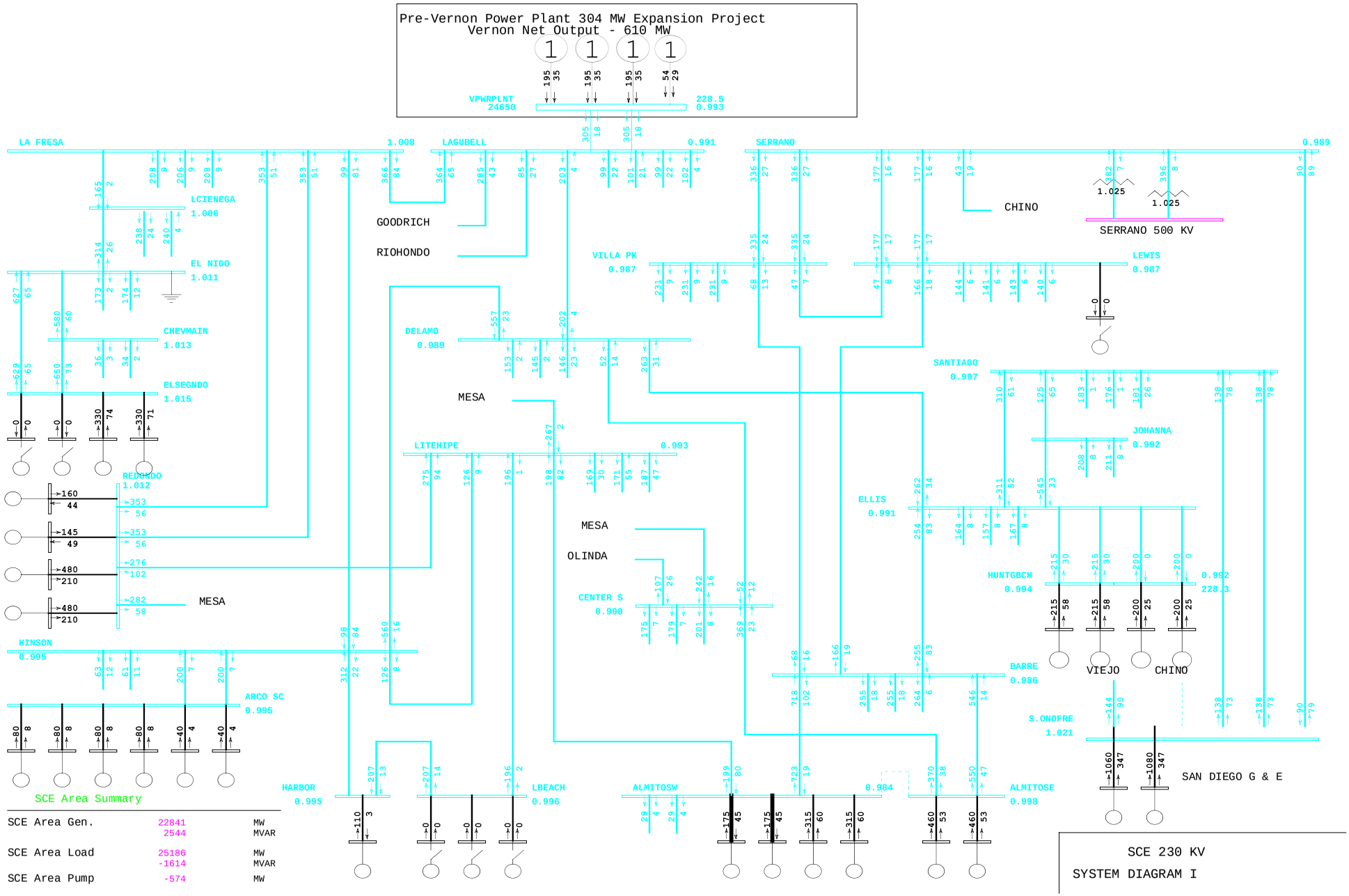
* The cost of upgrading the Etiwanda and Mira Loma Sub 220kV Switchyard to 80kA Rating is only an approximately value based on an existng estimated prepared for a similar facility.

The transmission schedule would be the controlling element of the Project. All other elements are expected to be within the 30-Month time frame shown below.

	1 Year				2 Year				3 Year			
	1 Qtr	2 Qtr	3Qtr	4 Qtr	1 Qtr	2 Qtr	3Qtr	4 Qtr	1 Qtr	2 Qtr	3Qtr	4 Qtr
Engineering												
Procurement												
Construction												

Appendix A

Load Flow Plots



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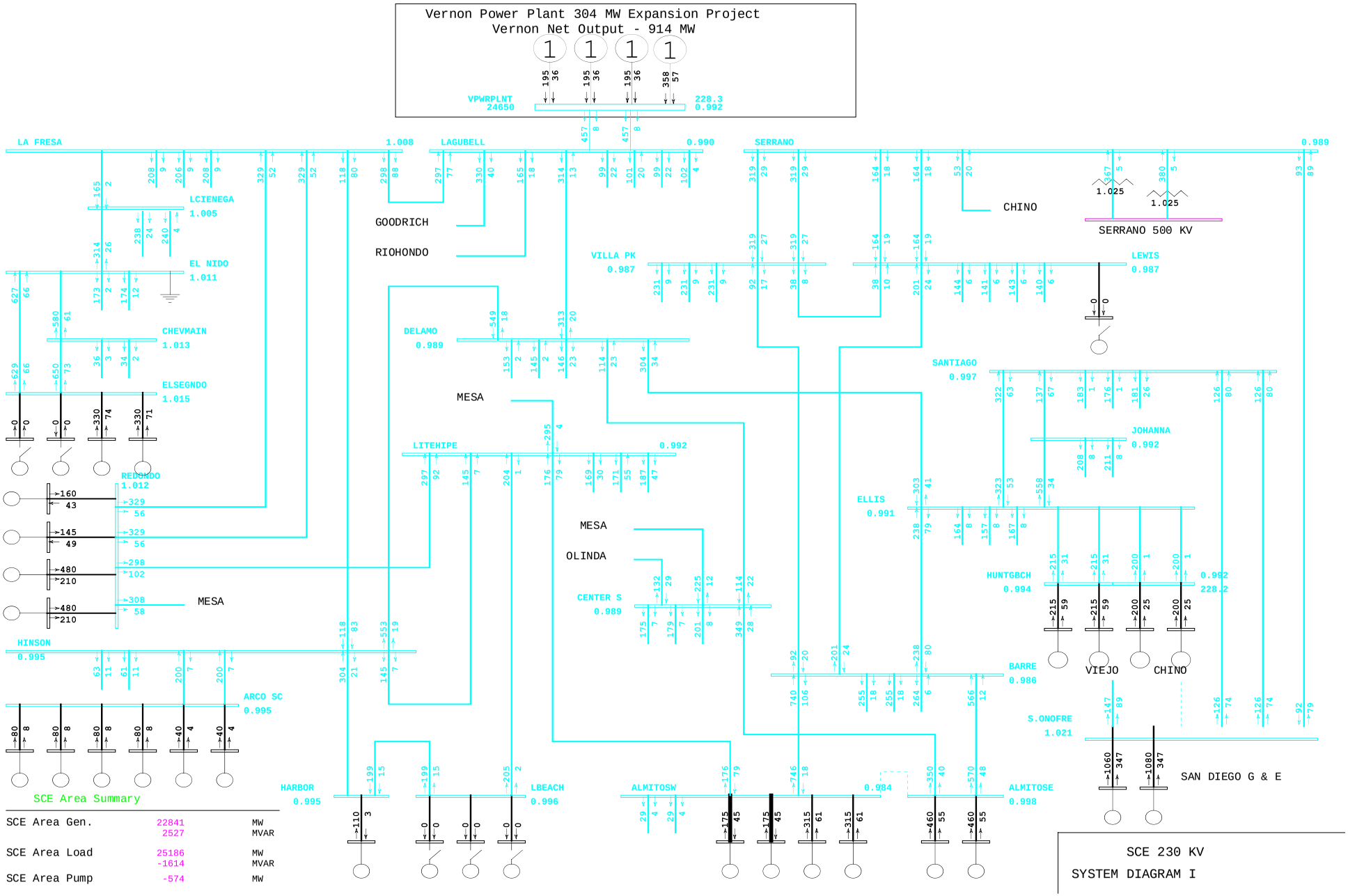

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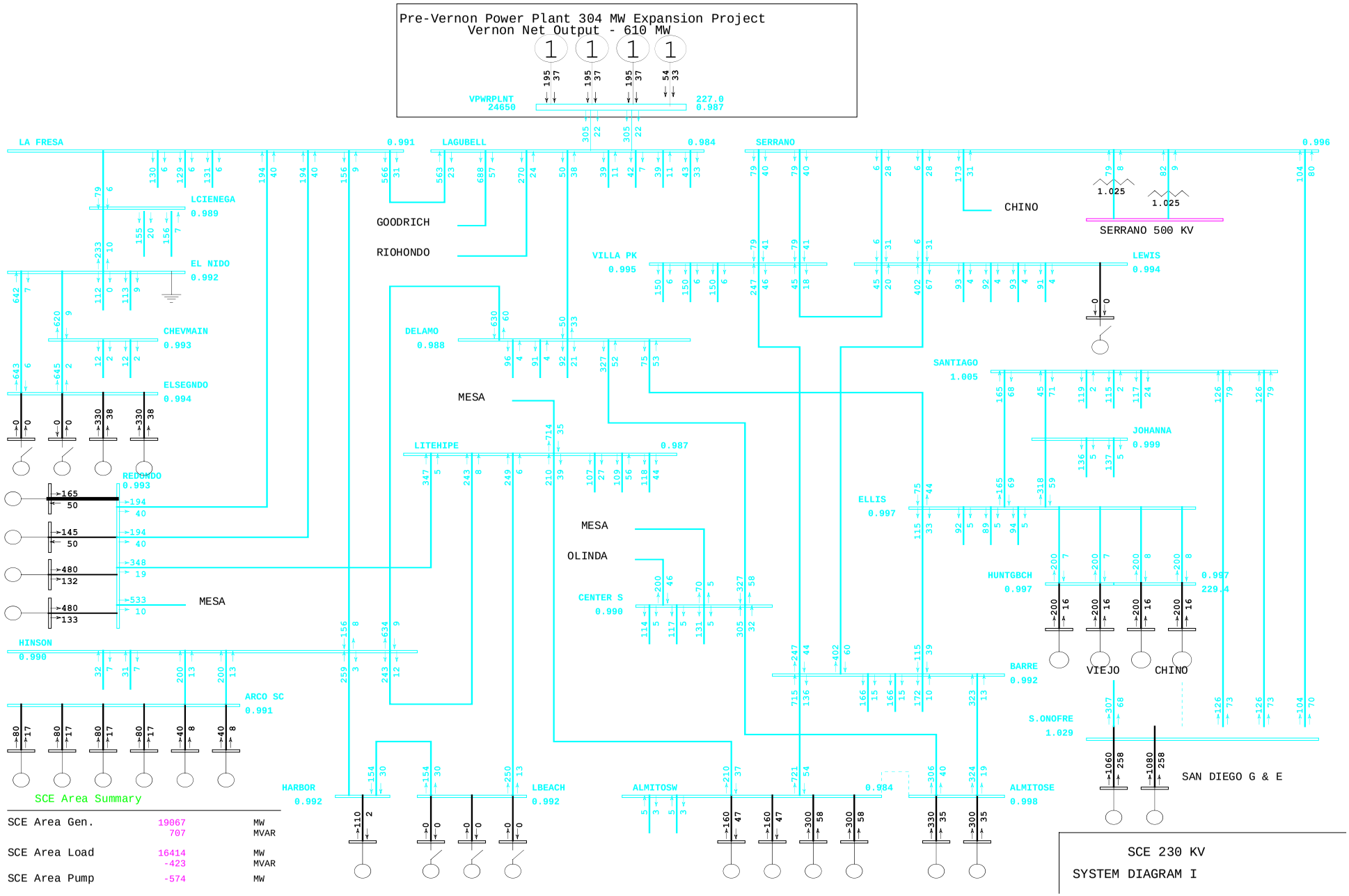
2009 Heavy Summer: POST VERNON 304 MW EXPANSION PROJECT Case: 09hs_pst-vpp304-rev1.sav Load scaled from 2008 HS to 2009 HS		MW/MVAR sce230-main-304exp.dr Rating = 1



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2009 Light Spring: PRE VERNON 304 MW EXPANSION PROJECT

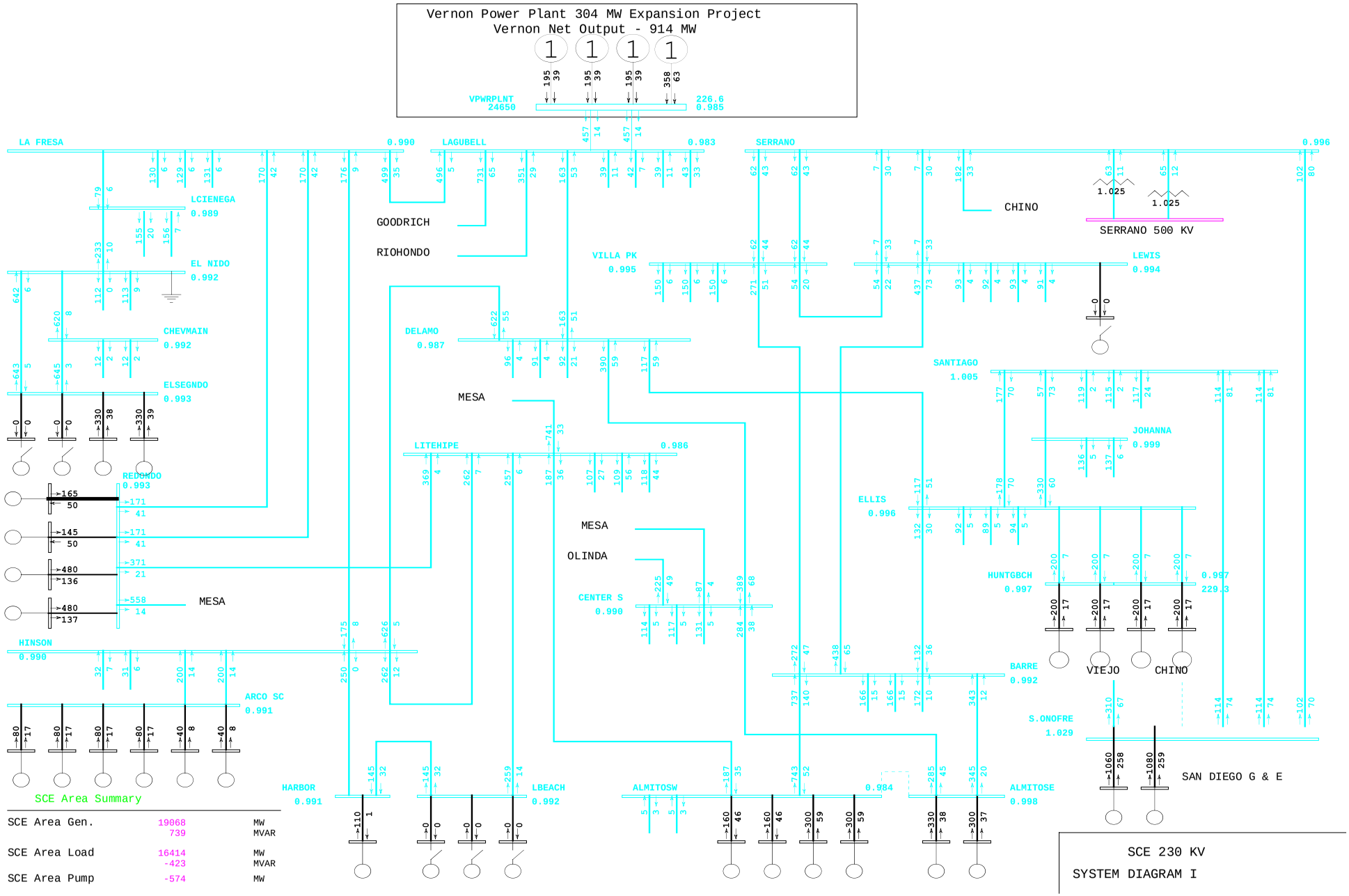
Case: 09lsp_pre-vpp304-rev1.sav

Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)

MW/MVAR

sce230-main-pre-304ex

Rating = 1



SCE Area Summary

SCE Area Gen.	19068	MW
	739	MVAR
SCE Area Load	16414	MW
	-423	MVAR
SCE Area Pump	-574	MW

General Electric International, Inc. PSLF Program Wed Jan 24 11:25:30 2007 vpp304mw\09lsp_pst-vpp914mw-rev1.sav

2009 Light Spring: POST VERNON 304 MW EXPANSION PROJECT

Case: 09lsp_pst-vpp304-rev1.sav

Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)

MW/MVAR

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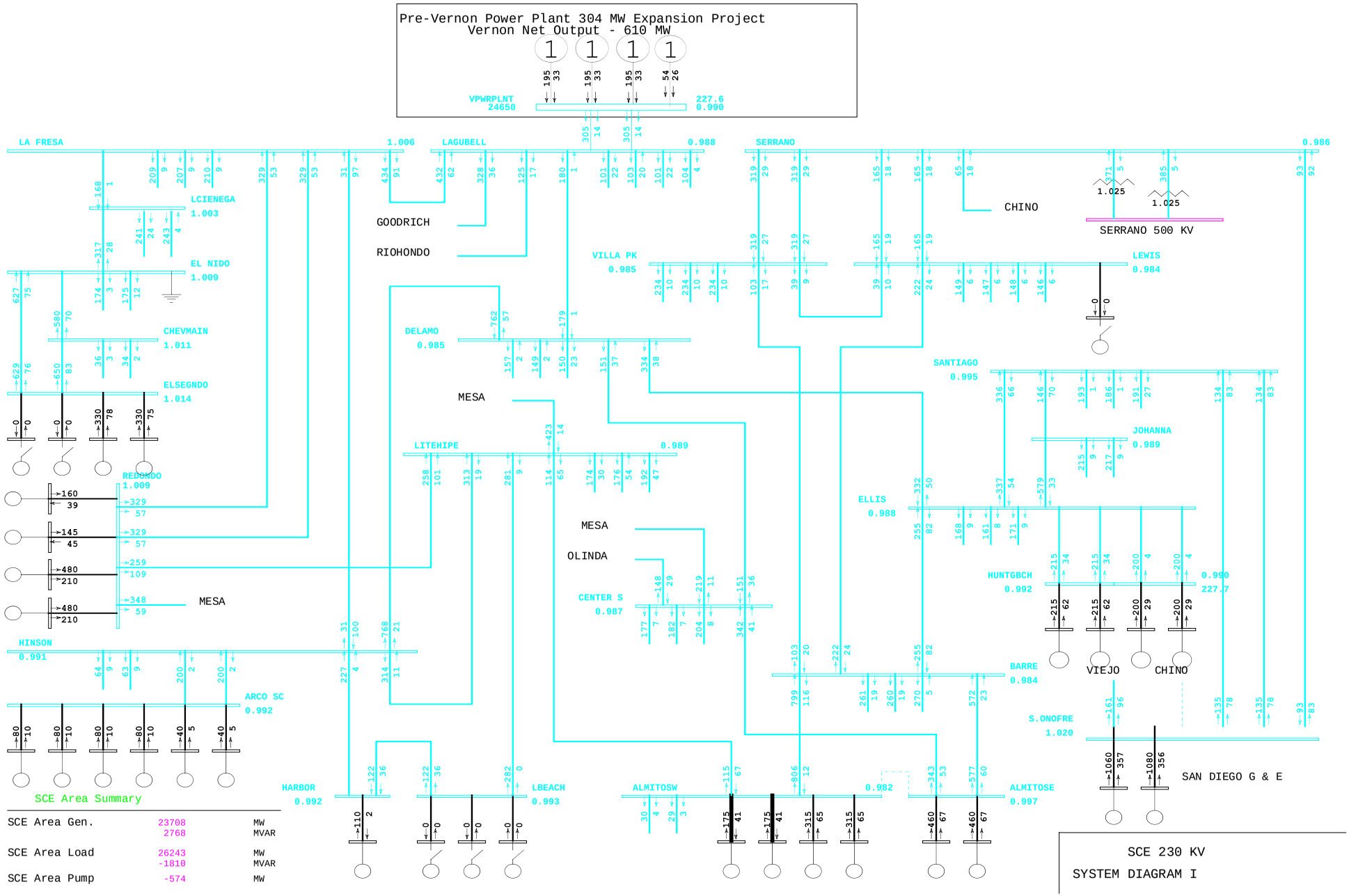
Rating = 1



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2011 Heavy Summer: PRE VERNON 304 MW EXPANSION PROJECT

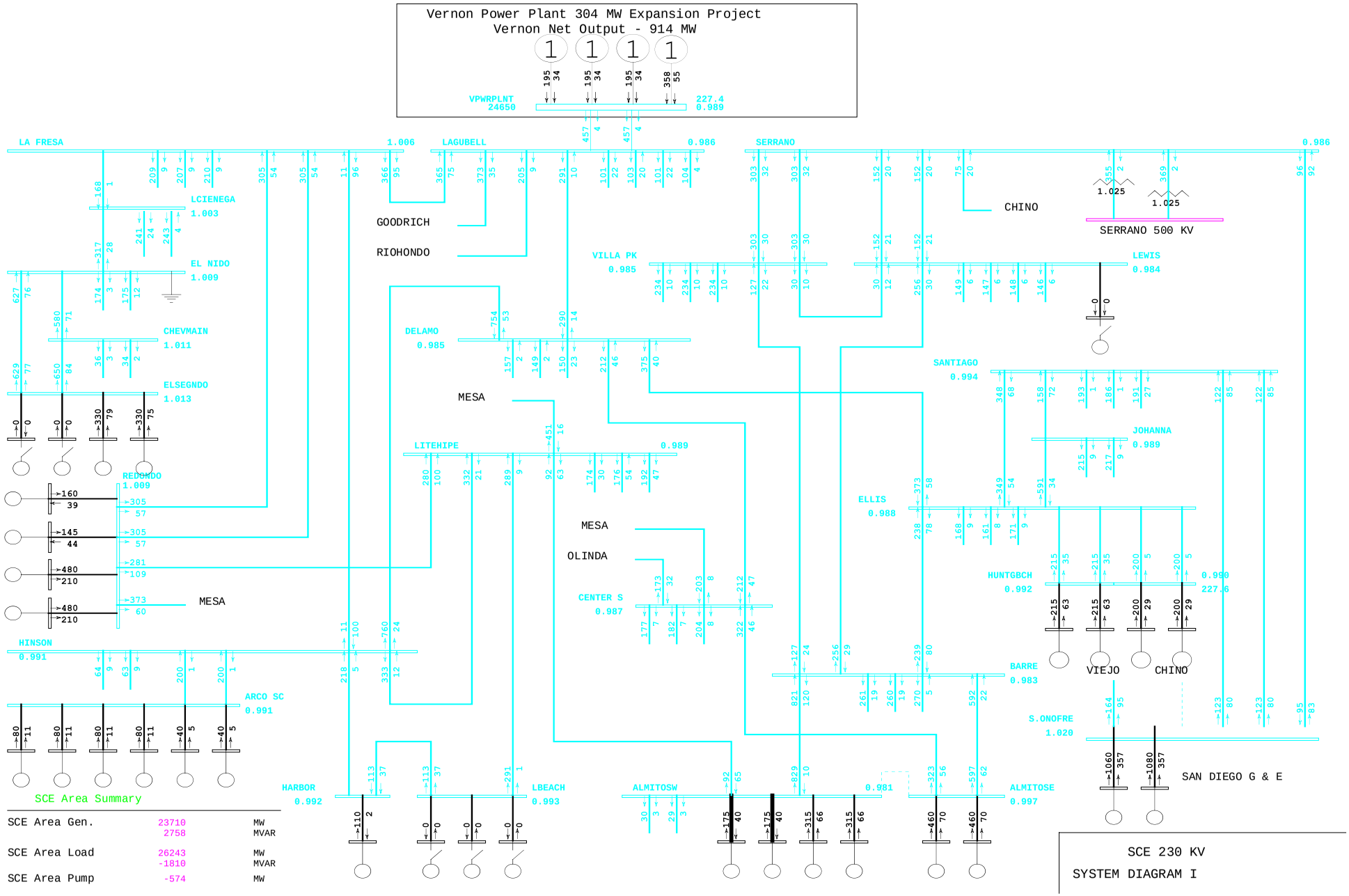
Case: 11hs_pre-vpp304-rev1.sav

Load scaled from 2008 HS to 2011 HS

MW/MVAR

sce230-main-pre-304ex

Rating = 1



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2011 Heavy Summer: POST VERNON 304 MW EXPANSION PROJECT

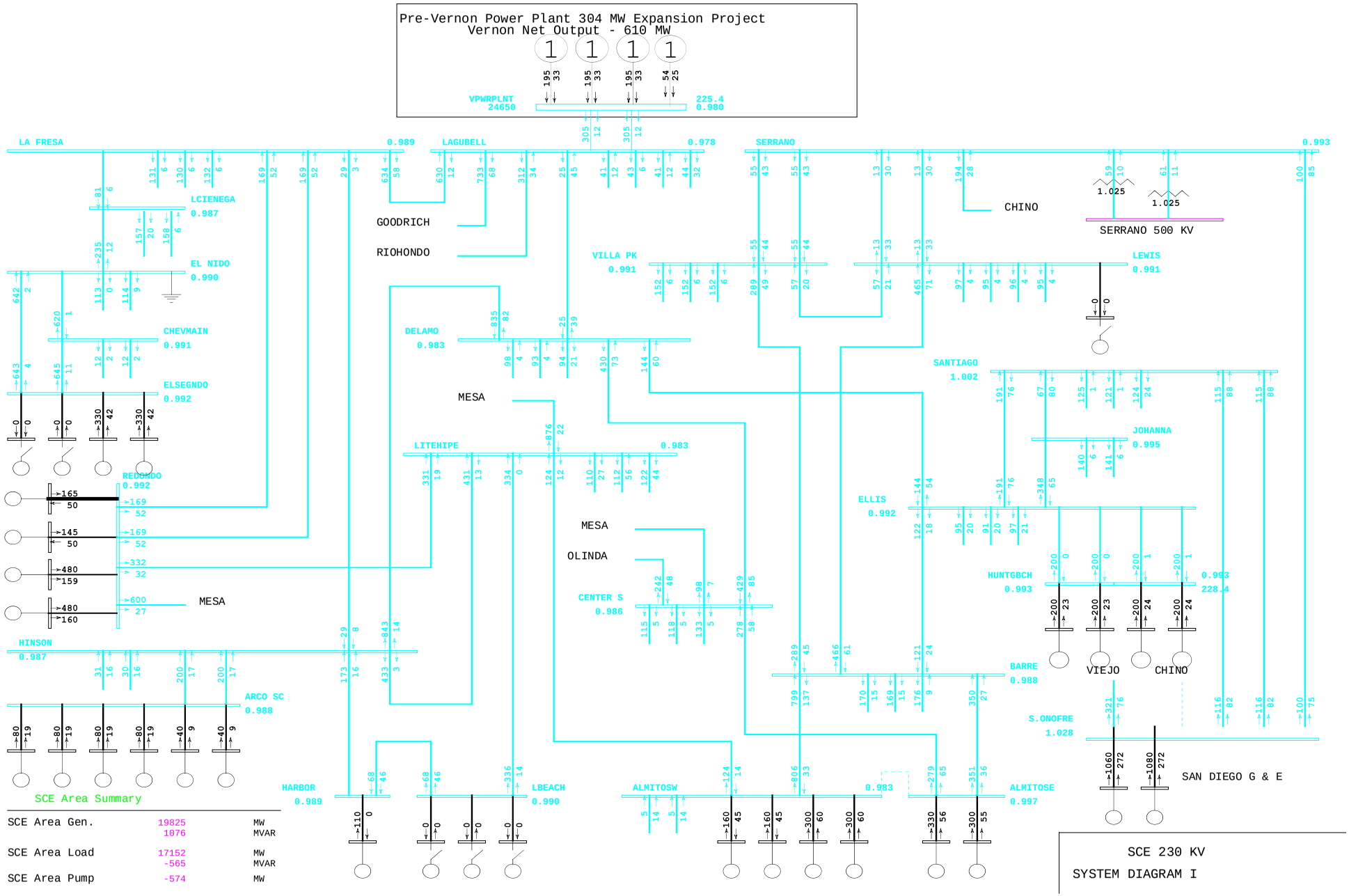
Case: 11hs_pst-vpp304-rev1.sav

Load scaled from 2008 HS to 2011 HS

MW/MVAR

sce230-main-304exp.dr

Rating = 1



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2011 Light Spring: PRE VERNON 304 MW EXPANSION PROJECT

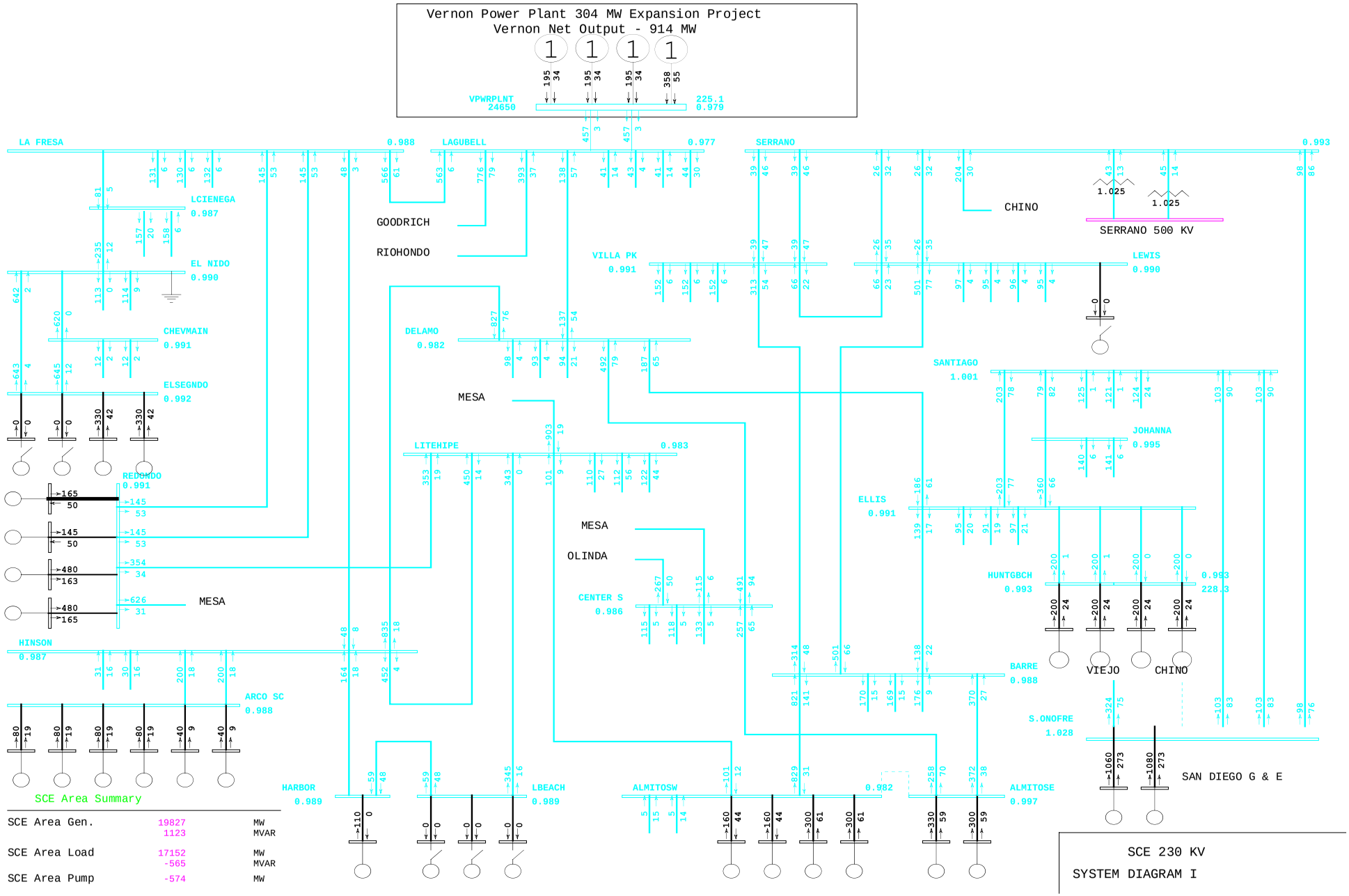
Case: 11LSP_pre-vpp304-rev1.sav

Load scaled from 2008 LSP to 2011 LSP (65% of 2011 HS)

MW/MVAR

sce230-main-pre-304ex

Rating = 1



General Electric International, Inc. PSLF Program Wed Jan 24 12:58:10 2007 vpp304mw\11lsp_pst-vpp914mw-rev1.sav

2011 Light Spring: POST VERNON 304 MW EXPANSION PROJECT		MW/MVAR
Case: 11LSp_pst-vpp304-rev1.sav		sce230-main-304exp.dr
Load scaled from 2008 LSP to 2011 LSP (65% of 2011 HS)		Rating = 1

Appendix B

Complete List of Power Flow Results

Following is a complete list of power flow results for the 2009 and 2011 Heavy Summer and Light Spring system conditions.

Table B-1. 2009 Heavy Summer NERC/WECC Category "B" and "C" Contingencies.

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
No Overload											

Table B-2. 2009 Light Spring NERC/WECC Category "B" and "C" Contingencies.

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Lighthipe - Mesa 230 kV Mesa - Redondo 230 kV	Del Amo - Hinson 230 kV	2400/2400	2825	2859	117.7	119.1	1.4	117.7	119.1	1.4
N-2	Del Amo - Hinson 230 kV Lighthipe - Long Beach 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2042	2096	172.4	176.9	4.6	127.7	131.1	3.4
N-2	Del Amo - Hinson 230 kV Hinson - Lighthipe 230 kV	Lighthipe - Long Beach 230 kV	1150/1500	1706	1748	148.4	152.0	3.6	113.7	116.5	2.8
N-2	Laguna Bell - La Fresa 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3072	3112	128.0	129.7	1.7	128.0	129.7	1.7
N-2	Del Amo - Hinson 230 kV Hinson - La Fresa 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2461	2507	102.5	104.5	1.9	102.5	104.5	1.9
N-2	Alamitos E - Center 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2498	2557	104.1	106.5	2.5	104.1	106.5	2.5
N-2	Del Amo - Laguna Bell 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2496	2594	104.0	108.1	4.1	104.0	108.1	4.1
N-1	Alamitos E - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2652	2750	110.5	114.6	4.1	110.5	114.6	4.1
N-2	Alamitos E - Barre No.1 230 kV Alamitos W - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2697	2799	112.4	116.6	4.2	112.4	116.6	4.2
N-2	Alamitos E - Center 230 kV Alamitos W - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2641	2743	110.1	114.3	4.2	110.1	114.3	4.2

Table B-2. 2009 Light Spring NERC/WECC Category "B" and "C" Contingencies. (continued)

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Alamitos W - Barre No.2 230 kV Del Amo - Ellis 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2750	2868	114.6	119.5	4.9	114.6	119.5	4.9
N-2	Goodrich - Laguna Bell 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2688	2807	112.0	117.0	5.0	112.0	116.9	5.0
N-2	Goodrich - Laguna Bell 230 kV Laguna Bell - Rio Hondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2376	2525	99.0	105.2	6.2	99.0	105.2	6.2
N-2	Laguna Bell - Rio Hondo 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2633	2796	109.7	116.5	6.8	109.7	116.5	6.8
N-2	Laguna Bell - La Fresa 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2421	2448	121.0	122.3	1.3	121.0	122.3	1.3
N-2	Goodrich - Laguna Bell 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2066	2167	103.2	108.3	5.1	103.2	108.3	5.1
N-2	Hinson - La Fresa 230 kV Lighthipe - Redondo 230 kV	Mesa - Redondo 230 kV	2000/2000	1954	2072	97.7	103.6	5.9	97.7	103.6	5.9
N-2	Laguna Bell - Rio Hondo 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2018	2151	100.9	107.5	6.6	100.9	107.5	6.6

Table B-3. 2011 Heavy Summer NERC/WECC Category "B" and "C" Contingencies.

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Del Amo - Laguna Bell 230 kV Lighthipe - Mesa 230 kV	Del Amo - Hinson 230 kV	2400/2400	2445	2552	101.9	106.4	4.5	101.9	106.4	4.5
N-2	Del Amo - Laguna Bell 230 kV Mesa - Redondo 230 kV	Del Amo - Hinson 230 kV	2400/2400	2313	2420	96.4	100.8	4.5	96.4	100.8	4.5
N-2	Lighthipe - Mesa 230 kV Mesa - Redondo 230 kV	Del Amo - Hinson 230 kV	2400/2400	2691	2724	112.1	113.5	1.4	112.1	113.5	1.4
N-1	Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1661	1701	140.2	143.6	3.3	103.9	106.4	2.5
N-2	Alamitos E - Center 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1637	1678	138.2	141.6	3.5	102.4	104.9	2.6

Table B-3. 2011 Heavy Summer NERC/WECC Category "B" and "C" Contingencies. (continued)

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Alamitos W - Lighthipe 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1647	1681	139.0	141.9	2.8	103.0	105.1	2.1
N-2	Arco - Hinson No.2 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1661	1701	140.2	143.6	3.3	103.9	106.4	2.5
N-2	Del Amo - Laguna Bell 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1766	1830	149.0	154.5	5.5	110.4	114.5	4.0
N-2	Del Amo - Hinson 230 kV Lighthipe - Long Beach 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2476	2529	209.0	213.4	4.5	154.9	158.2	3.3
N-2	Del Amo - Hinson 230 kV Hinson - Lighthipe 230 kV	Lighthipe - Long Beach 230 kV	1150/1500	2032	2072	176.7	180.2	3.5	135.5	138.1	2.6

Table B-4. 2011 Light Spring NERC/WECC Category "B" and "C" Contingencies.

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Lighthipe - Mesa 230 kV Mesa - Redondo 230 kV	Alamitos W - Barre No.2 230 kV	2480/3211	3177	3284	128.1	132.4	4.3	98.9	102.3	3.3
N-2	Lighthipe - Mesa 230 kV Mesa - Redondo 230 kV	Del Amo - Hinson 230 kV	2400/2400	3602	3643	150.1	151.8	1.7	150.1	151.8	1.7
N-2	Del Amo - Laguna Bell 230 kV Mesa - Redondo 230 kV	Del Amo - Hinson 230 kV	2400/2400	2498	2610	104.1	108.8	4.7	104.1	108.8	4.7
N-2	Del Amo - Laguna Bell 230 kV Lighthipe - Mesa 230 kV	Del Amo - Hinson 230 kV	2400/2400	2860	2973	119.2	123.9	4.7	119.2	123.9	4.7
N-2	Alamitos W - Lighthipe 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2045	2081	172.6	175.6	3.0	127.9	130.2	2.3
N-2	Hinson - La Fresa 230 kV Lighthipe - Long Beach 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1689	1727	142.6	145.7	3.1	105.7	108.0	2.3

Table B-4. 2011 Light Spring NERC/WECC Category "B" and "C" Contingencies. (continued)

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-1	Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2059	2101	173.8	177.3	3.6	128.8	131.4	2.6
N-2	Arco - Hinson No.2 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2059	2101	173.8	177.3	3.6	128.8	131.4	2.7
N-2	Alamitos E - Center 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2038	2082	172.0	175.7	3.7	127.5	130.2	2.7
N-2	Laguna Bell - La Fresa 230 kV Lighthipe - Redondo 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1702	1750	143.6	147.7	4.1	106.4	109.5	3.1
N-2	Del Amo - Hinson 230 kV Lighthipe - Long Beach 230 kV	Hinson - Lighthipe 230 kV	1185/1599	3010	3067	254.0	258.8	4.8	188.3	191.8	3.5
N-1	Lighthipe - Long Beach 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1633	1699	137.9	143.4	5.5	102.2	106.3	4.1
N-2	Del Amo - Laguna Bell 230 kV Del Amo - Hinson 230 kV	Hinson - Lighthipe 230 kV	1185/1599	2136	2205	180.3	186.1	5.8	133.6	137.9	4.3
N-2	Mesa - Redondo 230 kV Lighthipe - Redondo 230 kV	Hinson - Lighthipe 230 kV	1185/1599	1874	1971	158.2	166.4	8.2	117.2	123.3	6.1
N-2	Del Amo - Hinson 230 kV Hinson - Lighthipe 230 kV	Lighthipe - Long Beach 230 kV	1150/1500	2440	2485	212.2	216.1	3.9	162.7	165.7	3.0
N-1	Laguna Bell - La Fresa 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2610	2642	108.7	110.1	1.4	108.7	110.1	1.3
N-2	Hinson - La Fresa 230 kV Laguna Bell - La Fresa 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2555	2589	106.5	107.9	1.4	106.4	107.9	1.4
N-2	Laguna Bell - La Fresa 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3656	3698	152.3	154.1	1.8	152.3	154.1	1.8
N-2	Del Amo - Hinson 230 kV Hinson - La Fresa 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3227	3276	134.5	136.5	2.0	134.5	136.5	2.0
N-2	Alamitos E - Center 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3110	3171	129.6	132.2	2.6	129.6	132.1	2.6
N-2	Del Amo - Hinson 230 kV Hinson - Lighthipe 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2746	2808	114.4	117.0	2.6	114.4	117.0	2.6
N-2	Del Amo - Hinson 230 kV Lighthipe - Long Beach 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2919	2984	121.6	124.3	2.7	121.6	124.3	2.7
N-1	Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3023	3089	126.0	128.7	2.8	125.9	128.7	2.8
N-2	Arco - Hinson No.2 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3023	3089	126.0	128.7	2.8	125.9	128.7	2.8
N-2	Center - Del Amo 230 kV Del Amo - Laguna Bell 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2530	2602	105.4	108.4	3.0	105.4	108.4	3.0
N-2	Mesa - Redondo 230 kV Lighthipe - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2515	2597	104.8	108.2	3.4	104.8	108.2	3.4
N-2	Goodrich - Laguna Bell 230 kV Mesa - Vincent No.1 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2479	2567	103.3	107.0	3.7	103.3	107.0	3.7
N-2	Goodrich - Gould 230 kV Goodrich - Laguna Bell 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2464	2554	102.7	106.4	3.7	102.7	106.4	3.7

Table B-4. 2011 Light Spring NERC/WECC Category "B" and "C" Contingencies. (continued)

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-1	Goodrich - Laguna Bell 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2480	2570	103.4	107.1	3.8	103.3	107.1	3.7
N-2	Hinson - La Fresa 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2827	2925	117.8	121.9	4.1	117.8	121.9	4.1
N-2	Del Amo - Laguna Bell 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2855	2953	119.0	123.1	4.1	119.0	123.0	4.1
N-2	Center - Mesa 230 kV Center - Olinda 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2430	2529	101.3	105.4	4.1	101.3	105.4	4.1
N-2	La Fresa - Redondo No.1 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2888	2988	120.3	124.5	4.2	120.3	124.5	4.2
N-2	La Fresa - Redondo No.2 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2888	2988	120.3	124.5	4.2	120.3	124.5	4.2
N-2	Alamitos W - Lighthipe 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3097	3198	129.1	133.3	4.2	129.0	133.3	4.2
N-1	Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2857	2959	119.1	123.3	4.2	119.1	123.3	4.2
N-2	Del Amo - Laguna Bell 230 kV Del Amo - Hinson 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3125	3227	130.2	134.5	4.2	130.2	134.5	4.2
N-2	El Nido - La Fresa No.3 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2857	2959	119.1	123.3	4.2	119.0	123.3	4.2
N-2	El Nido - La Fresa No.4 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2857	2959	119.1	123.3	4.2	119.0	123.3	4.2
N-1	Alamitos W - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3172	3275	132.2	136.5	4.3	132.2	136.4	4.3
N-2	Barre - Villa Park 230 kV Barre - Lewis 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2612	2717	108.9	113.2	4.4	108.8	113.2	4.4
N-2	Alamitos E - Barre No.1 230 kV Alamitos W - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3223	3329	134.3	138.7	4.4	134.3	138.7	4.4
N-2	Alamitos E - Center 230 kV Alamitos W - Barre No.2 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3168	3273	132.0	136.4	4.4	132.0	136.4	4.4
N-2	Alamitos E - Center 230 kV Center - Del Amo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2669	2778	111.2	115.8	4.6	111.2	115.7	4.6
N-1	Center - Del Amo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2481	2591	103.4	108.0	4.6	103.4	108.0	4.6
N-1	Laguna Bell - Rio Hondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2410	2530	100.4	105.4	5.0	100.4	105.4	5.0
N-2	Alamitos W - Barre No.2 230 kV Del Amo - Ellis 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3307	3430	137.8	143.0	5.1	137.8	142.9	5.1
N-2	Goodrich - Laguna Bell 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3202	3327	133.5	138.6	5.2	133.4	138.6	5.2
N-2	Center - Mesa 230 kV Laguna Bell - Rio Hondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2509	2650	104.6	110.4	5.9	104.6	110.4	5.9

Table B-4. 2011 Light Spring NERC/WECC Category "B" and "C" Contingencies. (continued)

Outage Type	CONTINGENCY	AFFECTED ELEMENT	Normal/ Emergency Rating	Pre-Project Loading (Amps)	Post-Project Loading (Amps)	Percentage of Normal Rating			Percentage of Emergency Rating		
						Pre-Project	Post-Project	Project Impact	Pre-Project	Post-Project	Project Impact
N-2	Goodrich - Laguna Bell 230 kV Laguna Bell - Rio Hondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	2851	3004	118.8	125.2	6.4	118.8	125.2	6.4
N-2	Laguna Bell - Rio Hondo 230 kV Mesa - Redondo 230 kV	Lighthipe - Mesa 230 kV	2400/2400	3164	3332	131.9	138.9	7.0	131.9	138.8	7.0
N-2	Laguna Bell - La Fresa 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2794	2822	139.6	141.1	1.4	139.6	141.1	1.4
N-2	Del Amo - Hinson 230 kV Hinson - Lighthipe 230 kV	Mesa - Redondo 230 kV	2000/2000	1961	2031	98.0	101.5	3.5	98.0	101.5	3.5
N-1	Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2090	2177	104.5	108.8	4.4	104.5	108.8	4.4
N-2	Del Amo - Laguna Bell 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2090	2192	104.4	109.6	5.1	104.4	109.6	5.1
N-2	Del Amo - Laguna Bell 230 kV Del Amo - Hinson 230 kV	Mesa - Redondo 230 kV	2000/2000	1911	2015	95.5	100.7	5.2	95.5	100.7	5.2
N-2	Goodrich - Laguna Bell 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2367	2473	118.3	123.6	5.3	118.3	123.6	5.3
N-2	Hinson - La Fresa 230 kV Lighthipe - Redondo 230 kV	Mesa - Redondo 230 kV	2000/2000	1964	2085	98.2	104.2	6.0	98.2	104.2	6.0
N-2	Goodrich - Laguna Bell 230 kV Laguna Bell - Rio Hondo 230 kV	Mesa - Redondo 230 kV	2000/2000	1986	2113	99.3	105.6	6.4	99.3	105.6	6.4
N-2	Laguna Bell - Rio Hondo 230 kV Lighthipe - Mesa 230 kV	Mesa - Redondo 230 kV	2000/2000	2338	2475	116.9	123.7	6.9	116.9	123.7	6.9

Appendix C

List of Power Flow Contingencies

2011 Heavy Summer and 2012 Light Spring list of contingencies.

```
Category “B” Contingency List.
#   The following contingencies are included.
#   B2 - All single transmission circuit outages (230 kV).
#   B3 - All single transformer outages (500/230kV) under the ISO control.
#   Selected overlapping (single generator unit and transmission circuit outages).
#

#   Base Case -- Case Number 0
0
#
########################## B2 - LINE CONTINGENCIES (230 kV) ############################
# All 500-kV line contingencies were simulated with the governor power flow method.
#
#   Case Number 1
1  "MEAD S   230.00"  "ELDORDO  230.00"  "1"  0
0
#
#   Case Number 2
1  "MEAD S   230.00"  "ELDORDO  230.00"  "2"  0
0
#
#   Case Number 3
1  "ALMITOSE 230.00"  "BARRE    230.00"  "1"  0
0
#
#   Case Number 4
1  "ALMITOSE 230.00"  "CENTER S 230.00"  "1"  0
0
#
#   Case Number 5
1  "ALMITOSW 230.00"  "ALMITOSE 230.00"  "1"  0
0
#
#   Case Number 6
1  "ALMITOSW 230.00"  "BARRE    230.00"  "2"  0
0
#
#   Case Number 7
1  "ALMITOSW 230.00"  "LITEHIPE 230.00"  "1"  0
0
#
#   Case Number 8
1  "ARCO SC  230.00"  "HINSON   230.00"  "1"  0
0
#
#   Case Number 9
1  "ARCO SC  230.00"  "HINSON   230.00"  "2"  0
0
#
#   Case Number 10
1  "BARRE    230.00"  "ELLIS    230.00"  "1"  0
0
#
#   Case Number 11
1  "BARRE    230.00"  "VILLA PK 230.00"  "1"  0
0
#
#   Case Number 12
1  "BARRE    230.00"  "LEWIS    230.00"  "1"  0
0
#
#   Case Number 13
1  "CAMINO   230.00"  "MEAD S   230.00"  "E"  0
0
#
#   Case Number 14
1  "CAMINO   230.00"  "MEAD S   230.00"  "W"  0
```

```
0
#
#   Case Number 15
1  "CAMINO   230.00"  "GENE     230.00"  "1"  0
0
#
#   Case Number 16
1  "CENTER S 230.00"  "MESA CAL 230.00"  "1"  0
0
#
#   Case Number 17
1  "CENTER S 230.00"  "OLINDA   230.00"  "1"  0
0
#
#   Case Number 18
1  "CHINO    230.00"  "MIRALOMW 230.00"  "1"  0
0
#
#   Case Number 19
1  "CHINO    230.00"  "MIRALOMW 230.00"  "2"  0
0
#
#   Case Number 20
1  "CHINO    230.00"  "SERRANO  230.00"  "1"  0
0
#
#   Case Number 21
1  "CHINO    230.00"  "MIRALOME 230.00"  "3"  0
0
#
#   Case Number 22
1  "DELAMO   230.00"  "CENTER S 230.00"  "1"  0
0
#
#   Case Number 23
1  "DELAMO   230.00"  "ELLIS    230.00"  "1"  0
0
#
#   Case Number 24
1  "DELAMO   230.00"  "LAGUBELL 230.00"  "1"  0
0
#
#   Case Number 25
1  "EAGLROCK 230.00"  "MESA CAL 230.00"  "1"  0
0
#
#   Case Number 26
1  "EAGLROCK 230.00"  "PARDEE   230.00"  "1"  0
0
#
#   Case Number 27
1  "EAGLROCK 230.00"  "SYLMAR S 230.00"  "1"  0
0
#
#   Case Number 28
1  "EL NIDO  230.00"  "LA FRESA 230.00"  "3"  0
0
#
#   Case Number 29
1  "EL NIDO  230.00"  "LA FRESA 230.00"  "4"  0
0
#
#   Case Number 30
1  "EL NIDO  230.00"  "LCIENEGA 230.00"  "1"  0
0
#
#   Case Number 31
1  "EL NIDO  230.00"  "CHEVMAIN 230.00"  "1"  0
0
#
```

```
#   Case Number 32
1  "ELLIS    230.00"  "HUNTGBCH 230.00"  "1"  0
0
#
#   Case Number 33
1  "ELLIS    230.00"  "HUNTGBCH 230.00"  "3"  0
0
#
#   Case Number 34
1  "ELLIS    230.00"  "JOHANNA  230.00"  "1"  0
0
#
#   Case Number 35
1  "ELLIS    230.00"  "SANTIAGO 230.00"  "1"  0
0
#
#   Case Number 36
1  "ELLIS    230.00"  "HUNTBCH1 230.00"  "2"  0
0
#
#   Case Number 37
1  "ELLIS    230.00"  "HUNTBCH1 230.00"  "4"  0
0
#
#   Case Number 38
1  "ELSEGNDO 230.00"  "EL NIDO  230.00"  "1"  0
0
#
#   Case Number 39
1  "ELSEGNDO 230.00"  "CHEVMAIN 230.00"  "1"  0
0
#
#   Case Number 40
1  "ETIWANDA 230.00"  "PADUA    230.00"  "1"  0
0
#
#   Case Number 41
1  "ETIWANDA 230.00"  "SANBRDNO 230.00"  "1"  0
0
#
#   Case Number 42
1  "ETIWANDA 230.00"  "VSTA     230.00"  "1"  0
0
#
#   Case Number 43
1  "ETIWANDA 230.00"  "MIRALOME 230.00"  "1"  0
0
#
#   Case Number 44
1  "HARBOR   230.00"  "HINSON   230.00"  "1"  0
0
#
#   Case Number 45
1  "HARBOR   230.00"  "LBEACH   230.00"  "1"  0
0
#
#   Case Number 46
1  "HINSON   230.00"  "DELAMO   230.00"  "1"  0
0
#
#   Case Number 47
1  "HUNTGBCH 230.00"  "HUNTBCH1 230.00"  "1"  0
0
#
#   Case Number 48
1  "JOHANNA  230.00"  "SANTIAGO 230.00"  "1"  0
0
#
#   Case Number 49
1  "LA FRESA 230.00"  "HINSON   230.00"  "1"  0
```

```
0
#
#   Case Number 50
1  "LA FRESA 230.00"  "LAGUBELL 230.00"  "1"  0
0
#
#   Case Number 51
1  "LA FRESA 230.00"  "REDONDO  230.00"  "1"  0
0
#
#   Case Number 52
1  "LA FRESA 230.00"  "REDONDO  230.00"  "2"  0
0
#
#   Case Number 53
1  "LAGUBELL 230.00"  "RIOHONDO 230.00"  "1"  0
0
#
#   Case Number 54
1  "LBEACH   230.00"  "LITEHIPE 230.00"  "1"  0
0
#
#   Case Number 55
1  "LCIENEGA 230.00"  "LA FRESA 230.00"  "1"  0
0
#
#   Case Number 56
1  "LITEHIPE 230.00"  "HINSON   230.00"  "1"  0
0
#
#   Case Number 57
1  "LITEHIPE 230.00"  "MESA CAL 230.00"  "1"  0
0
#
#   Case Number 58
1  "MAGUNDEN 230.00"  "OMAR     230.00"  "1"  0
0
#
#   Case Number 59
1  "MAGUNDEN 230.00"  "PASTORIA 230.00"  "1"  0
0
#
#   Case Number 60
1  "MAGUNDEN 230.00"  "PASTORIA 230.00"  "2"  0
0
#
#   Case Number 61
1  "MAGUNDEN 230.00"  "PASTORIA 230.00"  "3"  0
0
#
#   Case Number 62
1  "MAGUNDEN 230.00"  "SPRINGVL 230.00"  "1"  0
0
#
#   Case Number 63
1  "MAGUNDEN 230.00"  "SPRINGVL 230.00"  "2"  0
0
#
#   Case Number 64
1  "MAGUNDEN 230.00"  "VESTAL   230.00"  "1"  0
0
#
#   Case Number 65
1  "MAGUNDEN 230.00"  "VESTAL   230.00"  "2"  0
0
#
#   Case Number 66
1  "MAGUNDEN 230.00"  "ANTELOPE 230.00"  "1"  0
0
#
```

```
#   Case Number 67
1  "MAGUNDEN 230.00"  "ANTELOPE 230.00"  "2"  0
0
#
#   Case Number 68
1  "MESA CAL 230.00"  "REDONDO  230.00"  "1"  0
0
#
#   Case Number 69
1  "MESA CAL 230.00"  "RIOHONDO 230.00"  "1"  0
0
#
#   Case Number 70
1  "MESA CAL 230.00"  "WALNUT   230.00"  "1"  0
0
#
#   Case Number 71
1  "MESA CAL 230.00"  "ANTELOPE 230.00"  "1"  0
0
#
#   Case Number 72
1  "MIRALOMW 230.00"  "WALNUT   230.00"  "1"  0
0
#
#   Case Number 73
1  "MIRALOMW 230.00"  "VSTA     230.00"  "1"  0
0
#
#   Case Number 74
1  "MOORPARK 230.00"  "ORMOND   230.00"  "1"  0
0
#
#   Case Number 75
1  "MOORPARK 230.00"  "ORMOND   230.00"  "2"  0
0
#
#   Case Number 76
1  "MOORPARK 230.00"  "ORMOND   230.00"  "3"  0
0
#
#   Case Number 77
1  "MOORPARK 230.00"  "ORMOND   230.00"  "4"  0
0
#
#   Case Number 78
1  "OLINDA   230.00"  "WALNUT   230.00"  "1"  0
0
#
#   Case Number 79
1  "PARDEE   230.00"  "MOORPARK 230.00"  "1"  0
0
#
#   Case Number 80
1  "PARDEE   230.00"  "MOORPARK 230.00"  "2"  0
0
#
#   Case Number 81
1  "PARDEE   230.00"  "MOORPARK 230.00"  "3"  0
0
#
#   Case Number 82
1  "PARDEE   230.00"  "PASTORIA 230.00"  "1"  0
0
#
#   Case Number 83
1  "PARDEE   230.00"  "S.CLARA  230.00"  "1"  0
0
#
#   Case Number 84
1  "PARDEE   230.00"  "SYLMAR S 230.00"  "1"  0
```

```
0
#
#   Case Number 85
1  "PARDEE   230.00"  "SYLMAR S 230.00"  "2"  0
0
#
#   Case Number 86
1  "PARDEE   230.00"  "VINCENT  230.00"  "1"  0
0
#
#   Case Number 87
1  "PARDEE   230.00"  "SAUG TAP 230.00"  "1"  0
0
#
#   Case Number 88
1  "PARDEE   230.00"  "SAUG TAP 230.00"  "2"  0
0
#
#   Case Number 89
1  "PARDEE   230.00"  "WARNETAP 230.00"  "1"  0
0
#
#   Case Number 90
1  "PARDEE   230.00"  "BAILEY   230.00"  "1"  0
0
#
#   Case Number 91
1  "PASTORIA 230.00"  "WARNETAP 230.00"  "1"  0
0
#
#   Case Number 92
1  "PASTORIA 230.00"  "EDMONSTN 230.00"  "1"  0
0
#
#   Case Number 93
1  "PASTORIA 230.00"  "PSTRIA   230.00"  "1"  0
0
#
#   Case Number 94
1  "REDONDO  230.00"  "LITEHIPE 230.00"  "1"  0
0
#
#   Case Number 95
1  "RIOHONDO 230.00"  "VINCENT  230.00"  "2"  0
0
#
#   Case Number 96
1  "S.CLARA  230.00"  "GOLETA   230.00"  "1"  0
0
#
#   Case Number 97
1  "S.CLARA  230.00"  "GOLETA   230.00"  "2"  0
0
#
#   Case Number 98
1  "S.CLARA  230.00"  "MANDALAY 230.00"  "1"  0
0
#
#   Case Number 99
1  "S.CLARA  230.00"  "MANDALAY 230.00"  "2"  0
0
#
#   Case Number 100
1  "S.CLARA  230.00"  "MOORPARK 230.00"  "1"  0
0
#
#   Case Number 101
1  "S.CLARA  230.00"  "MOORPARK 230.00"  "2"  0
0
#
```

```
#   Case Number 102
1  "S.ONOFRE 230.00"  "SANTIAGO 230.00"  "1"  0
0
#
#   Case Number 103
1  "S.ONOFRE 230.00"  "SANTIAGO 230.00"  "2"  0
0
#
#   Case Number 104
1  "S.ONOFRE 230.00"  "SERRANO  230.00"  "1"  0
0
#
#   Case Number 105
1  "SANBRDNO 230.00"  "DEVERS   230.00"  "1"  0
0
#
#   Case Number 106
1  "SERRANO  230.00"  "VILLA PK 230.00"  "1"  0
0
#
#   Case Number 107
1  "SERRANO  230.00"  "VILLA PK 230.00"  "2"  0
0
#
#   Case Number 108
1  "SPRINGVL 230.00"  "BIG CRK3 230.00"  "1"  0
0
#
#   Case Number 109
1  "SPRINGVL 230.00"  "BIG CRK4 230.00"  "1"  0
0
#
#   Case Number 110
1  "SYC CYN  230.00"  "OMAR     230.00"  "1"  0
0
#
#   Case Number 111
1  "SYLMAR S 230.00"  "GOULD    230.00"  "1"  0
0
#
#   Case Number 112
1  "VESTAL   230.00"  "RECTOR   230.00"  "1"  0
0
#
#   Case Number 113
1  "VINCENT  230.00"  "MESA CAL 230.00"  "1"  0
0
#
#   Case Number 114
1  "VINCENT  230.00"  "RIOHONDO 230.00"  "1"  0
0
#
#   Case Number 115
1  "VINCENT  230.00"  "S.CLARA  230.00"  "1"  0
0
#
#   Case Number 116
1  "VINCENT  230.00"  "SEAWEST  230.00"  "1"  0
0
#
#   Case Number 117
1  "VINCENT  230.00"  "ANTELOPE 230.00"  "1"  0
0
#
#   Case Number 118
1  "VINCENT  230.00"  "PEARBLSM 230.00"  "1"  0
0
#
#   Case Number 119
1  "WARNE    230.00"  "WARNETAP 230.00"  "1"  0
```

```
0
#
#   Case Number 120
1  "PISGAH   230.00"  "ELDORDO  230.00"  "2"  0
0
#
#   Case Number 121
1  "PISGAH   230.00"  "LUGO     230.00"  "1"  0
0
#
#   Case Number 122
1  "PISGAH   230.00"  "LUGO     230.00"  "2"  0
0
#
#   Case Number 123
1  "PISGAH   230.00"  "CIMA     230.00"  "1"  0
0
#
#   Case Number 124
1  "RECTOR   230.00"  "VESTAL   230.00"  "2"  0
0
#
#   Case Number 125
1  "BIG CRK1 230.00"  "RECTOR   230.00"  "1"  0
0
#
#   Case Number 126
1  "BIG CRK1 230.00"  "BIG CRK2 230.00"  "1"  0
0
#
#   Case Number 127
1  "BIG CRK1 230.00"  "EASTWOOD 230.00"  "1"  0
0
#
#   Case Number 128
1  "BIG CRK2 230.00"  "BIG CRK3 230.00"  "1"  0
0
#
#   Case Number 129
1  "BIG CRK2 230.00"  "BIG CRK8 230.00"  "1"  0
0
#
#   Case Number 130
1  "BIG CRK3 230.00"  "RECTOR   230.00"  "1"  0
0
#
#   Case Number 131
1  "BIG CRK4 230.00"  "BIG CRK3 230.00"  "1"  0
0
#
#   Case Number 132
1  "BIG CRK8 230.00"  "BIG CRK3 230.00"  "1"  0
0
#
#   Case Number 133
1  "MAMMOTH  230.00"  "BIG CRK3 230.00"  "1"  0
0
#
#   Case Number 134
1  "TOT005   230.00"  "VICTOR   230.00"  "1"  0
0
#
#   Case Number 135
1  "BAILEY   230.00"  "PASTORIA 230.00"  "1"  0
0
#
#   Case Number 136
1  "VICTOR   230.00"  "LUGO     230.00"  "1"  0
0
#
```

```
#   Case Number 137
1  "VICTOR   230.00"  "LUGO     230.00"  "2"  0
0
#
#   Case Number 138
1  "CIMA     230.00"  "ELDORDO  230.00"  "1"  0
0
#
#   Case Number 139
1  "KRAMER   230.00"  "LUGO     230.00"  "1"  0
0
#
#   Case Number 140
1  "KRAMER   230.00"  "LUGO     230.00"  "2"  0
0
#
#   Case Number 141
1  "KRAMER   230.00"  "COLWATER 230.00"  "1"  0
0
#
#   Case Number 142
1  "KRAMER   230.00"  "COLWATER 230.00"  "2"  0
0
#
#   Case Number 143
1  "BLM EAST 230.00"  "BLM WEST 230.00"  "1"  0
0
#
#   Case Number 144
1  "BLM WEST 230.00"  "KRAMER   230.00"  "1"  0
0
#
#   Case Number 145
1  "LUZ LSP  230.00"  "KRAMER   230.00"  "1"  0
0
#
#   Case Number 146
1  "OXBOW  B 230.00"  "OXBOW  A 230.00"  "1"  0
0
#
#   Case Number 147
1  "LUZ8     230.00"  "LUZ LSP  230.00"  "1"  0
0
#
#   Case Number 148
1  "LUZ9     230.00"  "LUZ LSP  230.00"  "1"  0
0
#
#   Case Number 149
1  "NAVYCOSO 230.00"  "BLM EAST 230.00"  "1"  0
0
#
#   Case Number 150
1  "OAK_VLLY 230.00"  "SANBRDNO 230.00"  "1"  0
0
#
#   Case Number 151
1  "DEVERS   230.00"  "OAK_VLLY 230.00"  "1"  0
0
#
#   Case Number 152
1  "DEVERS   230.00"  "MIRAGE   230.00"  "1"  0
0
#
#   Case Number 153
1  "DEVERS   230.00"  "VSTA     230.00"  "2"  0
0
#
#   Case Number 154
1  "VSTA     230.00"  "SANBRDNO 230.00"  "2"  0
```

```
0
#
#   Case Number 155
1  "VSTA     230.00"  "DEVERS   230.00"  "1"  0
0
#
#   Case Number 156
1  "GOODRICH 230.00"  "GOULD    230.00"  "1"  0
0
#
#   Case Number 157
1  "GOODRICH 230.00"  "LAGUBELL 230.00"  "1"  0
0
#
#   Case Number 158
1  "LEWIS    230.00"  "SERRANO  230.00"  "1"  0
0
#
#   Case Number 159
1  "LEWIS    230.00"  "SERRANO  230.00"  "2"  0
0
#
#   Case Number 160
1  "LEWIS    230.00"  "VILLA PK 230.00"  "1"  0
0
#
#   Case Number 161
1  "EAGLEMTN 230.00"  "IRON MTN 230.00"  "1"  0
0
#
#   Case Number 162
1  "IRON MTN 230.00"  "CAMINO   230.00"  "1"  0
0
#
#   Case Number 163
1  "J.HINDS  230.00"  "MIRAGE   230.00"  "1"  0
0
#
#   Case Number 164
1  "J.HINDS  230.00"  "EAGLEMTN 230.00"  "1"  0
0
#
#   Case Number 165
1  "MIRALOME 230.00"  "MIRALOMW 230.00"  "1"  0
0
#
#   Case Number 166
1  "MIRALOME 230.00"  "OLINDA   230.00"  "1"  0
0
#
#   Case Number 167
1  "MIRALOME 230.00"  "PADUA    230.00"  "1"  0
0
#
#   Case Number 168
1  "MIRALOME 230.00"  "VSTA     230.00"  "2"  0
0
#
#   Case Number 169
1  "CHINO    230.00"  "S.ONOFRE 230.00"  "1"  0
0
#
#   Case Number 170
1  "TOT109   230.00"  "SANBRDNO 230.00"  "1"  0
0
#
#   Case Number 171
1  "TOT109   230.00"  "SANBRDNO 230.00"  "2"  0
0
#
```

```
#   Case Number 172
1  "VIEJOSC  230.00"  "CHINO    230.00"  "1"  0
0
#
#   Case Number 173
1  "VIEJOSC  230.00"  "S.ONOFRE 230.00"  "1"  0
0
#
#   Case Number 174
1  "ETIWANDA 230.00"  "RANCHVST 230.00"  "1"  0
0
#
#   Case Number 175
1  "ETIWANDA 230.00"  "RANCHVST 230.00"  "2"  0
0
#
#   Case Number 176
1  "ETIWANDA 230.00"  "RANCHVST 230.00"  "3"  0
0
#
#   Case Number 177
1  "RANCHVST 230.00"  "PADUA    230.00"  "2"  0
0
#
#   Case Number 178
1  "RANCHVST 230.00"  "PADUA    230.00"  "1"  0
0
#
#   Case Number 179
1  "RANCHVST 230.00"  "MIRALOME 230.00"  "1"  0
0
#
#   Case Number 180
1  "RANCHVST 230.00"  "MIRALOME 230.00"  "2"  0
0
#
#   Case Number 181
1  "ANTELOPE 230.00"  "PARDEE   230.00"  "1"  0
0
#
#   Case Number 182
1  "MIRALOMW 230.00"  "JURUPA   230.00"  "1"  0
0
#
#   Case Number 183
1  "JURUPA   230.00"  "VSTA     230.00"  "1"  0
0
#
#   Case Number 184
1  "TOT135   230.00"  "WALNUT   230.00"  "1"  0
0
#
#   Case Number 185
1  "ETIWANDA 230.00"  "TOT139DL 230.00"  "1"  0
0
#
#   Case Number 186
1  "DEVERS   230.00"  "TOT032   230.00"  "1"  0
0
#
#   Case Number 187
1  "TOT138   230.00"  "LBEACH   230.00"  "1"  0
0
#
#   Case Number 188
1  "VINCENT  230.00"  "ANTELOPE 230.00"  "2"  0
0
#
#   Case Number 189
1  "ANTELOPE 230.00"  "COTTONWD 230.00"  "1"  0
```

```
0
#
#   Case Number 190
1  "ANTELOPE 230.00"  "COTTONWD 230.00"  "2"  0
0
#
#   Case Number 191
1  "MAGUNDEN 230.00"  "COTTONWD 230.00"  "1"  0
0
#
#   Case Number 192
1  "VINCENT  230.00"  "MESA CAL 230.00"  "2"  0
0
#
#   Case Number 193
1  "HINSON   230.00"  "TOT166   230.00"  "1"  0
0
#
#   Case Number 194
1  "HINSON   230.00"  "TOT166   230.00"  "2"  0
0
#
#   Case Number 195
1  "VINCENT  230.00"  "TEH_GENS 230.00"  "1"  0
0
#
########################## B3 - TRANSFORMER CONTINGENCIES (500/230 kV) ##############################
#
#   Case Number 196
2  "ELDORDO  500.00"  "ELDORDO  230.00"  "1"  0
0
#
#   Case Number 197
2  "ELDORDO  500.00"  "ELDORDO  230.00"  "2"  0
0
#
#   Case Number 198
2  "LUGO     500.00"  "LUGO     230.00"  "1"  0
0
#
#   Case Number 199
2  "LUGO     500.00"  "LUGO     230.00"  "2"  0
0
#
#   Case Number 200
2  "MIRALOMA 500.00"  "MIRALOMW 230.00"  "1"  0
0
#
#   Case Number 201
2  "MIRALOMA 500.00"  "MIRALOMW 230.00"  "2"  0
0
#
#   Case Number 202
2  "MIRALOMA 500.00"  "MIRALOME 230.00"  "3"  0
0
#
#   Case Number 203
2  "MIRALOMA 500.00"  "MIRALOME 230.00"  "4"  0
0
#
#   Case Number 204
2  "SERRANO  500.00"  "SERRANO  230.00"  "1"  0
0
#
#   Case Number 205
2  "SERRANO  500.00"  "SERRANO  230.00"  "2"  0
0
#
#   Case Number 206
2  "SERRANO  500.00"  "SERRANO  230.00"  "3"  0
```

```
0
#
#   Case Number 207
2  "VINCENT  500.00"  "VINCENT  230.00"  "1"  0
0
#
#   Case Number 208
2  "VINCENT  500.00"  "VINCENT  230.00"  "2"  0
0
#
#   Case Number 209
2  "VINCENT  500.00"  "VINCENT  230.00"  "3"  0
0
#
#   Case Number 210
2  "VINCENT  500.00"  "VINCENT  230.00"  "4"  0
0
#
#   Case Number 211
2  "DEVERS   500.00"  "DEVERS   230.00"  "1"  0
0
#
#   Case Number 212
2  "DEVERS   500.00"  "DEVERS   230.00"  "2"  0
0
#
#   Case Number 213
2  "RANCHVST 500.00"  "RANCHVST 230.00"  "1"  0
0
#
#   Case Number 214
2  "RANCHVST 500.00"  "RANCHVST 230.00"  "2"  0
0
#
#   Case Number 215
2  "MESA CAL 500.00"  "MESA CAL 230.00"  "1"  0
0
#
#   Case Number 216
2  "MESA CAL 500.00"  "MESA CAL 230.00"  "2"  0
0
#
#   Case Number 217
2  "MESA CAL 500.00"  "MESA CAL 230.00"  "3"  0
0
#
#   Case Number 218
2  "CMPPSHFT 230.00"  "CMPNL500 500.00"  "2"  0
0
#
#   Case Number 219
2  "CMPPSHFT 230.00"  "CMPNL500 500.00"  "1"  0
0
#
##################################################################################################
#################
#
# PROJECT CONTINGENCIES
#
##################################################################################################
##################
#
#   Case Number 220
1  "LAGUBELL 230.00"  "VPWRPLNT 230.00"  "1"  0
0
#
#   Case Number 221
1  "LAGUBELL 230.00"  "VPWRPLNT 230.00"  "2"  0
0
#
```

```
#   Case Number 222
3  "VERNNST1  19.00"  "0"  "1"  0
0
#
#   Case Number 223
3  "VERNNCT1  16.50"  "0"  "1"  0
0
#
#   Case Number 224
3  "VERNNCT2  16.50"  "0"  "1"  0
0
#
#   Case Number 225
3  "VERNNCT3  16.50"  "0"  "1"  0
0
#
-1
# EOF
```

```
Category “C” Contingency List.
#   The following contingencies are included.
#   C3 - Selected combination of two successive category B outages (except those included above in Category "B").
#   C5 - Outages of double circuit tower lines.

#   Base Case -- Case Number 0
0
#
########################## C3 & C5 CONTINGENCIES ##############################
#
#   Case Number 1
#
1 24006 24016  "1 "    0      line from ALMITOSE 230.00  to  BARRE    230.00
1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
21
0
#
#   Case Number 2
 1 24006 24016  "1 "    0      line from ALMITOSE 230.00  to  BARRE    230.00
 1 24008 24016  "2 "    0      line from ALMITOSW 230.00  to  BARRE    230.00
0
#
#   Case Number 3
 1 24006 24016  "1 "    0      line from ALMITOSE 230.00  to  BARRE    230.00
 1 24008 24084  "1 "    0      line from ALMITOSW 230.00  to  LITEHIPE 230.00
0
#
#   Case Number 4
 1 24006 24016  "1 "    0      line from ALMITOSE 230.00  to  BARRE    230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 5
 1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
 1 24008 24016  "2 "    0      line from ALMITOSW 230.00  to  BARRE    230.00
0
#
#   Case Number 6
# 1 24008 24016  "2 "    0      line from ALMITOSW 230.00  to  BARRE    230.00
# 1 24008 24084  "1 "    0      line from ALMITOSW 230.00  to  LITEHIPE 230.00
#0
#
#   Case Number 7
 1 24008 24016  "2 "    0      line from ALMITOSW 230.00  to  BARRE    230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 8
 1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
 1 24008 24084  "1 "    0      line from ALMITOSW 230.00  to  LITEHIPE 230.00
0
#
#   Case Number 9
 1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
 1 24029 24021  "1 "    0      line from DELAMO   230.00  to  CENTER S 230.00
0
#
#   Case Number 10
 1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 11
 1 24006 24021  "1 "    0      line from ALMITOSE 230.00  to  CENTER S 230.00
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
0
#
#   Case Number 12
 1 24008 24084  "1 "    0      line from ALMITOSW 230.00  to  LITEHIPE 230.00
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
```

```
0
#
#   Case Number 13
 1 24008 24084  "1 "    0      line from ALMITOSW 230.00  to  LITEHIPE 230.00
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
0
#
#   Case Number 14
 1 24015 24065  "1 "    0      line from ARCO SC  230.00  to  HINSON   230.00
 1 24015 24065  "2 "    0      line from ARCO SC  230.00  to  HINSON   230.00
21
0
#
#   Case Number 15
 1 24029 24021  "1 "    0      line from DELAMO   230.00  to  CENTER S 230.00
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
0
#
#   Case Number 16
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
0
#
#   Case Number 17
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
 1 24074 24076  "1 "    0      line from LA FRESA 230.00  to  LAGUBELL 230.00
0
#
#   Case Number 18
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
 1 24084 24091  "1 "    0      line from LITEHIPE 230.00  to  MESA CAL 230.00
0
#
#   Case Number 19
 1 24029 24076  "1 "    0      line from DELAMO   230.00  to  LAGUBELL 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 20
 1 24016 24044  "1 "    0      line from BARRE    230.00  to  ELLIS    230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 21
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 22
 1 24016 25201  "1 "    0      line from BARRE    230.00  to  LEWIS    230.00
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
0
#
#   Case Number 23
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
 1 24016 25201  "1 "    0      line from BARRE    230.00  to  LEWIS    230.00
0
#
#   Case Number 24
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
0
#
#   Case Number 25
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
0
#
#   Case Number 26
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
```

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 1 25201 24154  "1 "    0      line from LEWIS    230.00  to  VILLA PK 230.00
0
#
#   Case Number 27
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 25201 24154  "1 "    0      line from LEWIS    230.00  to  VILLA PK 230.00
0
#
#   Case Number 28
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 25201 24154  "1 "    0      line from LEWIS    230.00  to  VILLA PK 230.00
0
#
#   Case Number 29
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
0
#
#   Case Number 30
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 31
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 24137 24154  "2 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 32
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 33
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 24137 24154  "2 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 34
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
 1 24137 24154  "2 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 35
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
0
#
#   Case Number 36
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
 1 24077 24084  "1 "    0      line from LBEACH   230.00  to  LITEHIPE 230.00
0
#
#   Case Number 37
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
 1 24084 24065  "1 "    0      line from LITEHIPE 230.00  to  HINSON   230.00
0
#
#   Case Number 38
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
 1 24084 24065  "1 "    0      line from LITEHIPE 230.00  to  HINSON   230.00
0
#
#   Case Number 39
 1 24077 24084  "1 "    0      line from LBEACH   230.00  to  LITEHIPE 230.00
 1 24084 24065  "1 "    0      line from LITEHIPE 230.00  to  HINSON   230.00
0
#
#   Case Number 40
 1 24061 24065  "1 "    0      line from HARBOR   230.00  to  HINSON   230.00
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 1 24077 24084  "1 "    0      line from LBEACH   230.00  to  LITEHIPE 230.00
21
0
#
#   Case Number 41
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
 1 24077 24084  "1 "    0      line from LBEACH   230.00  to  LITEHIPE 230.00
0
#
#   Case Number 42
 1 24061 24065  "1 "    0      line from HARBOR   230.00  to  HINSON   230.00
 1 24061 24077  "1 "    0      line from HARBOR   230.00  to  LBEACH   230.00
21
0
#
#   Case Number 43
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
 1 24074 24076  "1 "    0      line from LA FRESA 230.00  to  LAGUBELL 230.00
0
#
#   Case Number 44
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 45
 1 24074 24065  "1 "    0      line from LA FRESA 230.00  to  HINSON   230.00
 1 24125 24084  "1 "    0      line from REDONDO  230.00  to  LITEHIPE 230.00
0
#
#   Case Number 46
 1 24074 24076  "1 "    0      line from LA FRESA 230.00  to  LAGUBELL 230.00
 1 24125 24084  "1 "    0      line from REDONDO  230.00  to  LITEHIPE 230.00
0
#
#   Case Number 47
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24125 24084  "1 "    0      line from REDONDO  230.00  to  LITEHIPE 230.00
0
#
#   Case Number 48
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24125 24084  "1 "    0      line from REDONDO  230.00  to  LITEHIPE 230.00
0
#
#   Case Number 49
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
 1 24125 24084  "1 "    0      line from REDONDO  230.00  to  LITEHIPE 230.00
0
#
#   Case Number 50
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24082 24074  "1 "    0      line from LCIENEGA 230.00  to  LA FRESA 230.00
0
#
#   Case Number 51
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24082 24074  "1 "    0      line from LCIENEGA 230.00  to  LA FRESA 230.00
0
#
#   Case Number 52
 1 24040 24074  "3 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24082 24074  "1 "    0      line from LCIENEGA 230.00  to  LA FRESA 230.00
0
#
#   Case Number 53
 1 24040 24074  "4 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24082 24074  "1 "    0      line from LCIENEGA 230.00  to  LA FRESA 230.00
0
#
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#   Case Number 54
 1 24040 24082  "1 "    0      line from EL NIDO  230.00  to  LCIENEGA 230.00
 1 24082 24074  "1 "    0      line from LCIENEGA 230.00  to  LA FRESA 230.00
0
#
#   Case Number 55
 1 24040 24198  "1 "    0      line from EL NIDO  230.00  to  CHEVMAIN 230.00
 1 24049 24040  "1 "    0      line from ELSEGNDO 230.00  to  EL NIDO  230.00
0
#
#   Case Number 56
 1 24040 24198  "1 "    0      line from EL NIDO  230.00  to  CHEVMAIN 230.00
 1 24049 24198  "1 "    0      line from ELSEGNDO 230.00  to  CHEVMAIN 230.00
21
0
#
#   Case Number 57
 1 24040 24074  "3 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24040 24074  "4 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
0
#
#   Case Number 58
 1 24040 24074  "3 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
0
#
#   Case Number 59
 1 24040 24074  "3 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
0
#
#   Case Number 60
 1 24040 24074  "4 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
0
#
#   Case Number 61
 1 24040 24074  "4 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
0
#
#   Case Number 62
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
0
#
#   Case Number 63
 1 24040 24074  "3 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 64
 1 24040 24074  "4 "    0      line from EL NIDO  230.00  to  LA FRESA 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 65
 1 24074 24125  "1 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 66
 1 24074 24125  "2 "    0      line from LA FRESA 230.00  to  REDONDO  230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 67
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
```

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#
#   Case Number 68
 1 24074 24076  "1 "    0      line from LA FRESA 230.00  to  LAGUBELL 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 69
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 70
 1 24084 24091  "1 "    0      line from LITEHIPE 230.00  to  MESA CAL 230.00
 1 24091 24125  "1 "    0      line from MESA CAL 230.00  to  REDONDO  230.00
0
#
#   Case Number 71
 1 24074 24076  "1 "    0      line from LA FRESA 230.00  to  LAGUBELL 230.00
 1 24084 24091  "1 "    0      line from LITEHIPE 230.00  to  MESA CAL 230.00
0
#
#   Case Number 72
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
 1 24084 24091  "1 "    0      line from LITEHIPE 230.00  to  MESA CAL 230.00
0
#
#   Case Number 73
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
 1 24084 24091  "1 "    0      line from LITEHIPE 230.00  to  MESA CAL 230.00
0
#
#   Case Number 74
 1 25001 24059  "1 "    0      line from GOODRICH 230.00  to  GOULD    230.00
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
0
#
#   Case Number 75
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
0
#
#   Case Number 76
 1 24036 24091  "1 "    0      line from EAGLROCK 230.00  to  MESA CAL 230.00
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
20
0
#
#   Case Number 77
 1 25001 24076  "1 "    0      line from GOODRICH 230.00  to  LAGUBELL 230.00
 1 24155 24091  "1 "    0      line from VINCENT  230.00  to  MESA CAL 230.00
0
#
#   Case Number 78
 1 24021 24091  "1 "    0      line from CENTER S 230.00  to  MESA CAL 230.00
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
0
#
#   Case Number 79
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
 1 24091 24126  "1 "    0      line from MESA CAL 230.00  to  RIOHONDO 230.00
0
#
#   Case Number 80
 1 24076 24126  "1 "    0      line from LAGUBELL 230.00  to  RIOHONDO 230.00
 1 24091 24158  "1 "    0      line from MESA CAL 230.00  to  WALNUT   230.00
0
#
#   Case Number 81
 1 24091 24126  "1 "    0      line from MESA CAL 230.00  to  RIOHONDO 230.00
 1 24091 24158  "1 "    0      line from MESA CAL 230.00  to  WALNUT   230.00
```

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0
#
#   Case Number 82
 1 24021 24091  "1 "    0     line from CENTER S 230.00  to  MESA CAL 230.00
 1 24091 24126  "1 "    0     line from MESA CAL 230.00  to  RIOHONDO 230.00
0
#
#   Case Number 83
 1 24021 24091  "1 "    0     line from CENTER S 230.00  to  MESA CAL 230.00
 1 24021 24100  "1 "    0     line from CENTER S 230.00  to  OLINDA   230.00
0
#
#   Case Number 84
 1 24021 24091  "1 "    0     line from CENTER S 230.00  to  MESA CAL 230.00
 1 24091 24158  "1 "    0     line from MESA CAL 230.00  to  WALNUT   230.00
0
#
#   Case Number 85
 1 24091 24158  "1 "    0     line from MESA CAL 230.00  to  WALNUT   230.00
 1 24093 24158  "1 "    0     line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 86
 1 24091 24158  "1 "    0     line from MESA CAL 230.00  to  WALNUT   230.00
 1 24100 24158  "1 "    0     line from OLINDA   230.00  to  WALNUT   230.00
0
#
#   Case Number 87
 1 24021 24100  "1 "    0     line from CENTER S 230.00  to  OLINDA   230.00
 1 24091 24158  "1 "    0     line from MESA CAL 230.00  to  WALNUT   230.00
0
#
#   Case Number 88
 1 24021 24100  "1 "    0     line from CENTER S 230.00  to  OLINDA   230.00
 1 25656 24100  "1 "    0     line from MIRALOMA 230.00  to  OLINDA   230.00
0
#
#   Case Number 89
 1 24021 24100  "1 "    0     line from CENTER S 230.00  to  OLINDA   230.00
 1 24093 24158  "1 "    0     line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 90
 1 24021 24100  "1 "    0     line from CENTER S 230.00  to  OLINDA   230.00
 1 24100 24158  "1 "    0     line from OLINDA   230.00  to  WALNUT   230.00
0
#
#   Case Number 91
 1 25656 24100  "1 "    0     line from MIRALOMA 230.00  to  OLINDA   230.00
 1 24100 24158  "1 "    0     line from OLINDA   230.00  to  WALNUT   230.00
0
#
#   Case Number 92
 1 24093 24158  "1 "    0     line from MIRALOMA 230.00  to  WALNUT   230.00
 1 24100 24158  "1 "    0     line from OLINDA   230.00  to  WALNUT   230.00
0
#
#   Case Number 93
 1 24036 24091  "1 "    0     line from EAGLROCK 230.00  to  MESA CAL 230.00
 1 25001 24059  "1 "    0     line from GOODRICH 230.00  to  GOULD    230.00
0
#
#   Case Number 94
 1 25001 24059  "1 "    0     line from GOODRICH 230.00  to  GOULD    230.00
 1 24155 24091  "1 "    0     line from VINCENT  230.00  to  MESA CAL 230.00
21
0
#
#   Case Number 95
 1 24036 24091  "1 "    0     line from EAGLROCK 230.00  to  MESA CAL 230.00
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 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
0
#
#   Case Number 96
 1 24036 24091  "1 "    0      line from EAGLROCK 230.00  to  MESA CAL 230.00
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
0
#
#   Case Number 97
 1 24036 24091  "1 "    0      line from EAGLROCK 230.00  to  MESA CAL 230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 98
 1 24036 24091  "1 "    0      line from EAGLROCK 230.00  to  MESA CAL 230.00
 1 24155 24091  "1 "    0      line from VINCENT  230.00  to  MESA CAL 230.00
0
#
#   Case Number 99
 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
0
#
#   Case Number 100
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 101
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
 1 24114 24147  "1 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
0
#
#   Case Number 102
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
 1 24114 24147  "2 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
0
#
#   Case Number 103
 1 24114 24147  "1 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 104
 1 24114 24147  "2 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 105
 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 106
 1 24114 24147  "1 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
 1 24114 24147  "2 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
0
#
#   Case Number 107
 1 24044 24069  "1 "    0      line from ELLIS    230.00  to  HUNTGBCH 230.00
 1 24044 24369  "2 "    0      line from ELLIS    230.00  to  HUNTBCH1 230.00
0
#
#   Case Number 108
 1 24044 24369  "2 "    0      line from ELLIS    230.00  to  HUNTBCH1 230.00
 1 24044 24069  "3 "    0      line from ELLIS    230.00  to  HUNTGBCH 230.00
0
#
#   Case Number 109
 1 24044 24069  "3 "    0      line from ELLIS    230.00  to  HUNTGBCH 230.00
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 1 24044 24369  "4 "    0      line from ELLIS    230.00  to  HUNTBCH1 230.00
0
#
#   Case Number 110
 1 24044 24072  "1 "    0      line from ELLIS    230.00  to  JOHANNA  230.00
 1 24044 24134  "1 "    0      line from ELLIS    230.00  to  SANTIAGO 230.00
0
#
#   Case Number 111
 1 24044 24134  "1 "    0      line from ELLIS    230.00  to  SANTIAGO 230.00
 1 24072 24134  "1 "    0      line from JOHANNA  230.00  to  SANTIAGO 230.00
0
#
#   Case Number 112
 1 24131 24134  "1 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
 1 24131 24134  "2 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
0
#
#   Case Number 113
 1 24131 24134  "1 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
0
#
#   Case Number 114
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24131 24134  "1 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
0
#
#   Case Number 115
 1 24131 24134  "2 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
0
#
#   Case Number 116
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24131 24134  "2 "    0      line from S.ONOFRE 230.00  to  SANTIAGO 230.00
0
#
#   Case Number 117
 1 24128 24058  "1 "    0      line from S.CLARA  230.00  to  GOLETA   230.00
 1 24128 24058  "2 "    0      line from S.CLARA  230.00  to  GOLETA   230.00
21
0
#
#   Case Number 118
 1 24128 24088  "1 "    0      line from S.CLARA  230.00  to  MANDALAY 230.00
 1 24128 24088  "2 "    0      line from S.CLARA  230.00  to  MANDALAY 230.00
21
0
#
#   Case Number 119
 1 24099 24106  "1 "    0      line from MOORPARK 230.00  to  ORMOND   230.00
 1 24099 24106  "2 "    0      line from MOORPARK 230.00  to  ORMOND   230.00
0
#
#   Case Number 120
 1 24114 24115  "1 "    0      line from PARDEE   230.00  to  PASTORIA 230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 121
 1 24114 24403  "1 "    0      line from PARDEE   230.00  to  BAILEY   230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 122
 1 24114 24099  "1 "    0      line from PARDEE   230.00  to  MOORPARK 230.00
 1 24114 24099  "2 "    0      line from PARDEE   230.00  to  MOORPARK 230.00
0
#
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#   Case Number 123
 1 24114 24128  "1 "    0      line from PARDEE   230.00  to  S.CLARA  230.00
 1 24128 24099  "1 "    0      line from S.CLARA  230.00  to  MOORPARK 230.00
0
#
#   Case Number 124
 1 24114 24128  "1 "    0      line from PARDEE   230.00  to  S.CLARA  230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 125
 1 24128 24099  "1 "    0      line from S.CLARA  230.00  to  MOORPARK 230.00
 1 24128 24099  "2 "    0      line from S.CLARA  230.00  to  MOORPARK 230.00
0
#
#   Case Number 126
 1 24128 24099  "2 "    0      line from S.CLARA  230.00  to  MOORPARK 230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 127
 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24114 24155  "1 "    0      line from PARDEE   230.00  to  VINCENT  230.00
0
#
#   Case Number 128
 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24155 24091  "1 "    0      line from VINCENT  230.00  to  MESA CAL 230.00
0
#
#   Case Number 129
 1 24036 24114  "1 "    0      line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 130
 1 24114 24155  "1 "    0      line from PARDEE   230.00  to  VINCENT  230.00
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
0
#
#   Case Number 131
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
0
#
#   Case Number 132
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
0
#
#   Case Number 133
 1 25656 24100  "1 "    0      line from MIRALOMA 230.00  to  OLINDA   230.00
 1 24093 24158  "1 "    0      line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 134
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24093 24158  "1 "    0      line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 135
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 24093 24158  "1 "    0      line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 136
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 25656 24100  "1 "    0      line from MIRALOMA 230.00  to  OLINDA   230.00
0
#
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#   Case Number 137
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 25656 24100  "1 "    0      line from MIRALOMA 230.00  to  OLINDA   230.00
0
#
#   Case Number 138
 1 24025 24093  "1 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24025 24093  "2 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
0
#
#   Case Number 139
 1 24025 24093  "2 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24025 25656  "3 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
0
#
#   Case Number 140
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
0
#
#   Case Number 141
 1 24237 24112  "1 "    0      line from RANCHVST 230.00  to  PADUA    230.00
 1 24237 24112  "2 "    0      line from RANCHVST 230.00  to  PADUA    230.00
0
#
#   Case Number 142
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 25656 24901  "2 "    0      line from MIRALOMA 230.00  to  VSTA     230.00
0
#
#   Case Number 143
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24056 24901  "1 "    0      line from ETIWANDA 230.00  to  VSTA     230.00
0
#
#   Case Number 144
 1 24804 24132  "1 "    0      line from DEVERS   230.00  to  SANBRDNO 230.00
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
0
#
#   Case Number 145
 1 24804 24901  "2 "    0      line from DEVERS   230.00  to  VSTA     230.00
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
0
#
#   Case Number 146
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24132 24804  "1 "    0      line from SANBRDNO 230.00  to  DEVERS   230.00
0
#
#   Case Number 147
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24901 24132  "2 "    0      line from VSTA     230.00  to  SANBRDNO 230.00
0
#
#   Case Number 148
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24901 24804  "1 "    0      line from VSTA     230.00  to  DEVERS   230.00
0
#
#   Case Number 149
 1 24901 24132  "2 "    0      line from VSTA     230.00  to  SANBRDNO 230.00
 1 24901 24804  "1 "    0      line from VSTA     230.00  to  DEVERS   230.00
0
#
#   Case Number 150
 1 24132 24804  "1 "    0      line from SANBRDNO 230.00  to  DEVERS   230.00
 1 24901 24132  "2 "    0      line from VSTA     230.00  to  SANBRDNO 230.00
0
#
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#   Case Number 151
 1 24804 24132  "1 "    0      line from DEVERS   230.00  to  SANBRDNO 230.00
 1 24901 24132  "2 "    0      line from VSTA     230.00  to  SANBRDNO 230.00
0
#
#   Case Number 152
 1 24804 24132  "1 "    0      line from DEVERS   230.00  to  SANBRDNO 230.00
 1 24804 24901  "2 "    0      line from DEVERS   230.00  to  VSTA     230.00
0
#
#   Case Number 153
 1 24804 24132  "1 "    0      line from DEVERS   230.00  to  SANBRDNO 230.00
 1 24901 24804  "1 "    0      line from VSTA     230.00  to  DEVERS   230.00
0
#
#   Case Number 154
 1 24804 24901  "2 "    0      line from DEVERS   230.00  to  VSTA     230.00
 1 24132 24804  "1 "    0      line from SANBRDNO 230.00  to  DEVERS   230.00
0
#
#   Case Number 155
 1 24132 24804  "1 "    0      line from SANBRDNO 230.00  to  DEVERS   230.00
 1 24901 24804  "1 "    0      line from VSTA     230.00  to  DEVERS   230.00
0
#
#   Case Number 156
 1 24804 24806  "1 "    0      line from DEVERS   230.00  to  MIRAGE   230.00
 1  8311 24804  "1 "    0      line from COACHELA 230.00  to  DEVERS   230.00
20
0
#
#   Case Number 157
 1 24804 24806  "1 "    0      line from DEVERS   230.00  to  MIRAGE   230.00
 1 25406 24806  "1 "    0      line from J.HINDS  230.00  to  MIRAGE   230.00
20
0
#
#   Case Number 158
 1 24601 24085  "1 "    0      line from VICTOR   230.00  to  LUGO     230.00
 1 24601 24085  "2 "    0      line from VICTOR   230.00  to  LUGO     230.00
21
0
#
#   Case Number 159
 1  8695 24806  "1 "    0      line from RAMON    230.00  to  MIRAGE   230.00
 1 25406 24806  "1 "    0      line from J.HINDS  230.00  to  MIRAGE   230.00
0
#
#   Case Number 160
 1  8311 24804  "1 "    0      line from COACHELA 230.00  to  DEVERS   230.00
 1 25406 24806  "1 "    0      line from J.HINDS  230.00  to  MIRAGE   230.00
0
#
#   Case Number 161
 1  8695 24806  "1 "    0      line from RAMON    230.00  to  MIRAGE   230.00
 1  8311 24804  "1 "    0      line from COACHELA 230.00  to  DEVERS   230.00
0
#
#   Case Number 162
 1 19012 24041  "1 "    0      line from MEAD S   230.00  to  ELDORDO  230.00
 1 19012 24041  "2 "    0      line from MEAD S   230.00  to  ELDORDO  230.00
0
#
#   Case Number 163
 1 24019 19012  "E "    0      line from CAMINO   230.00  to  MEAD S   230.00
 1 24019 19012  "W "    0      line from CAMINO   230.00  to  MEAD S   230.00
0
#
#   Case Number 164
 1 24219 24085  "1 "    0      line from PISGAH   230.00  to  LUGO     230.00
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 1 24219 24085  "2 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 165
 1 24042 24086  "1 "    0      line from ELDORDO  500.00  to  LUGO     500.00
 1 24219 24041  "2 "    0      line from PISGAH   230.00  to  ELDORDO  230.00
0
#
#   Case Number 166
 1 24042 24086  "1 "    0      line from ELDORDO  500.00  to  LUGO     500.00
 1 24219 24085  "1 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 167
 1 24042 24086  "1 "    0      line from ELDORDO  500.00  to  LUGO     500.00
 1 24219 24085  "2 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 168
 1 24086 24092  "2 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
 1 24086 24092  "3 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 169
 1 24086 24092  "2 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
 1 24086 24236  "1 "    0      line from LUGO     500.00  to  RANCHVST 500.00
0
#
#   Case Number 170
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24086 24092  "2 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 171
 1 24056 24901  "1 "    0      line from ETIWANDA 230.00  to  VSTA     230.00
 1 24086 24092  "2 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 172
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24086 24092  "3 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 173
 1 24056 24901  "1 "    0      line from ETIWANDA 230.00  to  VSTA     230.00
 1 24086 24092  "3 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 174
 1 24086 24097  "1 "    0      line from LUGO     500.00  to  MOHAVE   500.00
 1 24219 24085  "1 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 175
 1 24086 24097  "1 "    0      line from LUGO     500.00  to  MOHAVE   500.00
 1 24219 24085  "2 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 176
 1 24025 24093  "1 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 177
 1 24025 24093  "2 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 178
 1 24025 25656  "3 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
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 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 179
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 180
 1 24056 24237  "1 "    0      line from ETIWANDA 230.00  to  RANCHVST 230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 181
 1 24056 24132  "1 "    0      line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 182
 1 24056 24901  "1 "    0      line from ETIWANDA 230.00  to  VSTA     230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 183
 1 25656 24100  "1 "    0      line from MIRALOMA 230.00  to  OLINDA   230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 184
 1 24237 24112  "1 "    0      line from RANCHVST 230.00  to  PADUA    230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 185
 1 24093 24158  "1 "    0      line from MIRALOMA 230.00  to  WALNUT   230.00
 1 24236 24138  "1 "    0      line from RANCHVST 500.00  to  SERRANO  500.00
0
#
#   Case Number 186
 1 24086 24156  "1 "    0      line from LUGO     500.00  to  VINCENT  500.00
 1 24086 24156  "2 "    0      line from LUGO     500.00  to  VINCENT  500.00
0
#
#   Case Number 187
 1 30060 24156  "1 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
 1 30060 24156  "2 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 188
 1 24155 24401  "1 "    0      line from VINCENT  230.00  to  ANTELOPE 230.00
 1 30060 24156  "1 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 189
 1 30060 24156  "2 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
 1 30060 24156  "3 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 190
 1 24155 24401  "1 "    0      line from VINCENT  230.00  to  ANTELOPE 230.00
 1 30060 24156  "2 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 191
 1 24155 24401  "1 "    0      line from VINCENT  230.00  to  ANTELOPE 230.00
 1 30060 24156  "3 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 192
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
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 1 24092 24138  "2 "    0      line from MIRALOMA 500.00  to  SERRANO  500.00
0
#
#   Case Number 193
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 24092 24138  "2 "    0      line from MIRALOMA 500.00  to  SERRANO  500.00
0
#
#   Case Number 194
 1 14002 24042  "1 "    0      line from MOENKOPI 500.00  to  ELDORDO  500.00
 1 24219 24041  "2 "    0      line from PISGAH   230.00  to  ELDORDO  230.00
0
#
#   Case Number 195
 1 24097 24042  "1 "    0      line from MOHAVE   500.00  to  ELDORDO  500.00
 1 24219 24041  "2 "    0      line from PISGAH   230.00  to  ELDORDO  230.00
0
#
#   Case Number 196
 1 24804 24806  "1 "    0      line from DEVERS   230.00  to  MIRAGE   230.00
 1 24801 24900  "1 "    0      line from DEVERS   500.00  to  MIDPINTS 500.00
0
#
#   Case Number 197
 1 24801 24900  "1 "    0      line from DEVERS   500.00  to  MIDPINTS 500.00
 1  8311 24804  "1 "    0      line from COACHELA 230.00  to  DEVERS   230.00
0
#
#   Case Number 198
 1 24801 24900  "1 "    0      line from DEVERS   500.00  to  MIDPINTS 500.00
 1 25406 24806  "1 "    0      line from J.HINDS  230.00  to  MIRAGE   230.00
0
#
#   Case Number 199
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
 1 24138 99100  "1 "    0      line from SERRANO  500.00  to  LEELAKE  500.00
0
#
#   Case Number 200
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24138 99100  "1 "    0      line from SERRANO  500.00  to  LEELAKE  500.00
0
#
#   Case Number 201
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
 1 24138 99100  "1 "    0      line from SERRANO  500.00  to  LEELAKE  500.00
0
#
#   Case Number 202
 1 24025 24093  "1 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
0
#
#   Case Number 203
 1 24025 25654  "1 "    0      line from CHINO    230.00  to  VIEJOSC  230.00
 1 24025 24137  "1 "    0      line from CHINO    230.00  to  SERRANO  230.00
0
#
#   Case Number 204
 1 24801 24151  "1 "    0      line from DEVERS   500.00  to  VALLEYSC 500.00
 1 24801 24900  "1 "    0      line from DEVERS   500.00  to  MIDPINTS 500.00
0
#
#   Case Number 205
 1 24901 24804  "1 "    0      line from VSTA     230.00  to  DEVERS   230.00
 1 24801 24900  "1 "    0      line from DEVERS   500.00  to  MIDPINTS 500.00
0
#
#   Case Number 206
 1 24804 24901  "2 "    0      line from DEVERS   230.00  to  VSTA     230.00
```

```
 1 24132 24804  "1 "    0      line from SANBRDNO 230.00  to  DEVERS   230.00
0
#
#   Case Number 207
 1 24804 24806  "1 "    0      line from DEVERS   230.00  to  MIRAGE   230.00
 1  8695 24806  "1 "    0      line from RAMON    230.00  to  MIRAGE   230.00
0
#
#   Case Number 208
 1 19012 24041  "2 "    0      line from MEAD S   230.00  to  ELDORDO  230.00
 1 24219 24041  "2 "    0      line from PISGAH   230.00  to  ELDORDO  230.00
0
#
#   Case Number 209
 1 24627 24041  "1 "    0      line from CIMA     230.00  to  ELDORDO  230.00
 1 19012 24041  "1 "    0      line from MEAD S   230.00  to  ELDORDO  230.00
0
#
#   Case Number 210
 1 24029 24044  "1 "    0      line from DELAMO   230.00  to  ELLIS    230.00
 1 24044 24134  "1 "    0      line from ELLIS    230.00  to  SANTIAGO 230.00
0
#
#   Case Number 211
 1 24016 24044  "1 "    0      line from BARRE    230.00  to  ELLIS    230.00
 1 24044 24072  "1 "    0      line from ELLIS    230.00  to  JOHANNA  230.00
0
#
#   Case Number 212
 1 24061 24065  "1 "    0      line from HARBOR   230.00  to  HINSON   230.00
 1 24061 24077  "1 "    0      line from HARBOR   230.00  to  LBEACH   230.00
21
0
#
#   Case Number 213
 1 24015 24065  "2 "    0      line from ARCO SC  230.00  to  HINSON   230.00
 1 24065 24029  "1 "    0      line from HINSON   230.00  to  DELAMO   230.00
0
#
#   Case Number 214
 1 24086 24092  "3 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
 1 24086 24097  "1 "    0      line from LUGO     500.00  to  MOHAVE   500.00
0
#
#   Case Number 215
 1 24042 24086  "1 "    0      line from ELDORDO  500.00  to  LUGO     500.00
 1 24086 24092  "2 "    0      line from LUGO     500.00  to  MIRALOMA 500.00
0
#
#   Case Number 216
 1 24086 24156  "2 "    0      line from LUGO     500.00  to  VINCENT  500.00
 1 24086 26105  "1 "    0      line from LUGO     500.00  to  VICTORVL 500.00
0
#
#   Case Number 217
 1 24601 24085  "2 "    0      line from VICTOR   230.00  to  LUGO     230.00
 1 24219 24085  "2 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 218
 1 24701 24085  "1 "    0      line from KRAMER   230.00  to  LUGO     230.00
 1 24219 24085  "1 "    0      line from PISGAH   230.00  to  LUGO     230.00
0
#
#   Case Number 219
 1 24025 24093  "2 "    0      line from CHINO    230.00  to  MIRALOMA 230.00
 1 24093 24158  "1 "    0      line from MIRALOMA 230.00  to  WALNUT   230.00
0
#
#   Case Number 220
```

```
 1 24025 25656  "3 "    0     line from CHINO    230.00  to  MIRALOMA 230.00
 1 25656 24100  "1 "    0     line from MIRALOMA 230.00  to  OLINDA   230.00
0
#
#   Case Number 221
 1 24056 24237  "1 "    0     line from ETIWANDA 230.00  to  RANCHVST 230.00
 1 24237 24112  "1 "    0     line from RANCHVST 230.00  to  PADUA    230.00
0
#
#   Case Number 222
 1 24099 24106  "3 "    0     line from MOORPARK 230.00  to  ORMOND   230.00
 1 24114 24099  "1 "    0     line from PARDEE   230.00  to  MOORPARK 230.00
0
#
#   Case Number 223
 1 24099 24106  "4 "    0     line from MOORPARK 230.00  to  ORMOND   230.00
 1 24128 24099  "2 "    0     line from S.CLARA  230.00  to  MOORPARK 230.00
0
#
#   Case Number 224
 1 25656 24100  "1 "    0     line from MIRALOMA 230.00  to  OLINDA   230.00
 1 24100 24158  "1 "    0     line from OLINDA   230.00  to  WALNUT   230.00
0
#
#   Case Number 225
 1 24056 24132  "1 "    0     line from ETIWANDA 230.00  to  SANBRDNO 230.00
 1 24132 24804  "1 "    0     line from SANBRDNO 230.00  to  DEVERS   230.00
0
#
#   Case Number 226
 1 24128 24058  "1 "    0     line from S.CLARA  230.00  to  GOLETA   230.00
 1 24128 24099  "1 "    0     line from S.CLARA  230.00  to  MOORPARK 230.00
0
#
#   Case Number 227
 1 24128 24058  "2 "    0     line from S.CLARA  230.00  to  GOLETA   230.00
 1 24128 24099  "2 "    0     line from S.CLARA  230.00  to  MOORPARK 230.00
0
#
#   Case Number 228
 1 24044 24134  "1 "    0     line from ELLIS    230.00  to  SANTIAGO 230.00
 1 24131 24134  "2 "    0     line from S.ONOFRE 230.00  to  SANTIAGO 230.00
0
#
#   Case Number 229
 1 24036 24114  "1 "    0     line from EAGLROCK 230.00  to  PARDEE   230.00
 1 24114 24115  "1 "    0     line from PARDEE   230.00  to  PASTORIA 230.00
0
#
#   Case Number 230
 1 24114 24099  "3 "    0     line from PARDEE   230.00  to  MOORPARK 230.00
 1 24114 24147  "1 "    0     line from PARDEE   230.00  to  SYLMAR S 230.00
0
#
#   Case Number 231
 1 25201 24137  "2 "    0     line from LEWIS    230.00  to  SERRANO  230.00
 1 24131 24137  "1 "    0     line from S.ONOFRE 230.00  to  SERRANO  230.00
0
#
#   Case Number 232
 1 24025 24137  "1 "    0     line from CHINO    230.00  to  SERRANO  230.00
 1 25201 24137  "2 "    0     line from LEWIS    230.00  to  SERRANO  230.00
0
#
#   Case Number 233
 1 24025 24137  "1 "    0     line from CHINO    230.00  to  SERRANO  230.00
 1 24137 24154  "2 "    0     line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 234
```

```
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 235
 1 24131 24137  "1 "    0      line from S.ONOFRE 230.00  to  SERRANO  230.00
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
#   Case Number 236
 1 24114 24147  "1 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
 1 24147 24059  "1 "    0      line from SYLMAR S 230.00  to  GOULD    230.00
0
#
#   Case Number 237
 1 24036 24147  "1 "    0      line from EAGLROCK 230.00  to  SYLMAR S 230.00
 1 24114 24147  "2 "    0      line from PARDEE   230.00  to  SYLMAR S 230.00
0
#
#   Case Number 238
 1 24086 24156  "2 "    0      line from LUGO     500.00  to  VINCENT  500.00
 1 30060 24156  "3 "    0      line from MIDWAY   500.00  to  VINCENT  500.00
0
#
#   Case Number 239
 1 24155 24128  "1 "    0      line from VINCENT  230.00  to  S.CLARA  230.00
 1 24155 24401  "1 "    0      line from VINCENT  230.00  to  ANTELOPE 230.00
0
#
#   Case Number 240
 1 24114 24155  "1 "    0      line from PARDEE   230.00  to  VINCENT  230.00
 1 24155 24091  "1 "    0      line from VINCENT  230.00  to  MESA CAL 230.00
0
#
#   Case Number 241
 1 25201 24137  "1 "    0      line from LEWIS    230.00  to  SERRANO  230.00
 1 25201 24154  "1 "    0      line from LEWIS    230.00  to  VILLA PK 230.00
0
#
#   Case Number 242
 1 24016 25201  "1 "    0      line from BARRE    230.00  to  LEWIS    230.00
 1 25201 24137  "2 "    0      line from LEWIS    230.00  to  SERRANO  230.00
0
#
#   Case Number 243
 1 24016 24154  "1 "    0      line from BARRE    230.00  to  VILLA PK 230.00
 1 24137 24154  "1 "    0      line from SERRANO  230.00  to  VILLA PK 230.00
0
#
##################################################################################################
##################
#
# PROJECT CONTINGENCY
#
##################################################################################################
##################
#
#   Case Number 244
1  "LAGUBELL 230.00"  "VPWRPLNT 230.00"  "1"  0
1  "LAGUBELL 230.00"  "VPWRPLNT 230.00"  "2"  0
21
0
#
-1
# EOF
```

Appendix D

2009 Heavy Summer Transient Stability Plots

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2009 Heavy Summer – Category "B" Contingencies

Plot 1. Full load rejection of the VPP.
Plot 2. Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.
Plot 3. Three-phase fault at the VPP 230 kV bus followed by loss of the VPP – Laguna Bell 230 kV #1 circuit.
Plot 4. Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Rio Hondo 230 kV #1 circuit.
Plot 5. Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Goodrich 230 kV #1 circuit.
Plot 6. Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV #1 circuit.
Plot 7. Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – La Fresa 230 kV circuit.
Plot 8. Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach – Harbor Gen 230 kV circuit.
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Plot 10. Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent – Rio Hondo 230 kV circuit.
Plot 11. Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint – Devers 500 kV #1 circuit.
Plot 12. Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint – Harquahala 500 kV circuit.
Plot 13. Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint – Palo Verde 500 kV circuit.
Plot 14. Three-phase fault at the Lee Lake 500 kV bus followed by loss of the Lee Lake – Serrano 500 kV circuit.
Plot 15. Three-phase fault at the Lee Lake 500 kV bus followed by loss of the Lee Lake – Valley 500 kV circuit.

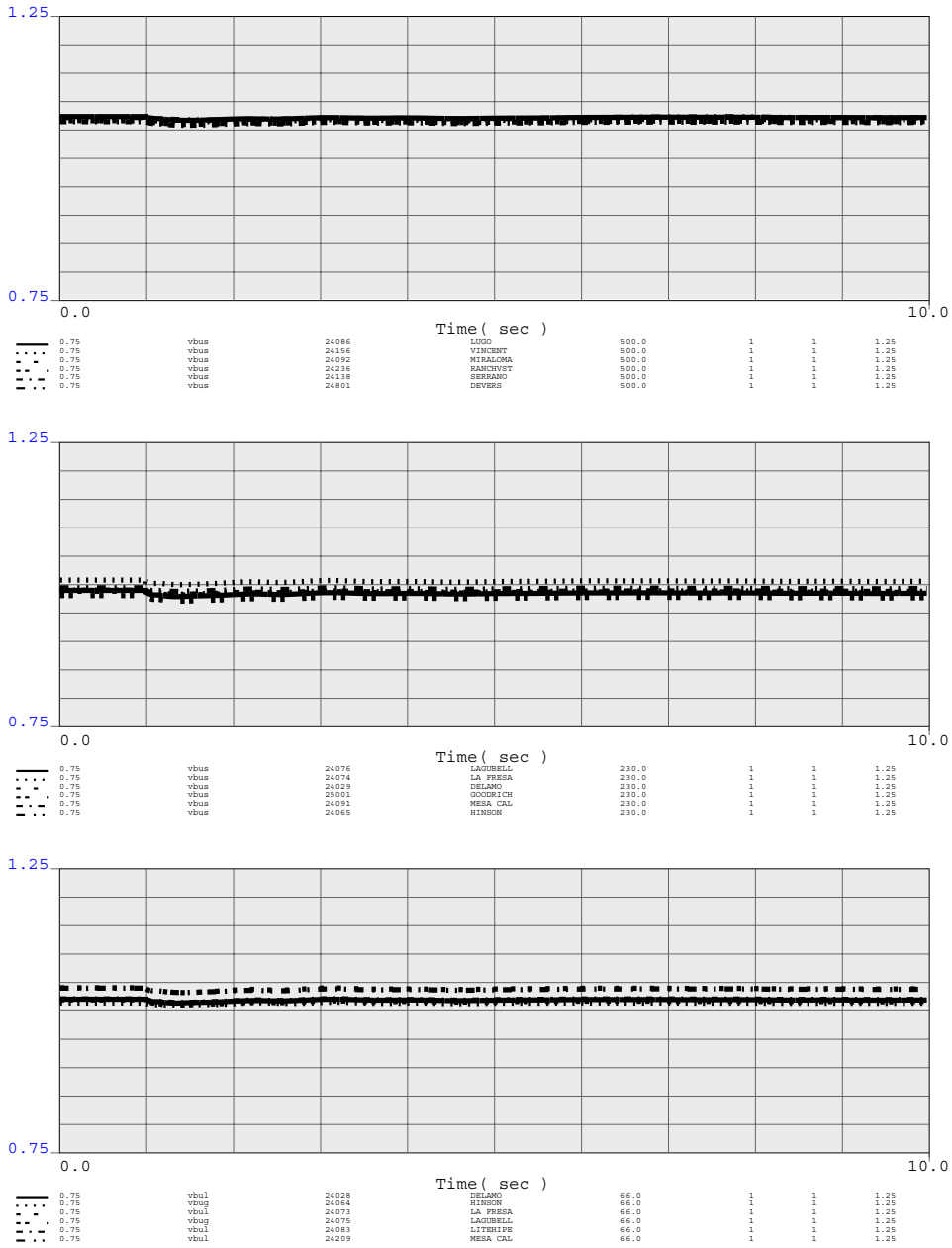
2009 Heavy Summer – Category "C" Contingencies

Plot 16. Pre-fault outage of the Laguna Bell – Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Rio Hondo 230 kV circuit.
Plot 17. Pre-fault outage of the Laguna Bell – Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – La Fresa 230 kV #2 circuit.
Plot 18. Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach – Lighthipe 230 kV and Harbor Gen – Hinson 230 kV transmission lines.
Plot 19. Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista – Vincent 500 kV and Mira Loma – Walnut 230 kV transmission lines.
Plot 20. Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista – Vincent 500 kV and Mira Loma – Serrano 500 kV transmission lines.

2009 Heavy Summer – Category "D" Contingency

Plot 21. Pre-fault outage of the Laguna Bell – Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV and the Laguna Bell – La Fresa 230 kV transmission lines.

Plot 1 - 1: Full load rejection of the VPP.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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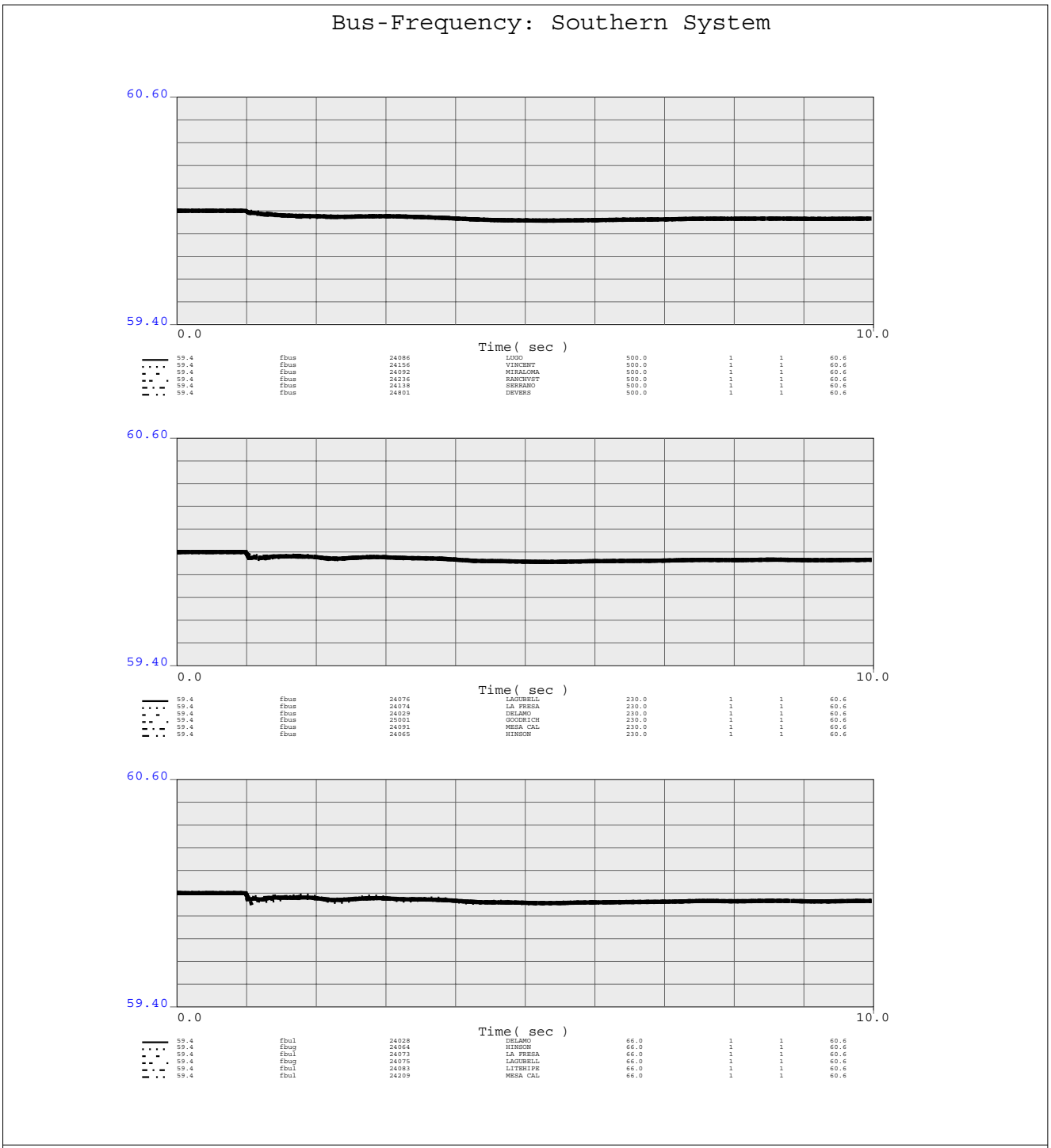
	09hs_pst-vpp304-rev1_VPP-Load-Rejection.chf	c:\upslf16\mypslf Wed Nov 15 08:24:36 2006

Plot 1 - 2: Full load rejection of the VPP.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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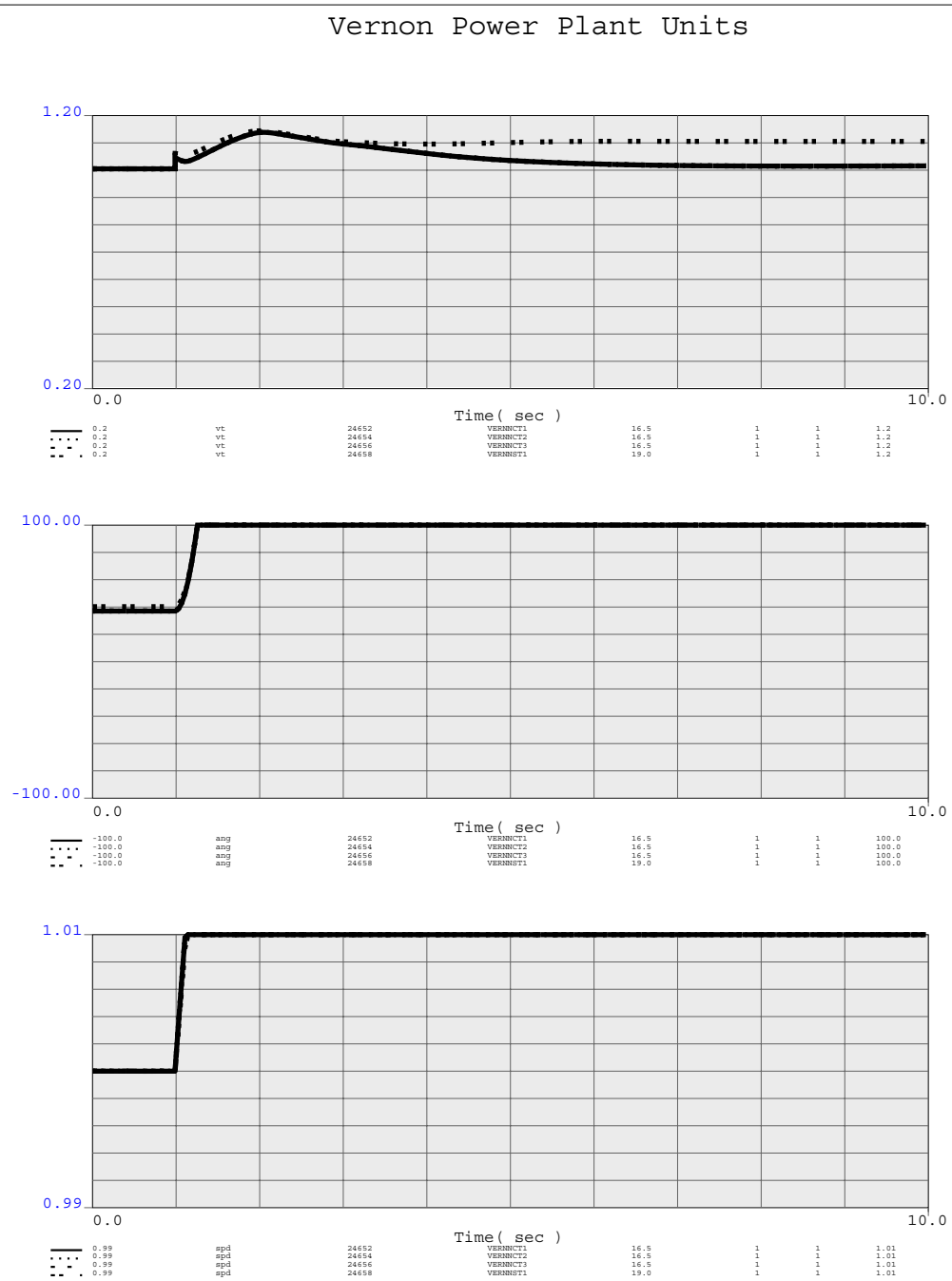
	09hs_pst-vpp304-rev1_VPP-Load-Rejection.chf	c:\upslf16\mypslf Wed Nov 15 08:24:36 2006

Plot 1 - 3: Full load rejection of the VPP.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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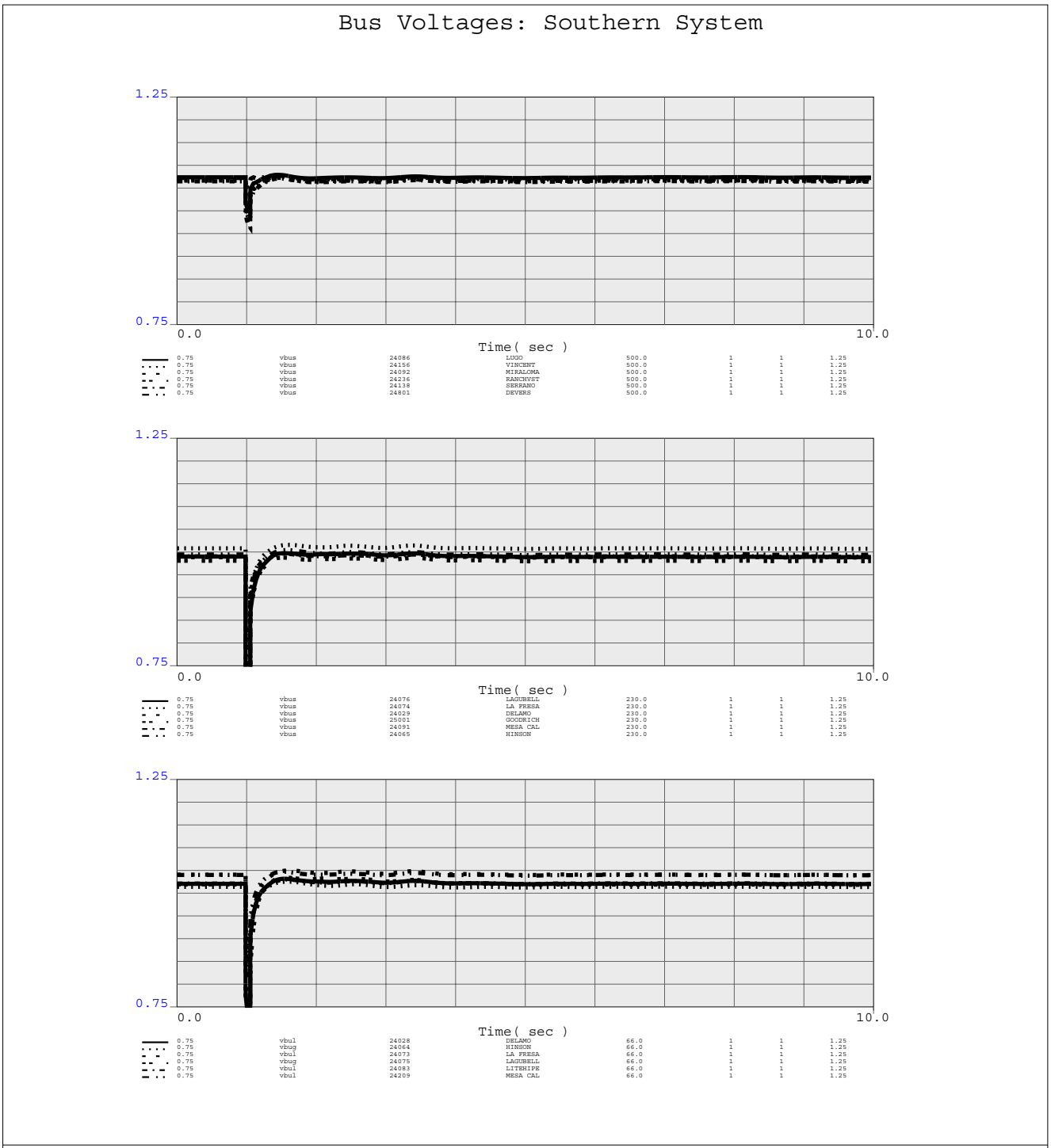
	09hs_pst-vpp304-rev1_VPP-Load-Rejection.chf	c:\upslf16\mypslf Wed Nov 15 08:24:36 2006

Plot 2 - 1: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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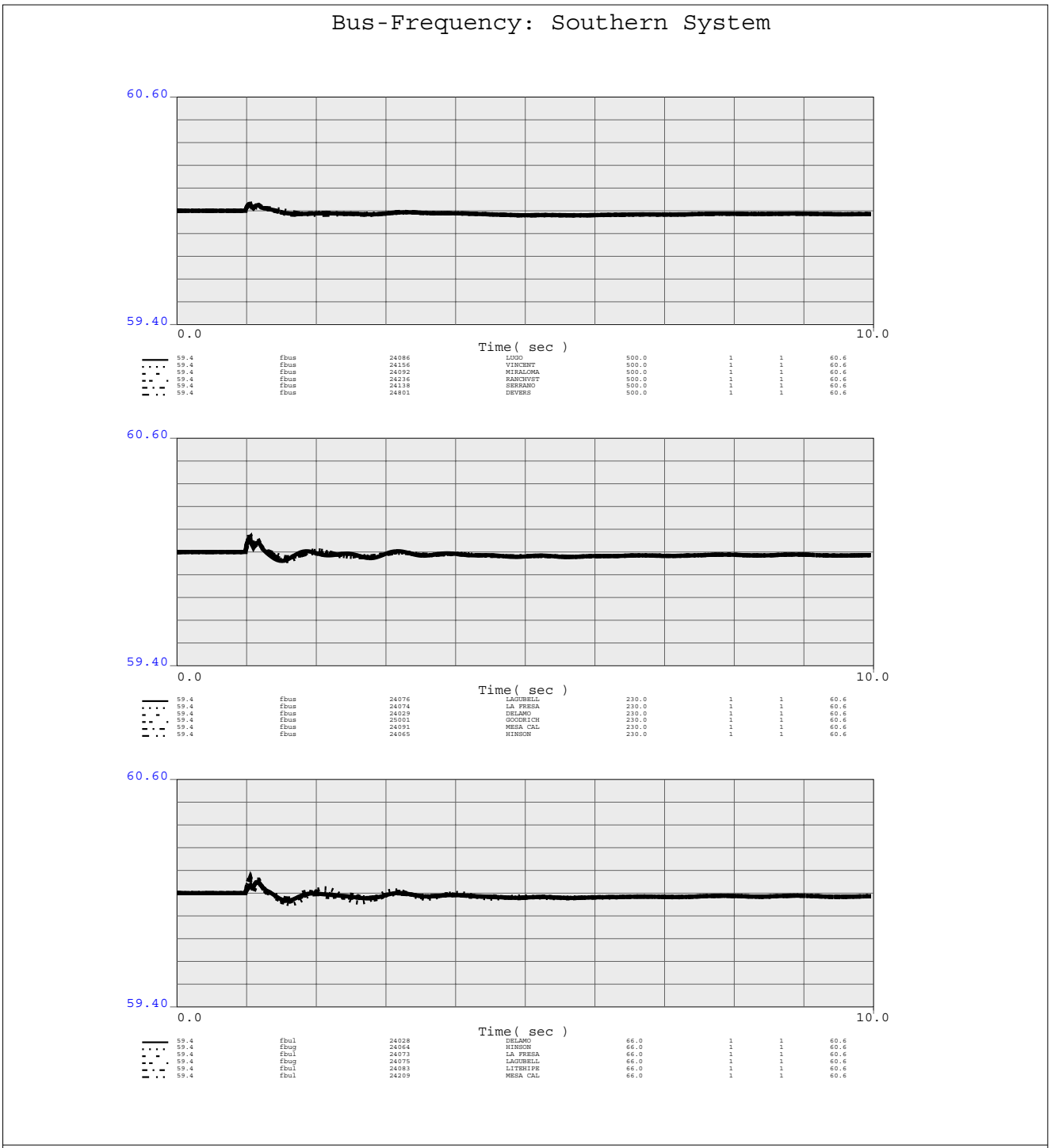
	09hs_pst-vpp304-rev1_VPP-LossofSTG.chf	c:\upslf16\mypslf Wed Nov 15 08:24:39 2006

Plot 2 - 2: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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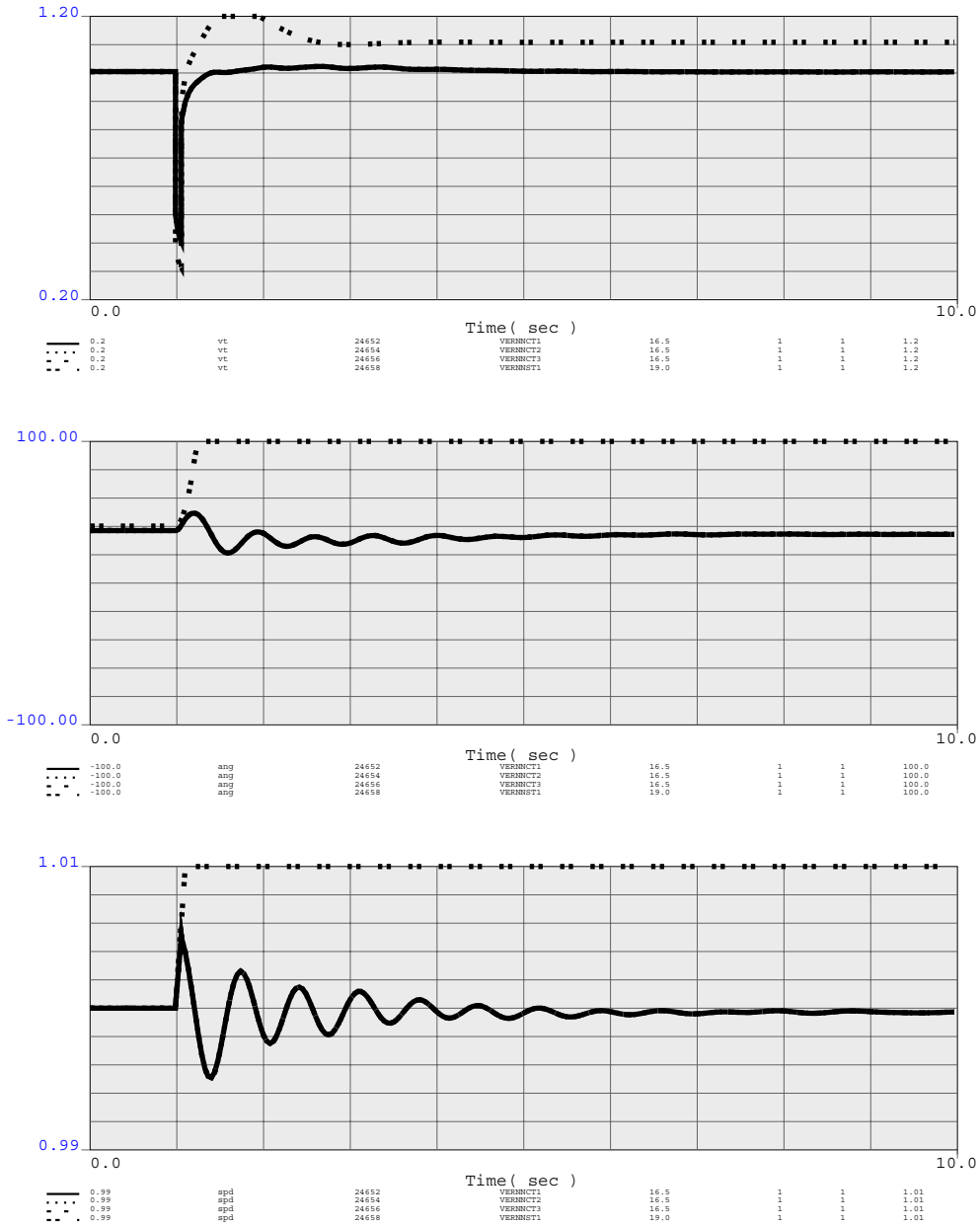
	09hs_pst-vpp304-rev1_VPP-LossofSTG.chf	c:\upslf16\mypslf Wed Nov 15 08:24:40 2006

Plot 2 - 3: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.

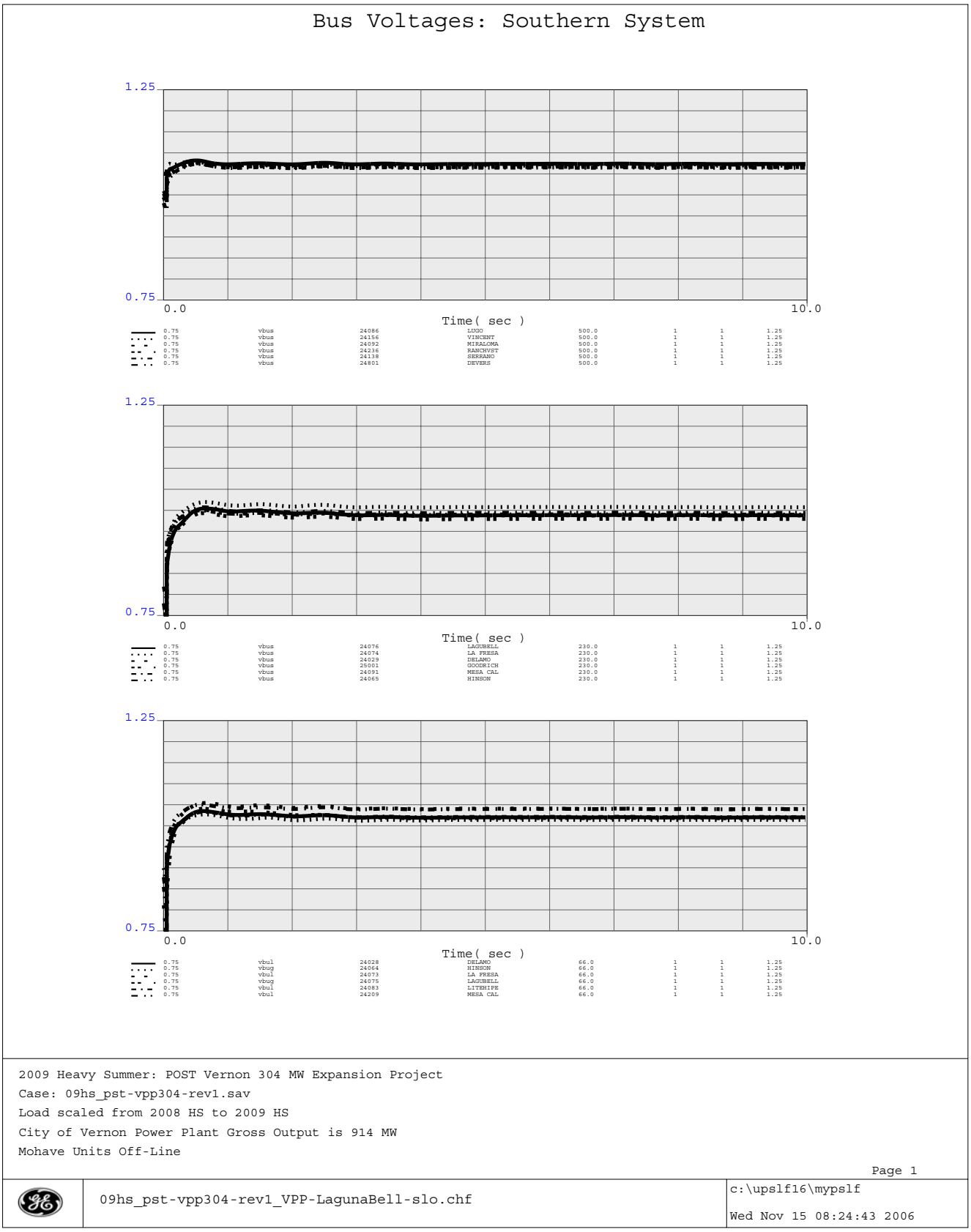


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 3

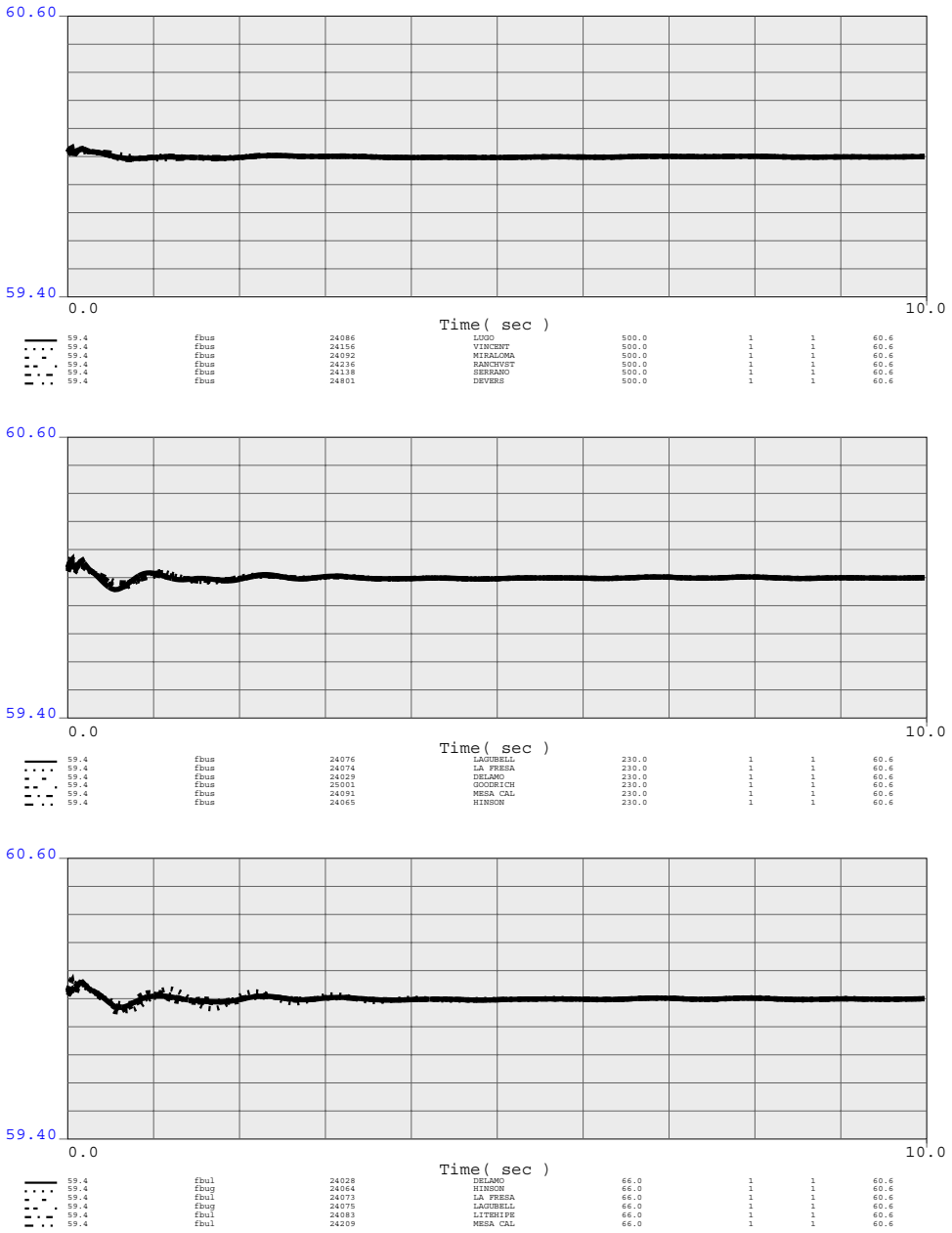
	09hs_pst-vpp304-rev1_VPP-LossofSTG.chf	c:\upslf16\mypslf Wed Nov 15 08:24:40 2006

Plot 3 - 1: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.



Plot 3 - 2: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.

Bus-Frequency: Southern System



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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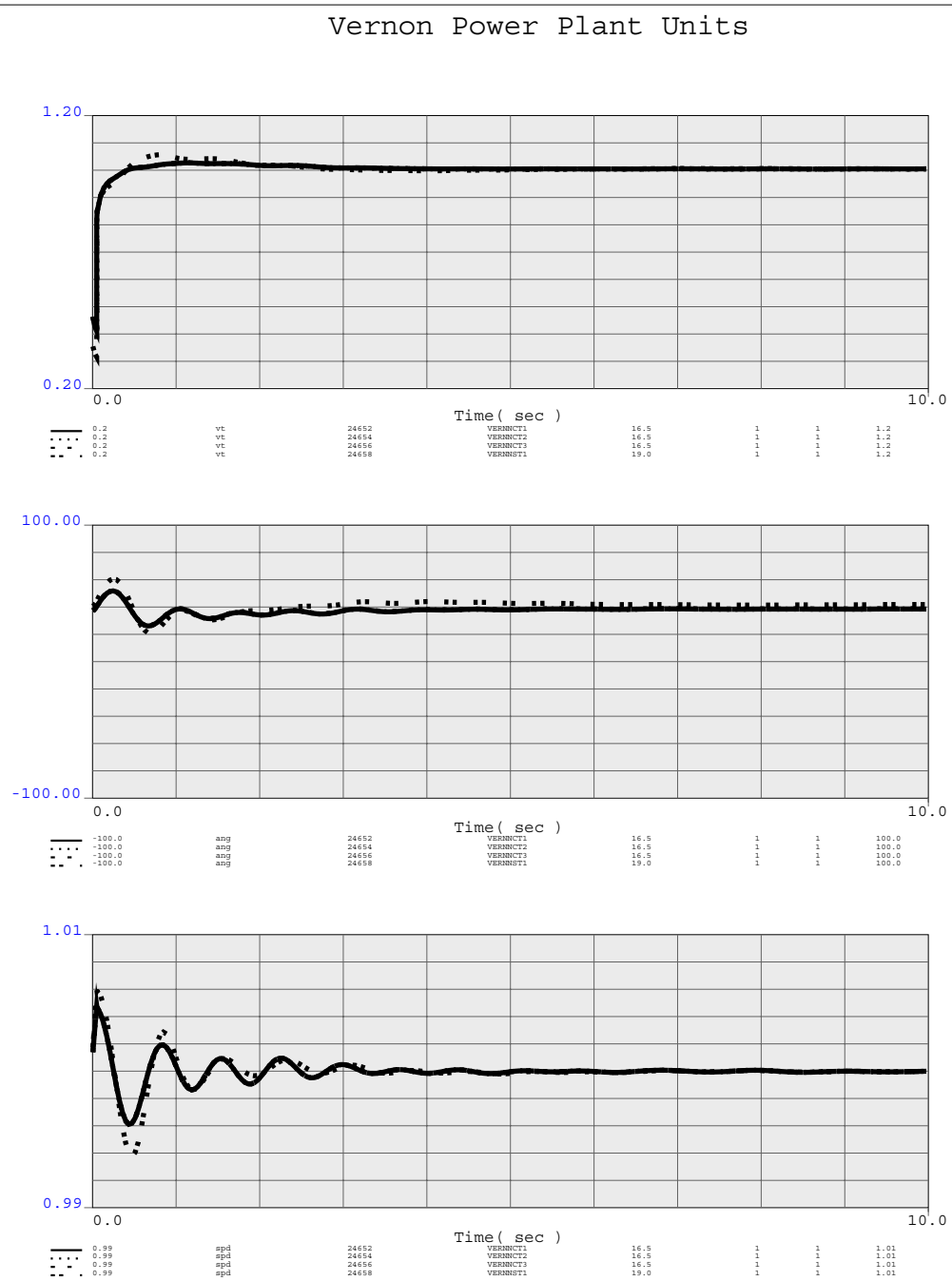
	09hs_pst-vpp304-rev1_VPP-LagunaBell-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:43 2006

Plot 3 - 3: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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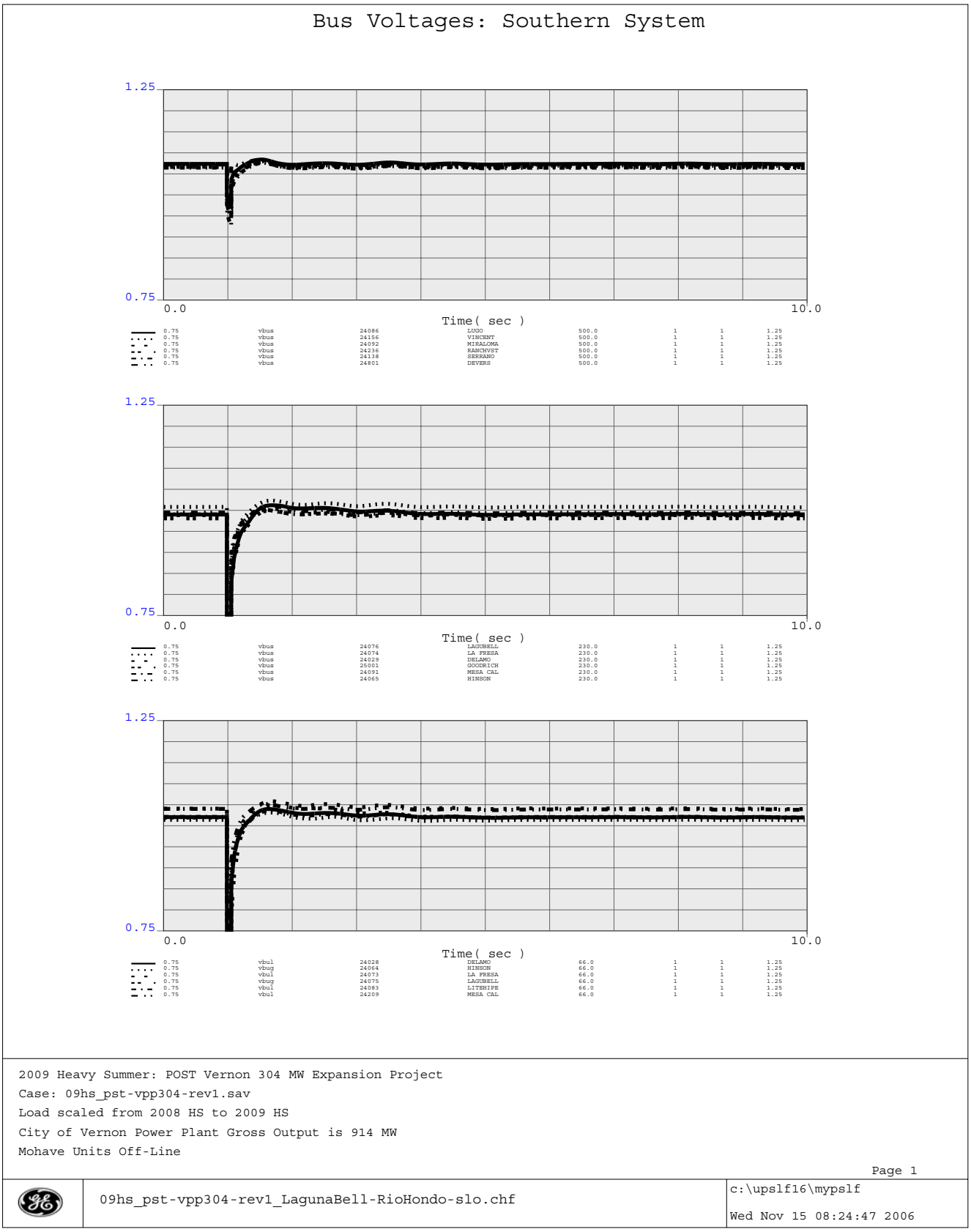
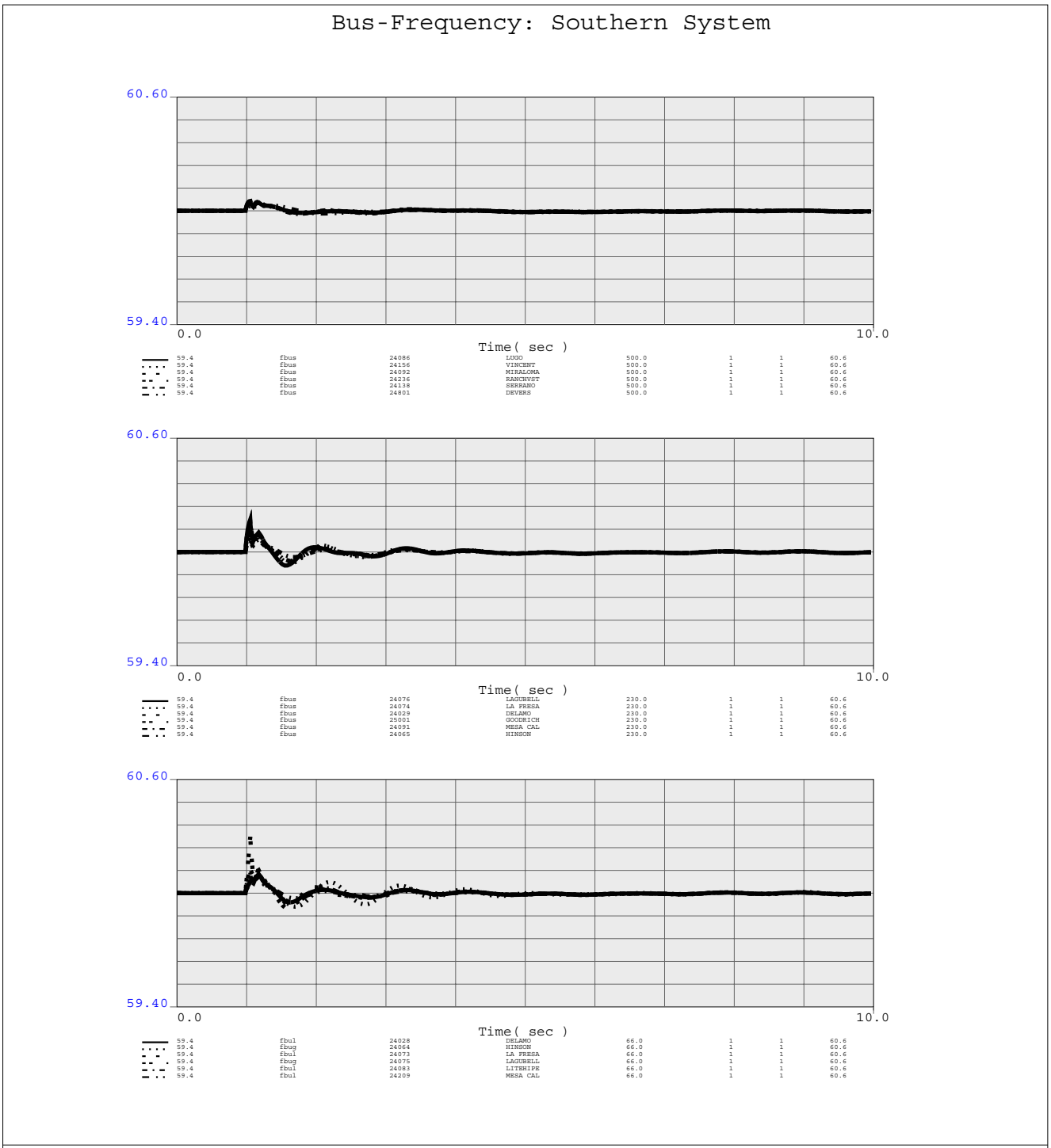
	09hs_pst-vpp304-rev1_VPP-LagunaBell-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:43 2006

Plot 4 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



Plot 4 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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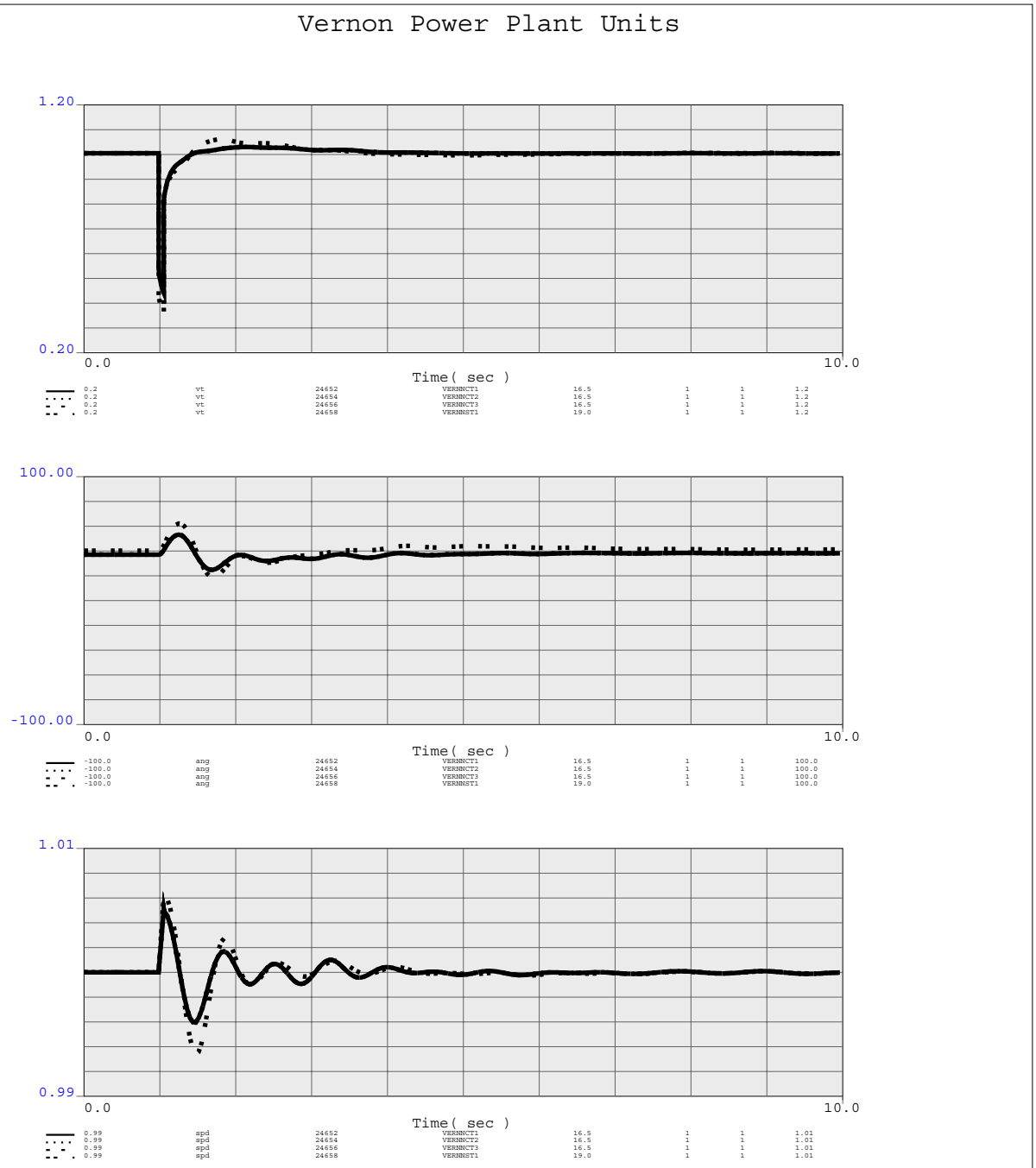
09hs_pst-vpp304-rev1_LagunaBell-RioHondo-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:24:47 2006

Plot 4 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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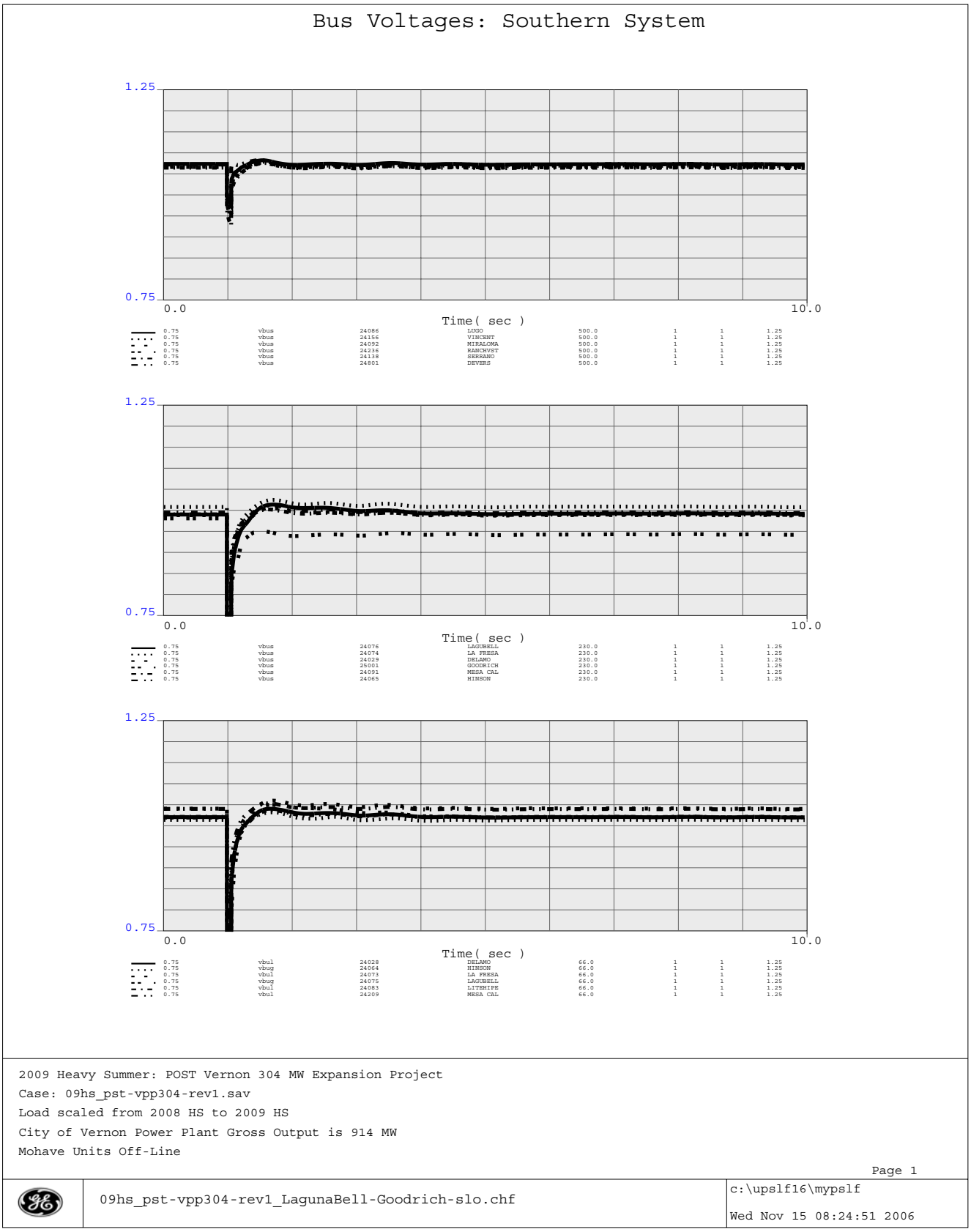
09hs_pst-vpp304-rev1_LagunaBell-RioHondo-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:24:47 2006

Plot 5 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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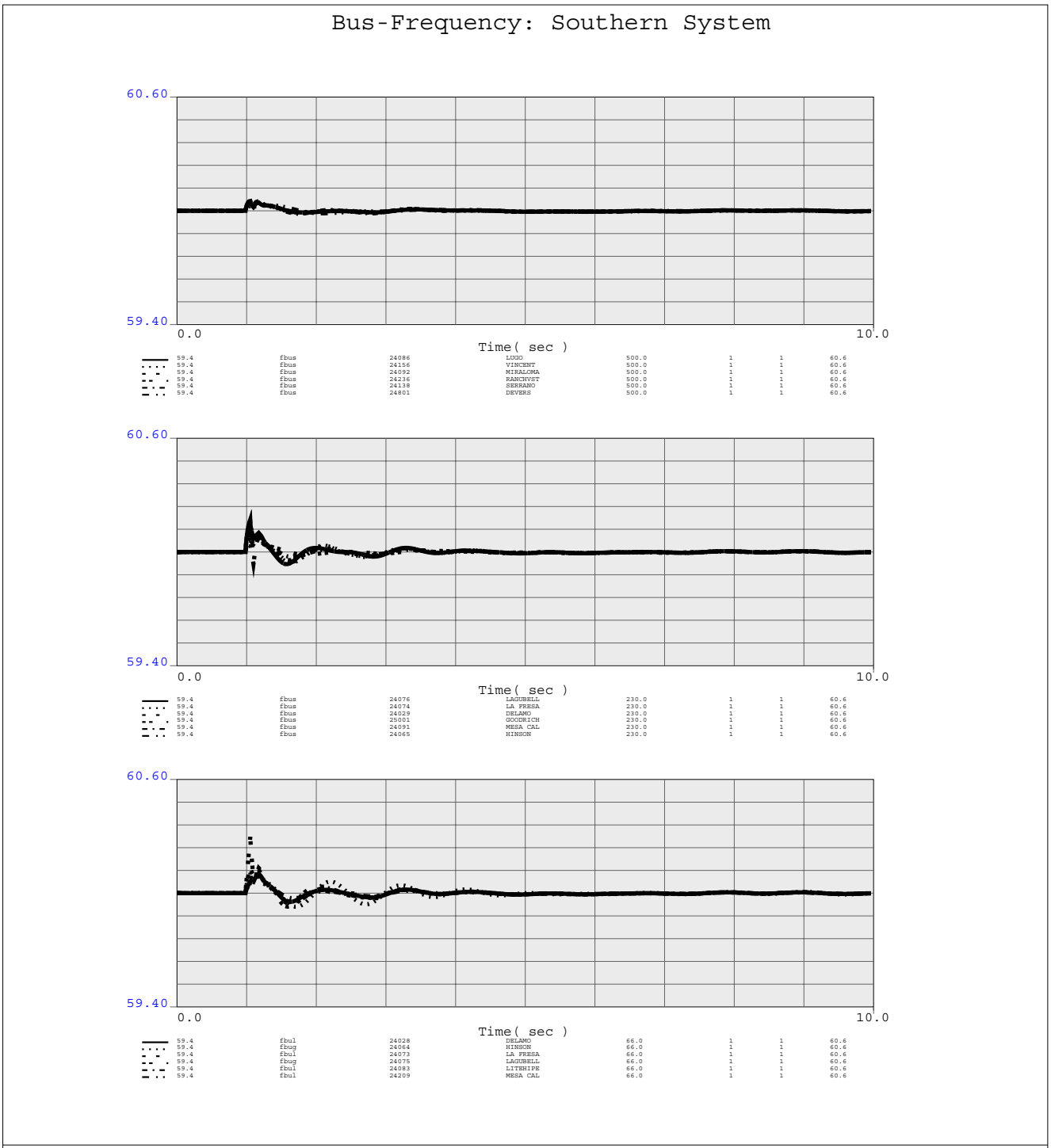
	09hs_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:51 2006

Plot 5 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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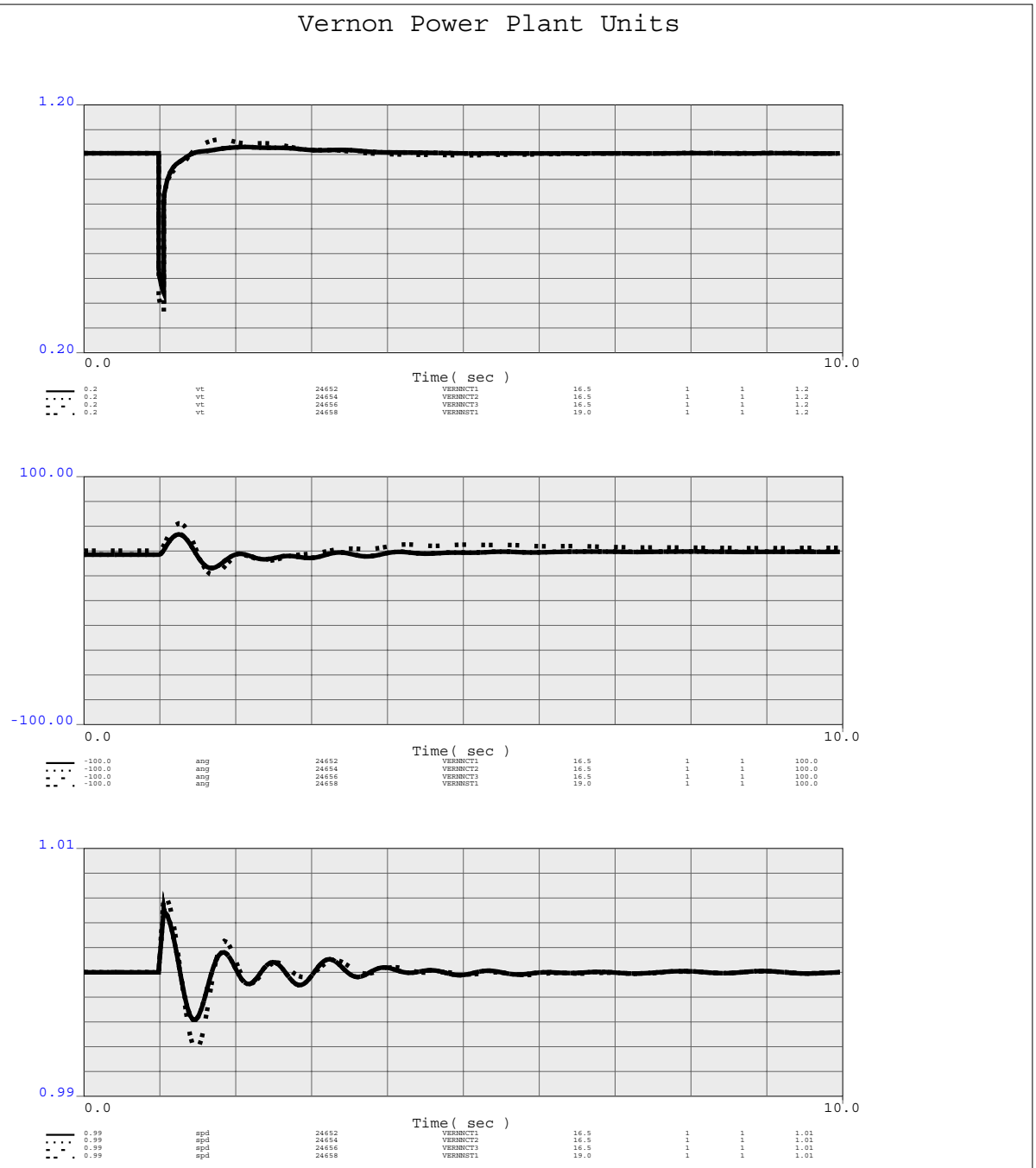
09hs_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:24:51 2006

Plot 5 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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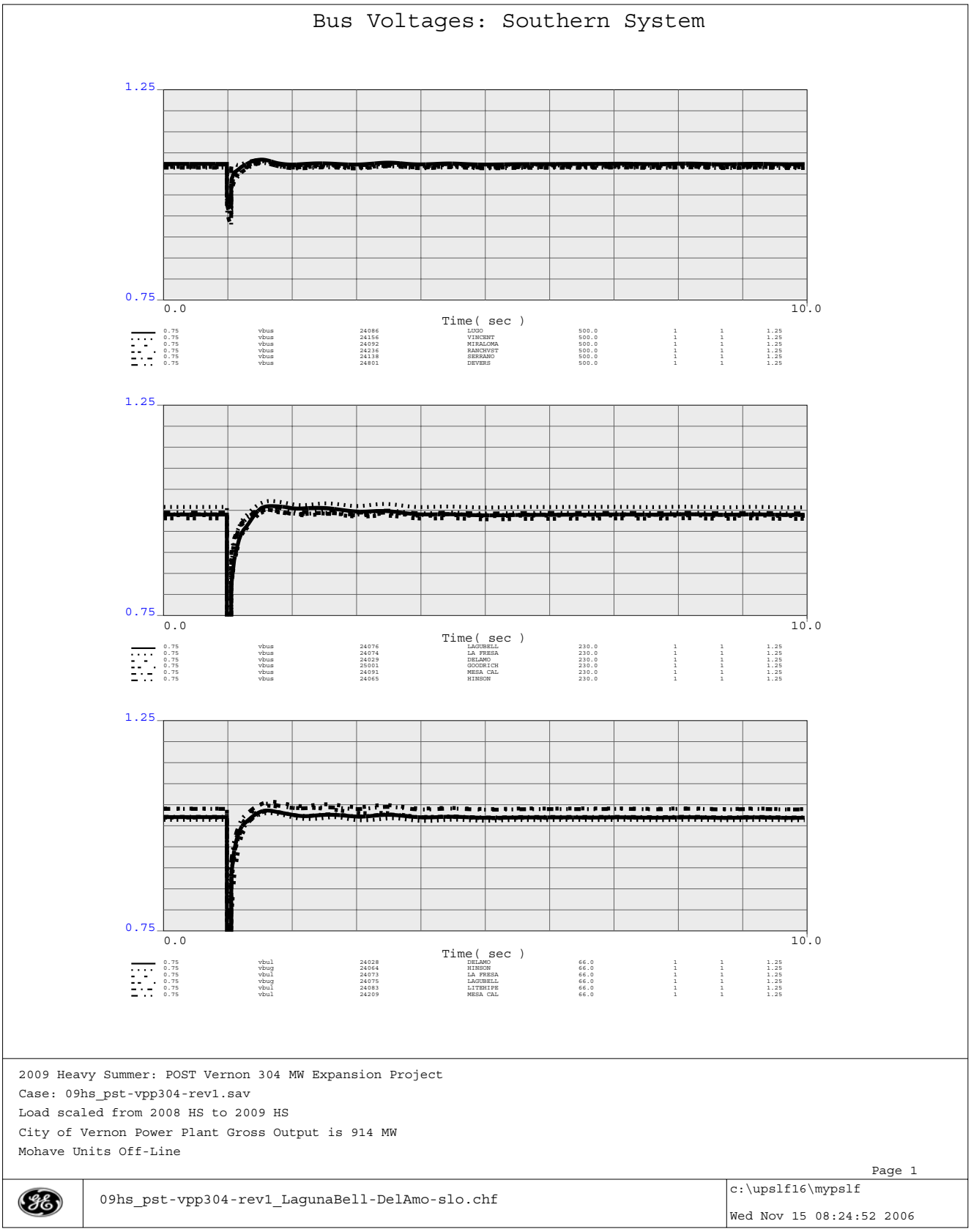
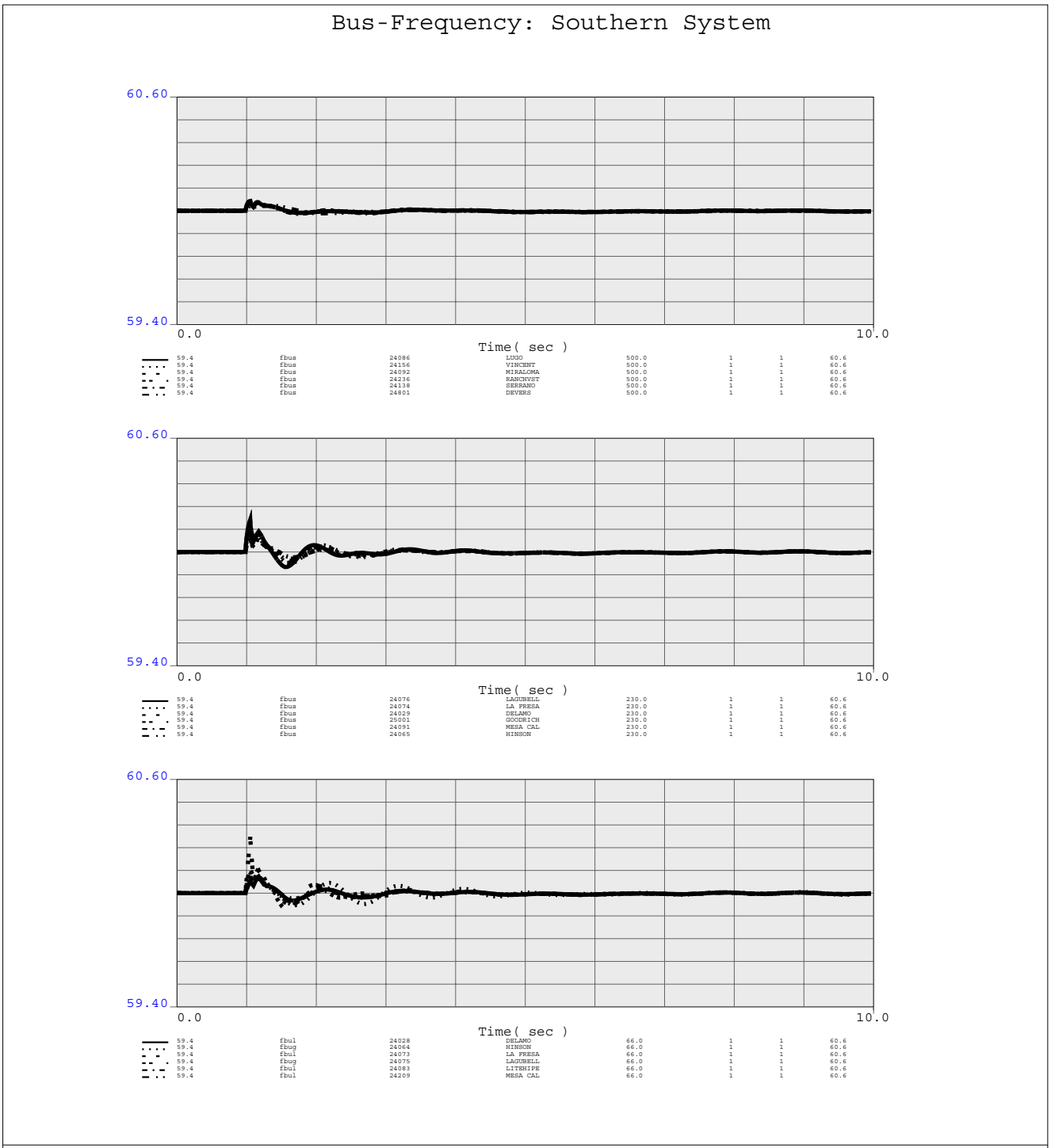
	09hs_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:51 2006

Plot 6 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.



Plot 6 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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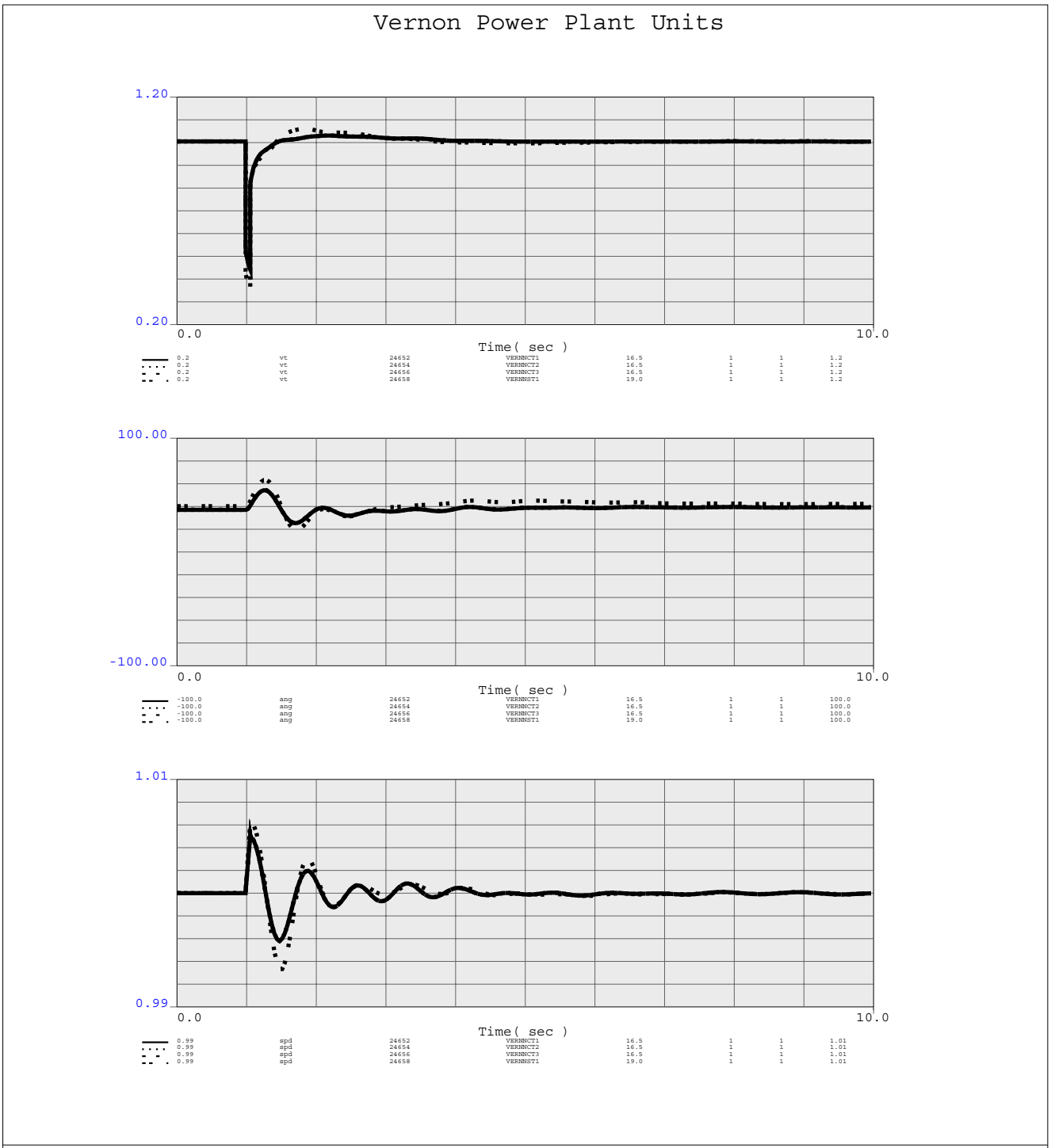
09hs_pst-vpp304-rev1_LagunaBell-DelAmo-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:24:52 2006

Plot 6 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.

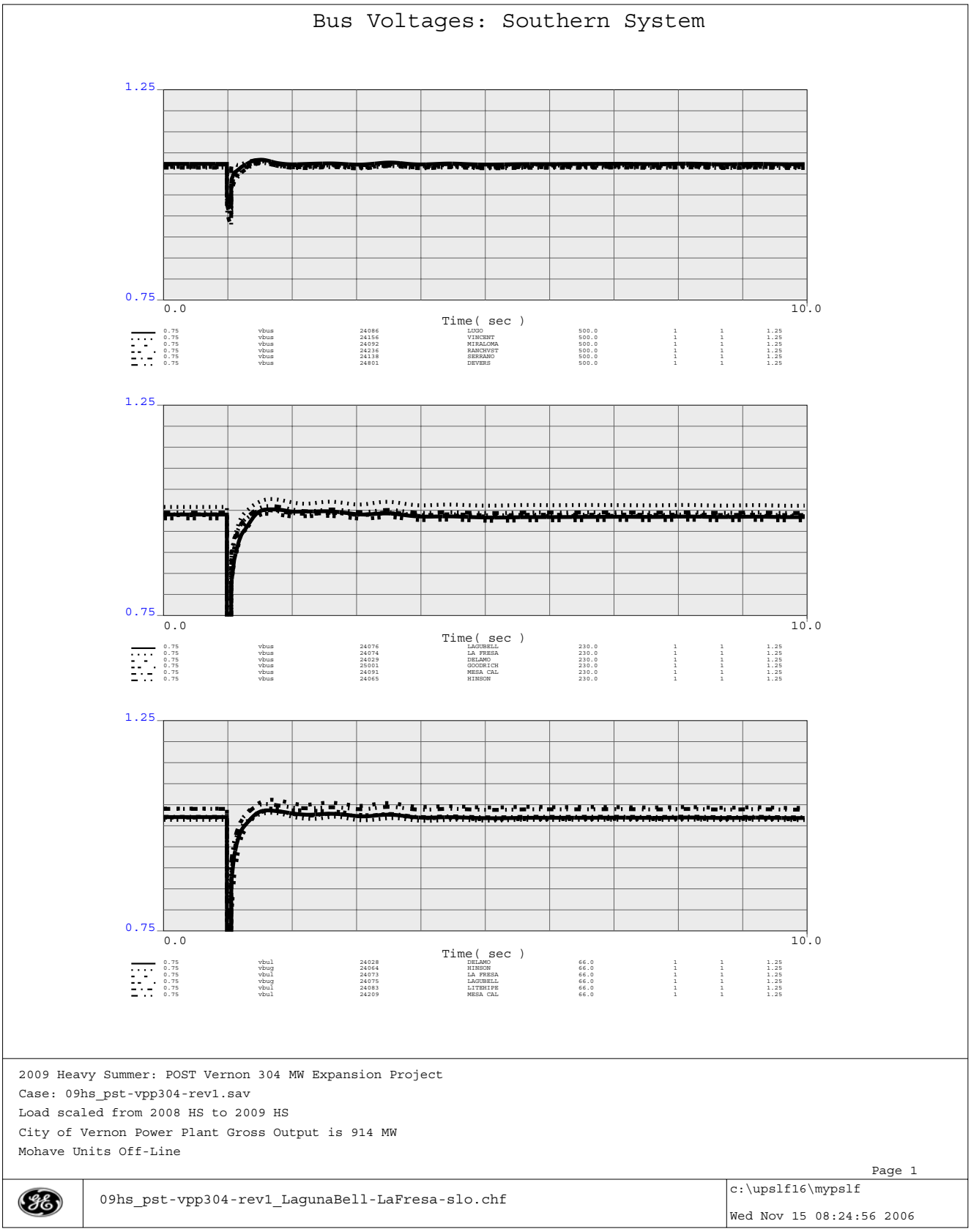


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

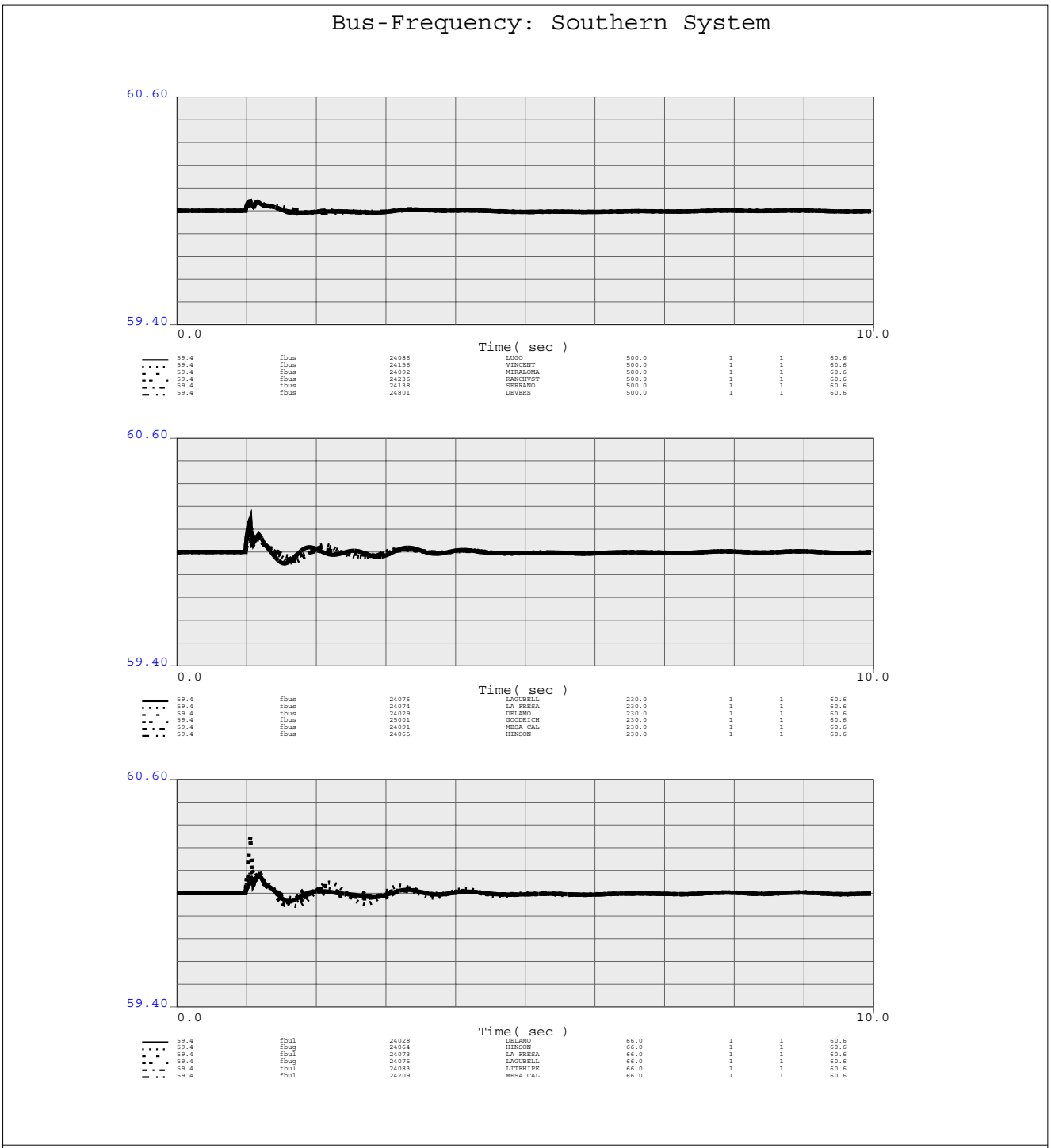
Page 3

	09hs_pst-vpp304-rev1_LagunaBell-DelAmo-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:52 2006

Plot 7 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.



Plot 7 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

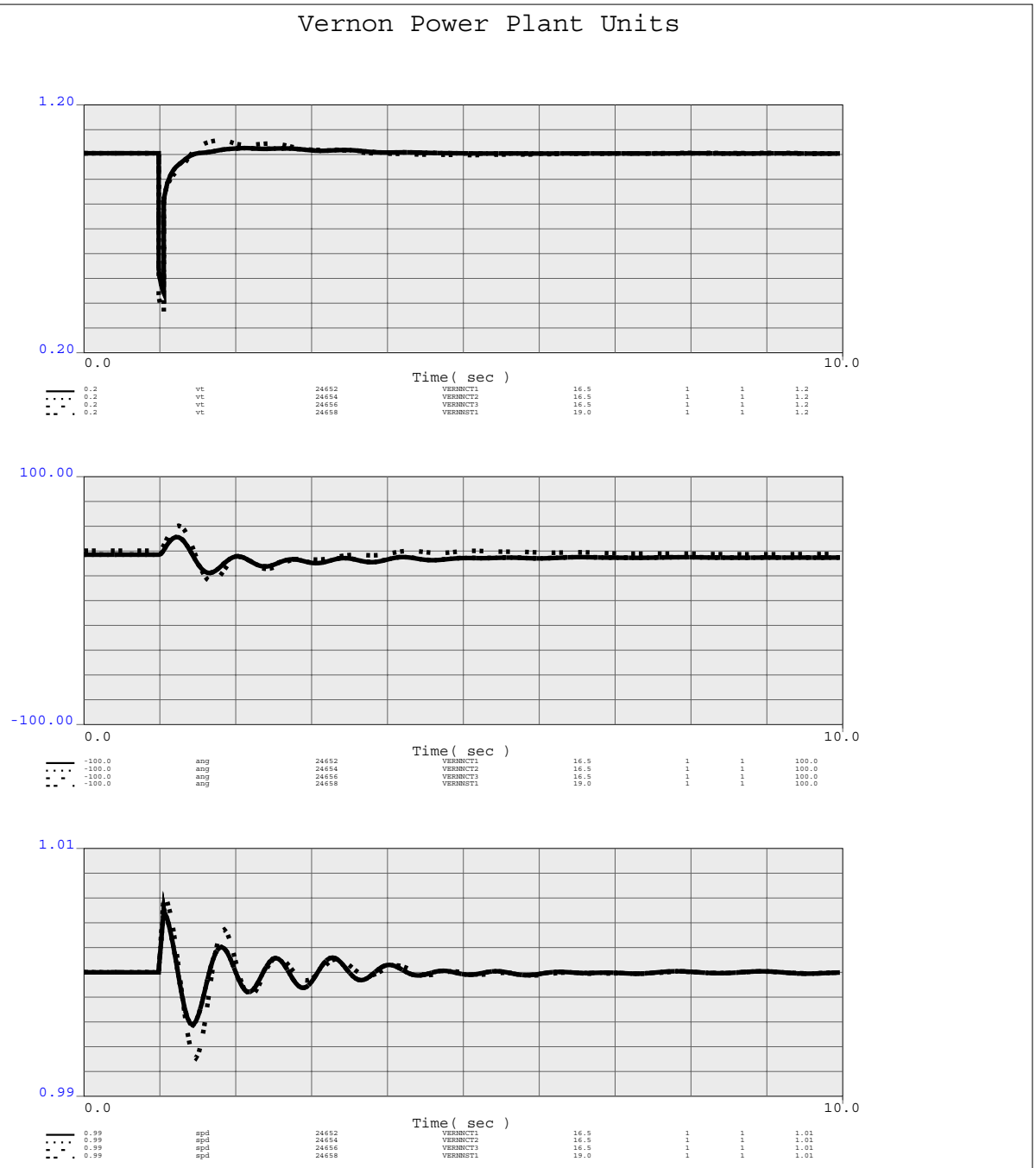
Page 2

09hs_pst-vpp304-rev1_LagunaBell-LaFresa-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:24:56 2006

Plot 7 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.

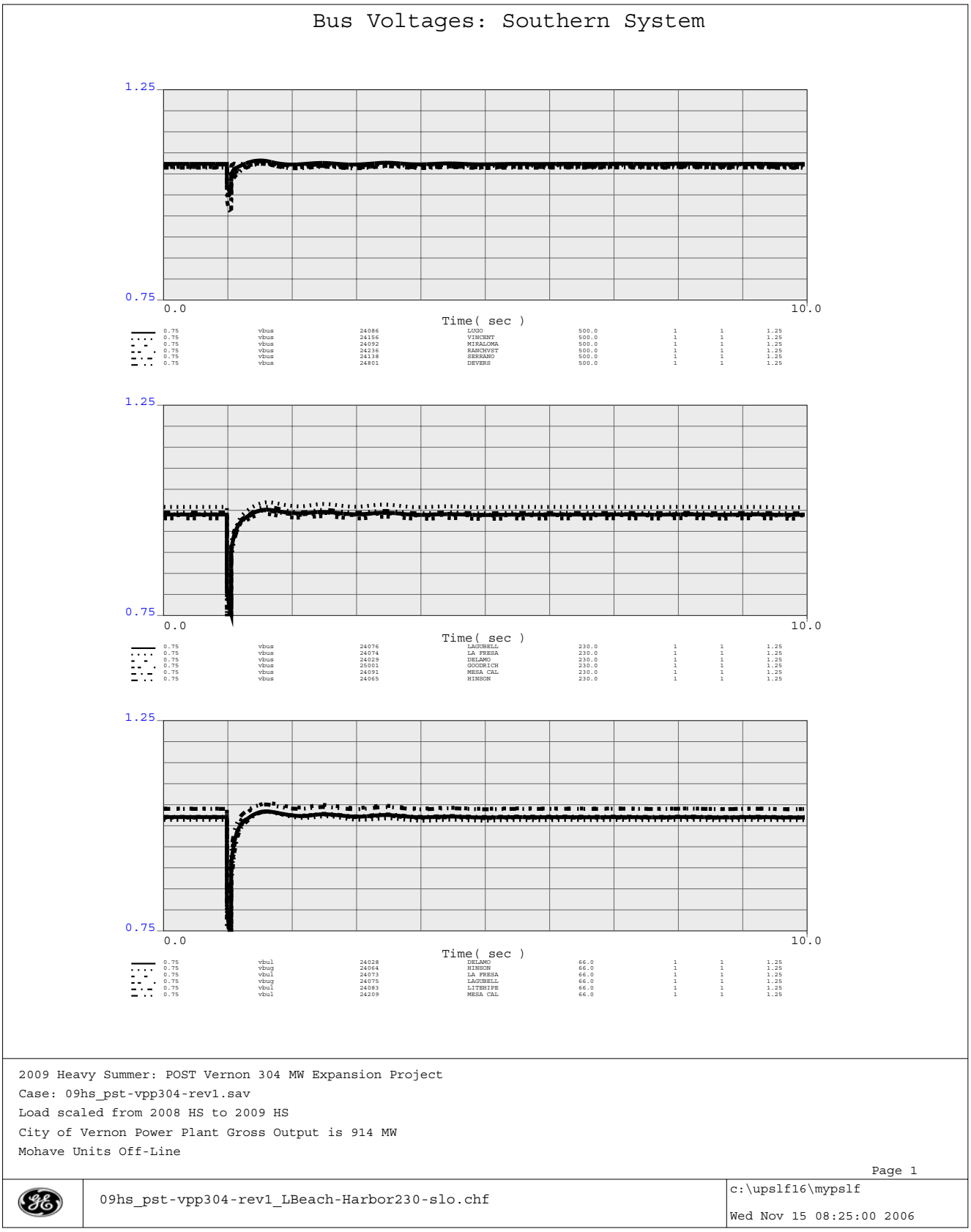


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

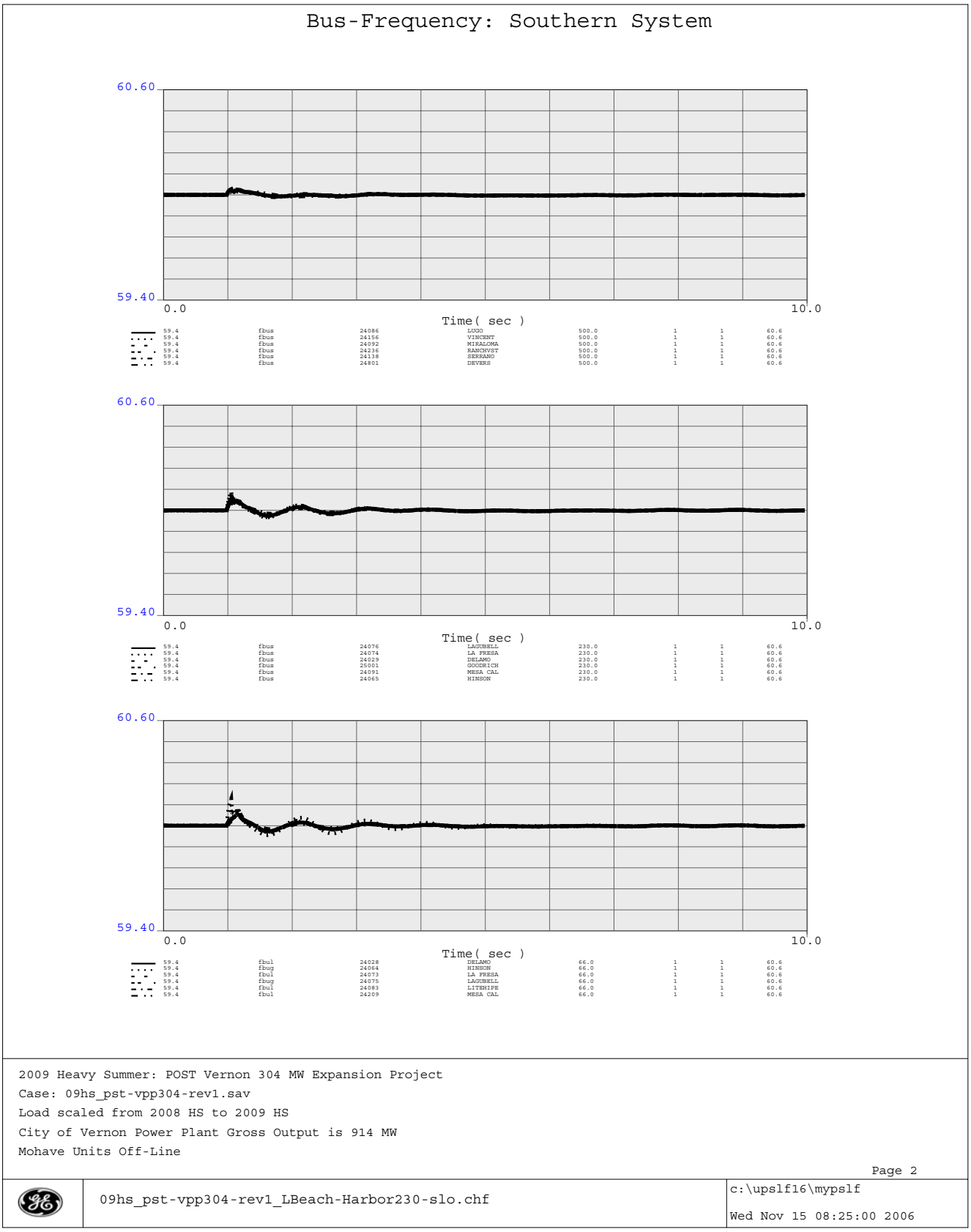
Page 3

	09hs_pst-vpp304-rev1_LagunaBell-LaFresa-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:24:56 2006

Plot 8 - 1: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



Plot 8 - 2: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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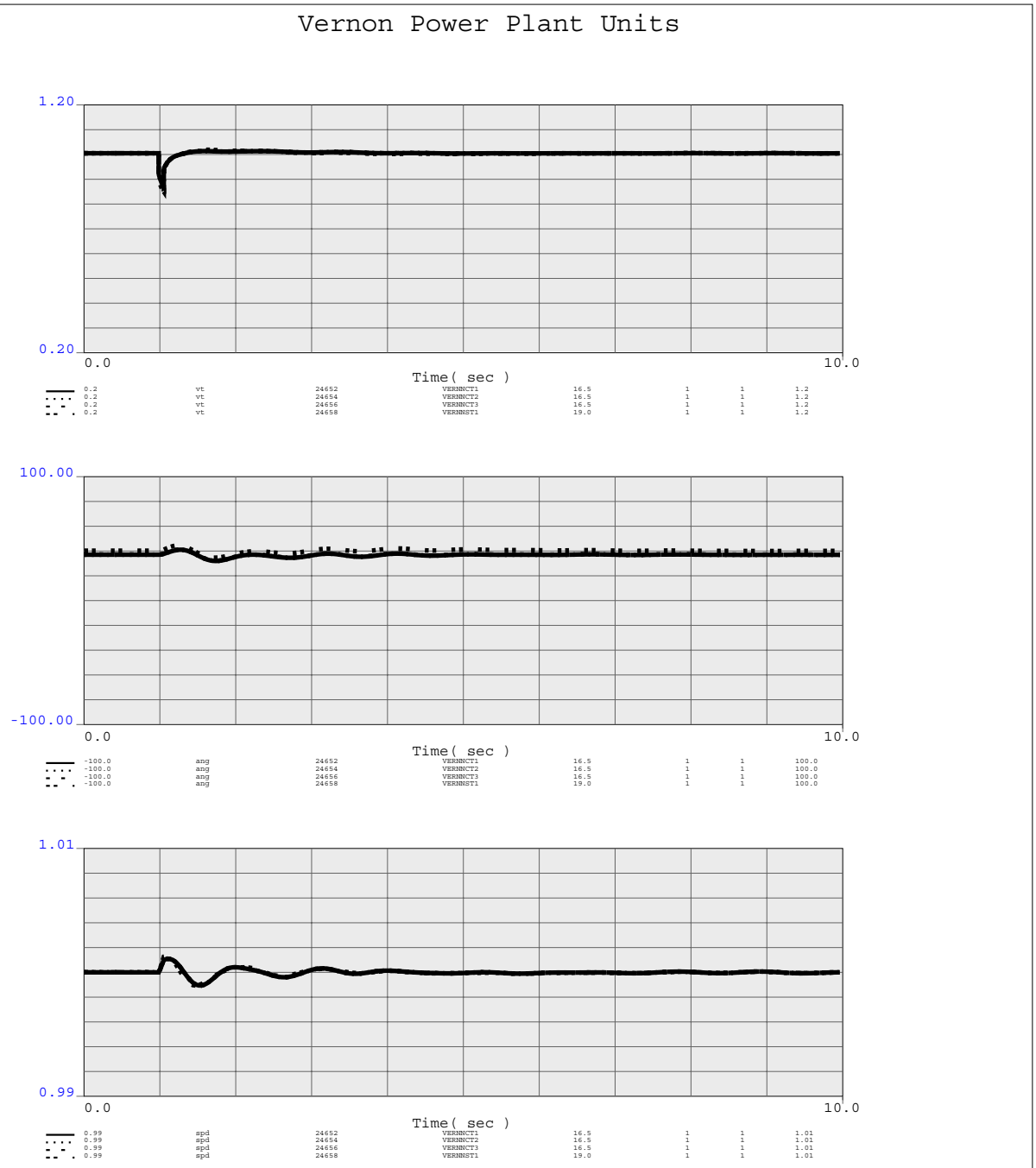
09hs_pst-vpp304-rev1_LBeach-Harbor230-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:25:00 2006

Plot 8 - 3: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



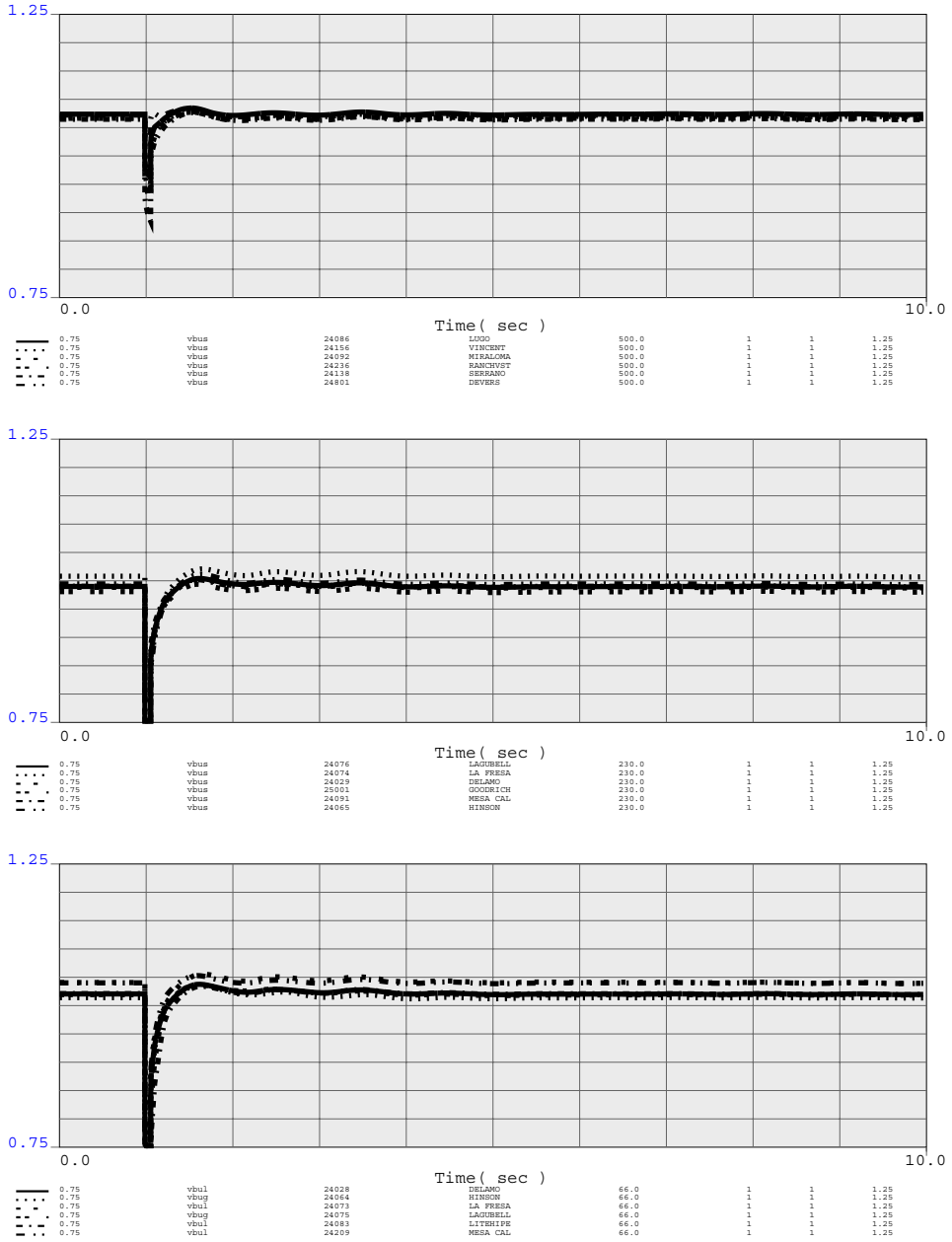
2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 3

	09hs_pst-vpp304-rev1_LBeach-Harbor230-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:00 2006

Plot 9 - 1: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.

Bus Voltages: Southern System

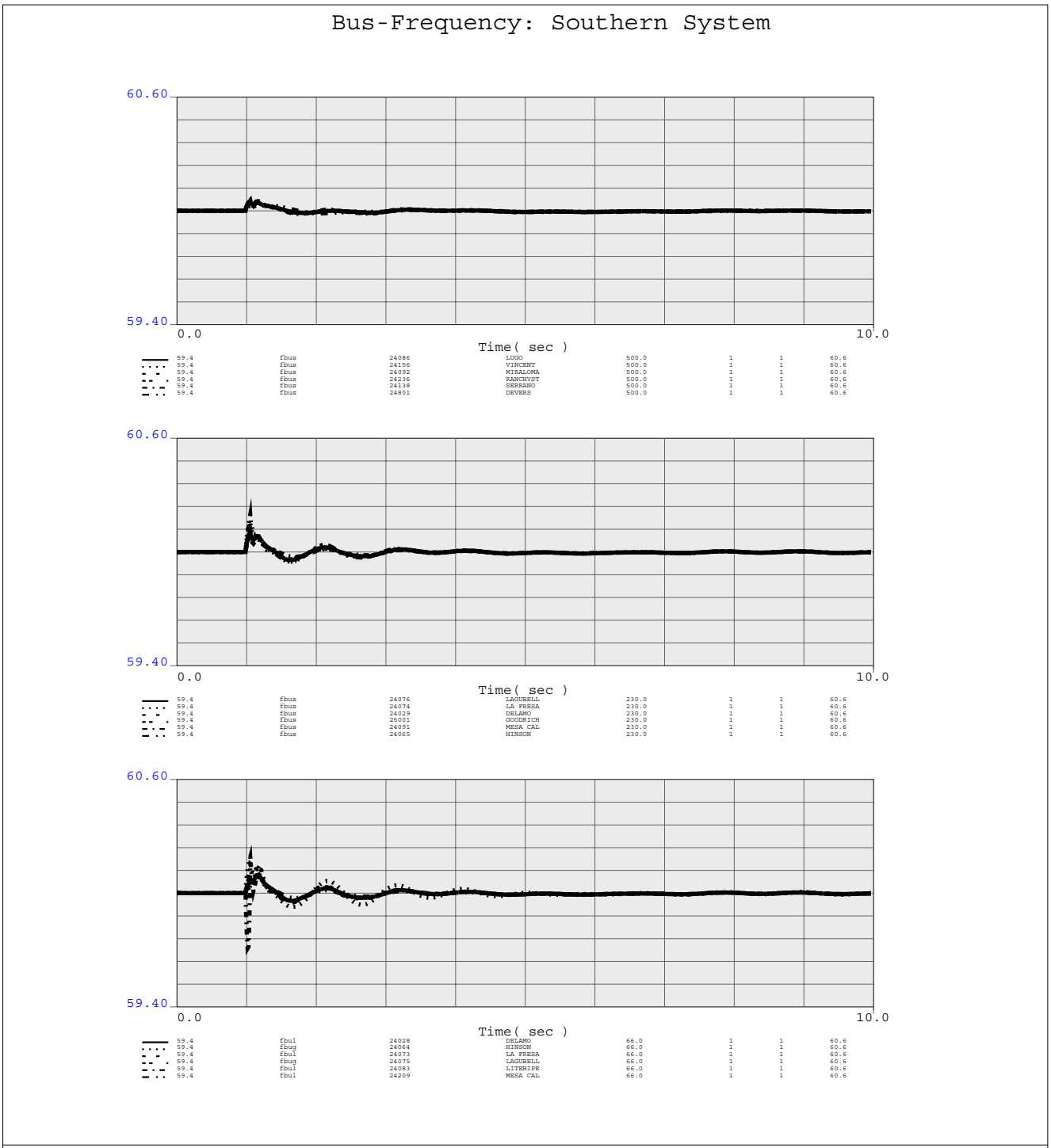


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 1

	09hs_pst-vpp304-rev1_LBeach-Litehipe230-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:04 2006

Plot 9 - 2: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.

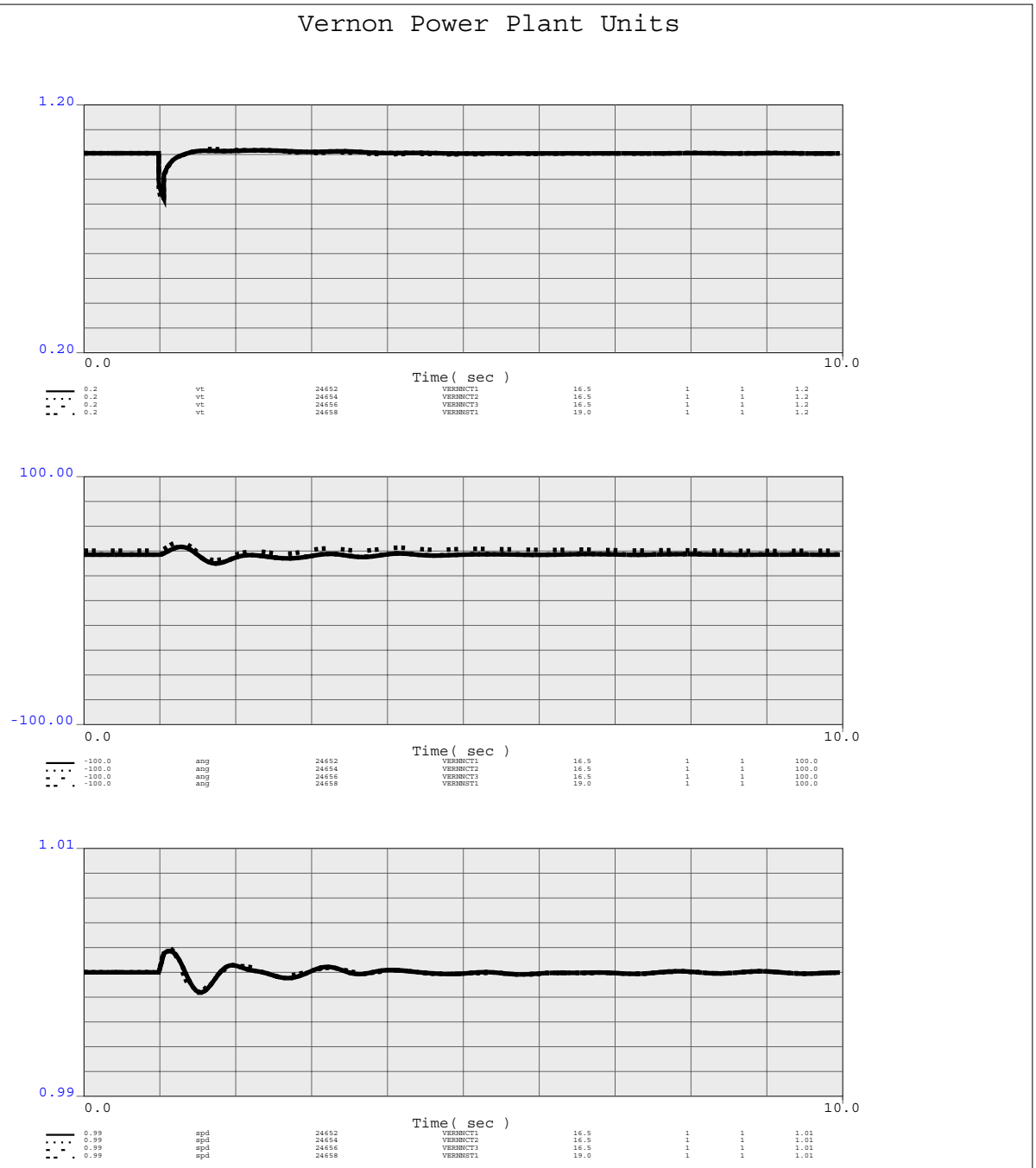


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 2

	09hs_pst-vpp304-rev1_LBeach-Litehipe230-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:04 2006

Plot 9 - 3: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.

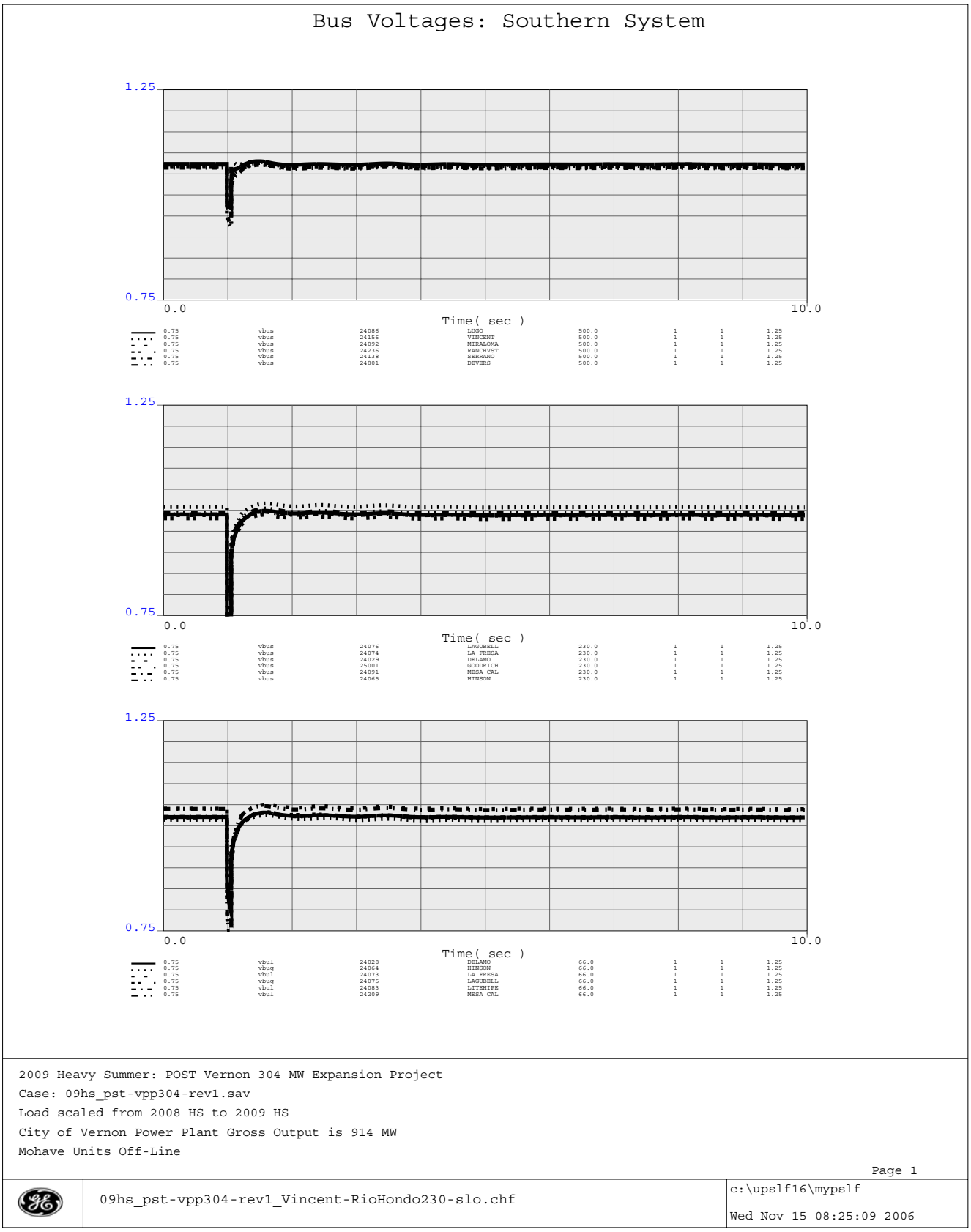


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

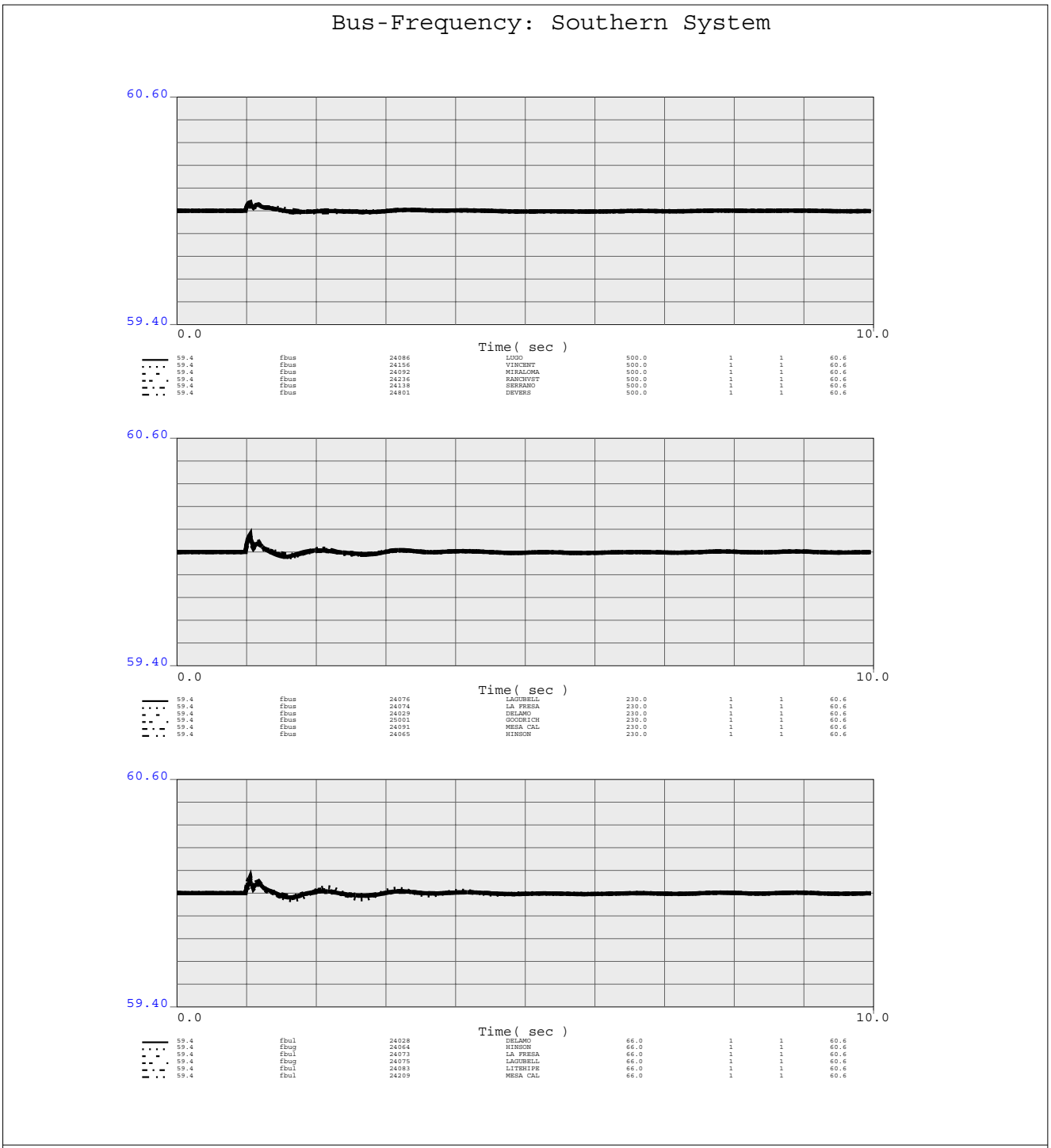
Page 3

	09hs_pst-vpp304-rev1_LBeach-Litehipe230-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:04 2006

Plot 10 - 1: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.



Plot 10 - 2: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

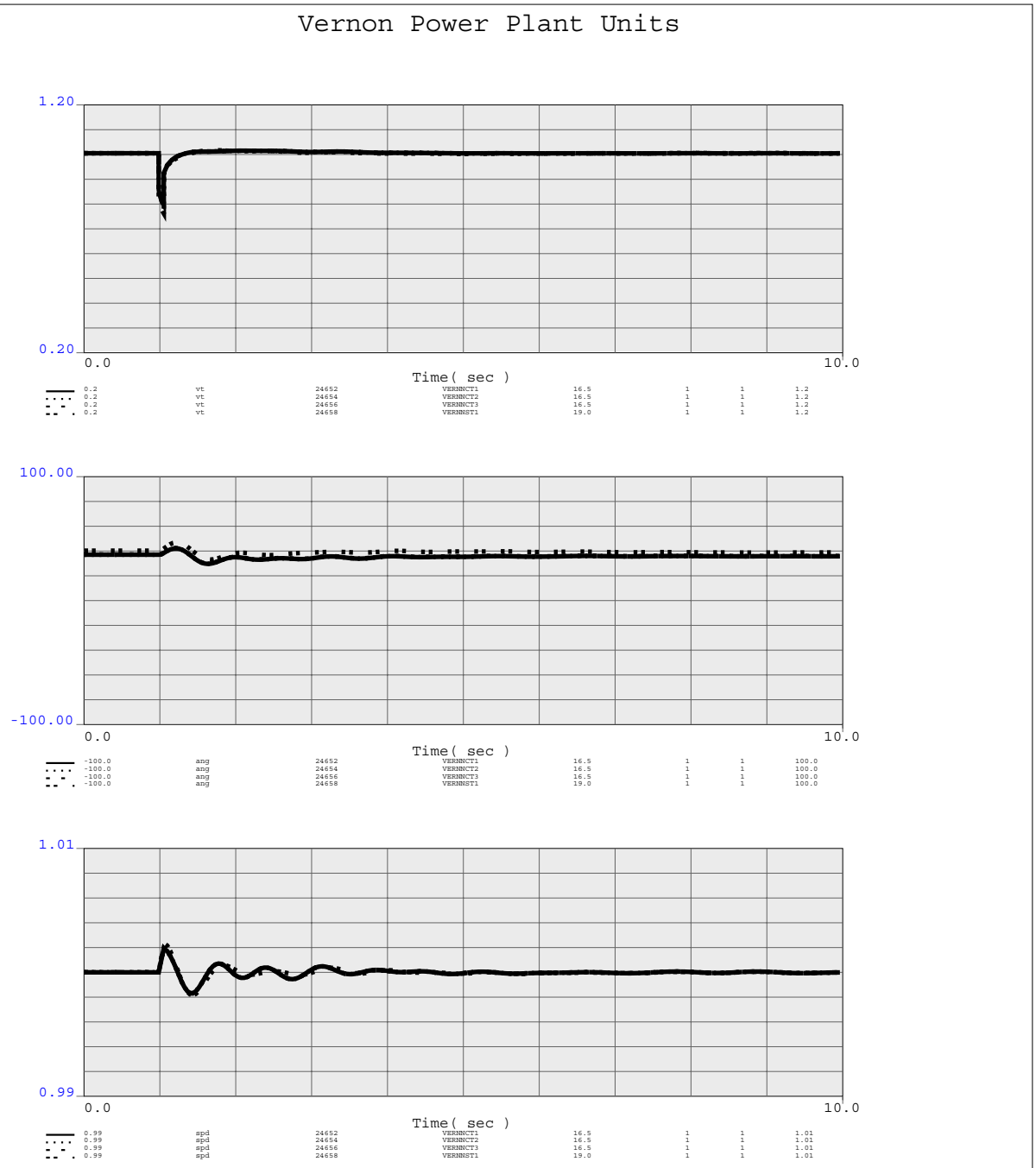
Page 2

09hs_pst-vpp304-rev1_Vincent-RioHondo230-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:25:09 2006

Plot 10 - 3: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.

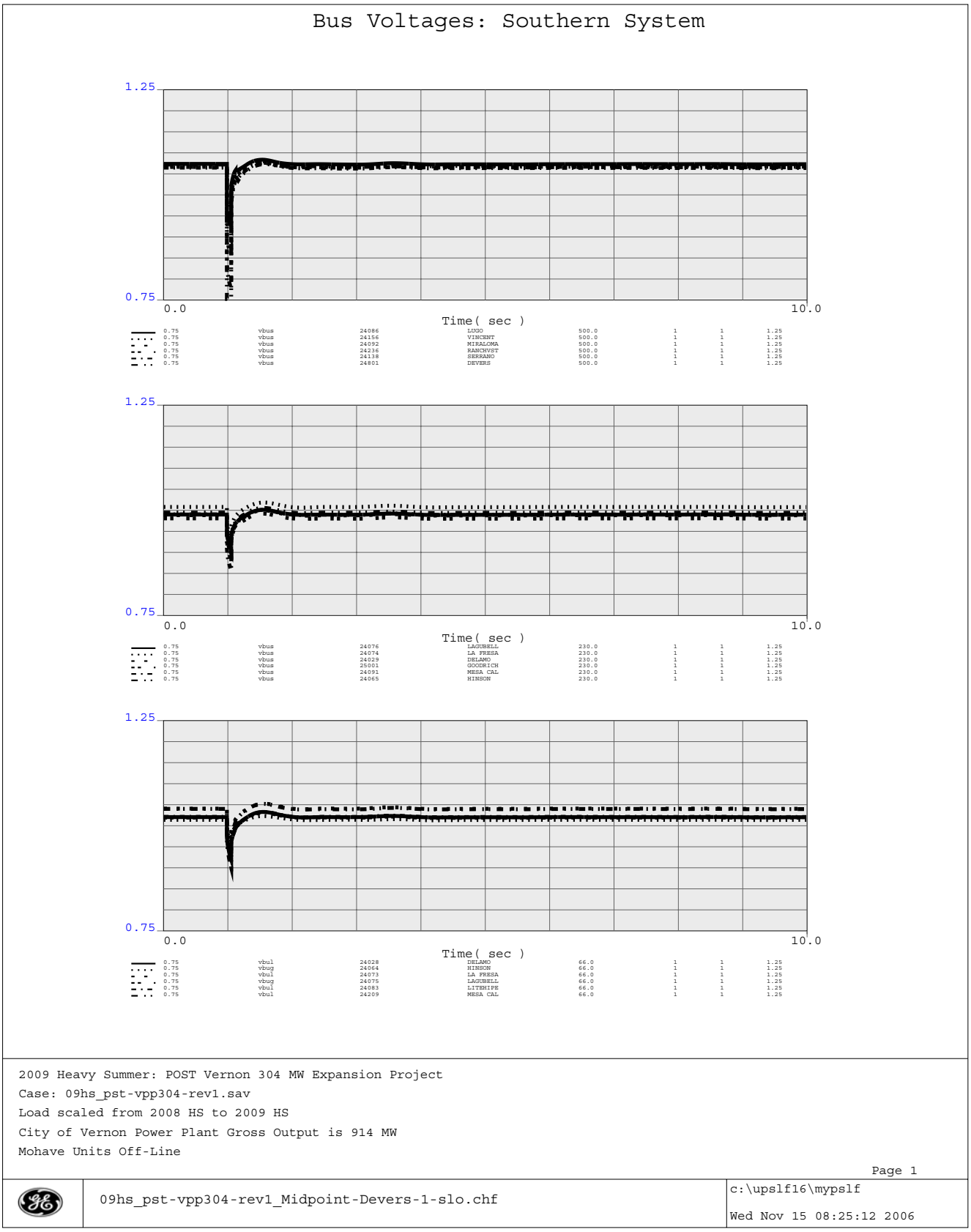


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 3

	09hs_pst-vpp304-rev1_Vincent-RioHondo230-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:09 2006

Plot 11 - 1: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.



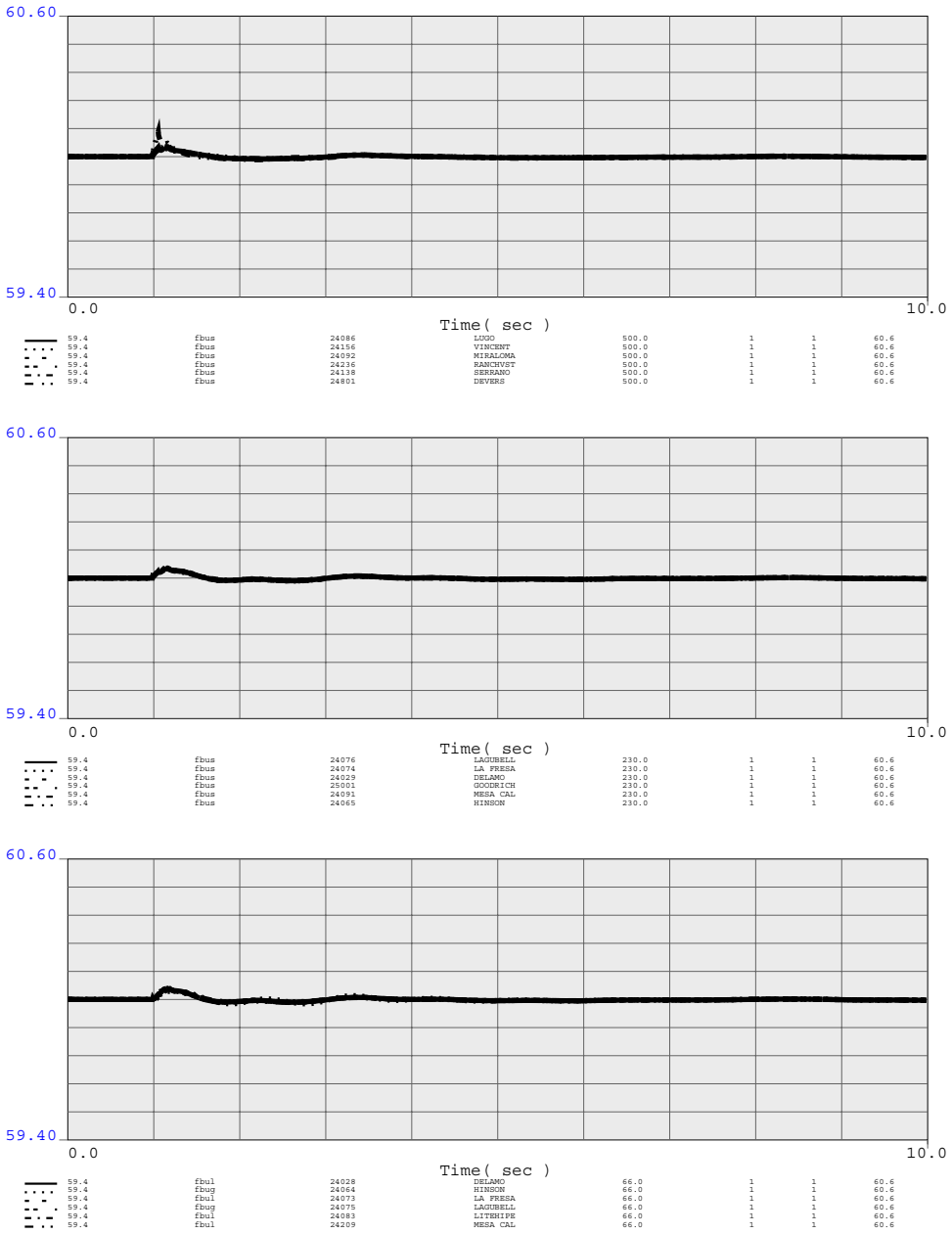
2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 1

	09hs_pst-vpp304-rev1_Midpoint-Devers-1-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:12 2006

Plot 11 - 2: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.

Bus-Frequency: Southern System

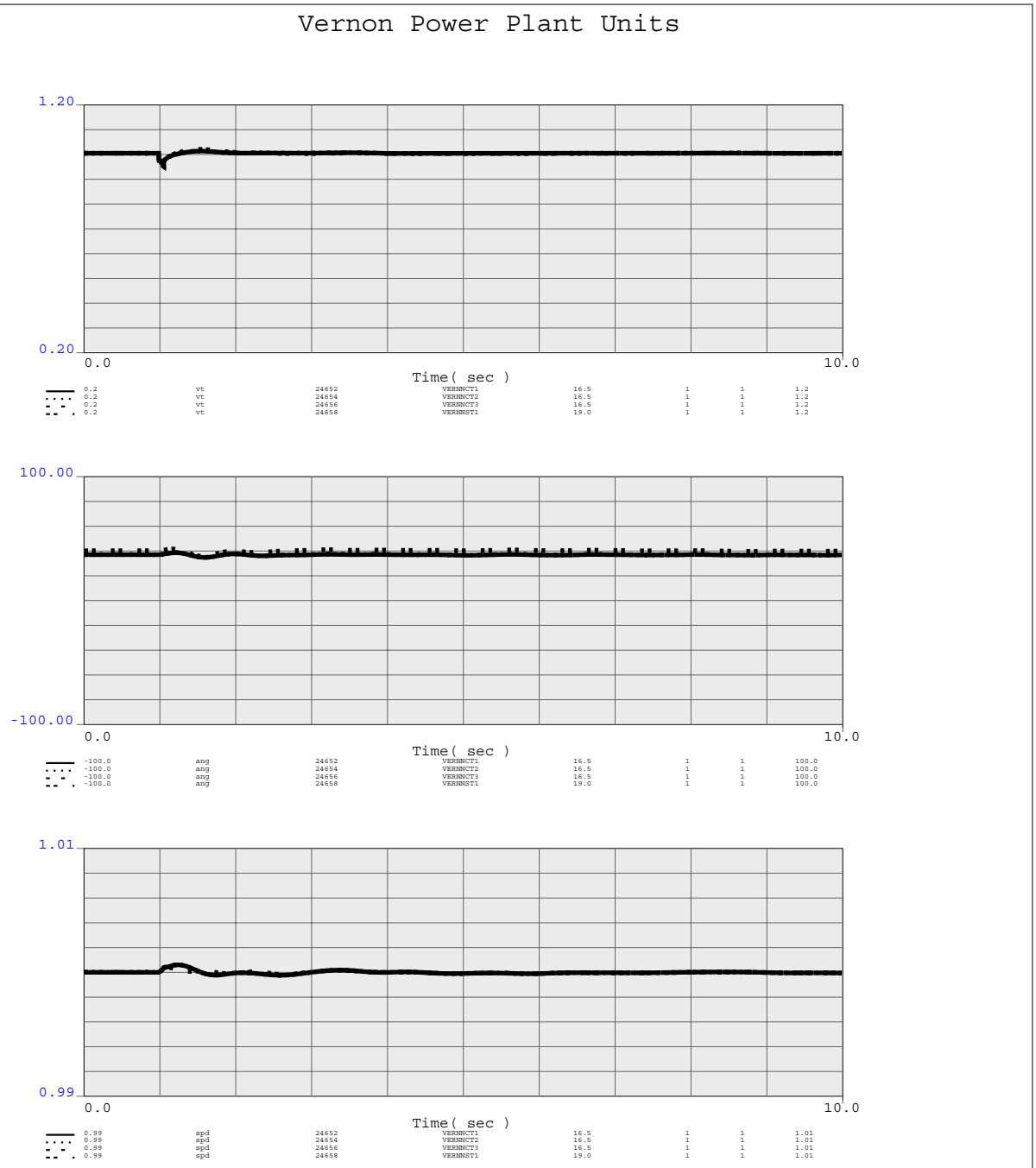


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 2

	09hs_pst-vpp304-rev1_Midpoint-Devers-1-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:13 2006

Plot 11 - 3: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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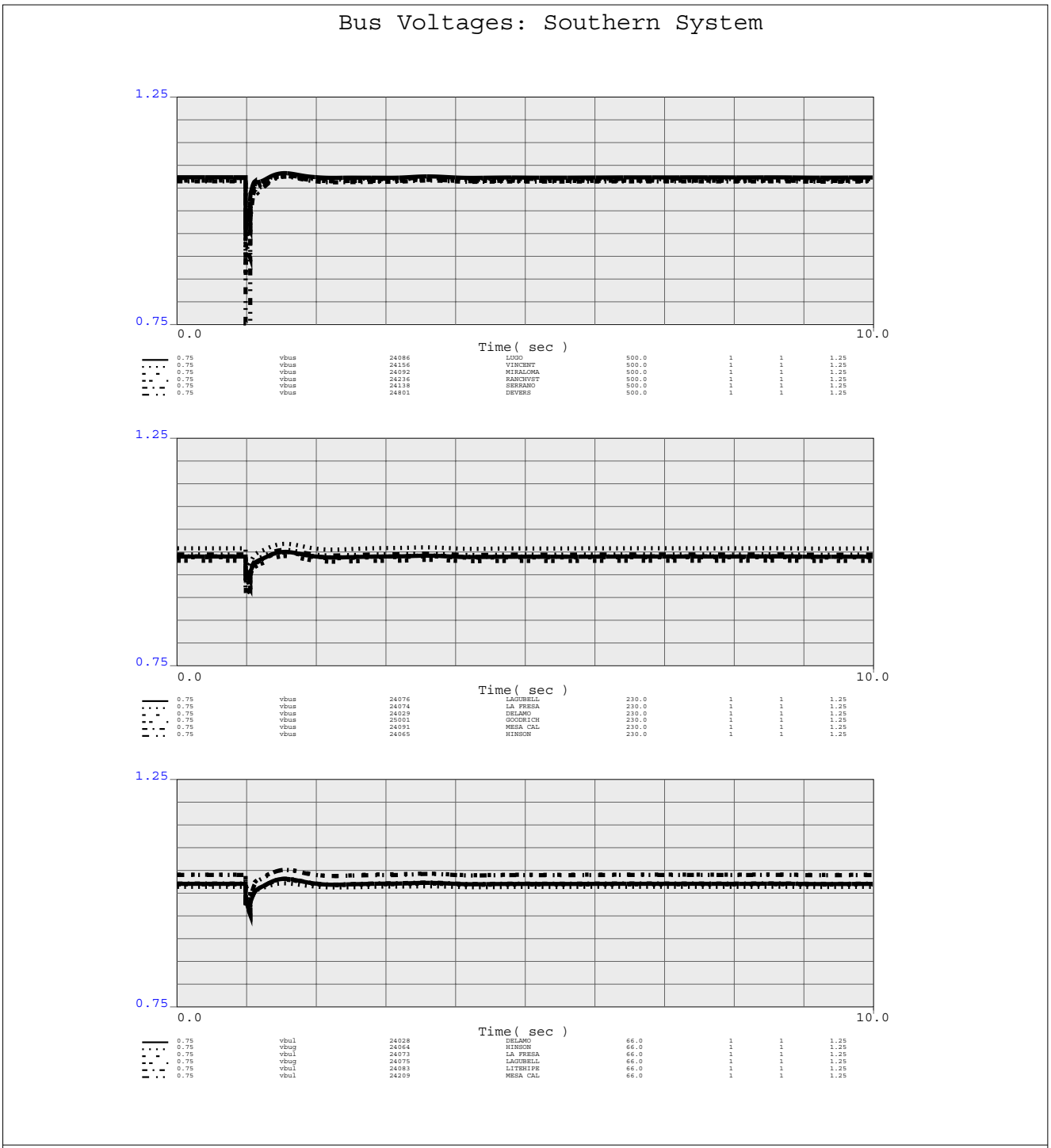
09hs_pst-vpp304-rev1_Midpoint-Devers-1-slo.chf

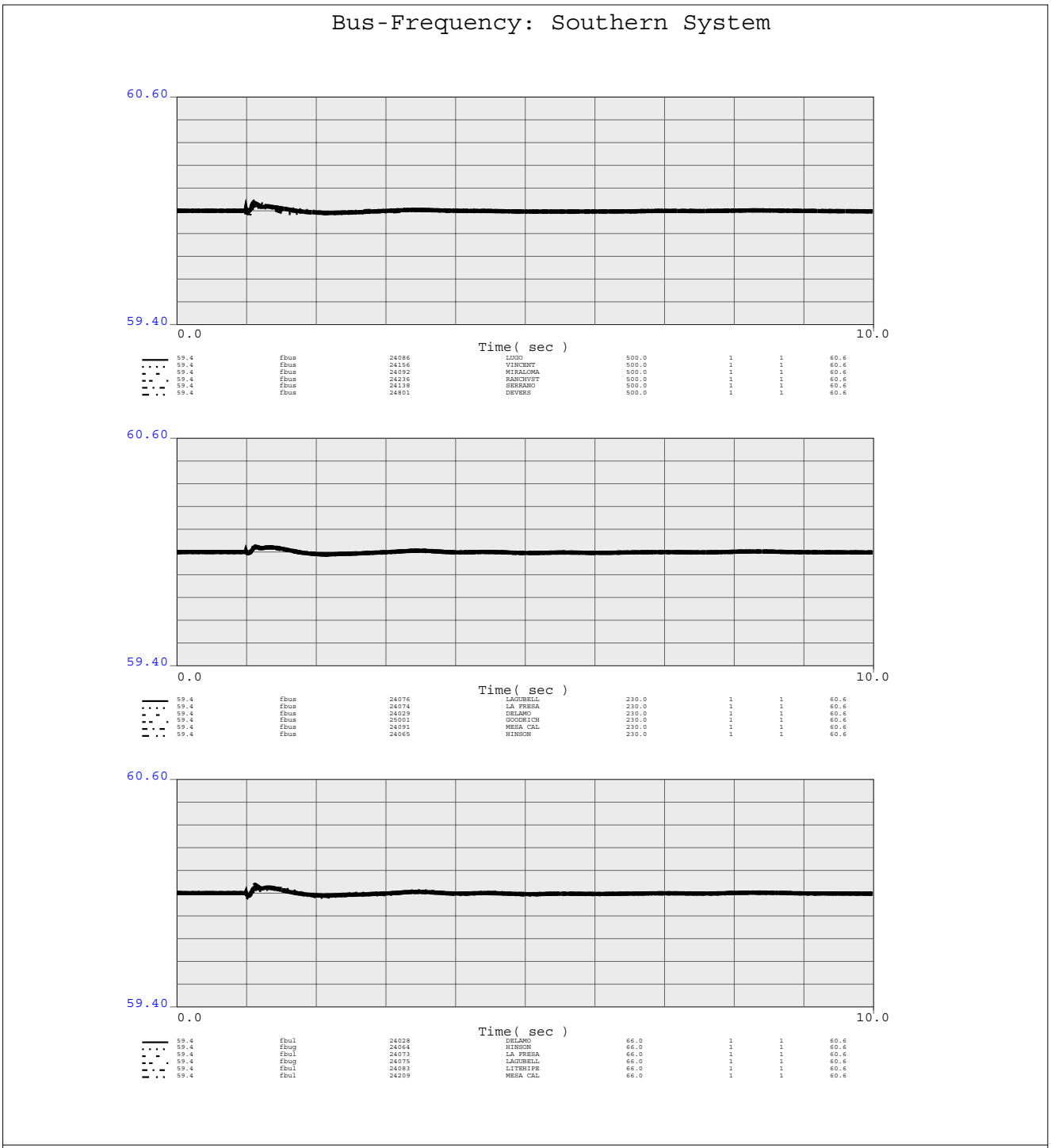
c:\upslf16\mypslf

Wed Nov 15 08:25:13 2006

Plot 12 - 1: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.



Plot 12 - 2: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

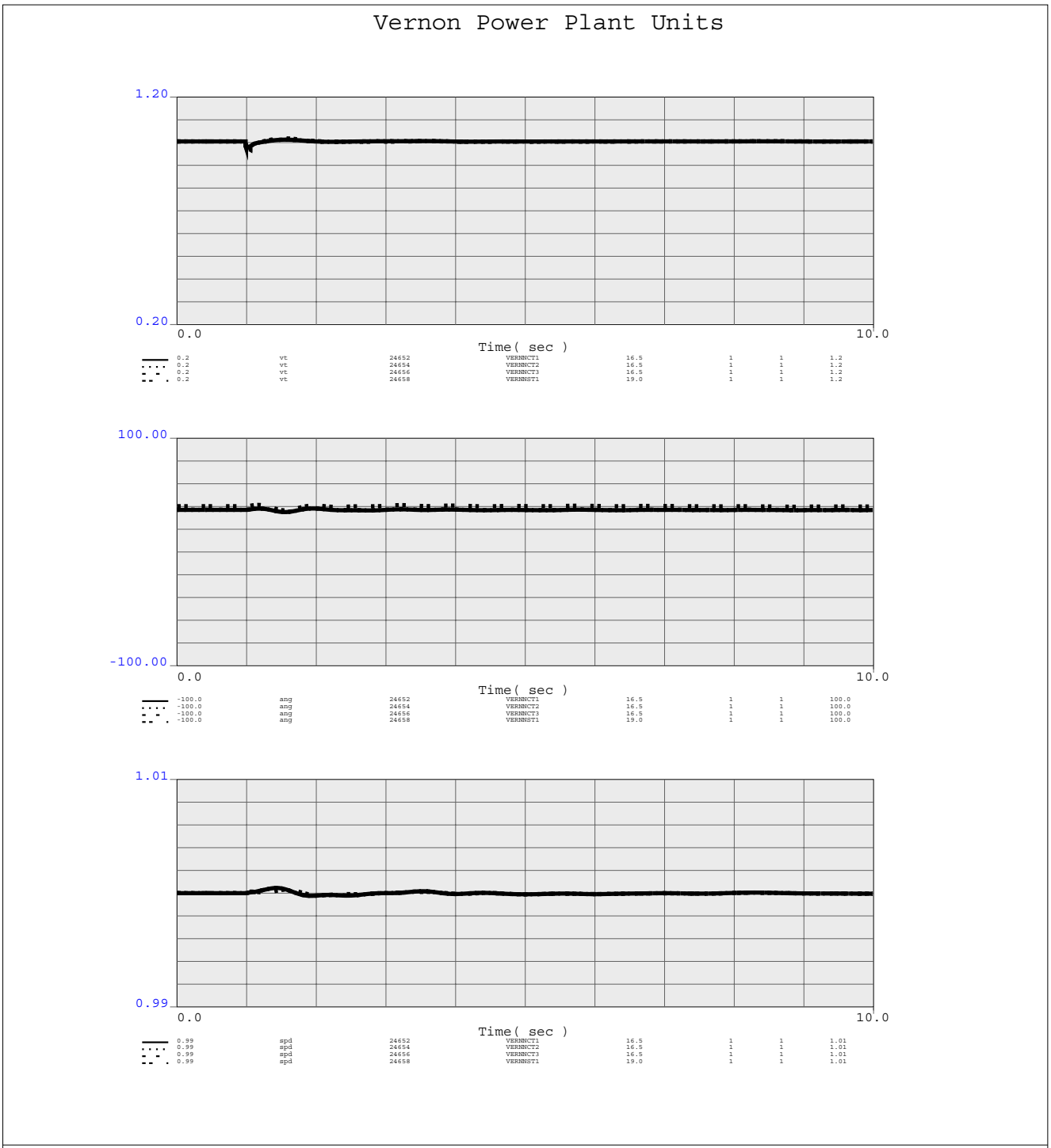
Page 2

09hs_pst-vpp304-rev1_Midpoint-Harquahala-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:25:17 2006

Plot 12 - 3: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

Page 3

09hs_pst-vpp304-rev1_Midpoint-Harquahala-slo.chf

c:\upslf16\mypslf

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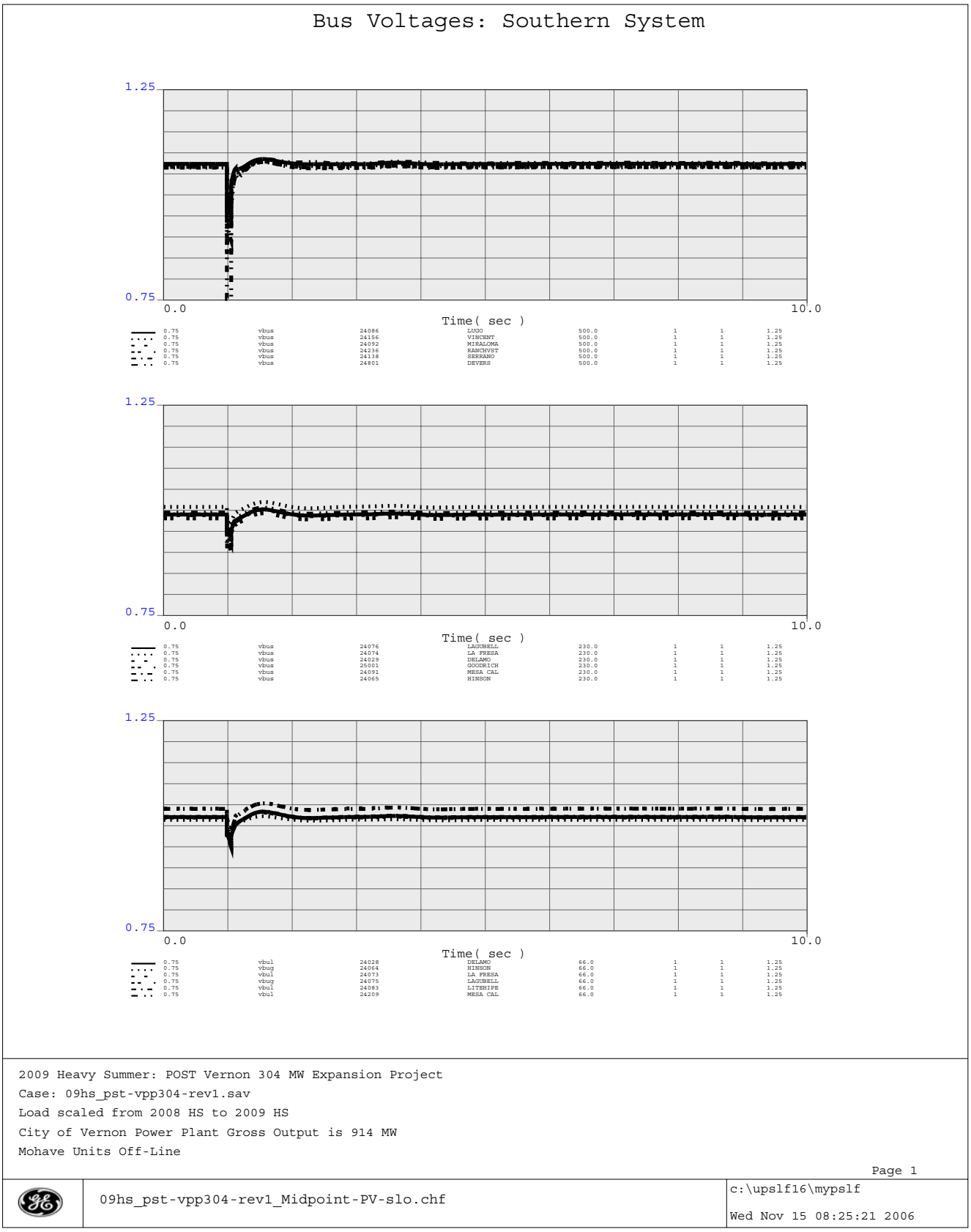
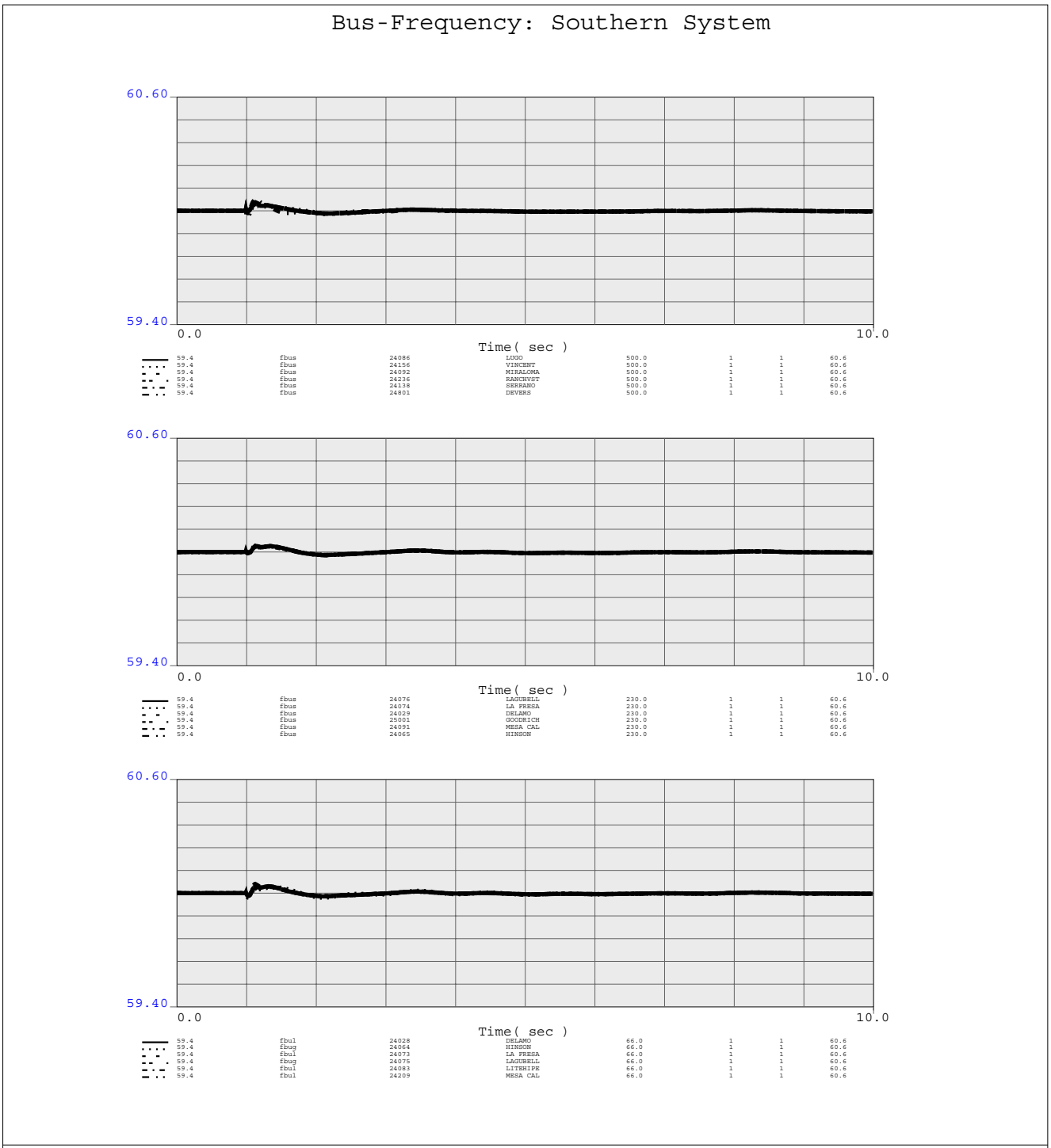
Plot 13 - 1: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.



Plot 13 - 2: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

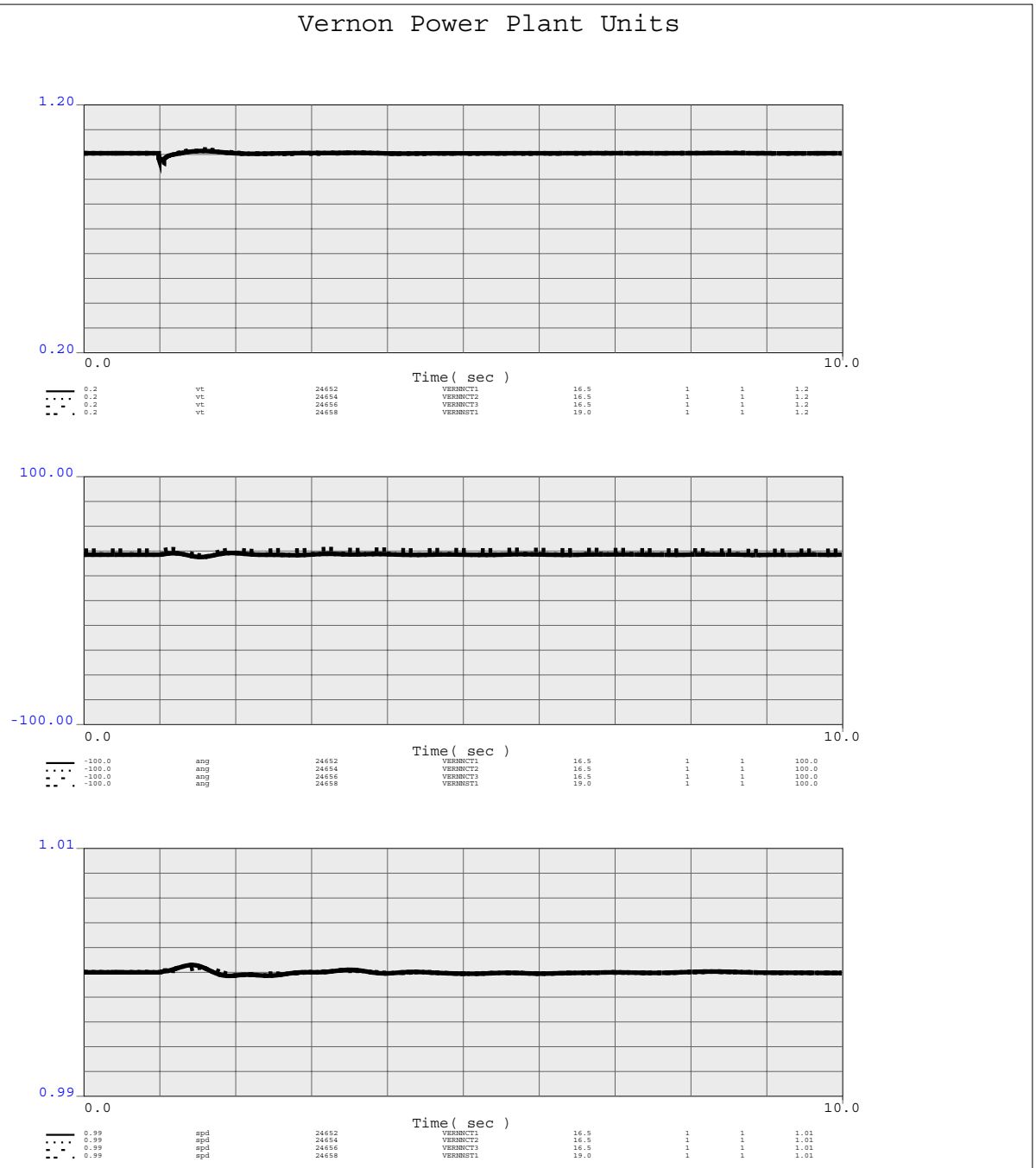
Page 2

09hs_pst-vpp304-rev1_Midpoint-PV-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:25:21 2006

Plot 13 - 3: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.

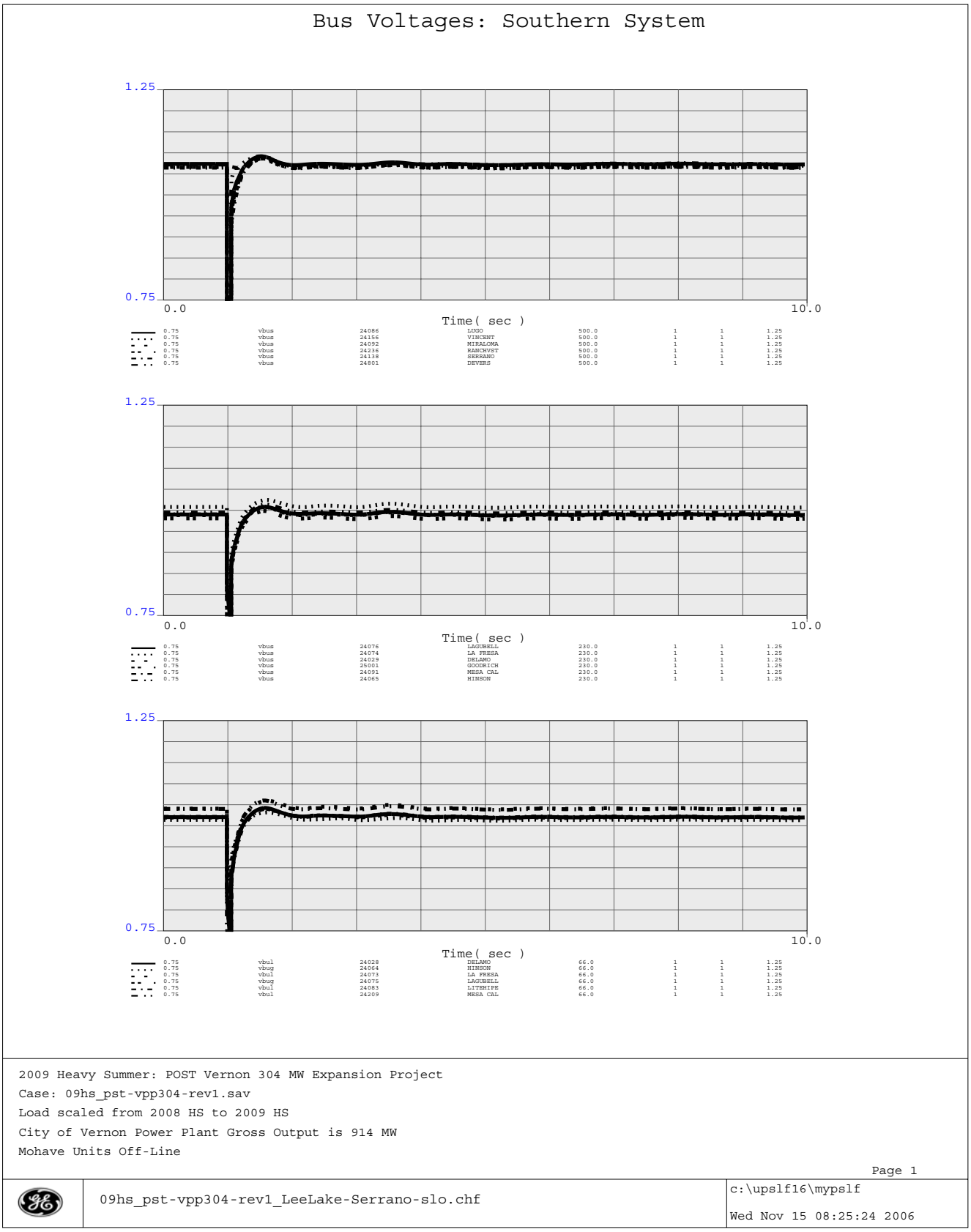


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

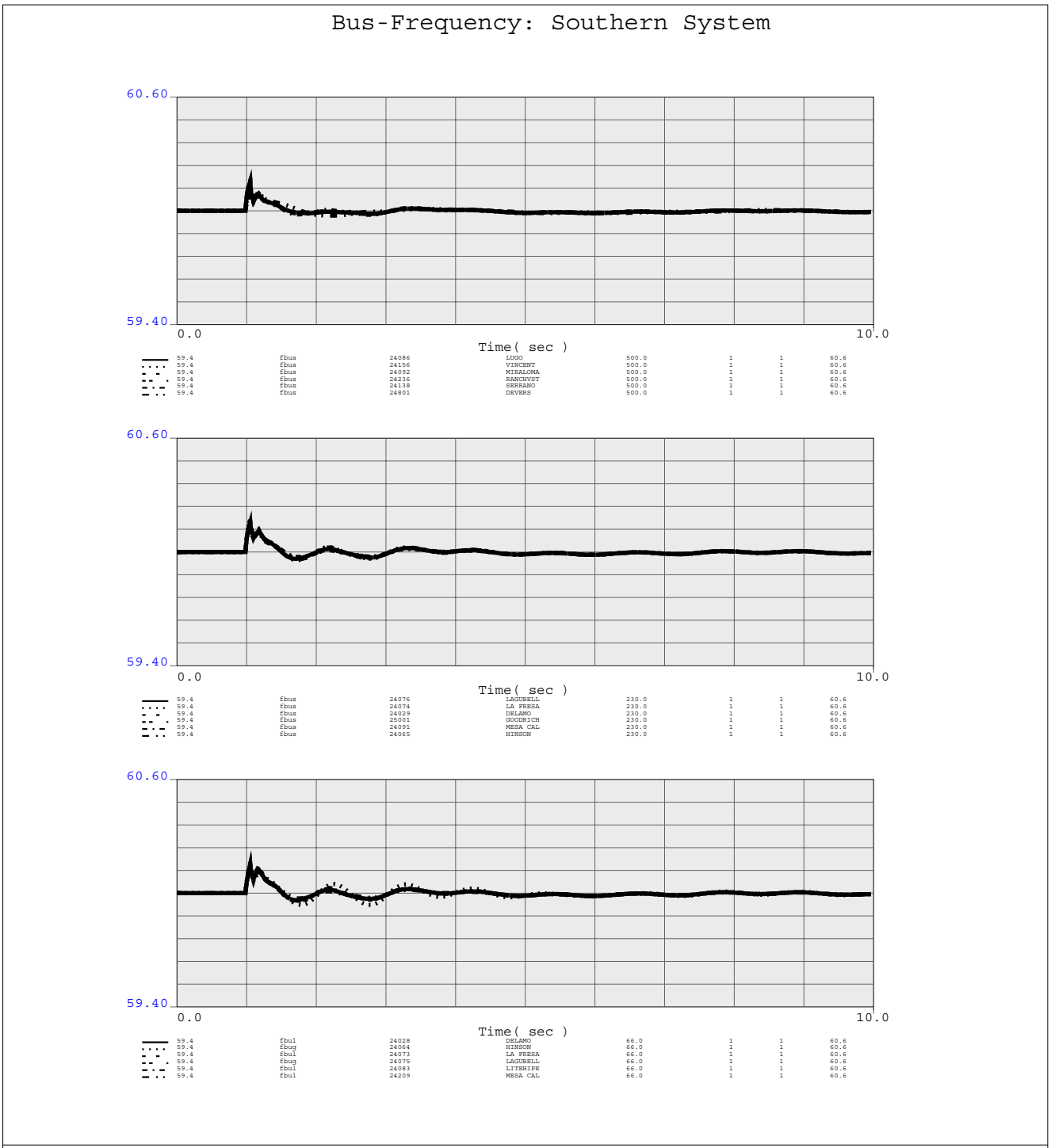
Page 3

	09hs_pst-vpp304-rev1_Midpoint-PV-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:21 2006

Plot 14 - 1: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



Plot 14 - 2: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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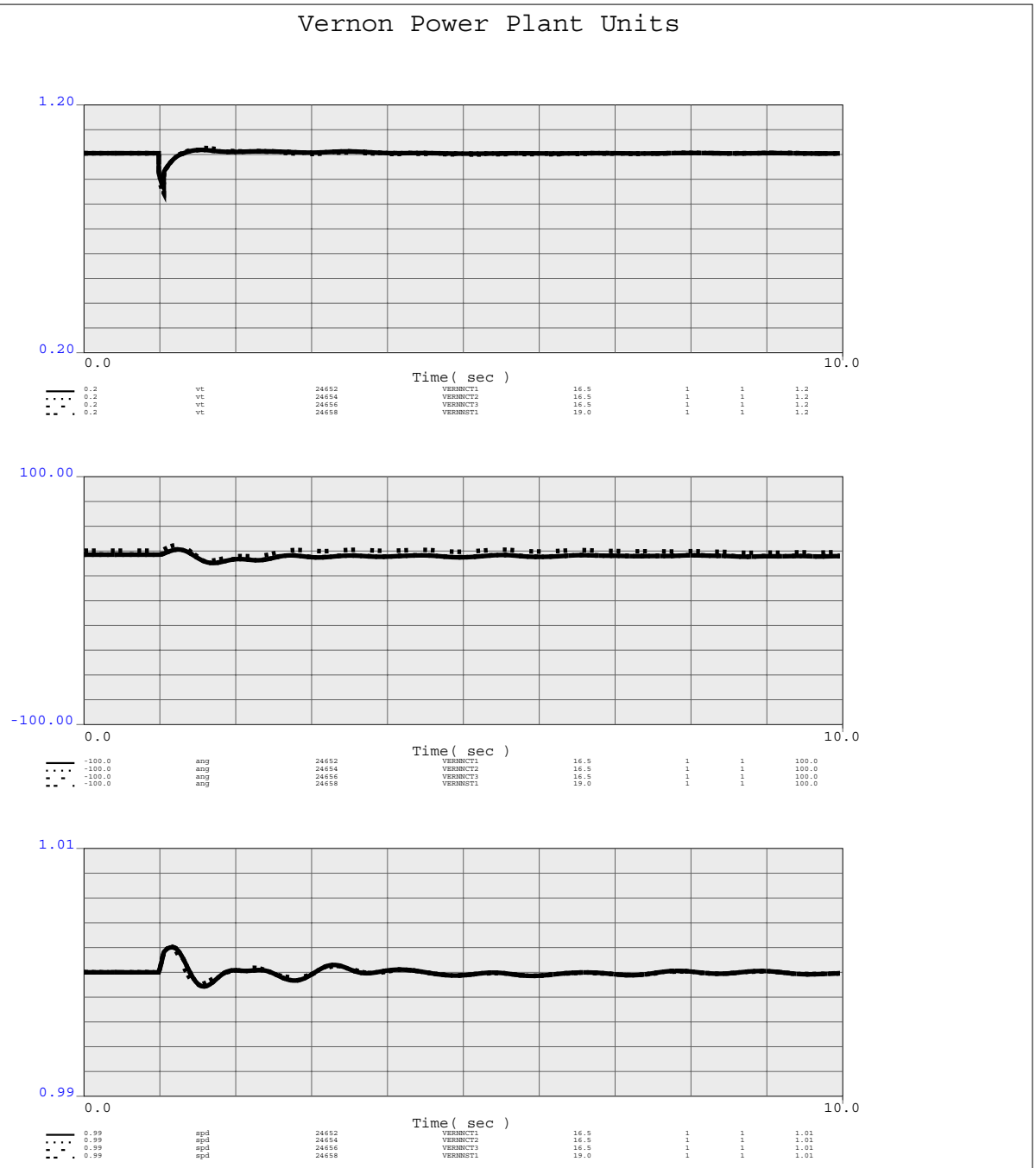
09hs_pst-vpp304-rev1_LeeLake-Serrano-slo.chf

c:\upslf16\mypslf

Wed Nov 15 08:25:24 2006

Plot 14 - 3: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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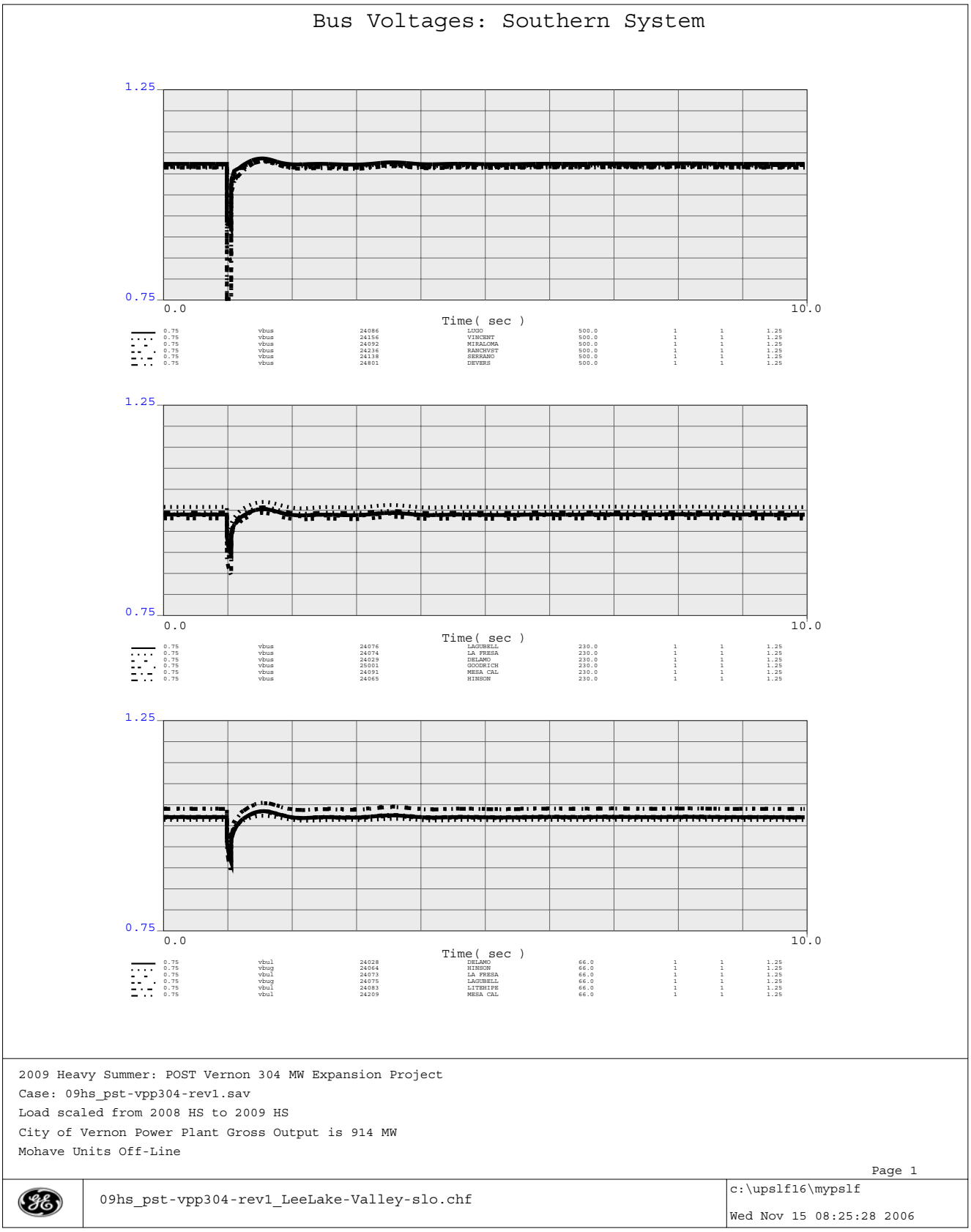
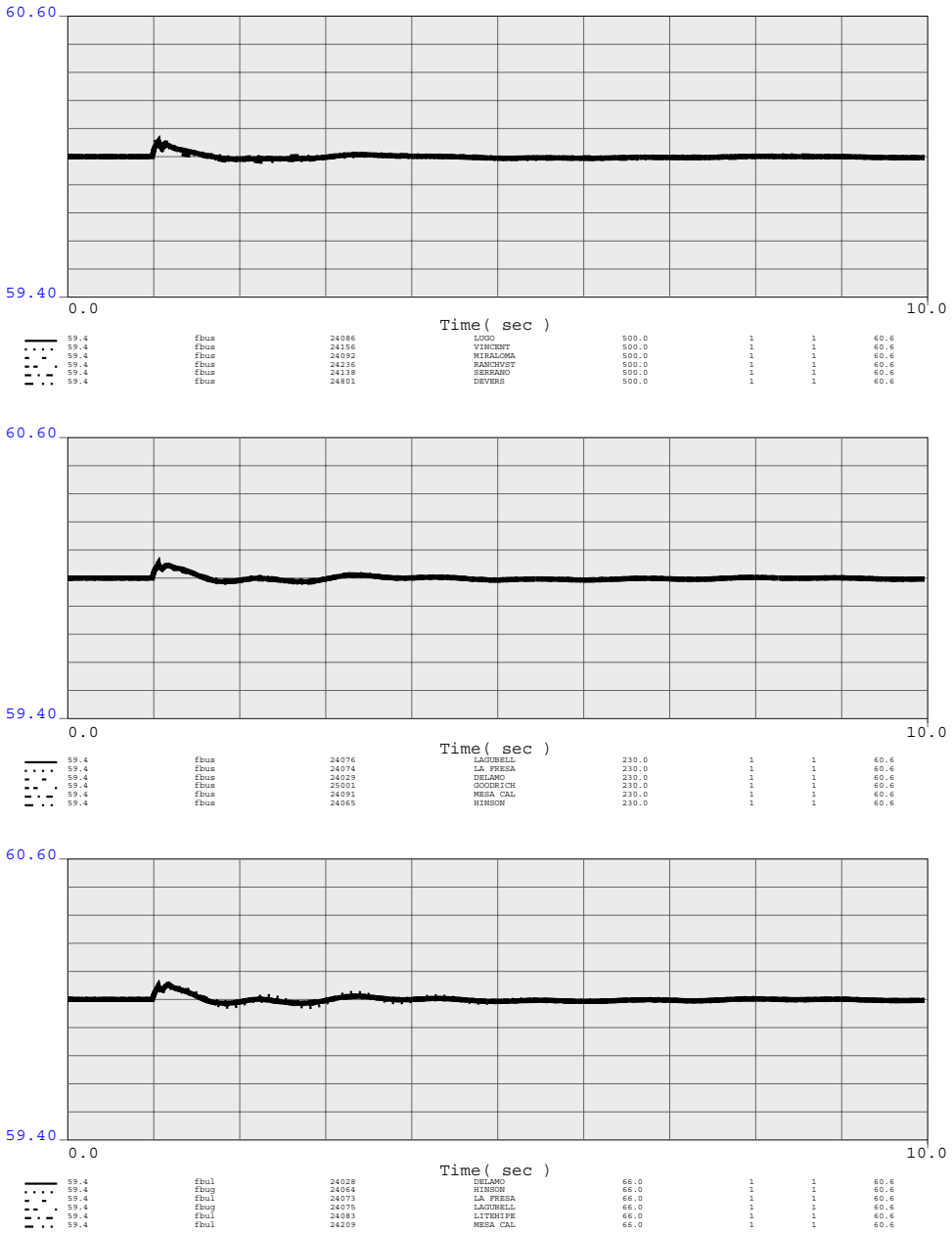
	09hs_pst-vpp304-rev1_LeeLake-Serrano-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:24 2006

Plot 15 - 1: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.



Plot 15 - 2: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.

Bus-Frequency: Southern System



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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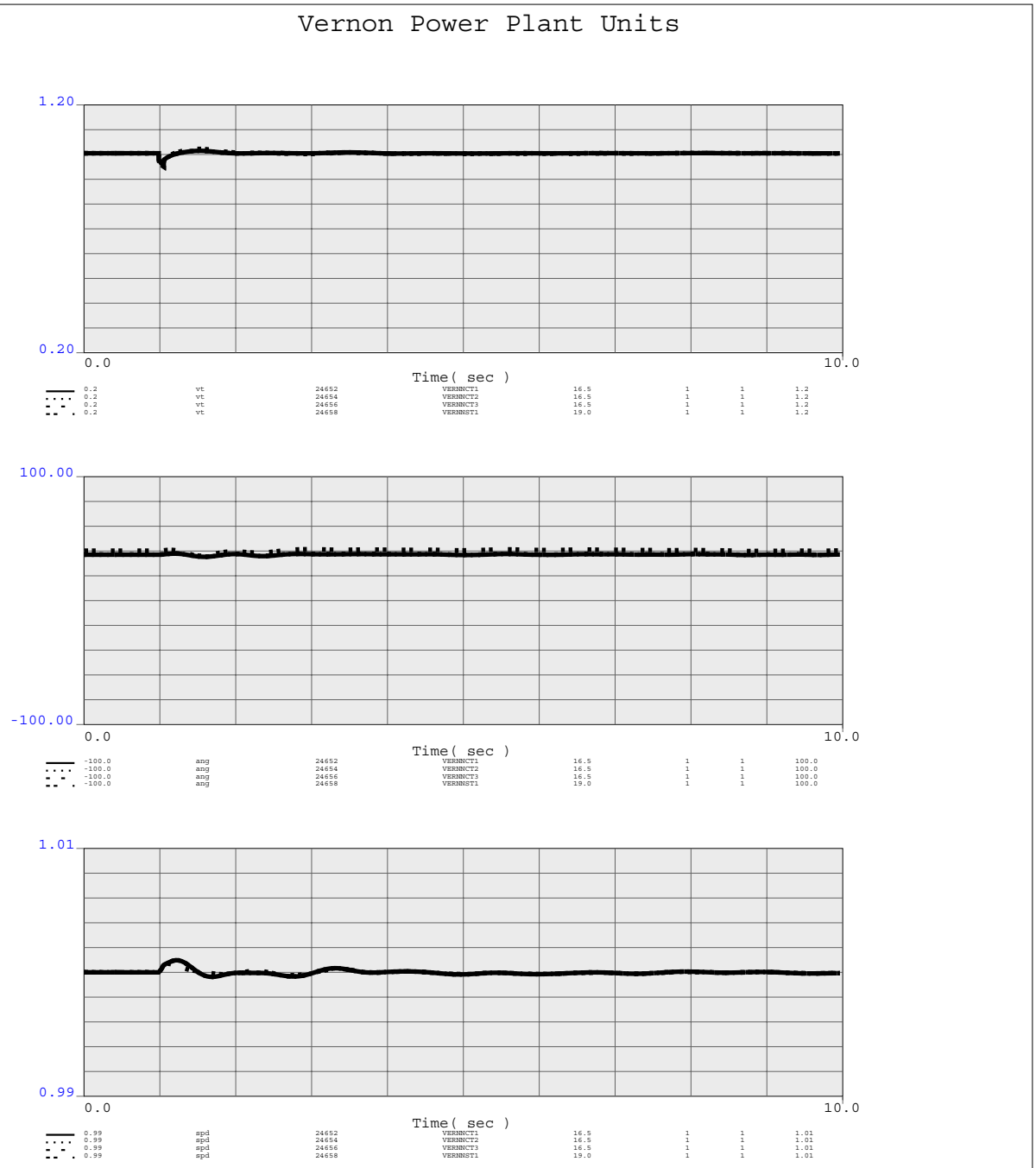
	09hs_pst-vpp304-rev1_LeeLake-Valley-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:28 2006

Plot 15 - 3: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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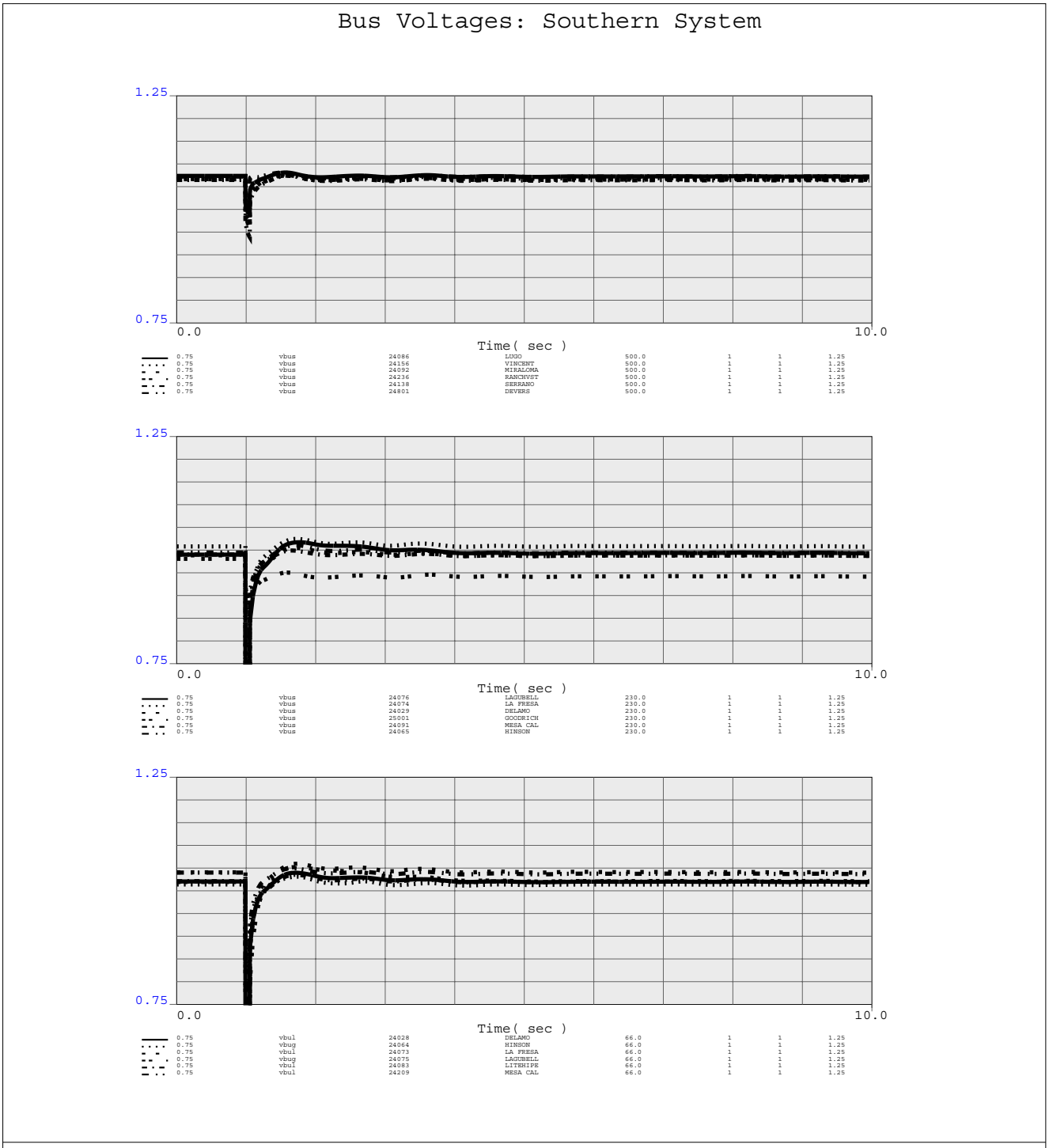
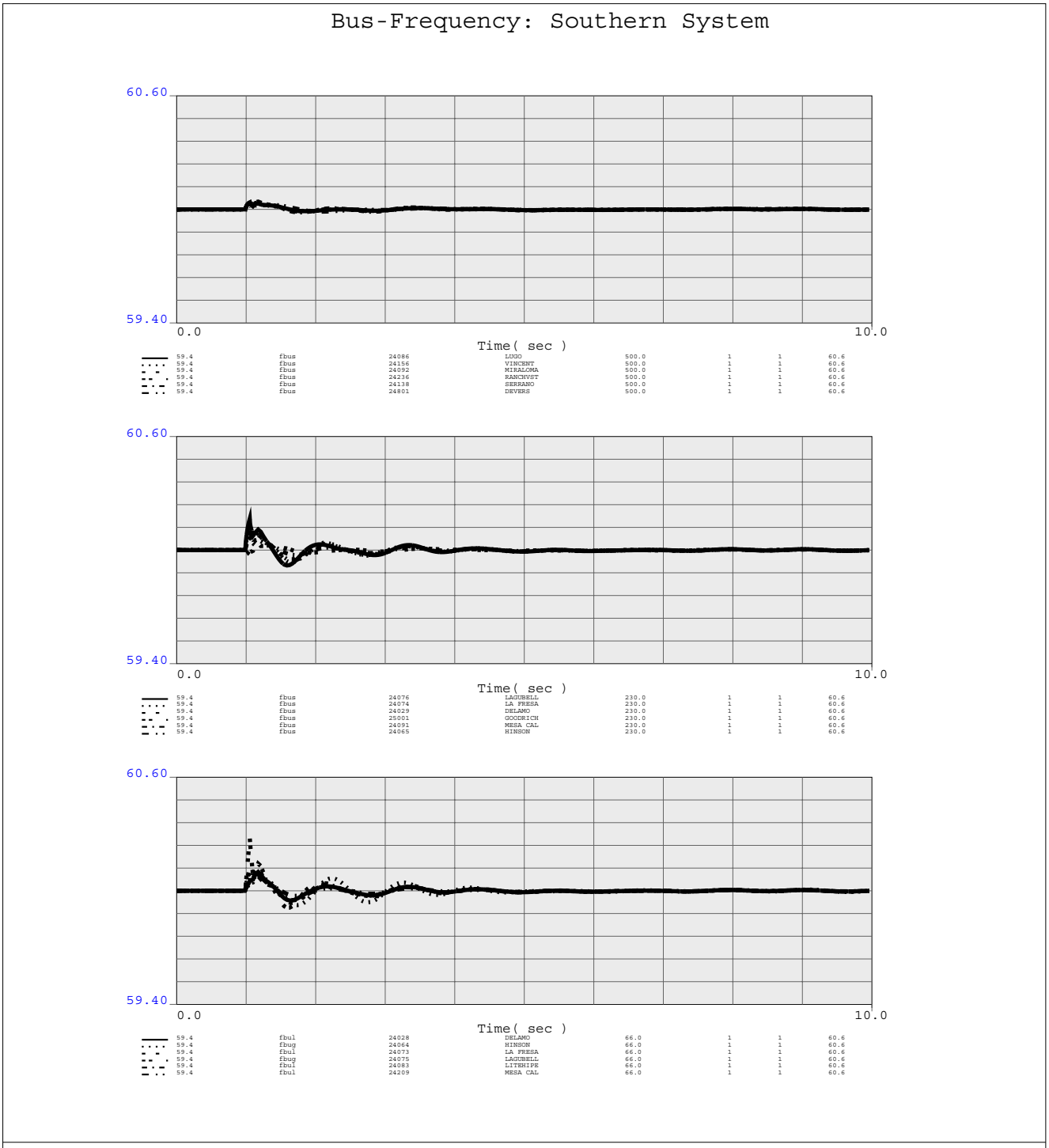
	09hs_pst-vpp304-rev1_LeeLake-Valley-slo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:28 2006

Plot 16 - 1: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.



Plot 16 - 2: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.

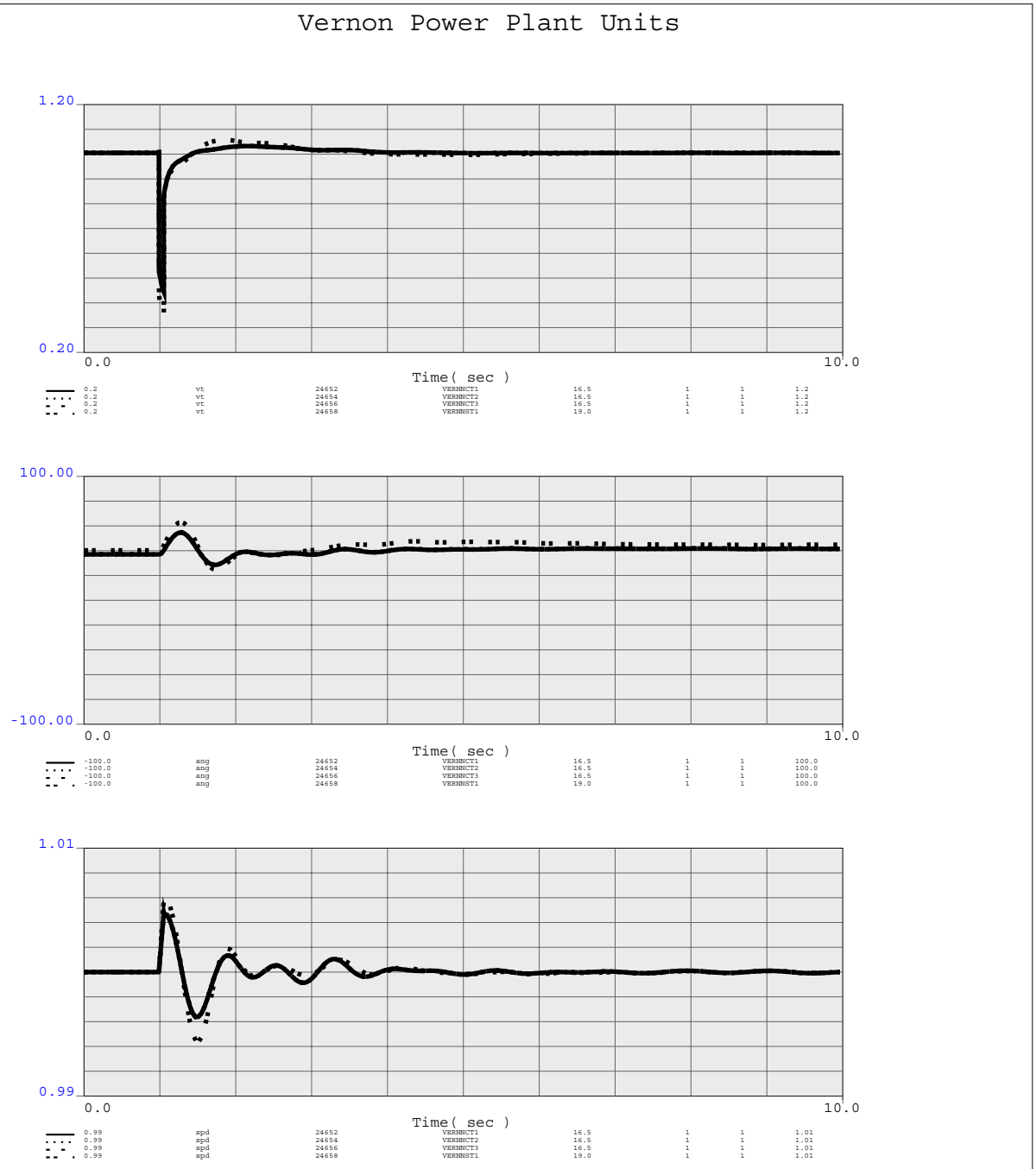


2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

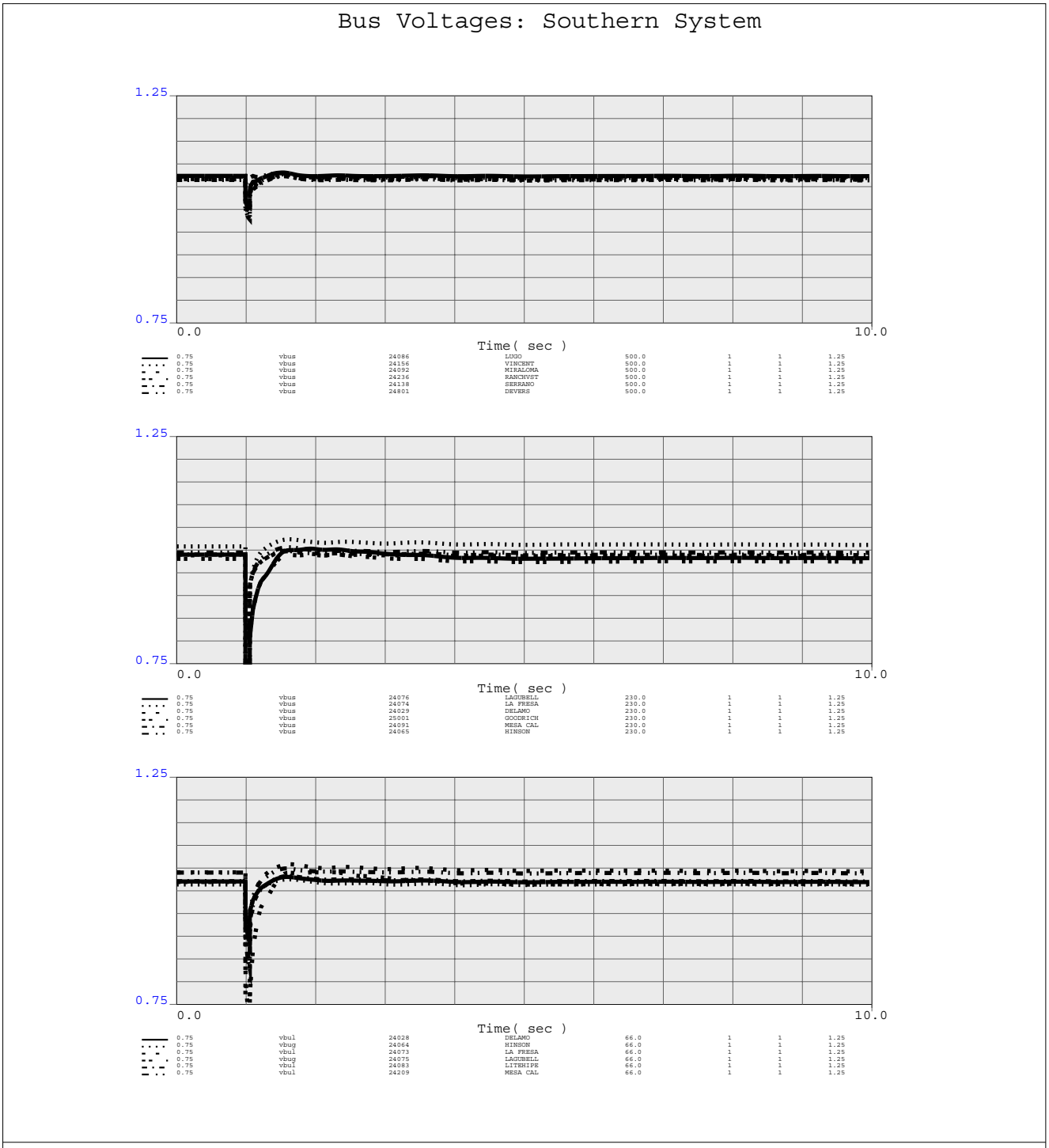
Page 2

	09hs_pst-vpp304-rev1_LBell-Gdrich_THEN_LB-Riohondo-dlo.chf	c:\upslf16\mypslf Wed Nov 15 08:25:32 2006

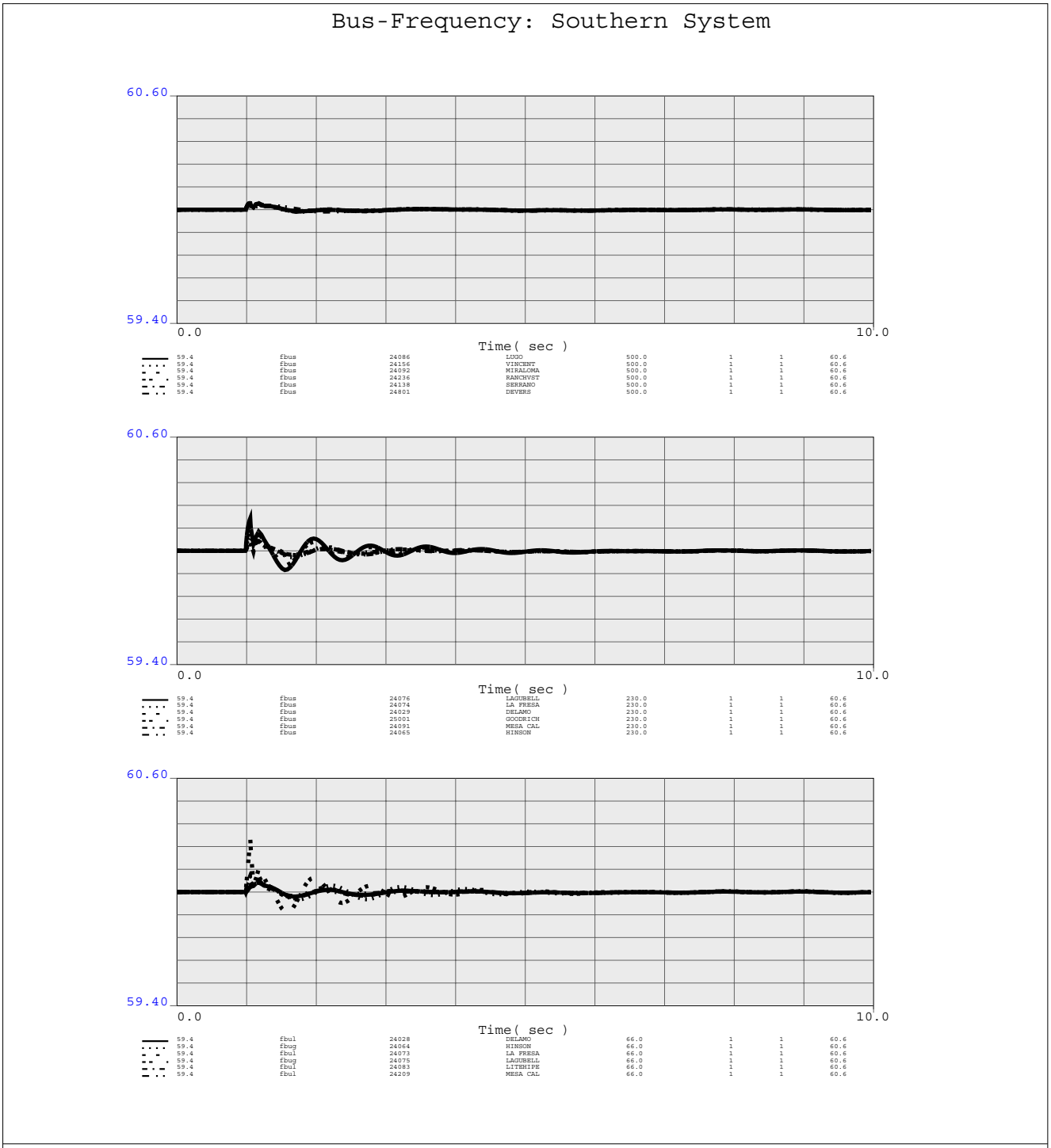
Plot 16 - 3: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.



Plot 17 - 1: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



Plot 17 - 2: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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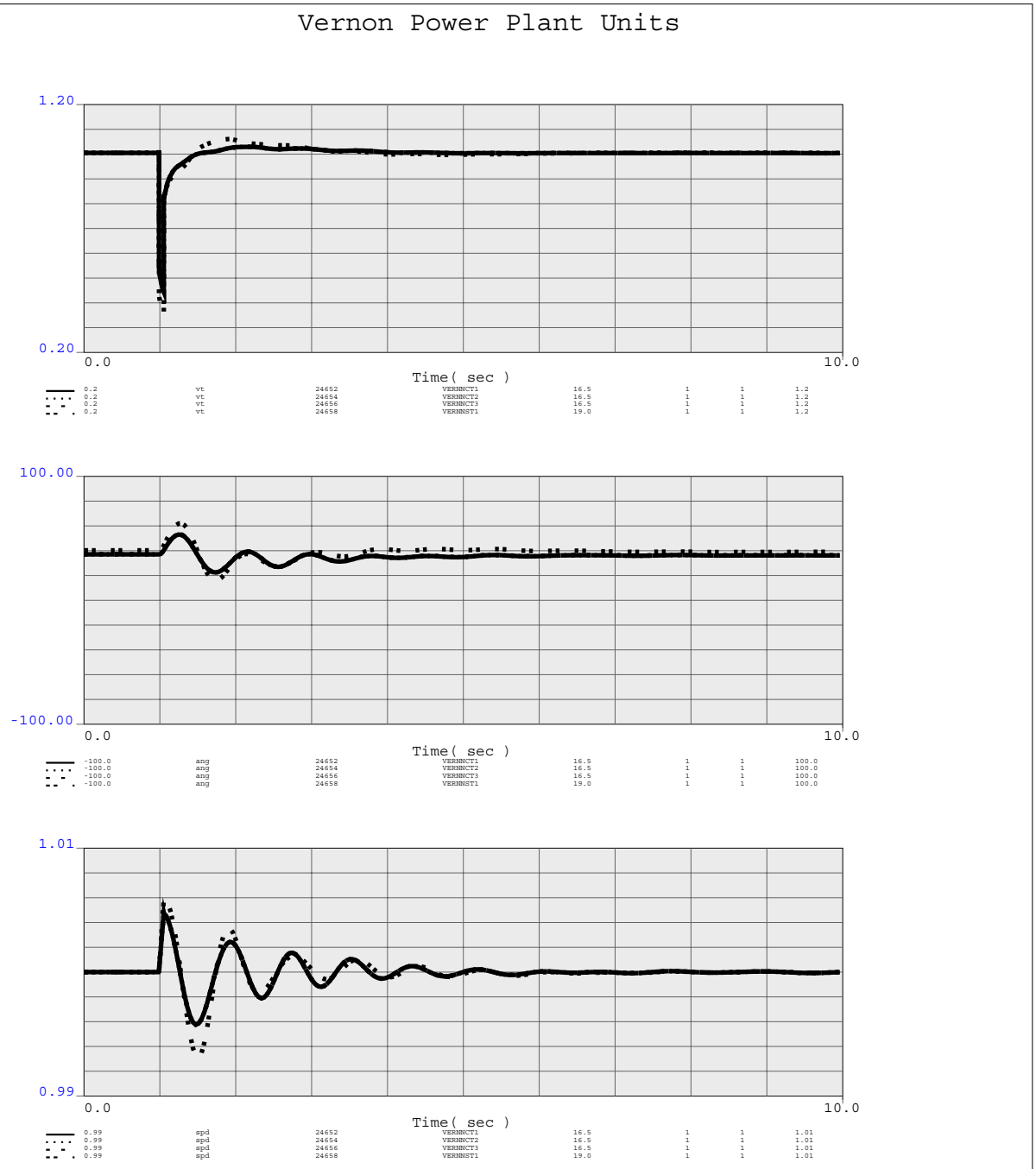
Plot 17 - 3: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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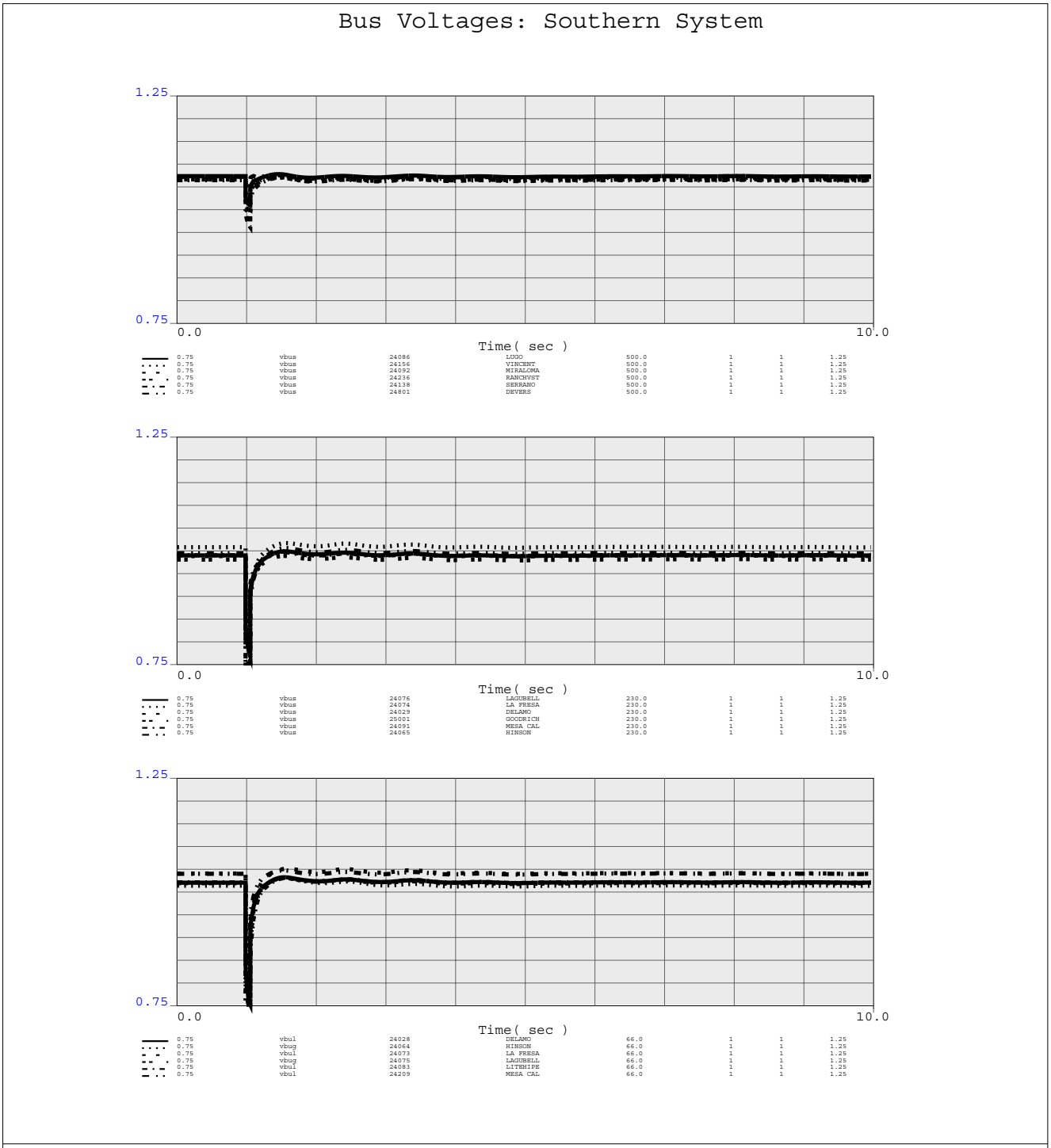
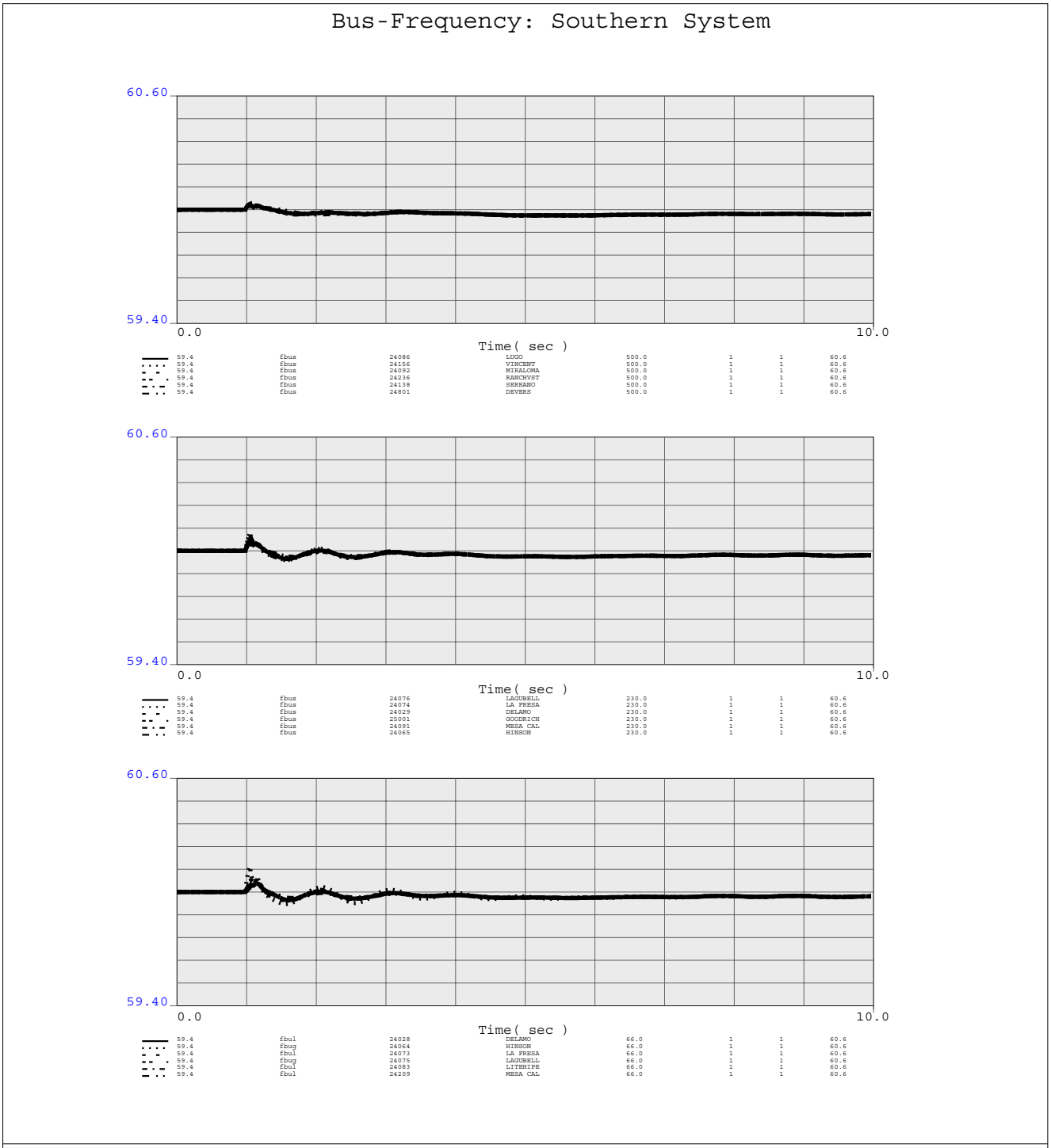
Plot 18 - 1: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.



Plot 18 - 2: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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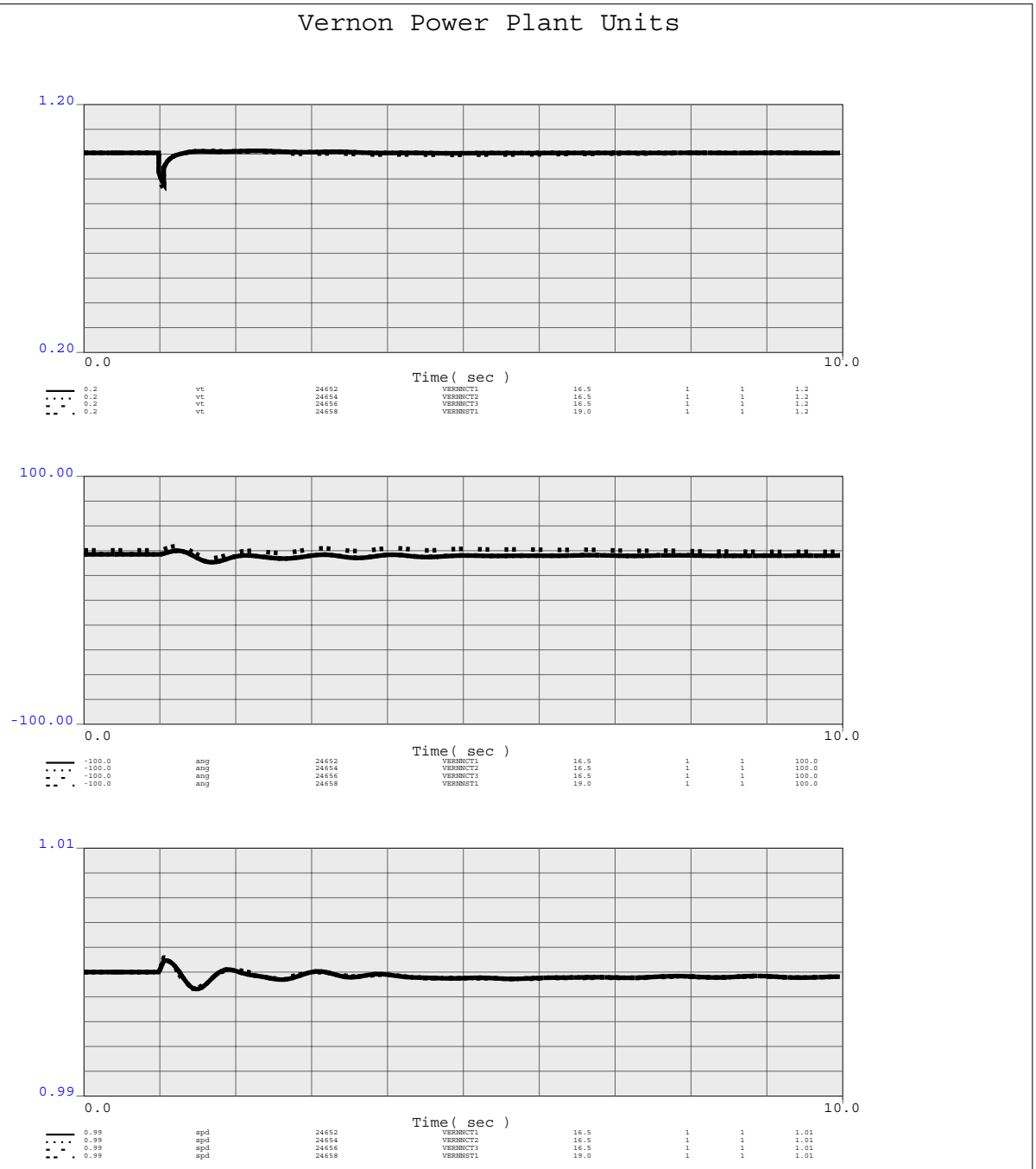
Plot 18 - 3: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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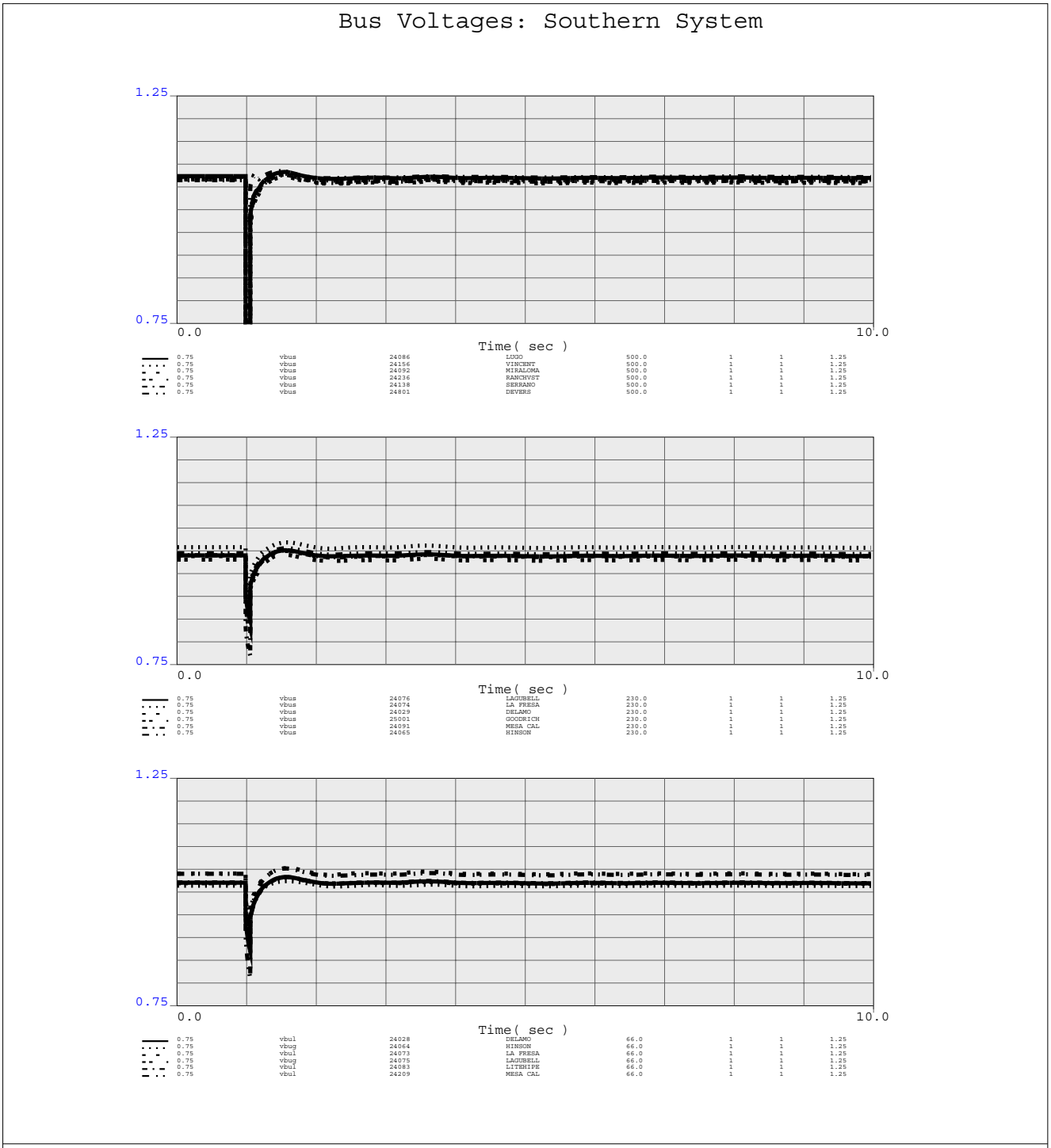
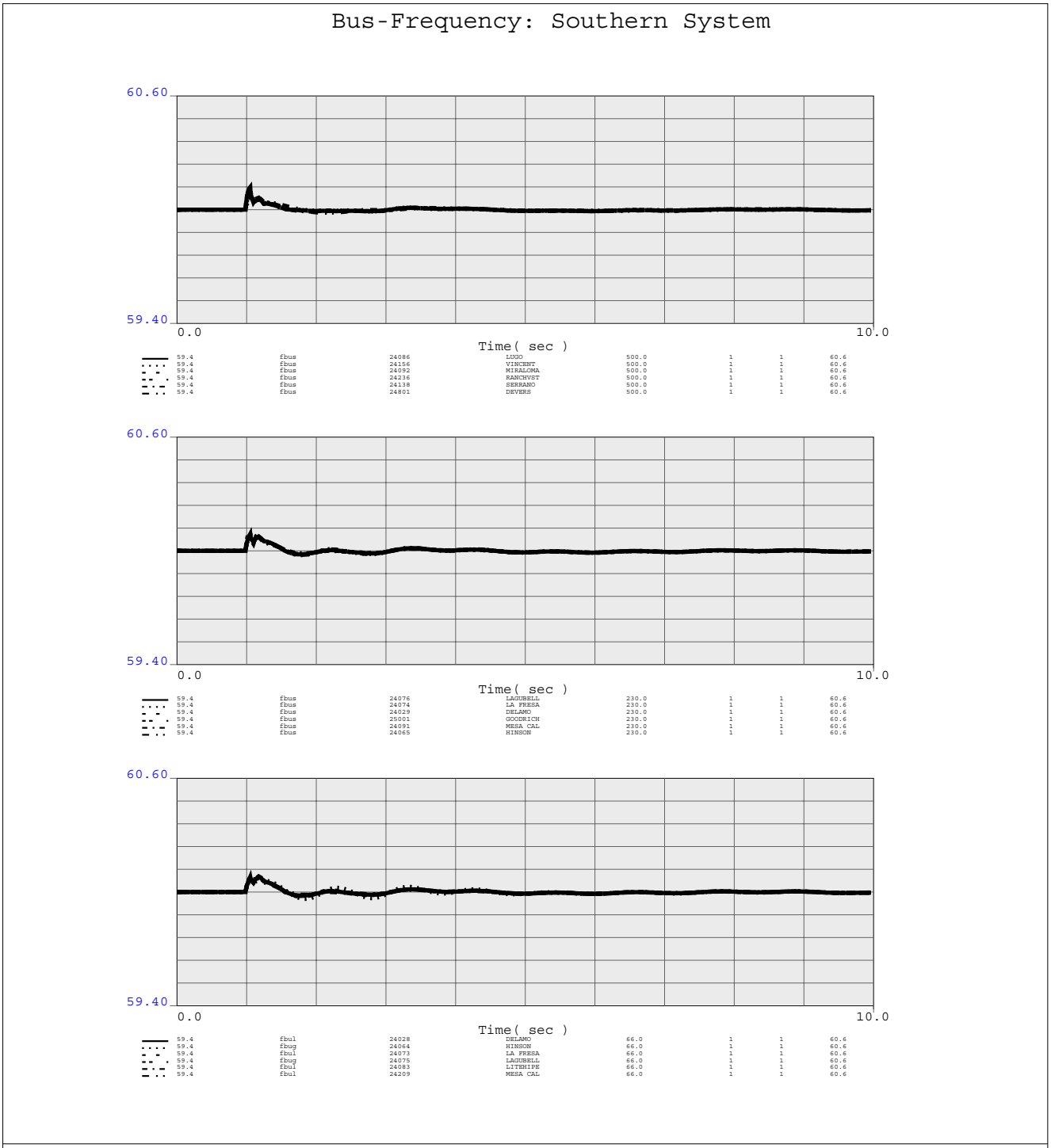
Plot 19 - 1: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.



Plot 19 - 2: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
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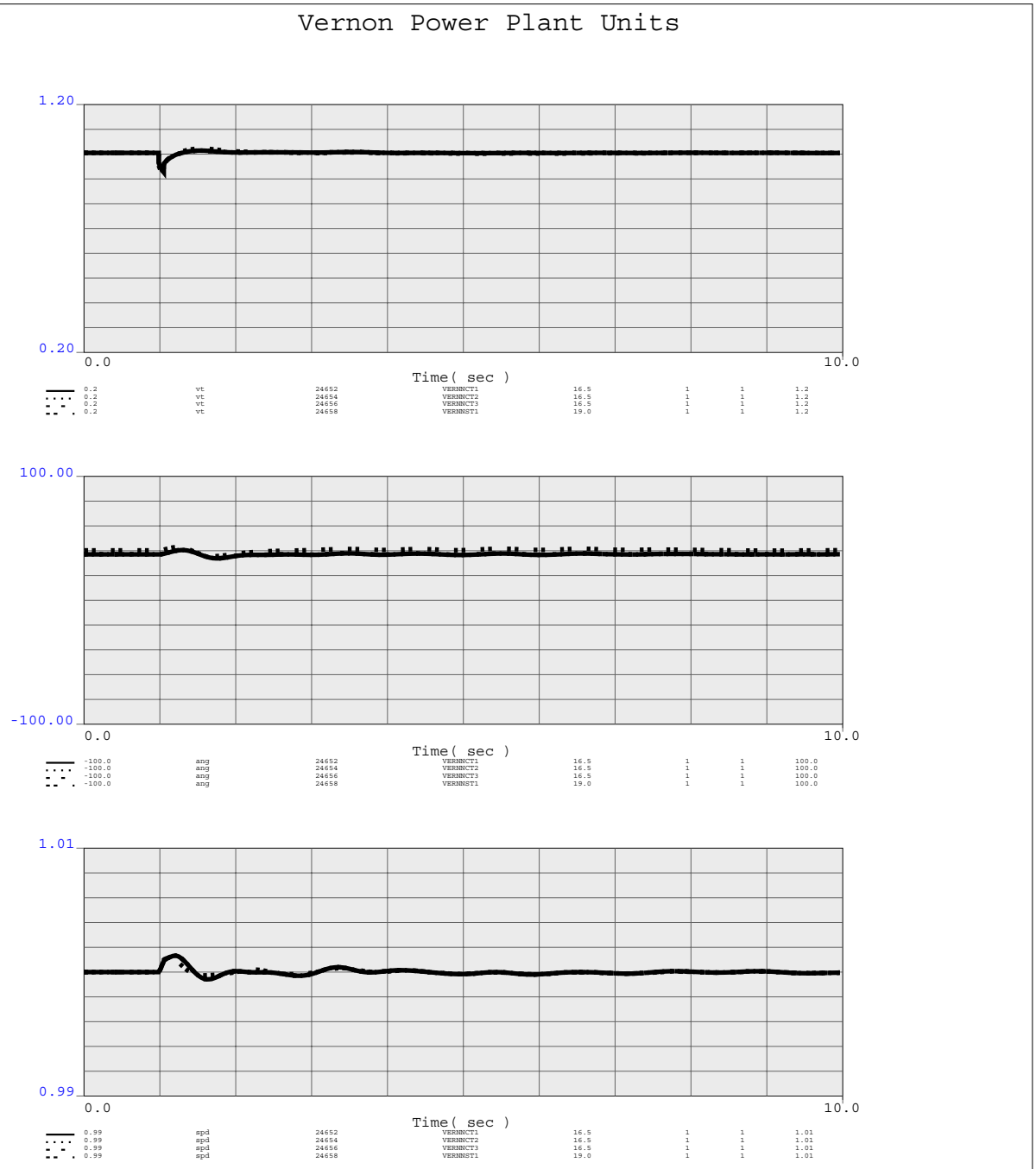
Plot 19 - 3: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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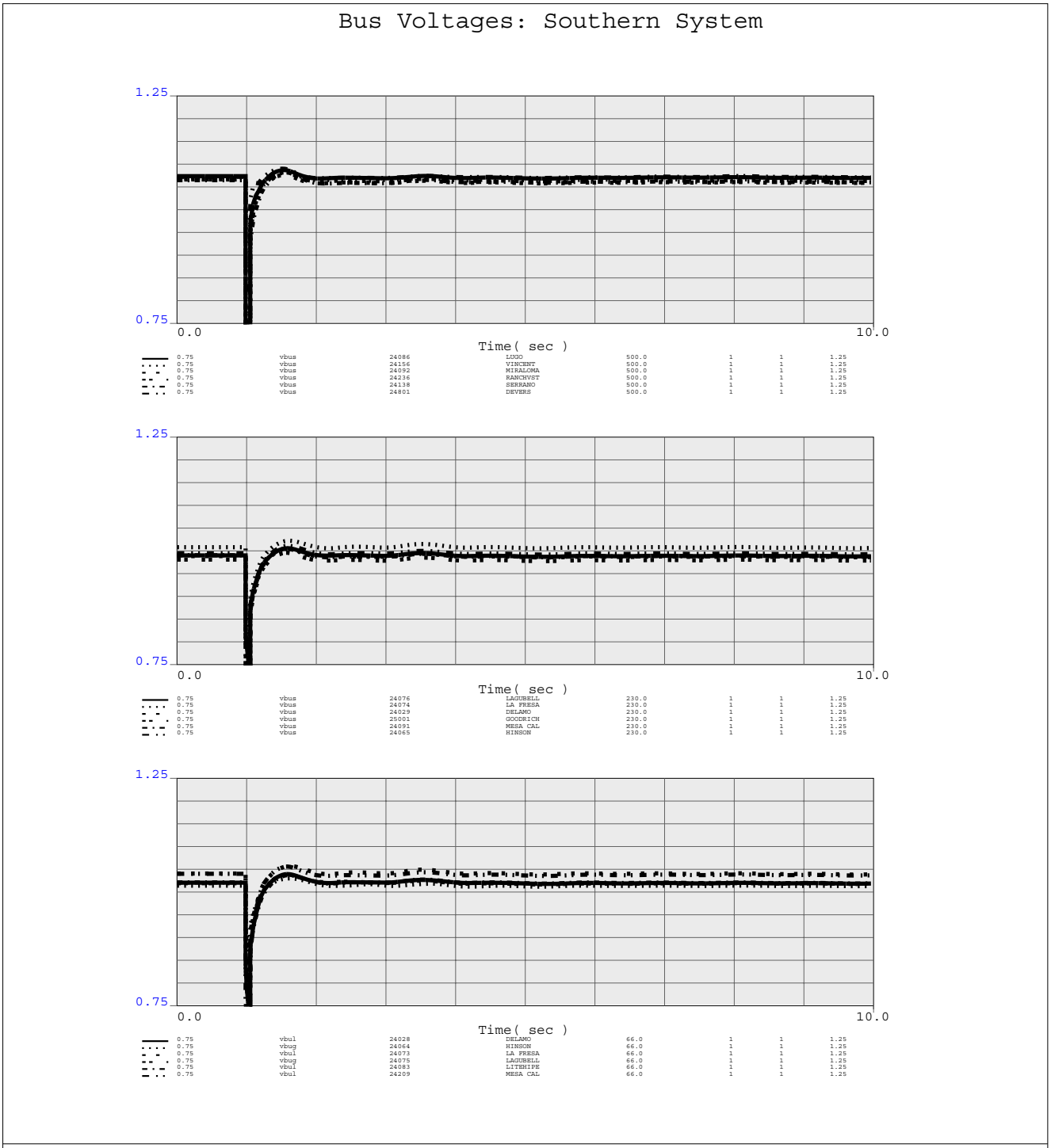
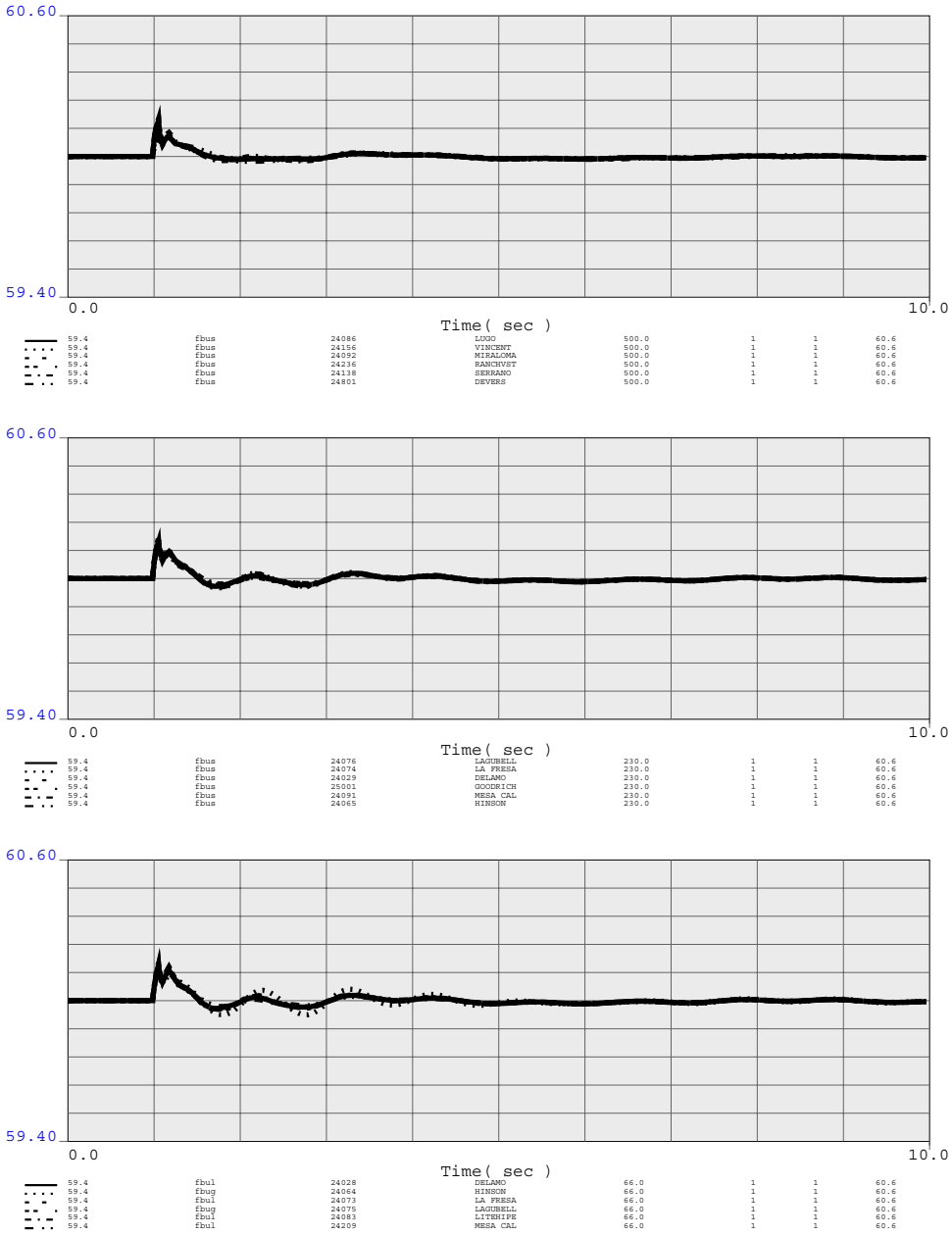
Plot 20 - 1: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.



Plot 20 - 2: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
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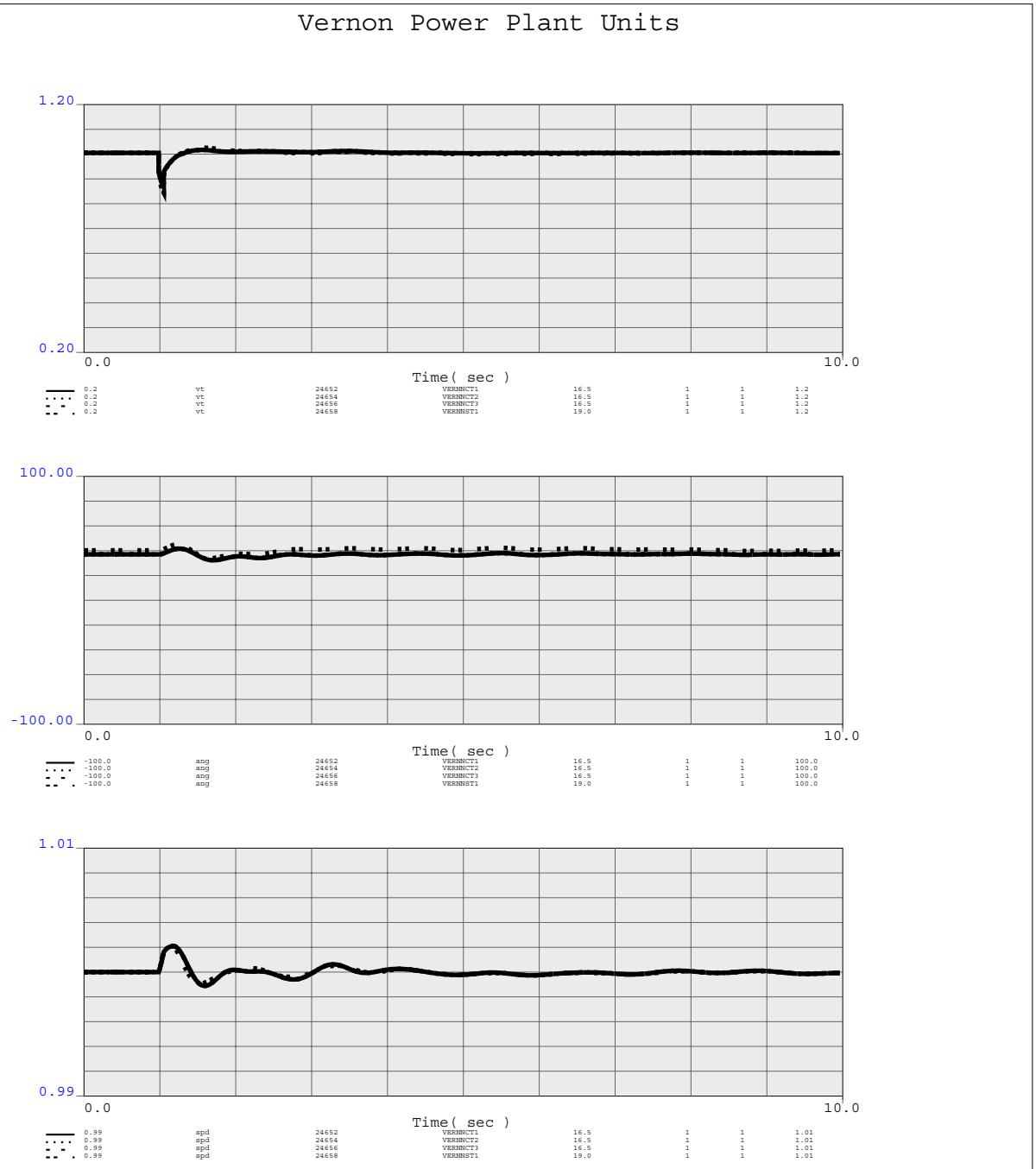
Plot 20 - 3: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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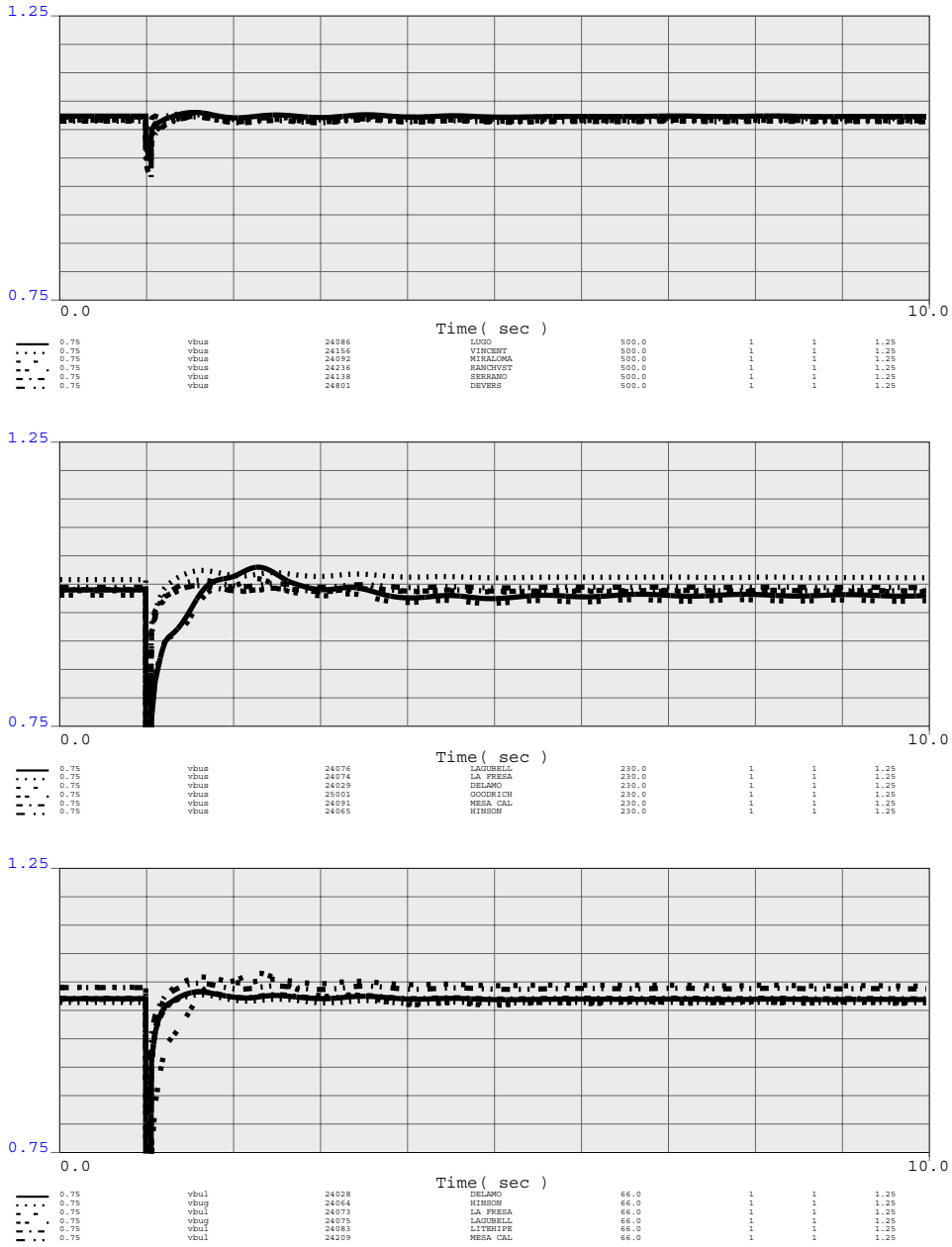
Plot 21 - 1: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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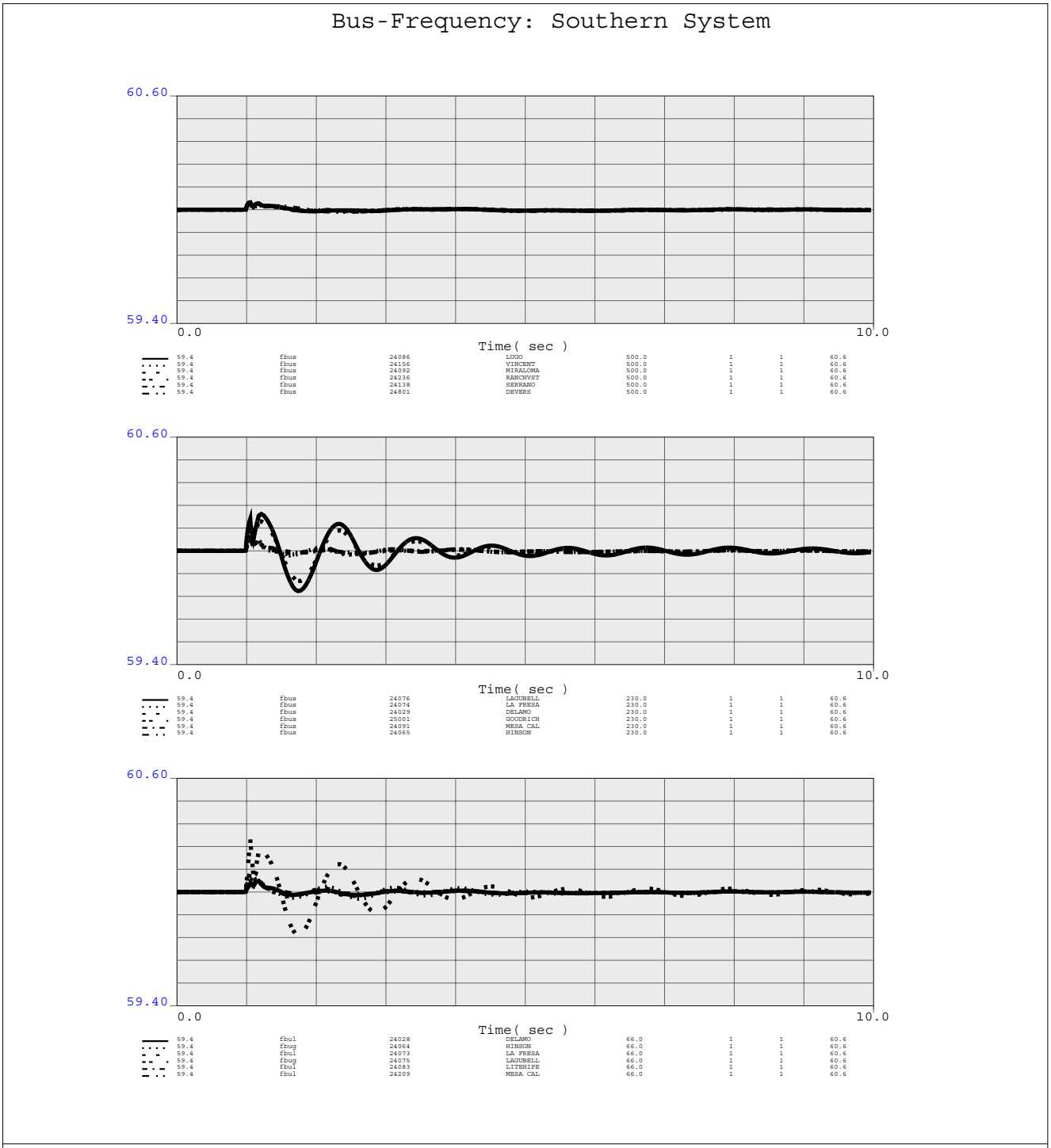
Plot 21 - 2: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
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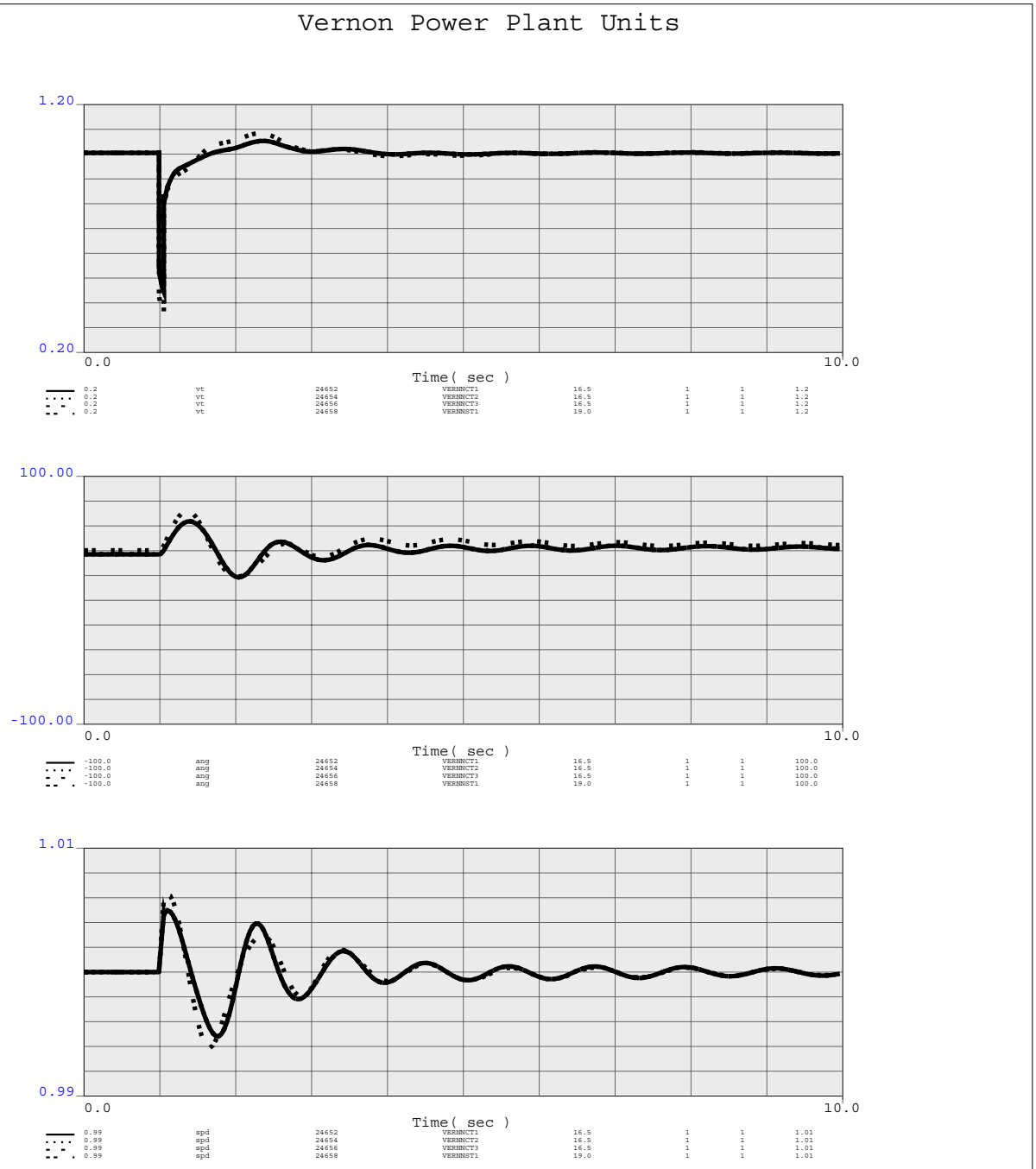
Plot 21 - 3: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



2009 Heavy Summer: POST Vernon 304 MW Expansion Project
Case: 09hs_pst-vpp304-rev1.sav
Load scaled from 2008 HS to 2009 HS
City of Vernon Power Plant Gross Output is 914 MW
Mohave Units Off-Line

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Appendix D

2009 Light Spring
Transient Stability Plots

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Plot 6. Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV #1 circuit.
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Plot 16. Pre-fault outage of the Laguna Bell – Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Rio Hondo 230 kV circuit.
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Plot 18. Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach – Lighthipe 230 kV and Harbor Gen – Hinson 230 kV transmission lines.
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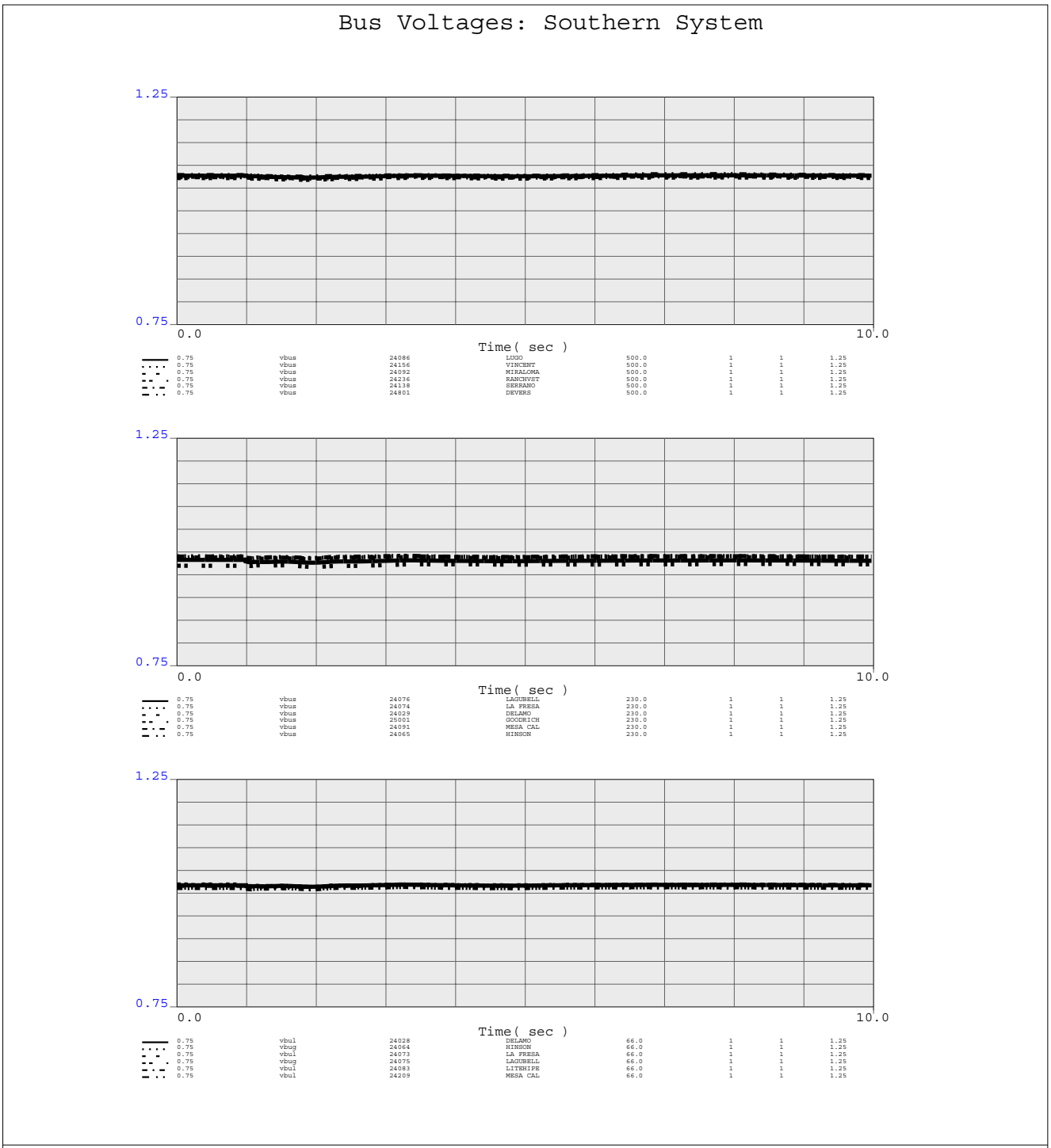
Plot 21. Pre-fault outage of the Laguna Bell – Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV and the Laguna Bell – La Fresa 230 kV transmission lines.

Plot 1 - 1: Full load rejection of the VPP.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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09lsp_pst-vpp304-rev1_VPP-Load-Rejection.chf

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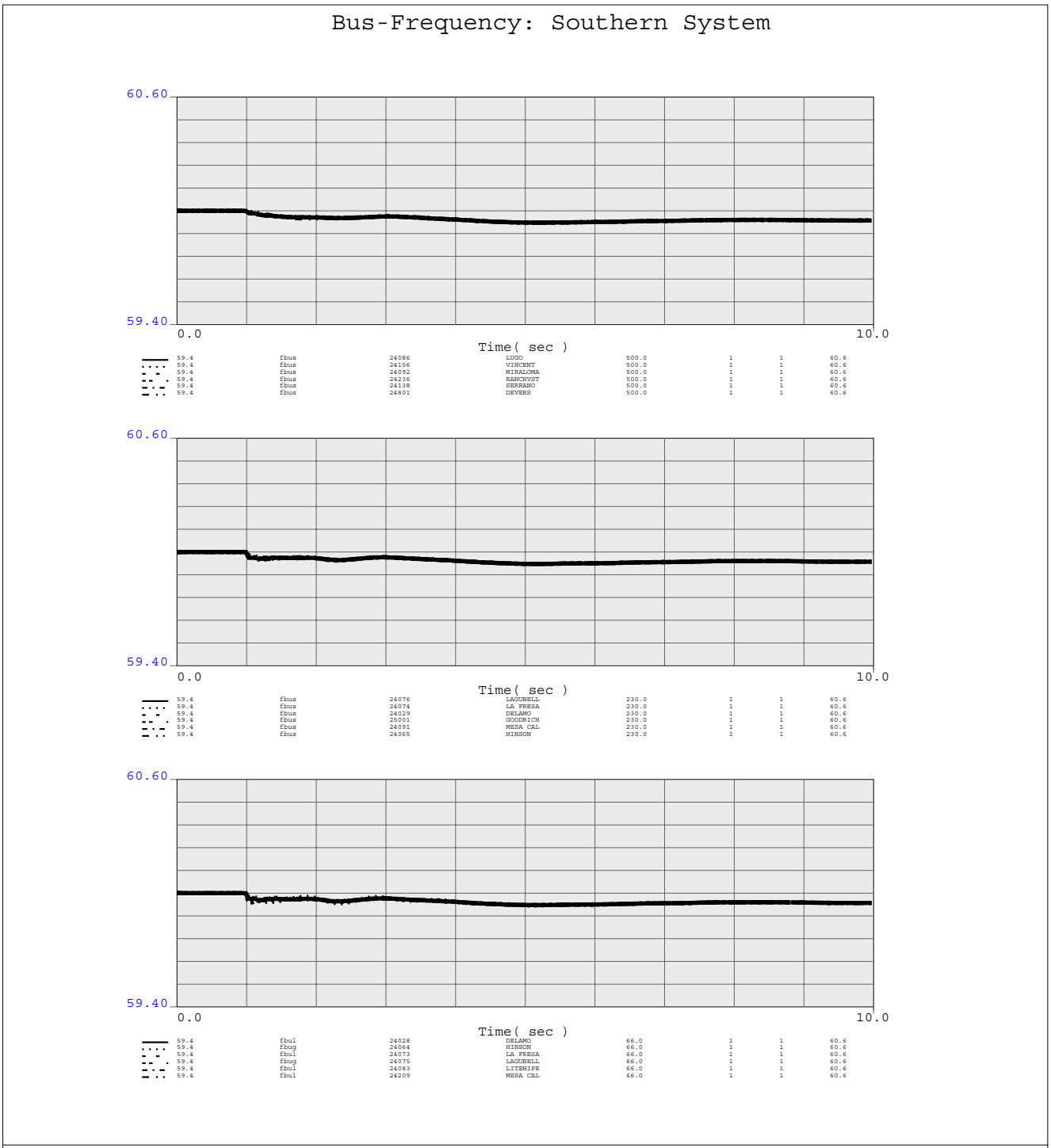
Plot 1 - 2: Full load rejection of the VPP.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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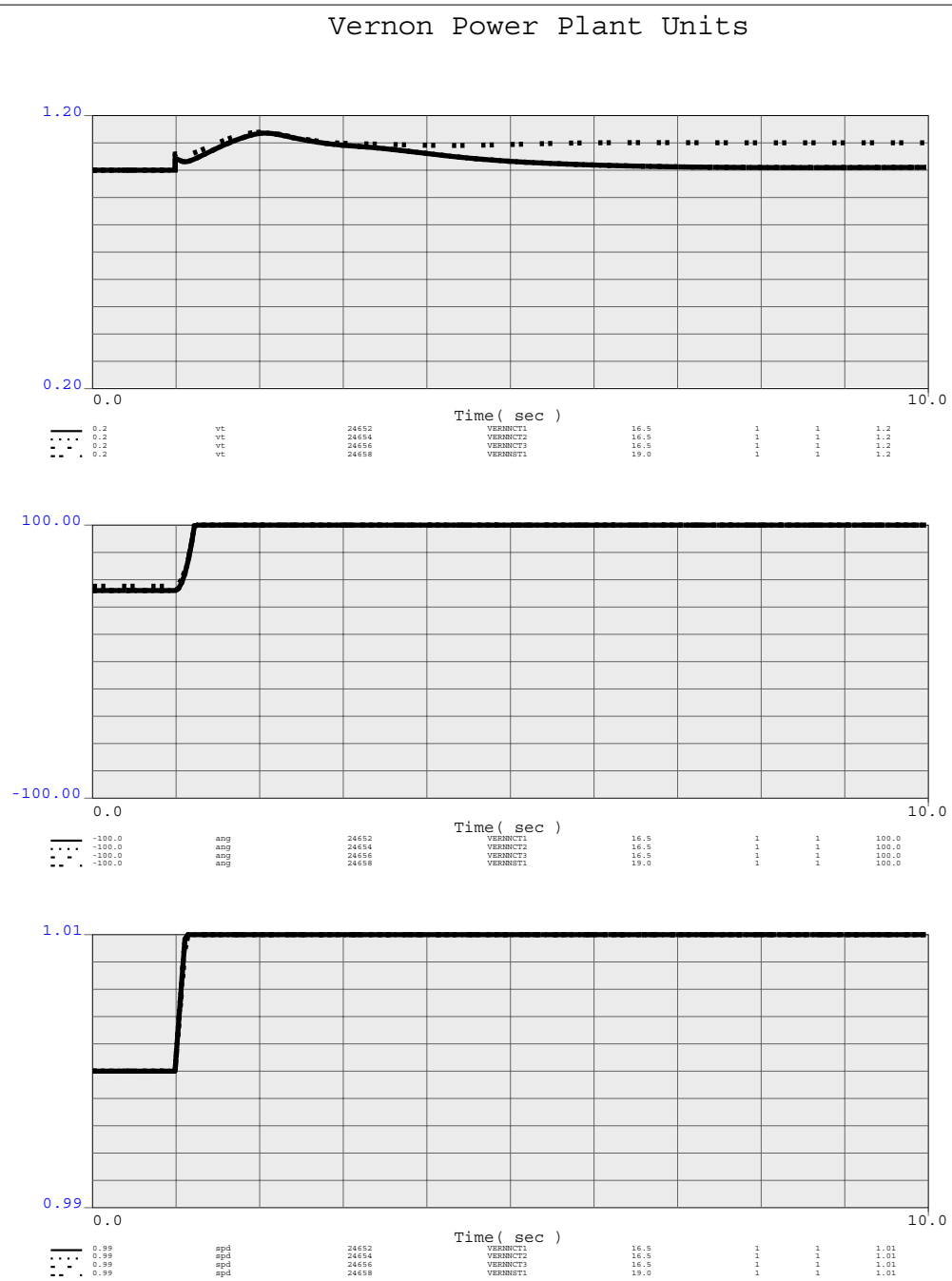
Plot 1 - 3: Full load rejection of the VPP.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
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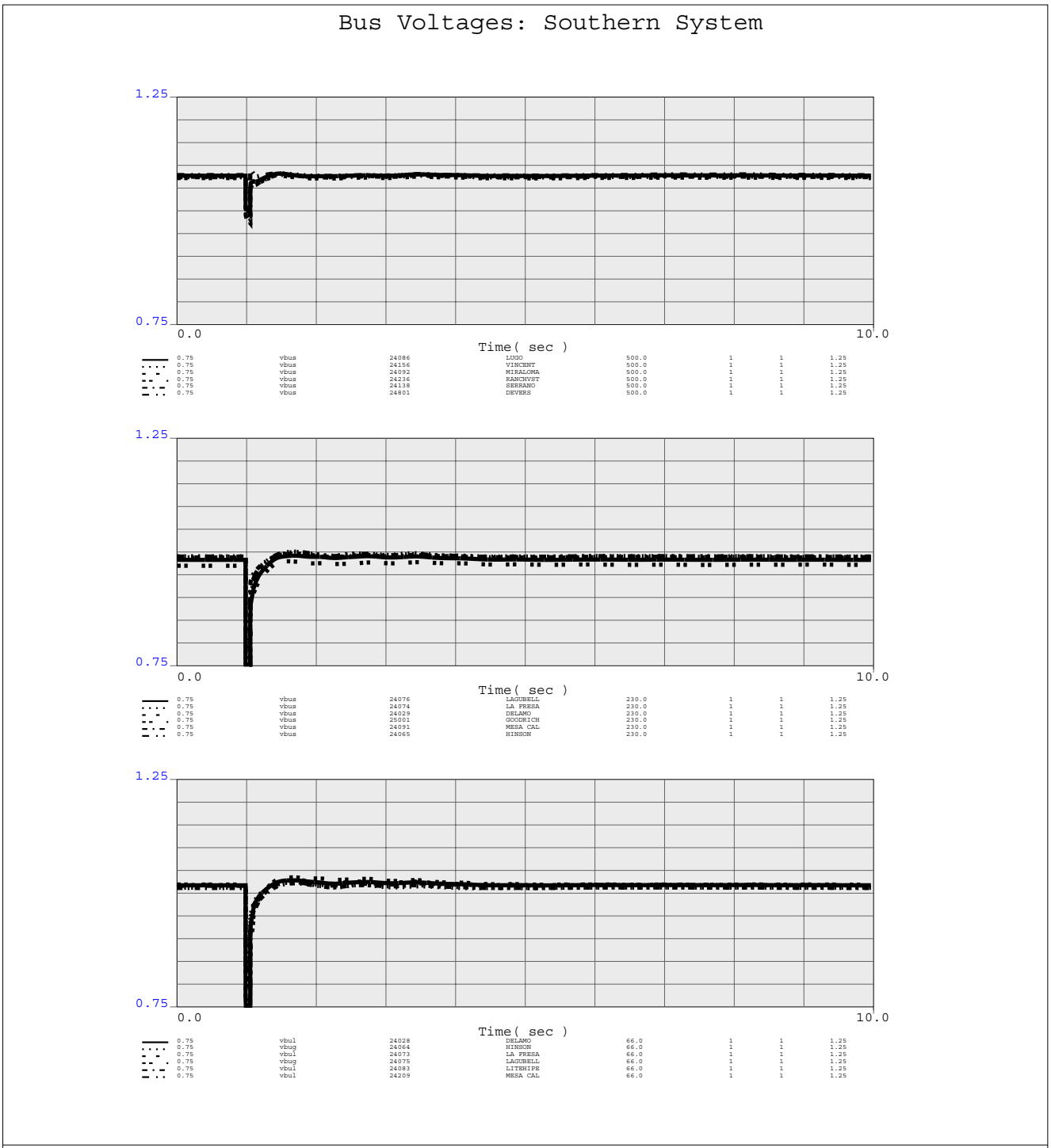
Plot 2 - 1: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
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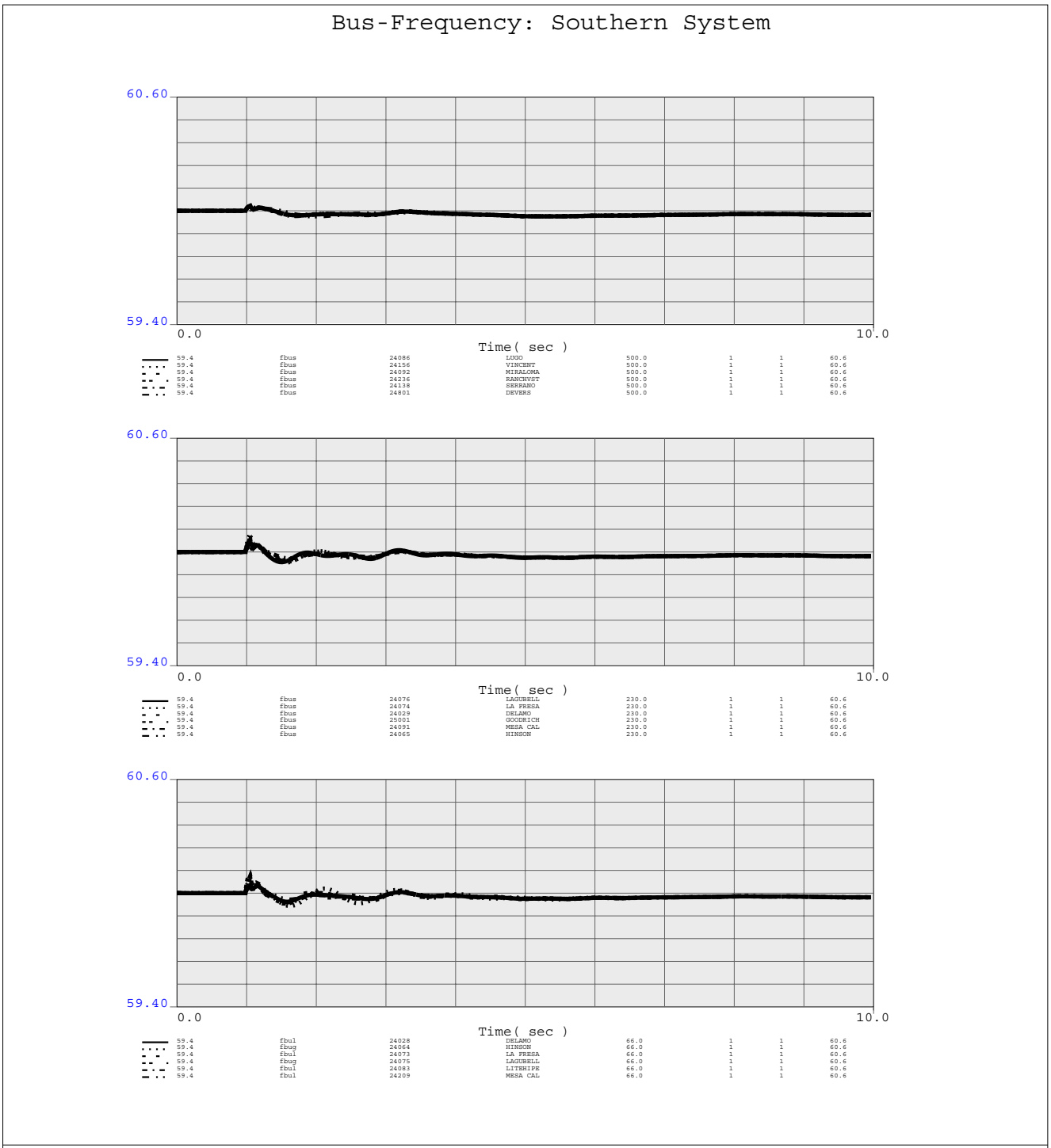
Plot 2 - 2: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.



2009 Light Spring: POST Vernon 304 MW Expansion Project
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Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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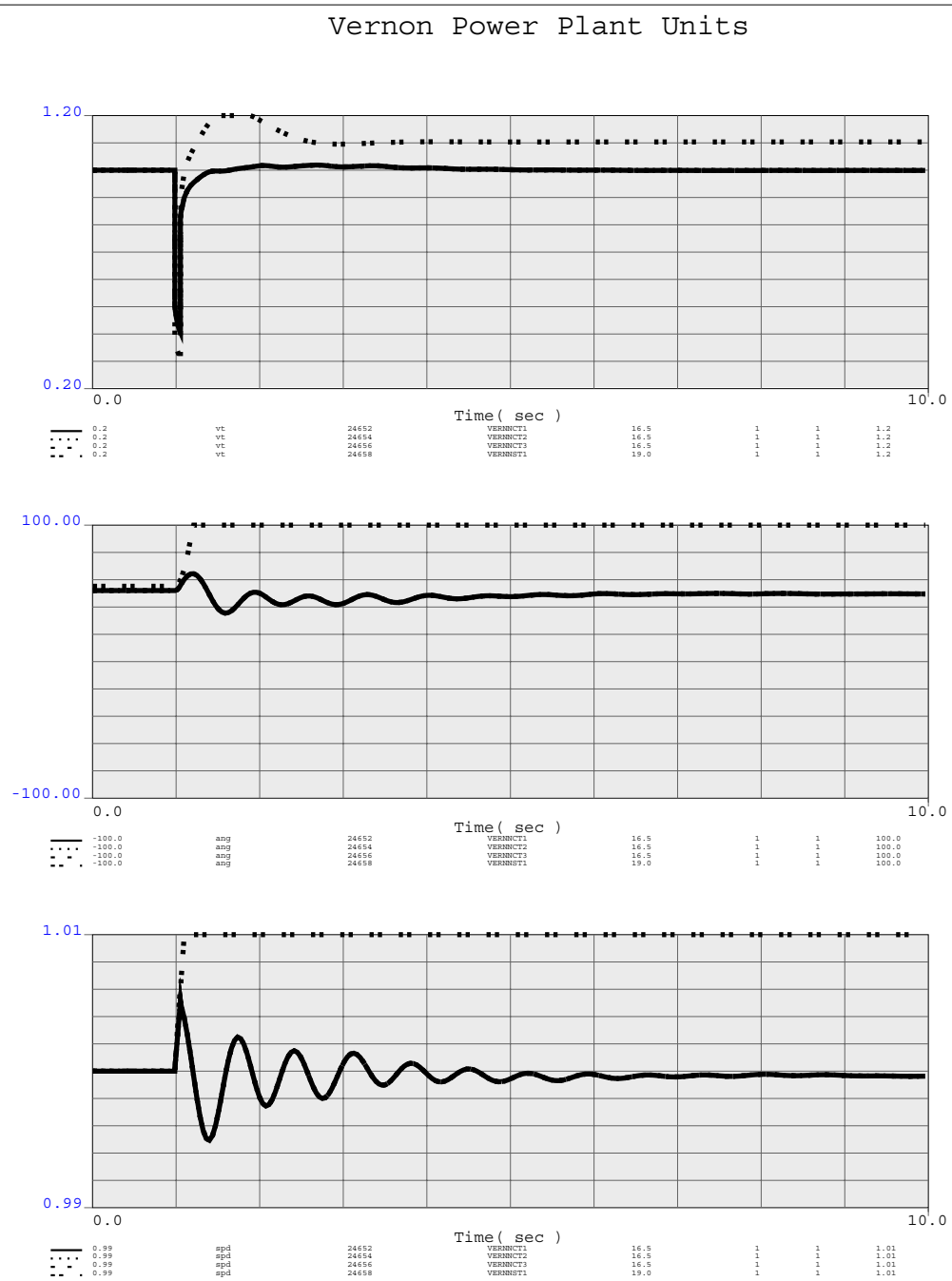
Plot 2 - 3: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.



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Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
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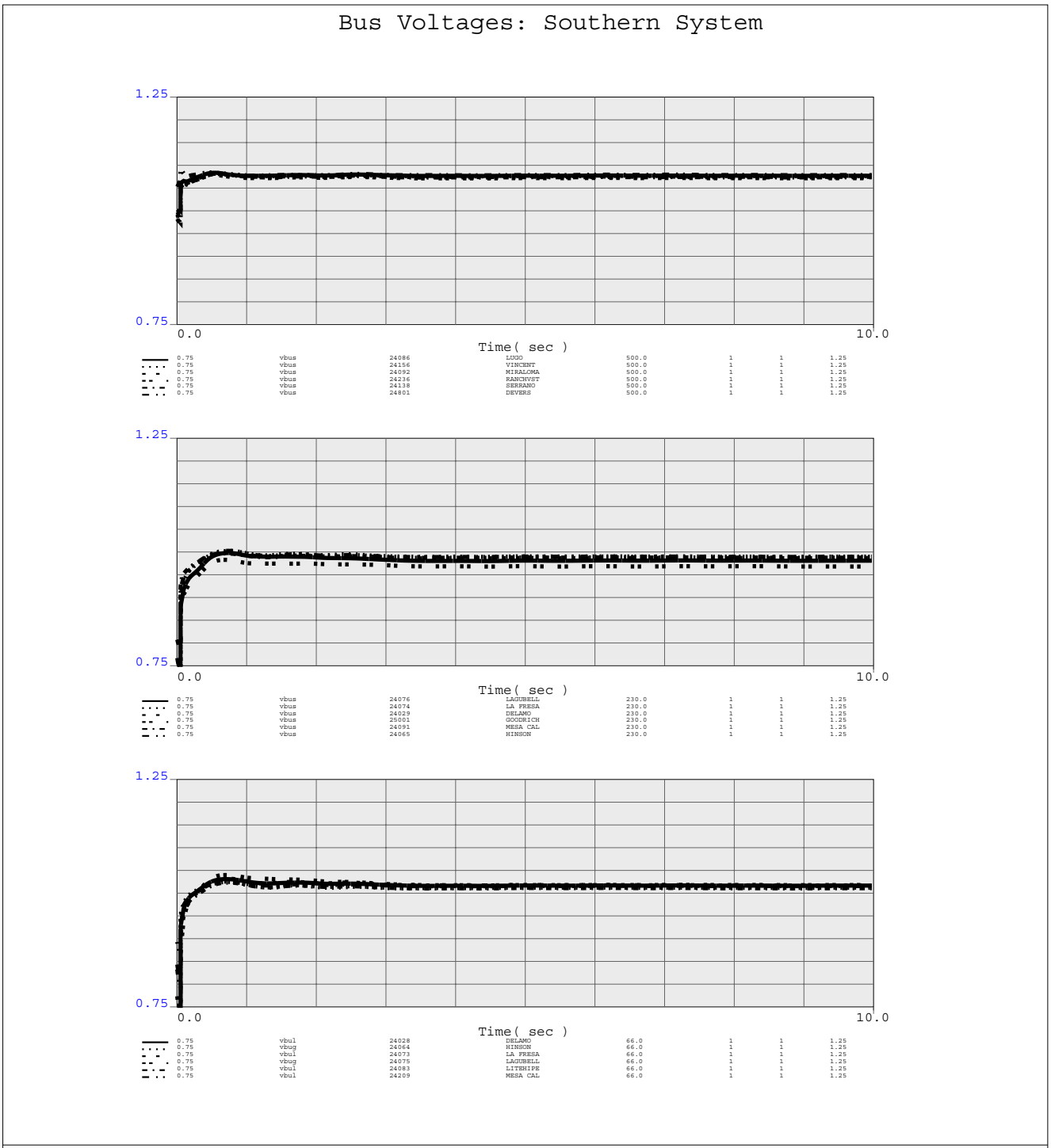
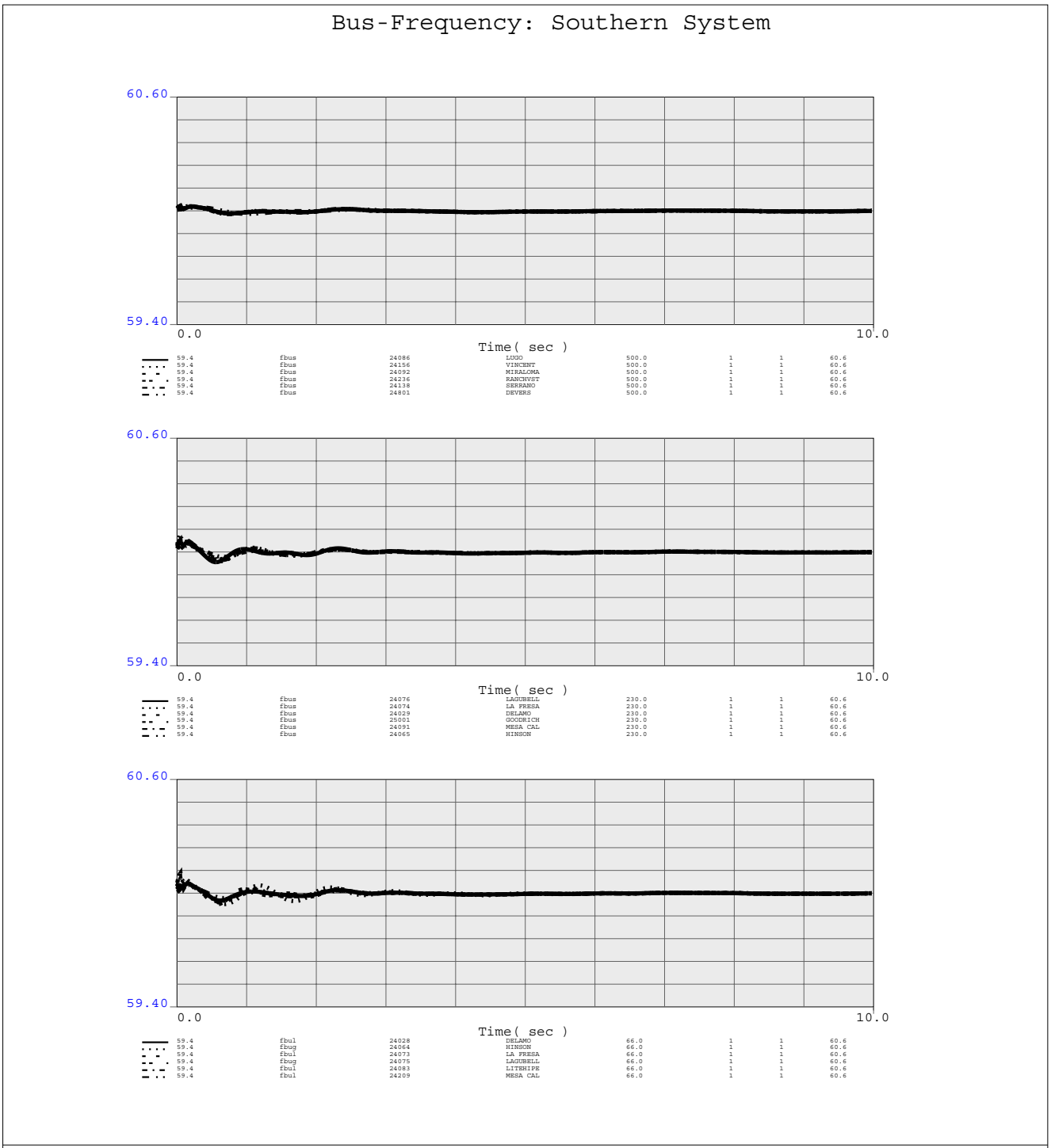
Plot 3 - 1: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.



Plot 3 - 2: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
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Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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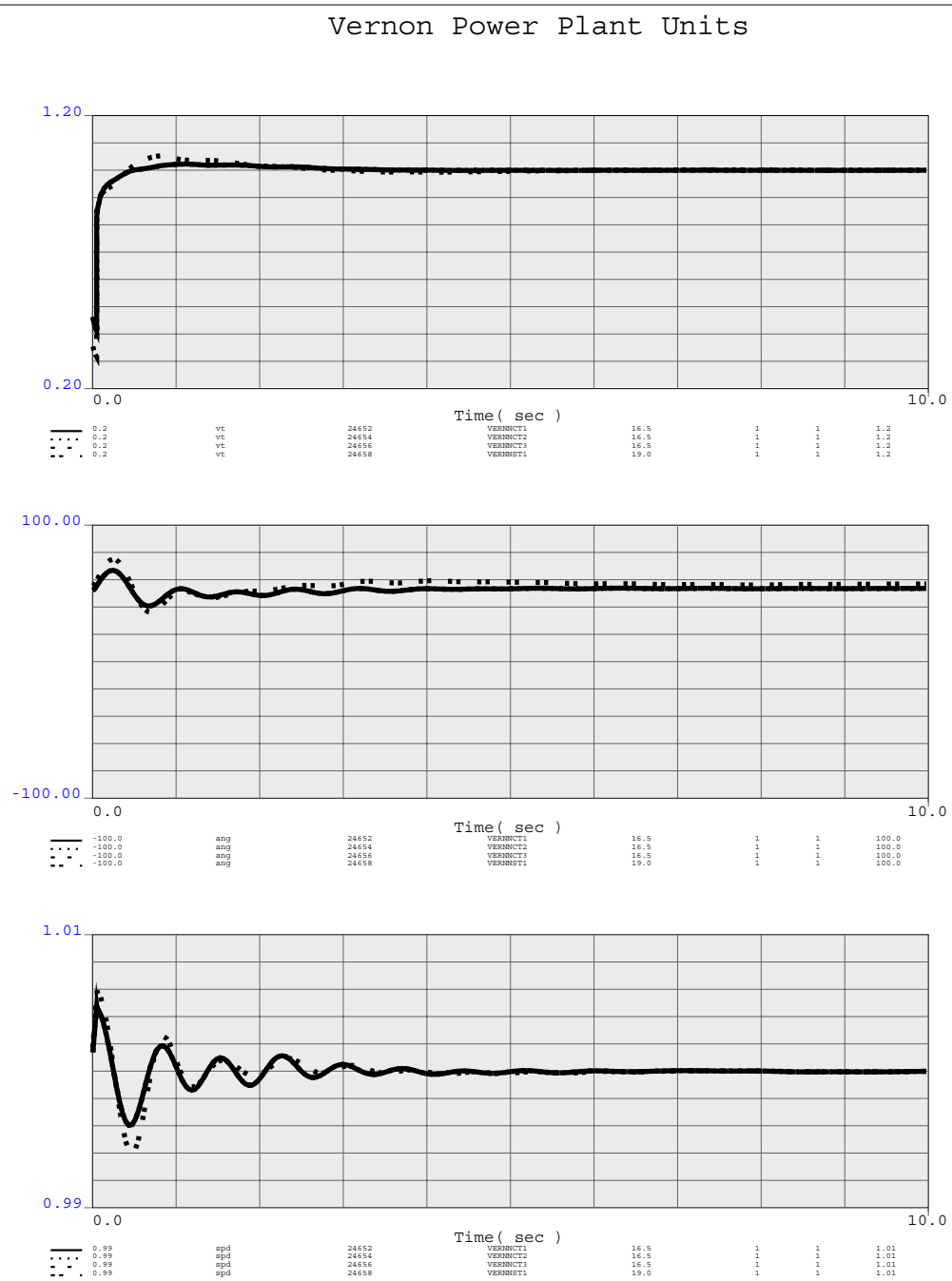
Plot 3 - 3: Three-phase fault at the VPP 230 kV bus followed by loss of the VPP - Laguna Bell 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
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Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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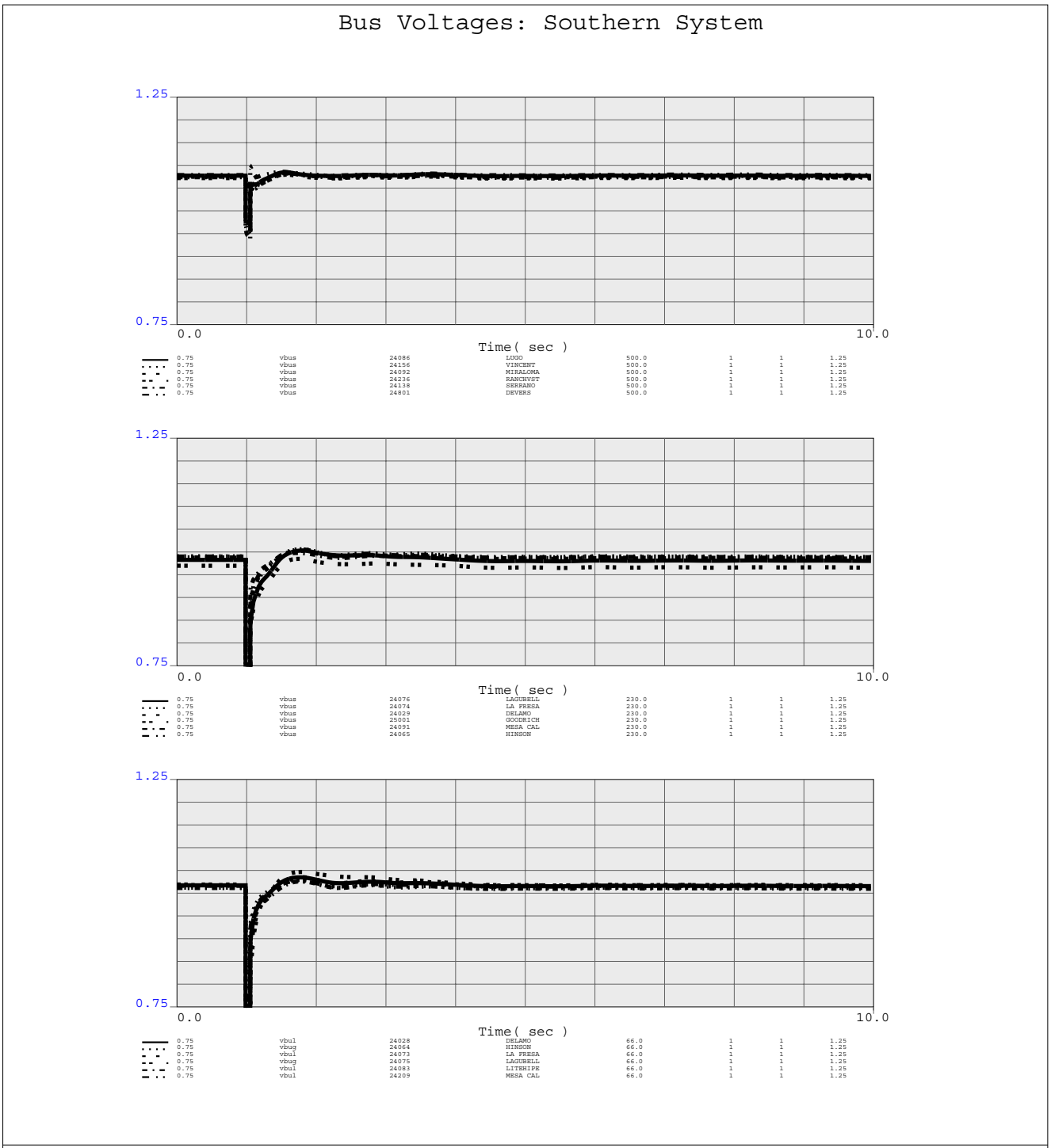
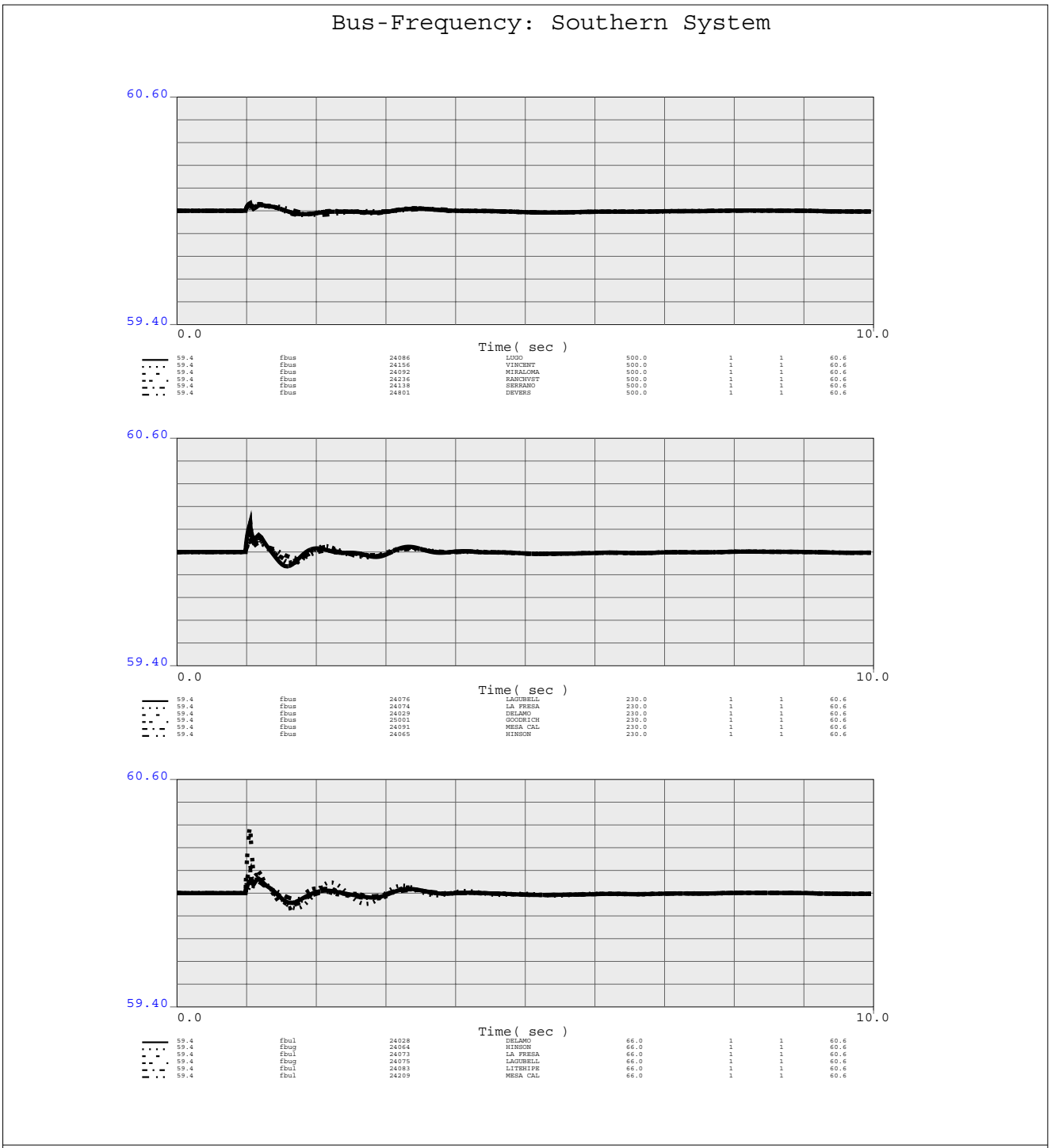
Plot 4 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



Plot 4 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



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Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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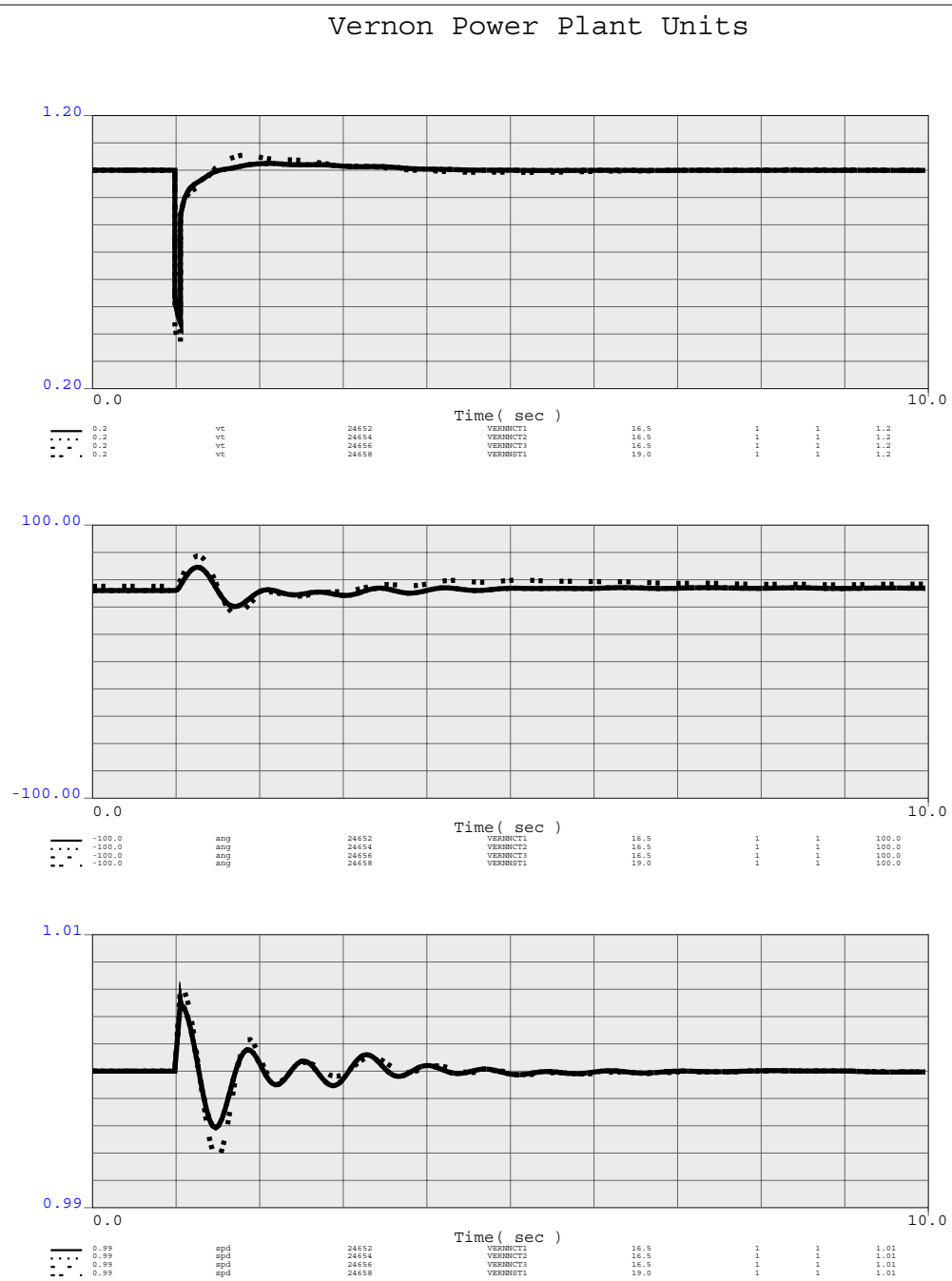
Plot 4 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LagunaBell-RioHondo-slo.chf

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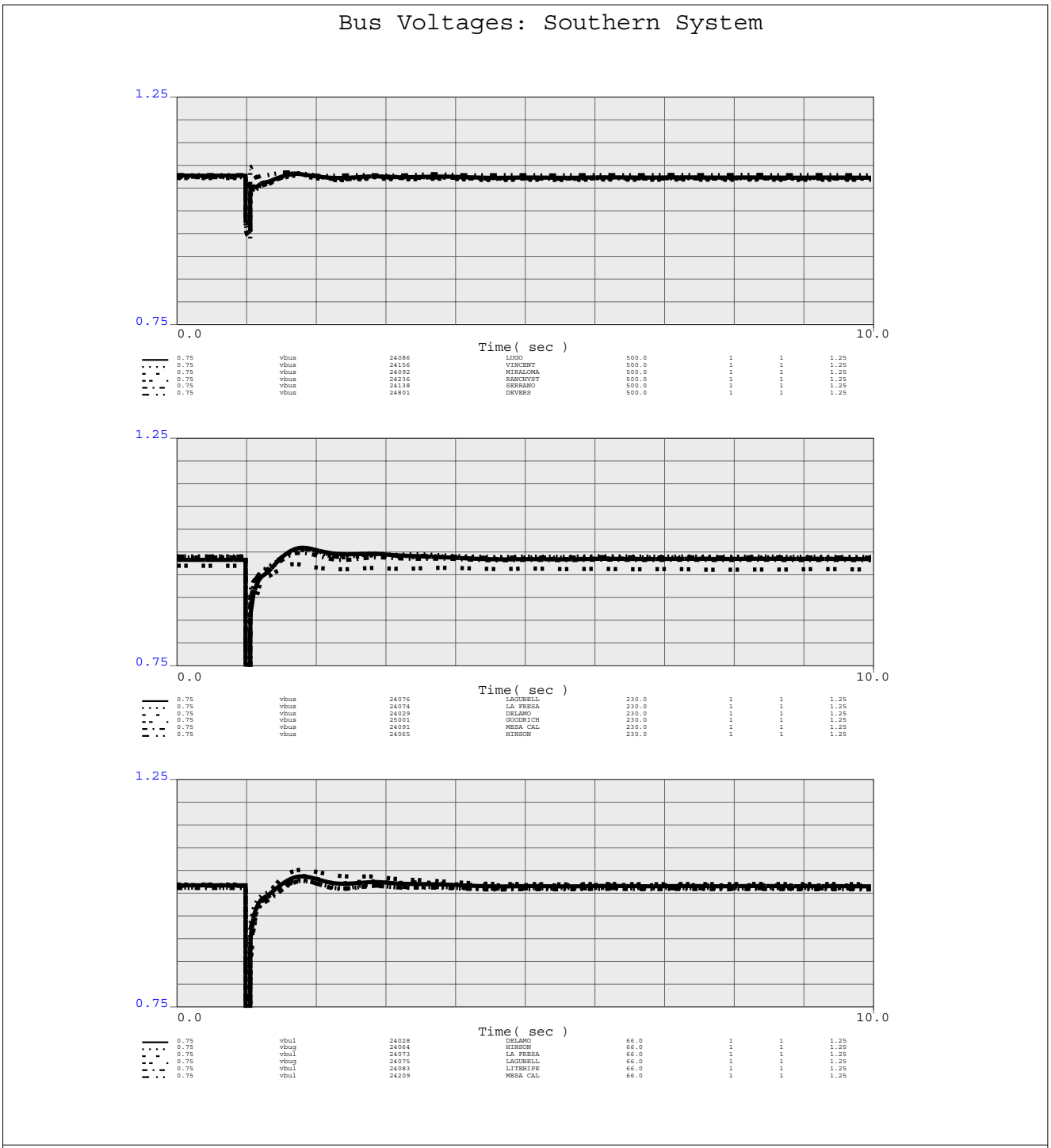
Plot 5 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

09lsp_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf

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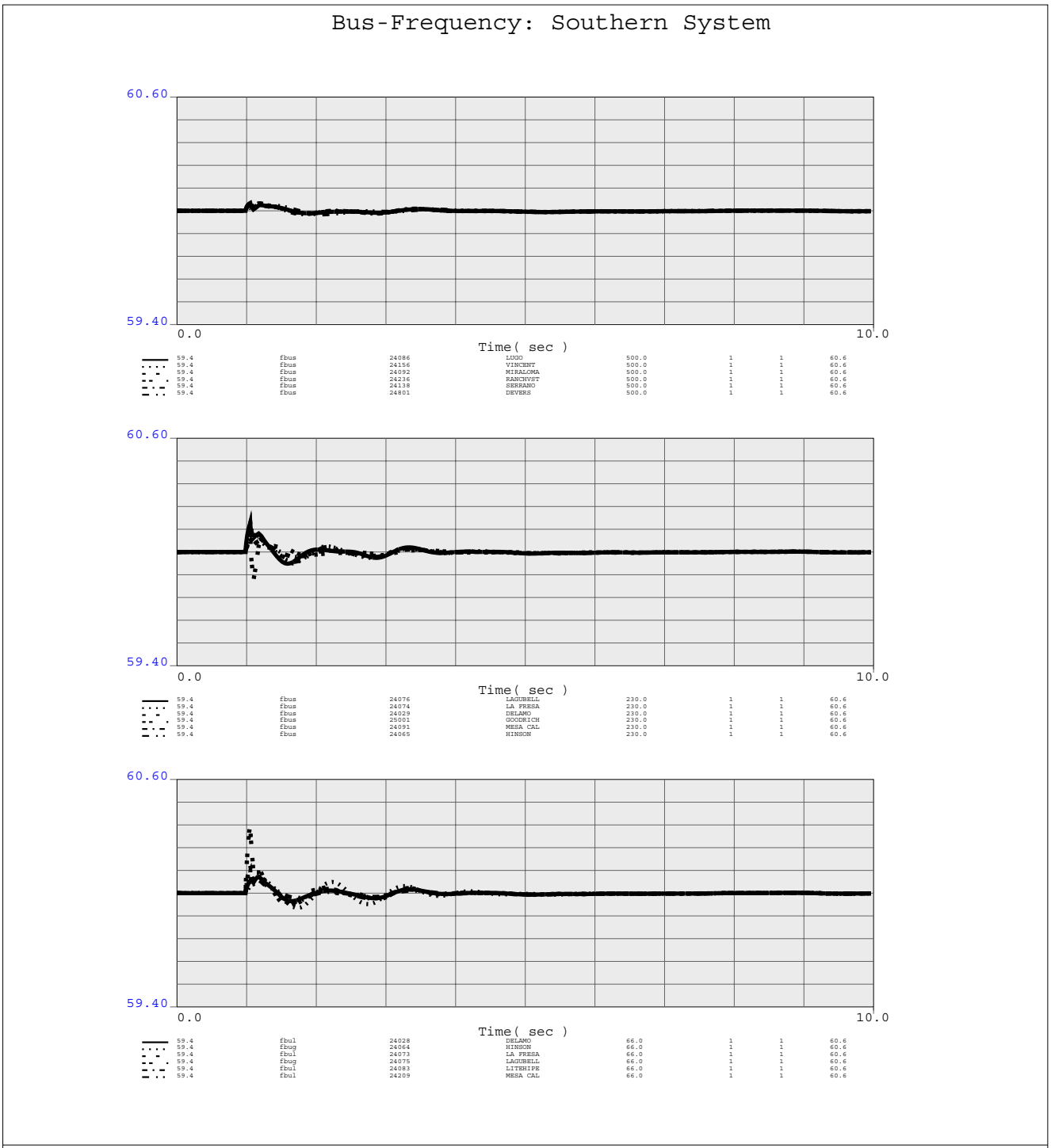
Wed Nov 15 09:27:33 2006

Plot 5 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 2

09lsp_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf

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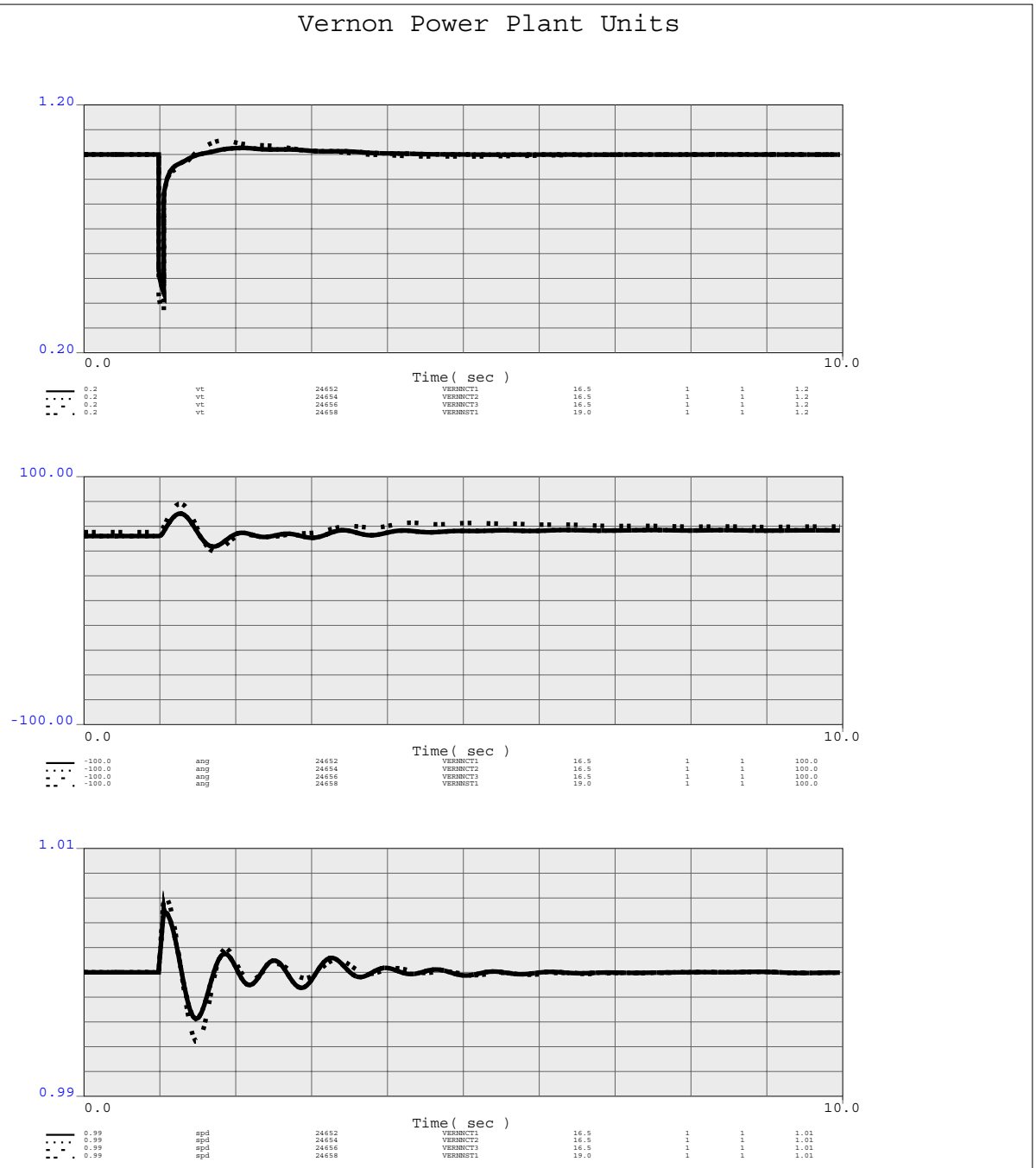
Wed Nov 15 09:27:33 2006

Plot 5 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Goodrich 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

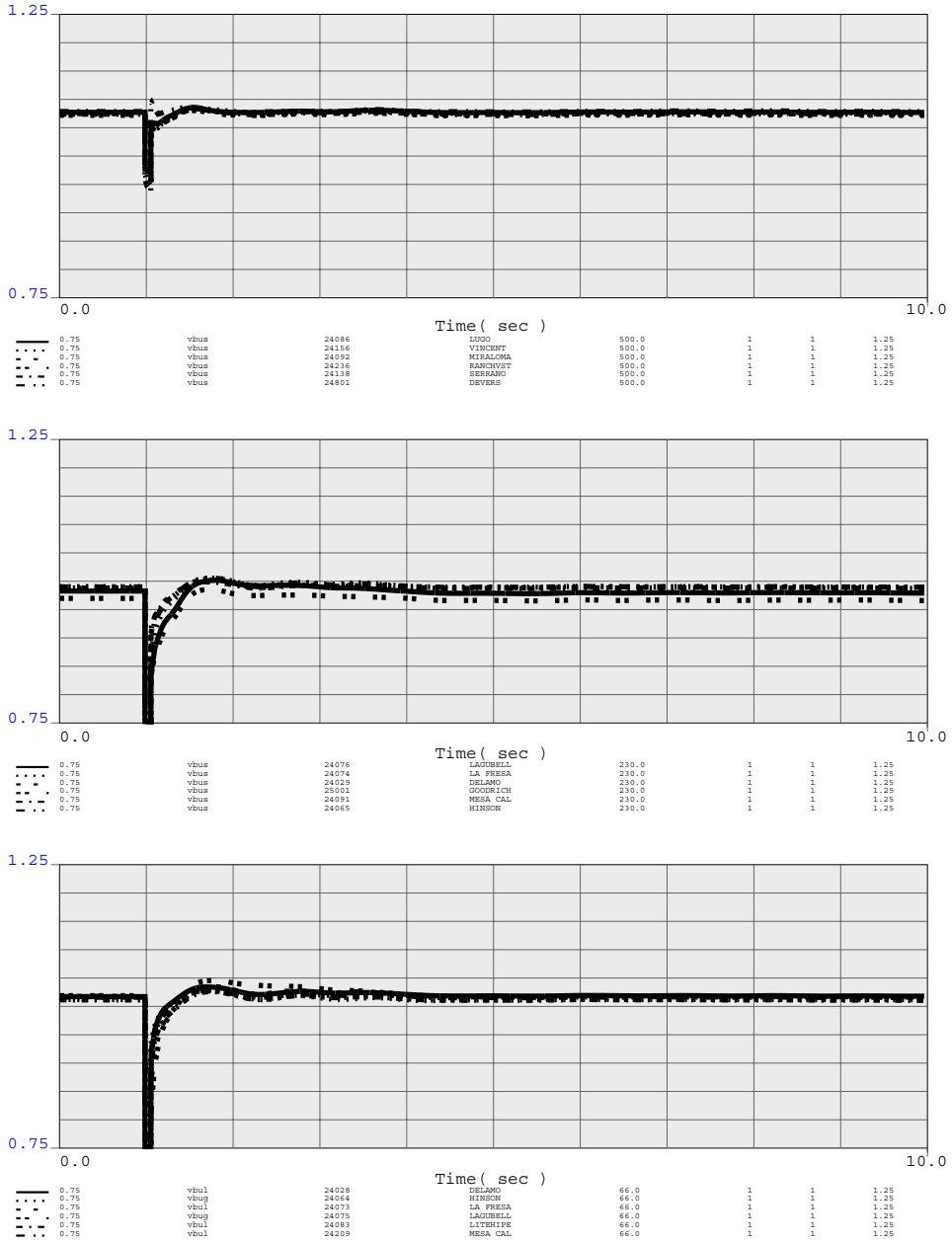
09lsp_pst-vpp304-rev1_LagunaBell-Goodrich-slo.chf

c:\upslf16\mypslf

Wed Nov 15 09:27:33 2006

Plot 6 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.

Bus Voltages: Southern System

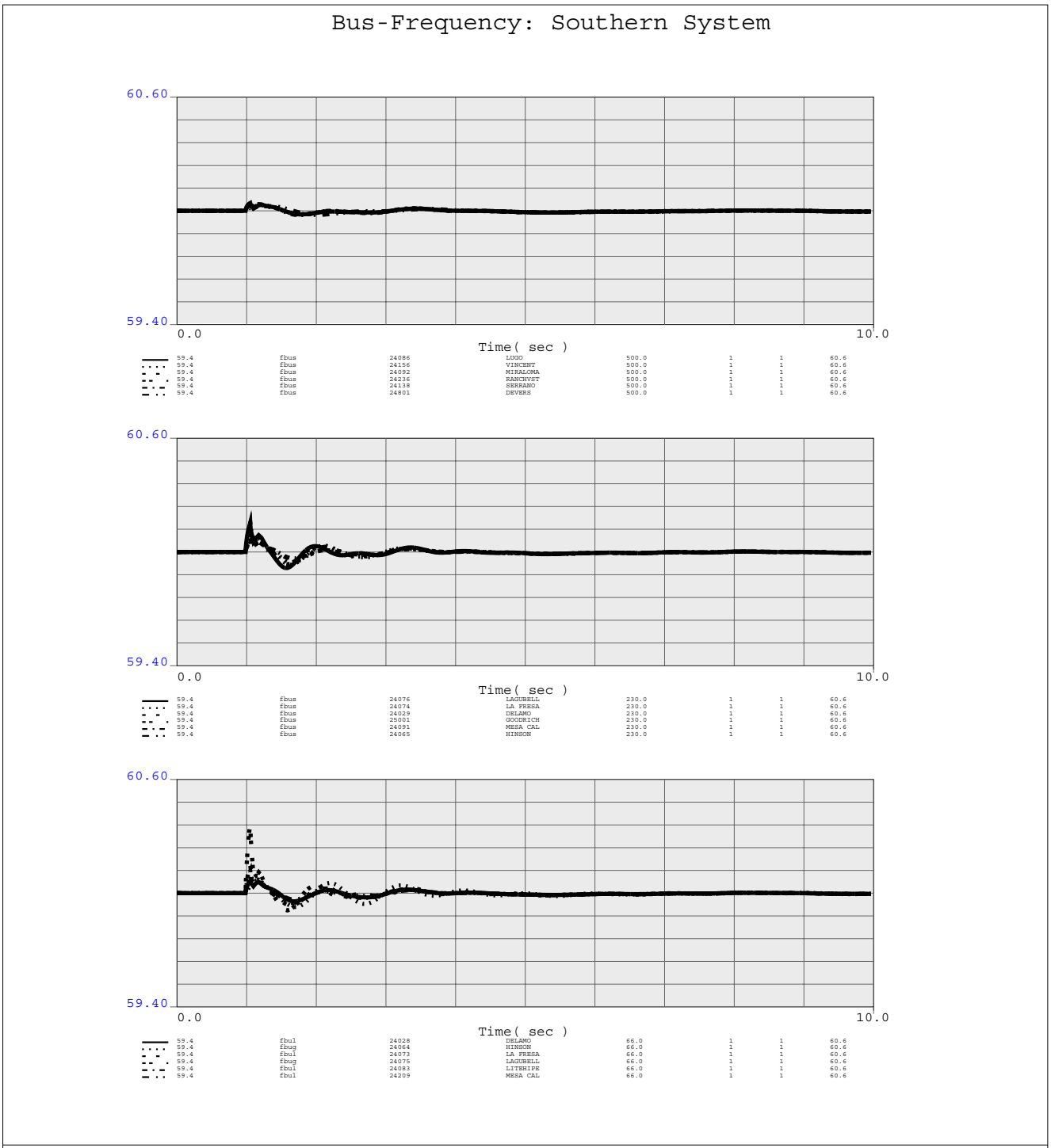


2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

	09lsp_pst-vpp304-rev1_LagunaBell-DelAmo-slo.chf	c:\upslf16\mypslf Wed Nov 15 09:27:37 2006

Plot 6 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

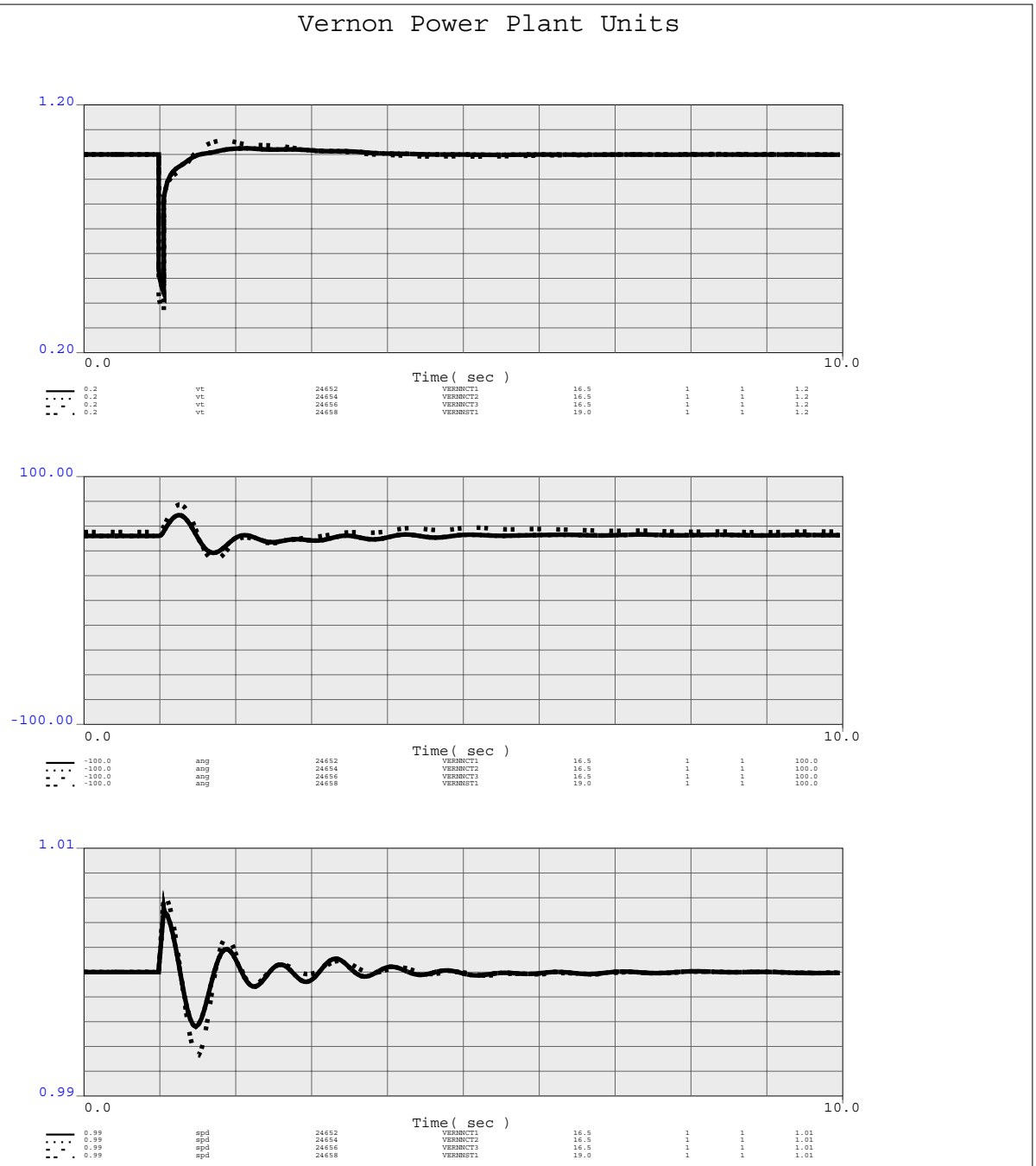
Page 2

09lsp_pst-vpp304-rev1_LagunaBell-DelAmo-slo.chf

c:\upslf16\mypslf

Wed Nov 15 09:27:37 2006

Plot 6 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LagunaBell-DelAmo-slo.chf

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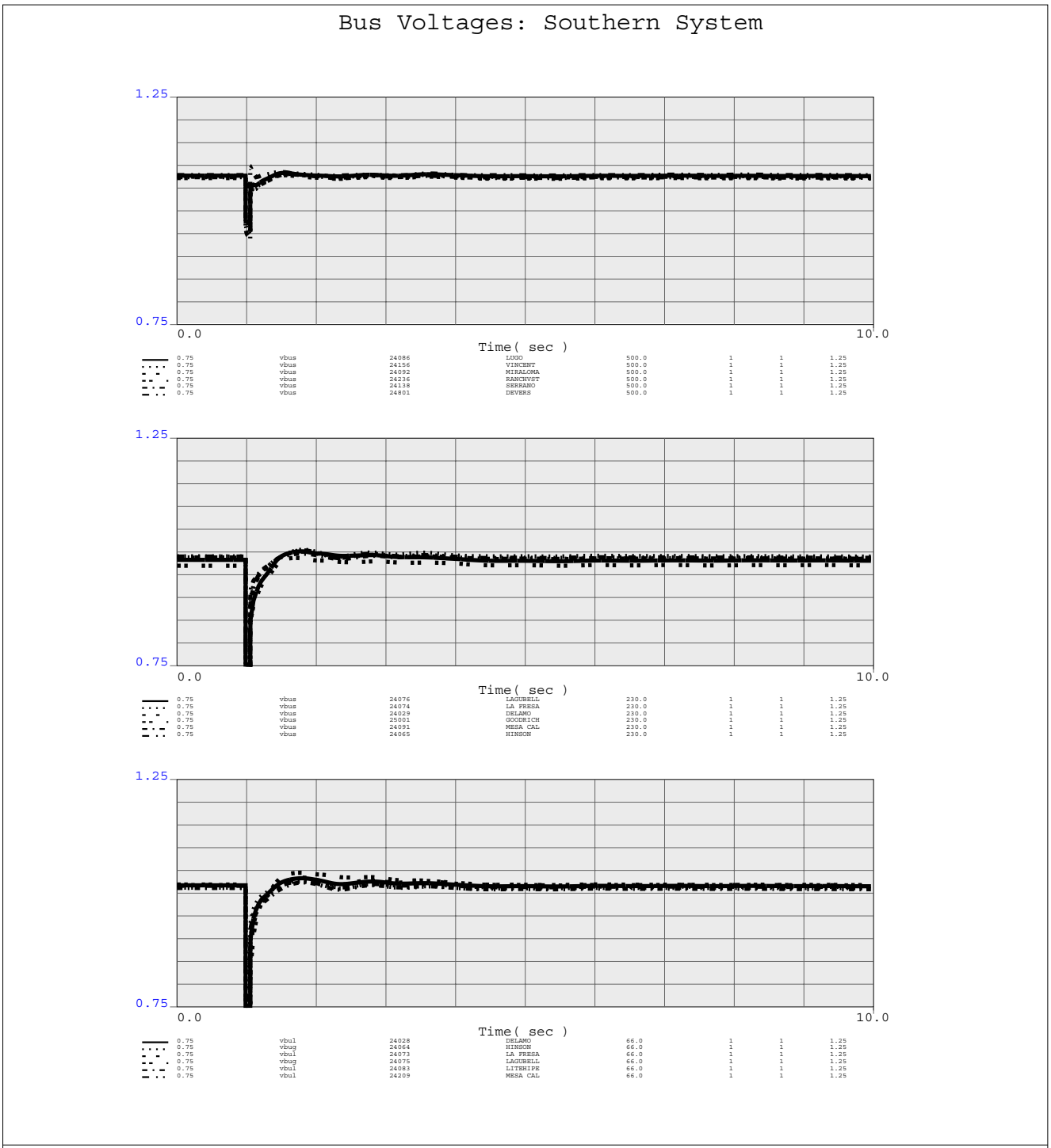
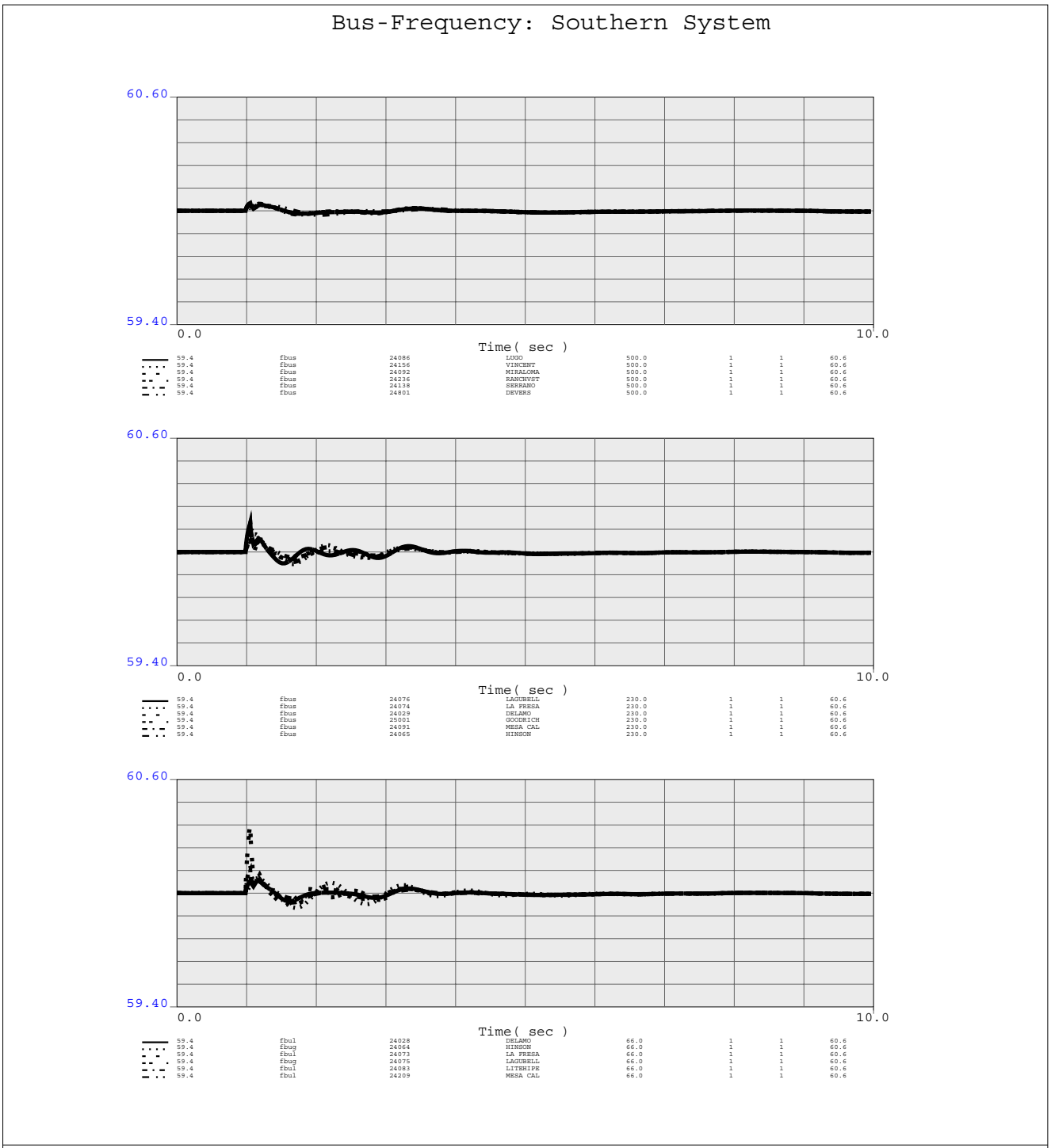
Wed Nov 15 09:27:37 2006

Plot 7 - 1: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.



Plot 7 - 2: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 2

09lsp_pst-vpp304-rev1_LagunaBell-LaFresa-slo.chf

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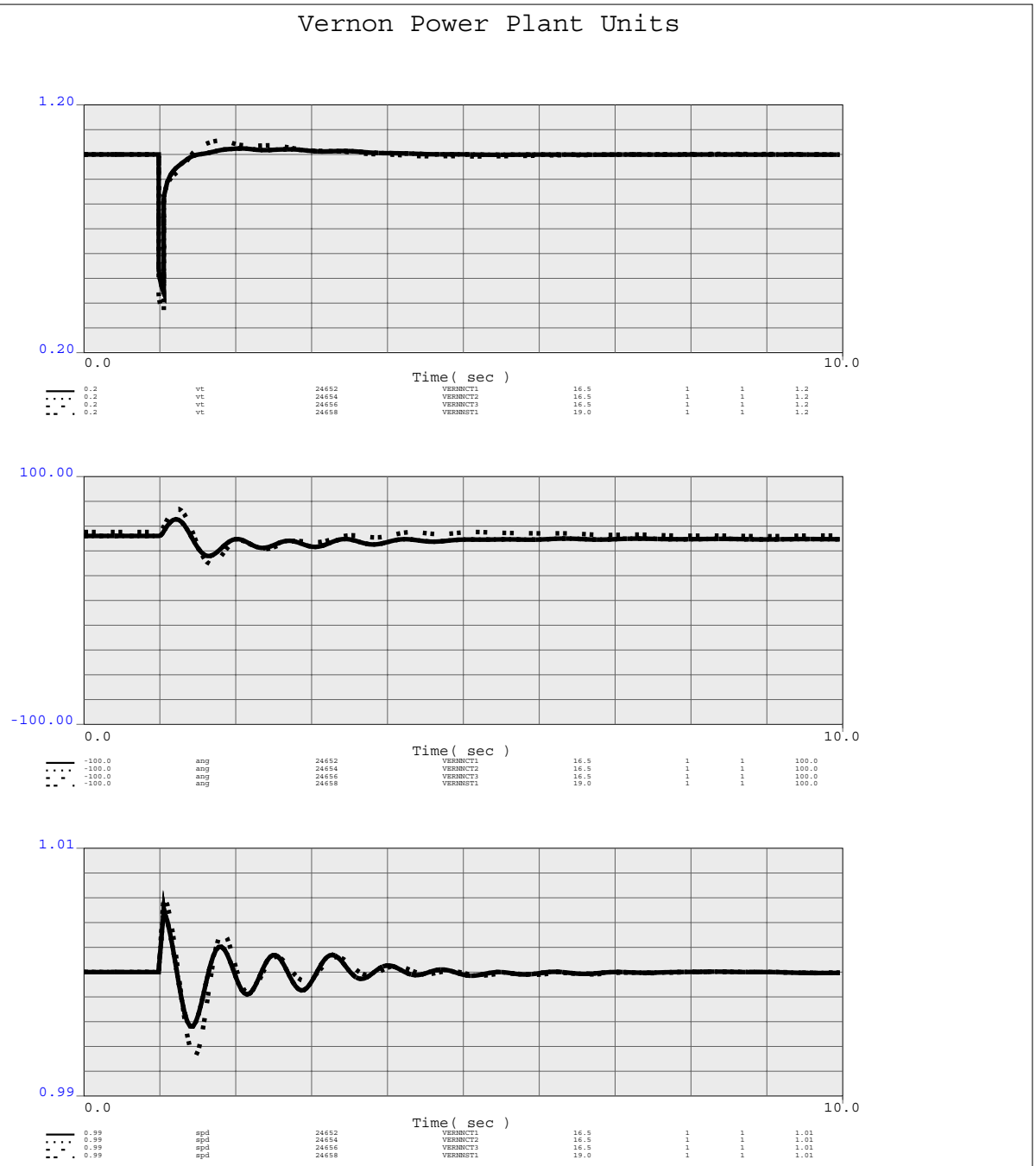
Wed Nov 15 09:27:40 2006

Plot 7 - 3: Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LagunaBell-LaFresa-slo.chf

c:\upslf16\mypslf

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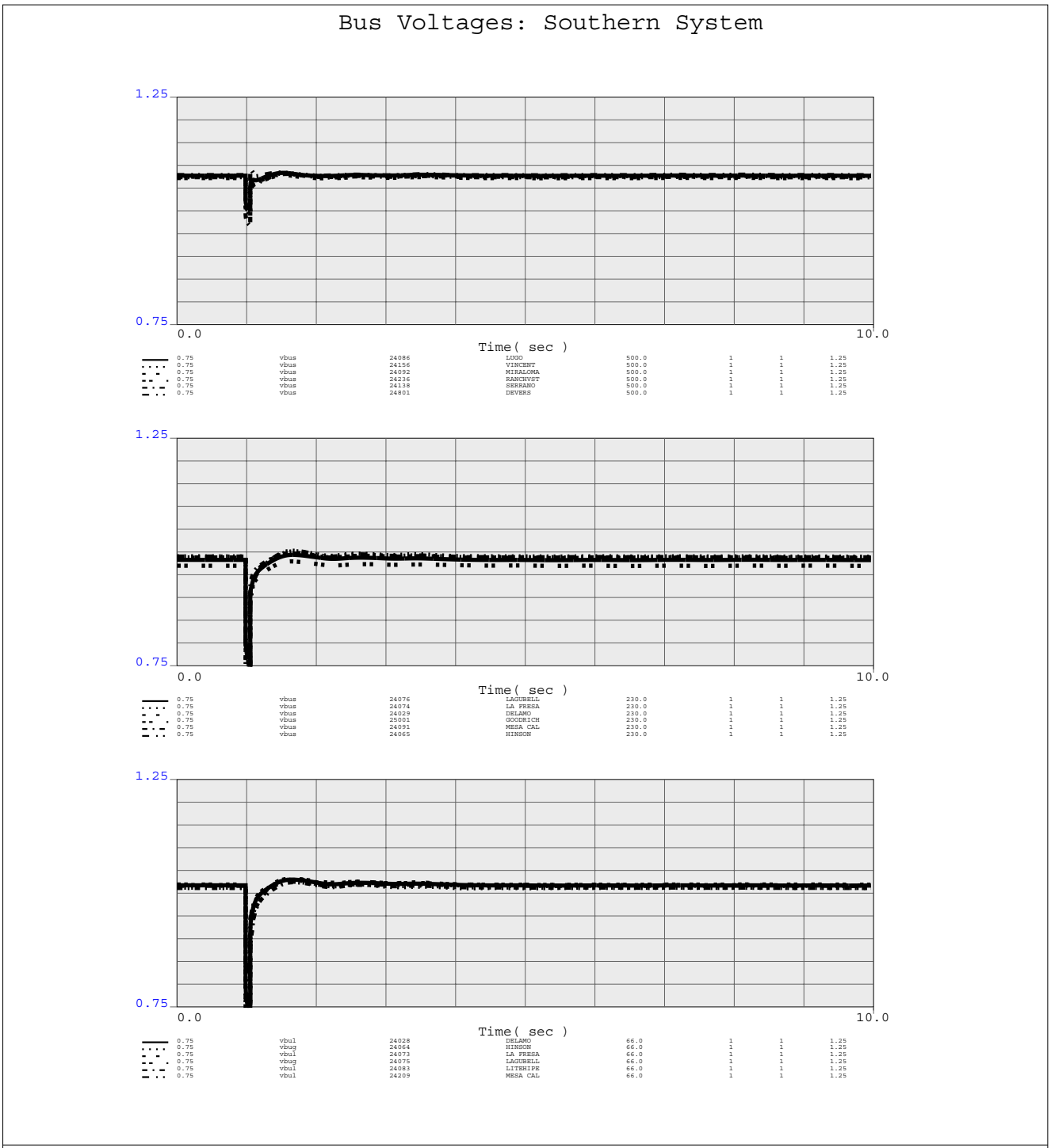
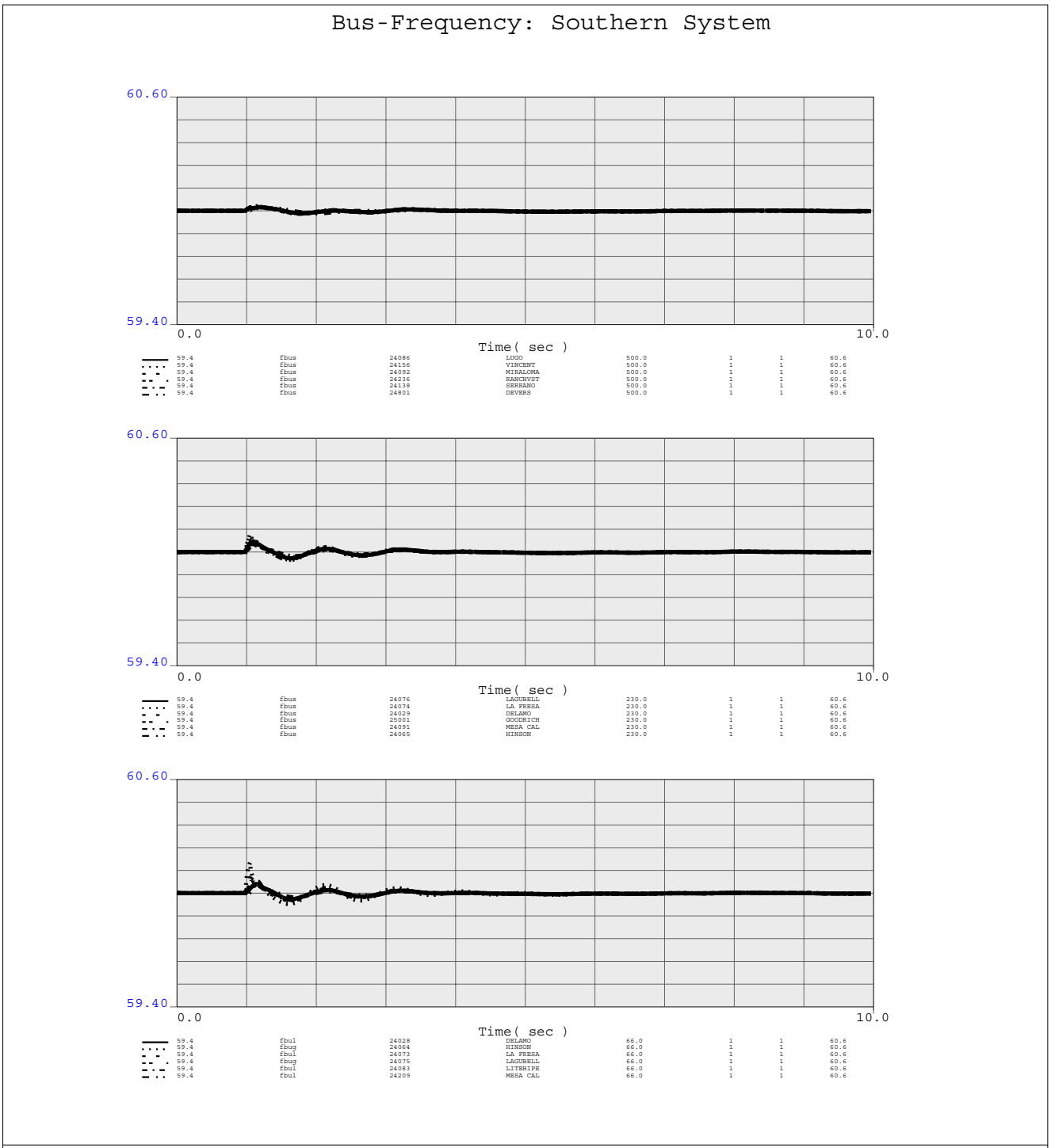
Plot 8 - 1: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



Plot 8 - 2: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 2

09lsp_pst-vpp304-rev1_LBeach-Harbor230-slo.chf

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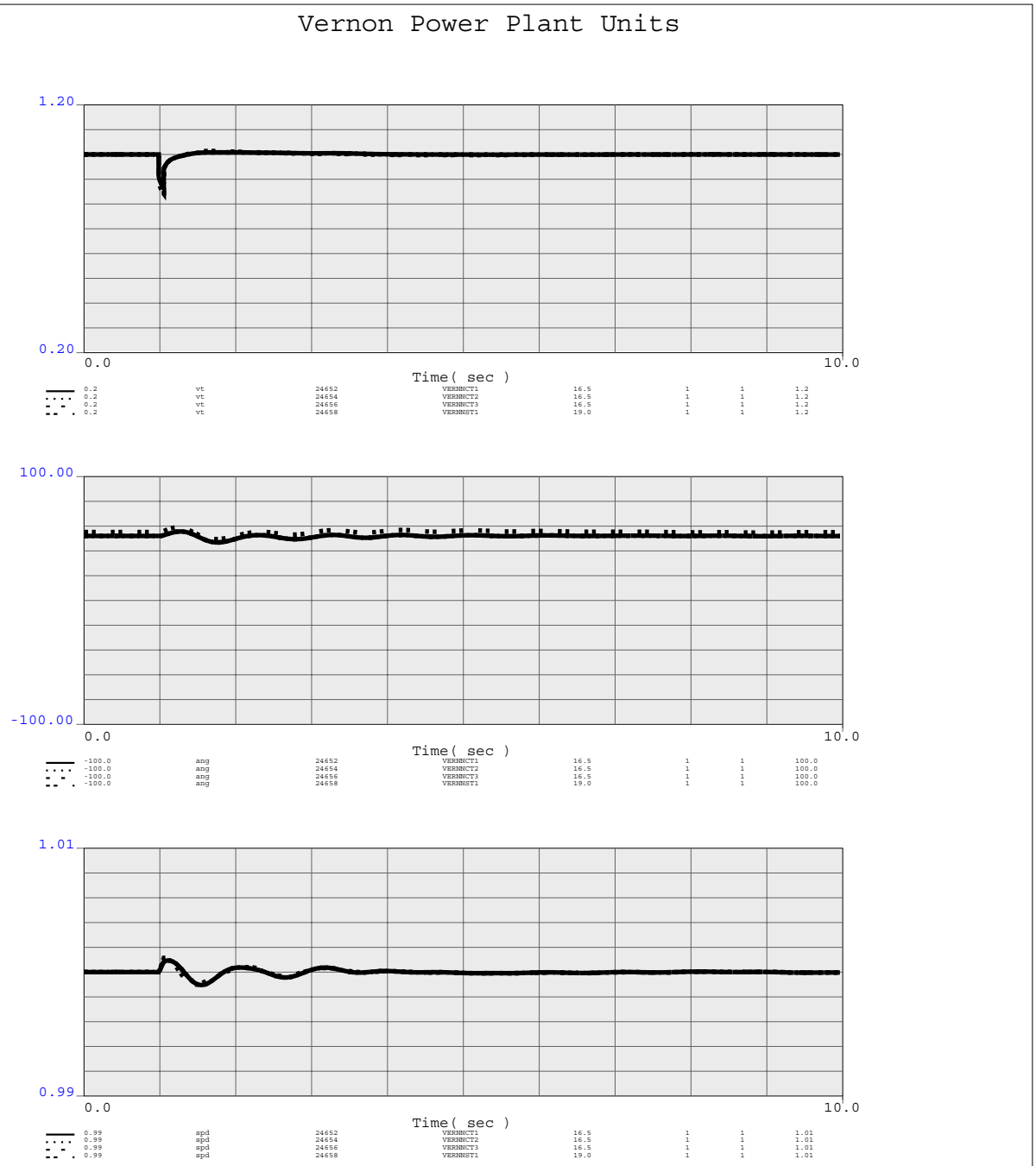
Wed Nov 15 09:27:45 2006

Plot 8 - 3: Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach - Harbor Gen 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LBeach-Harbor230-slo.chf

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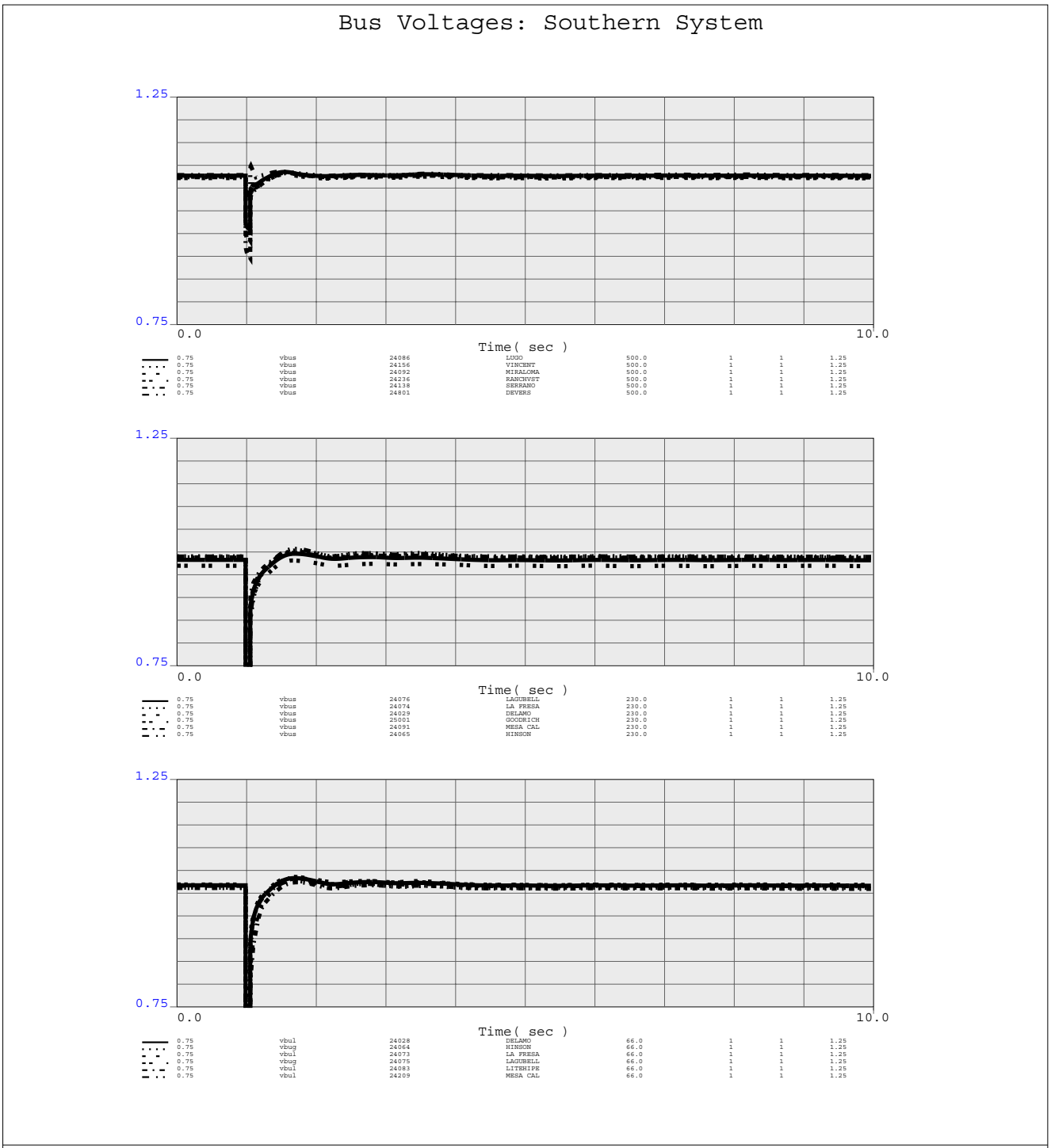
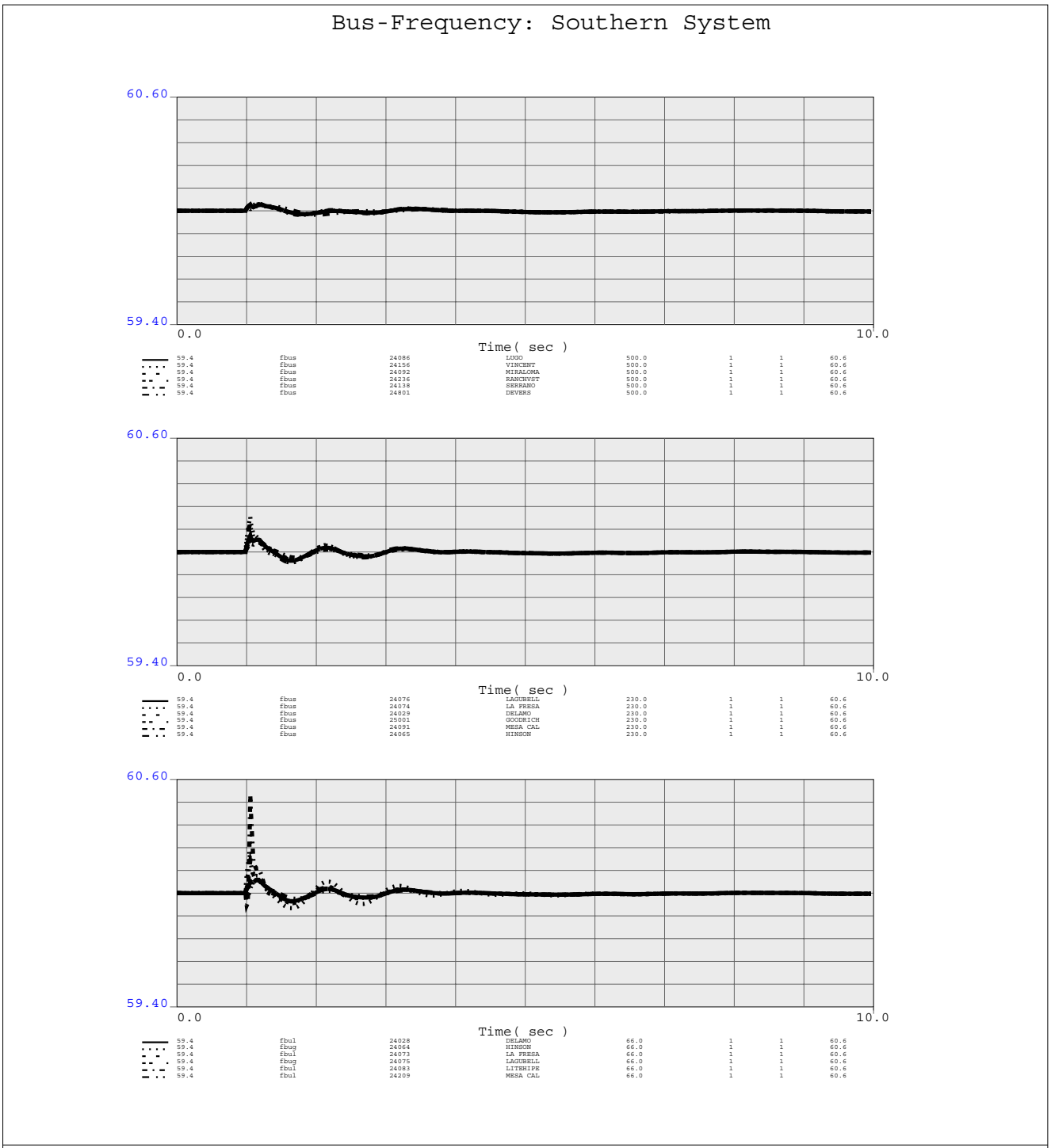
Plot 9 - 1: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.



Plot 9 - 2: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 2

09lsp_pst-vpp304-rev1_LBeach-Litehipe230-slo.chf

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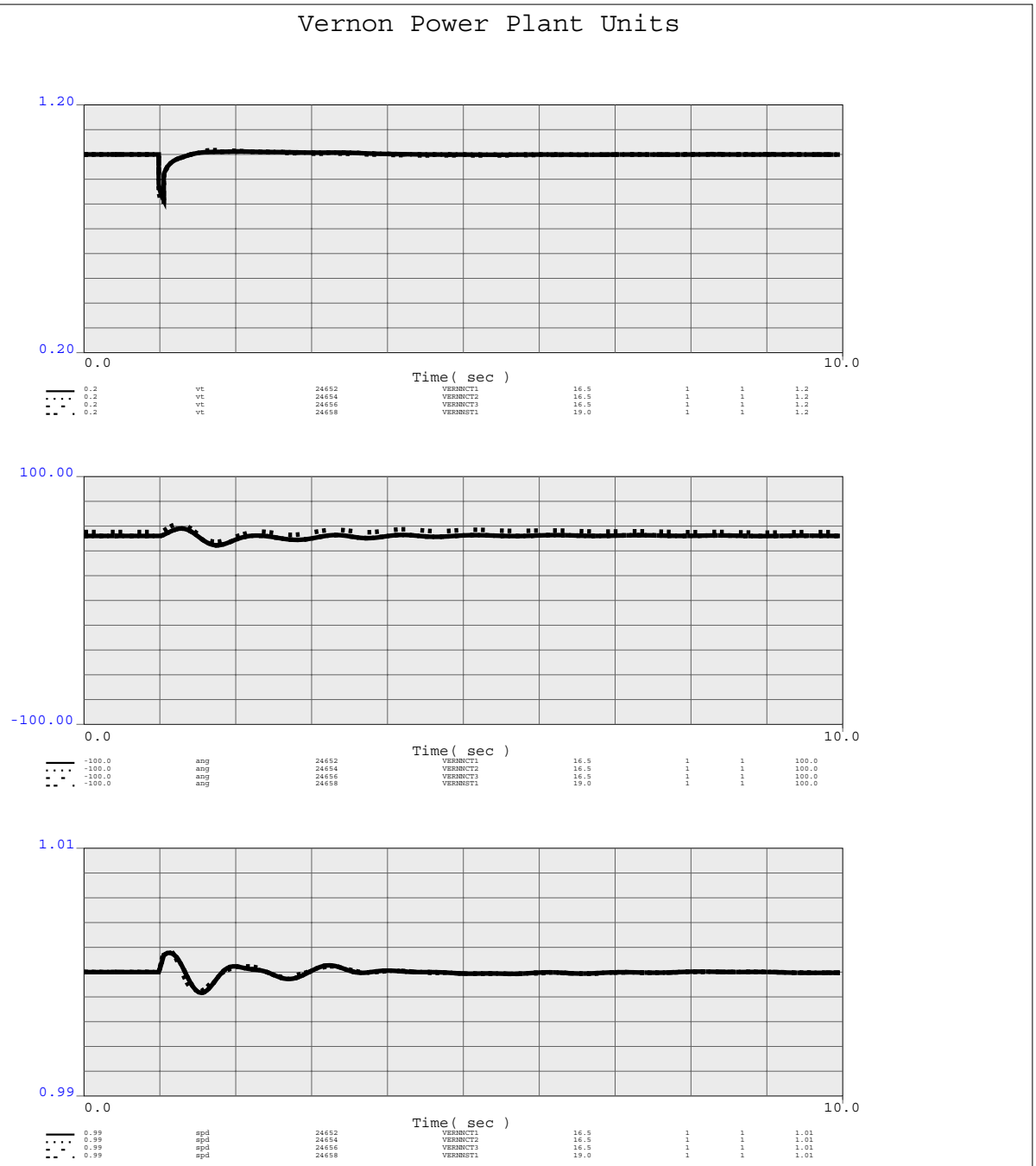
Plot 9 - 3: Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LBeach-Litehipe230-slo.chf

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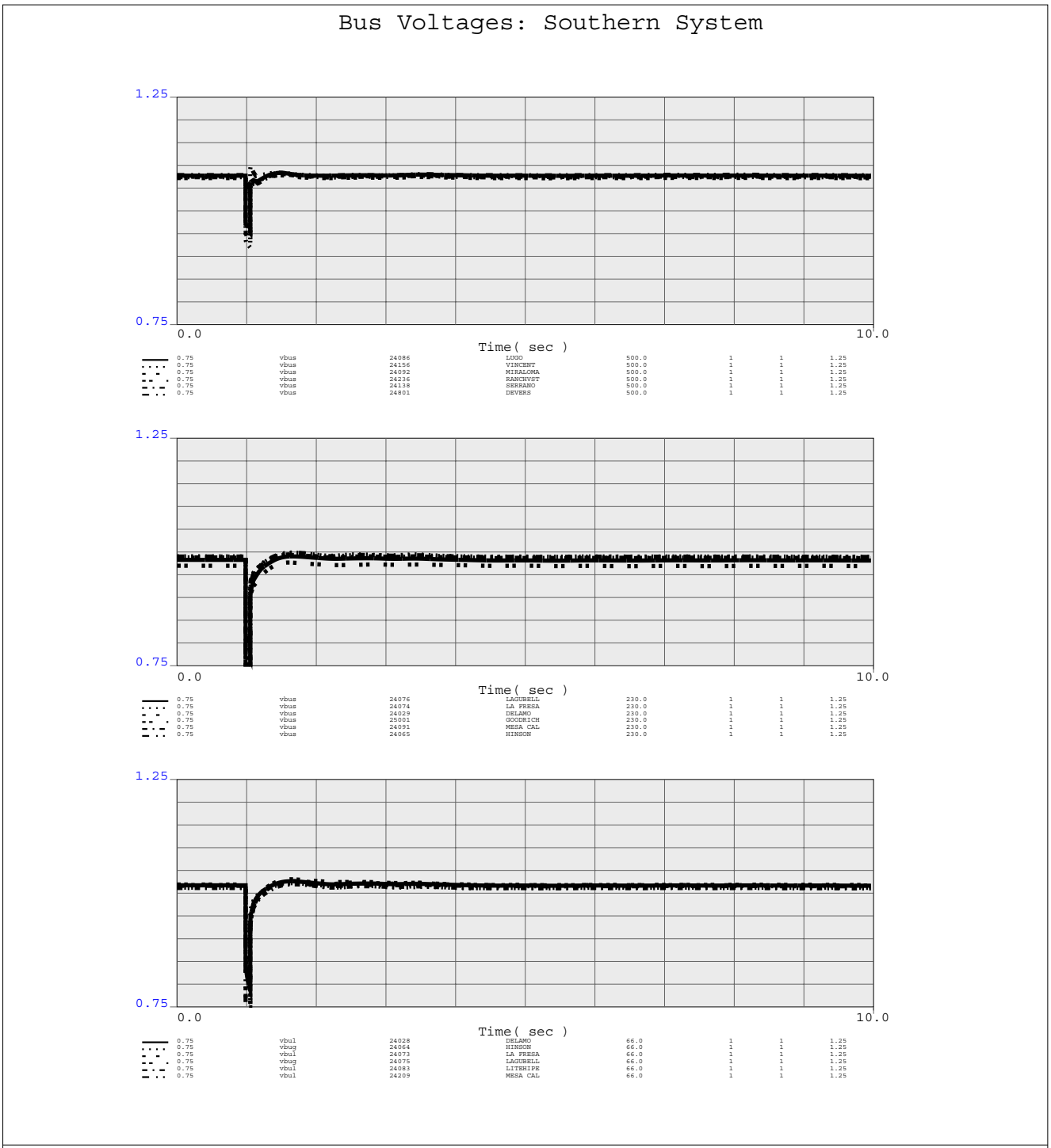
Plot 10 - 1: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

09lsp_pst-vpp304-rev1_Vincent-RioHondo230-slo.chf

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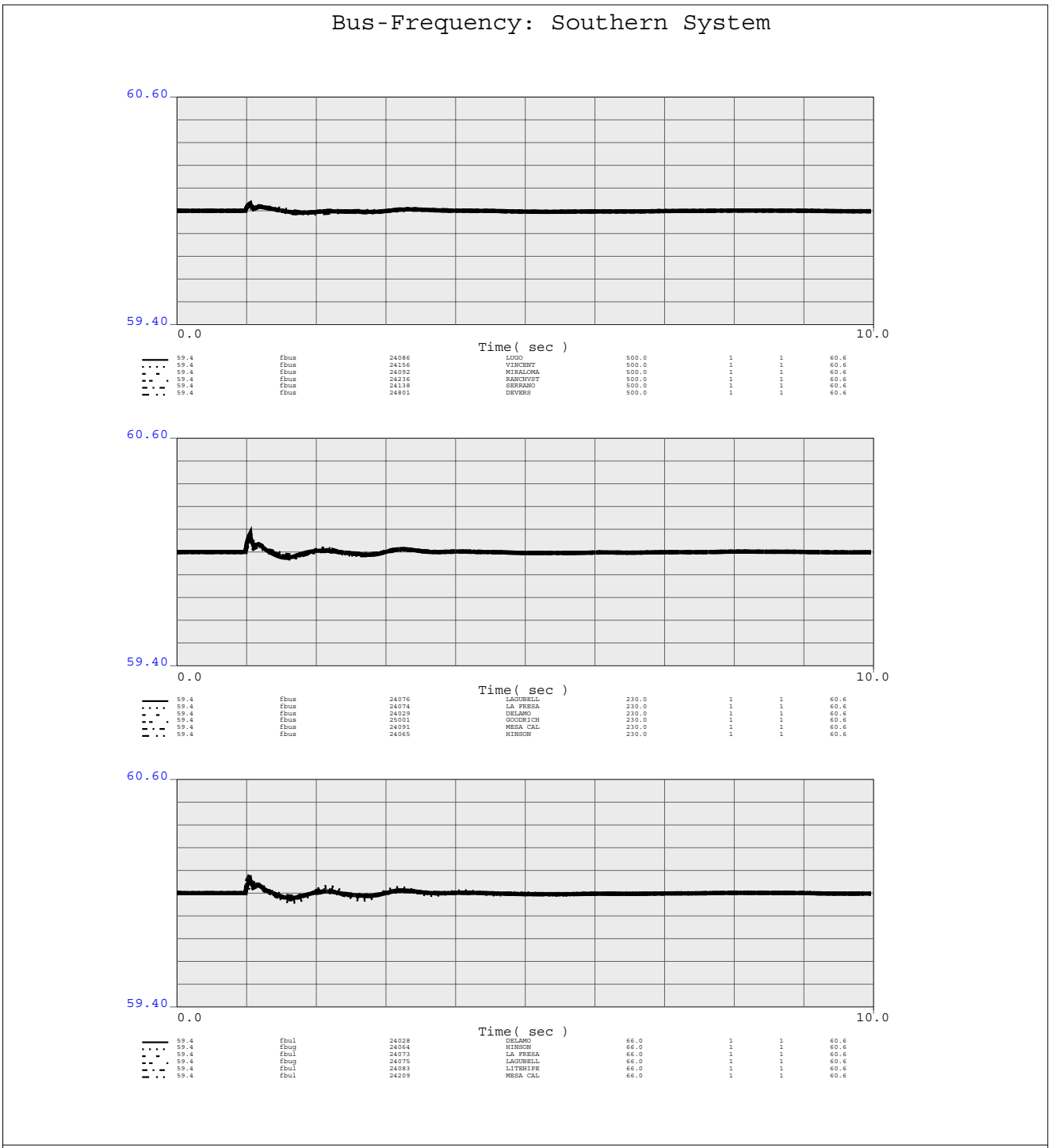
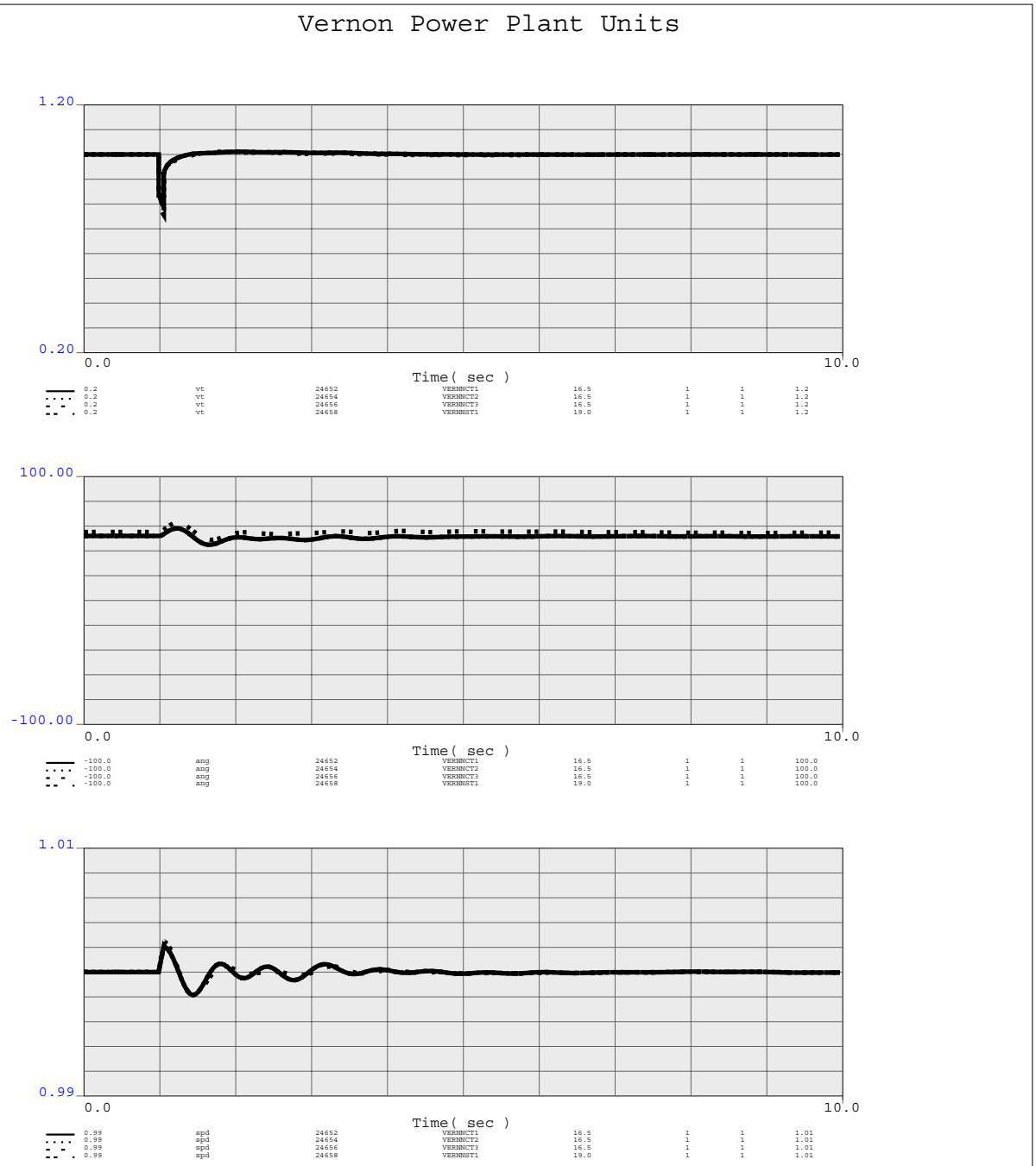
Plot 10 - 2: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.



Plot 10 - 3: Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent - Rio Hondo 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_Vincent-RioHondo230-slo.chf

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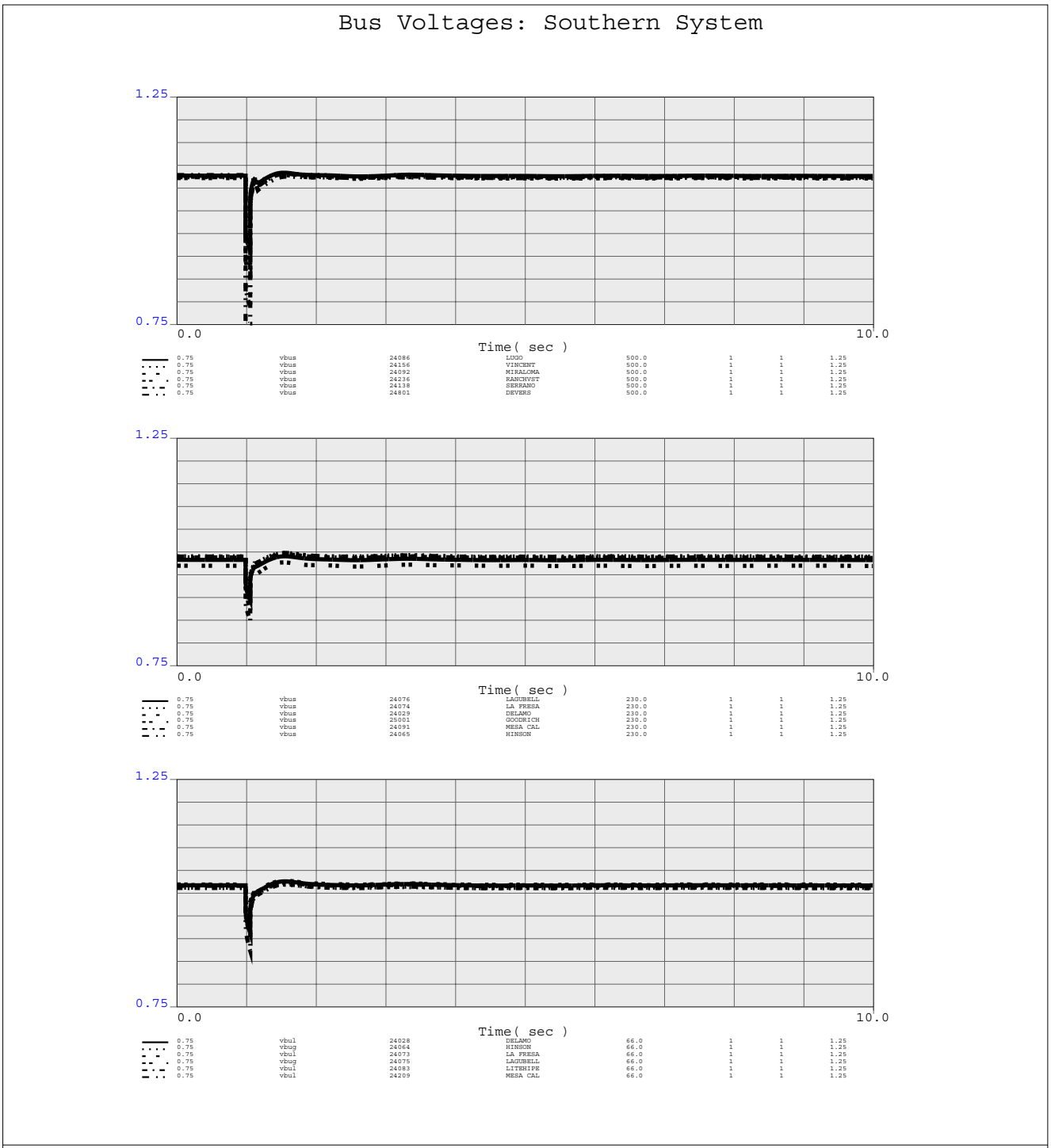
Wed Nov 15 09:27:52 2006

Plot 11 - 1: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.

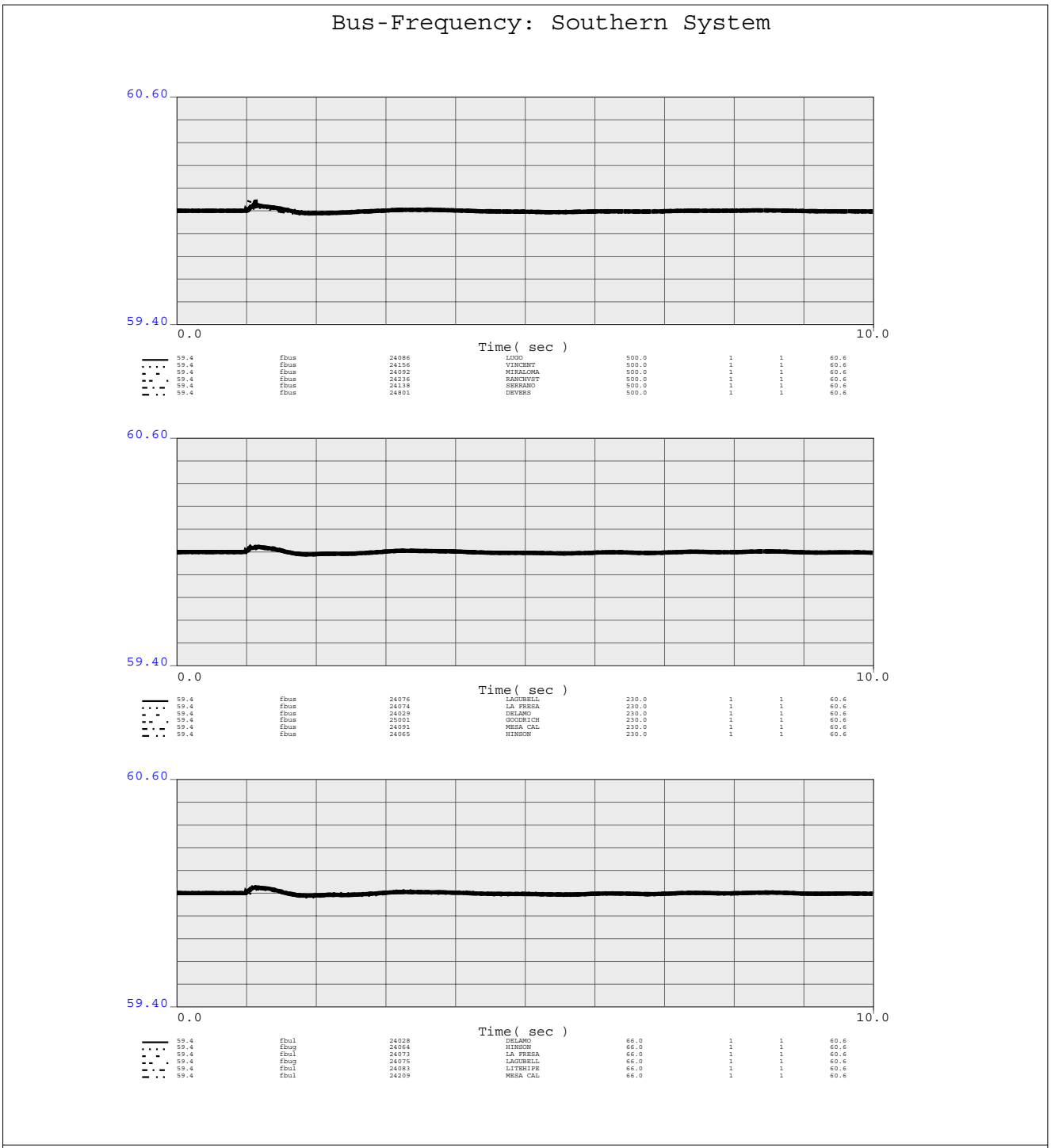


2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

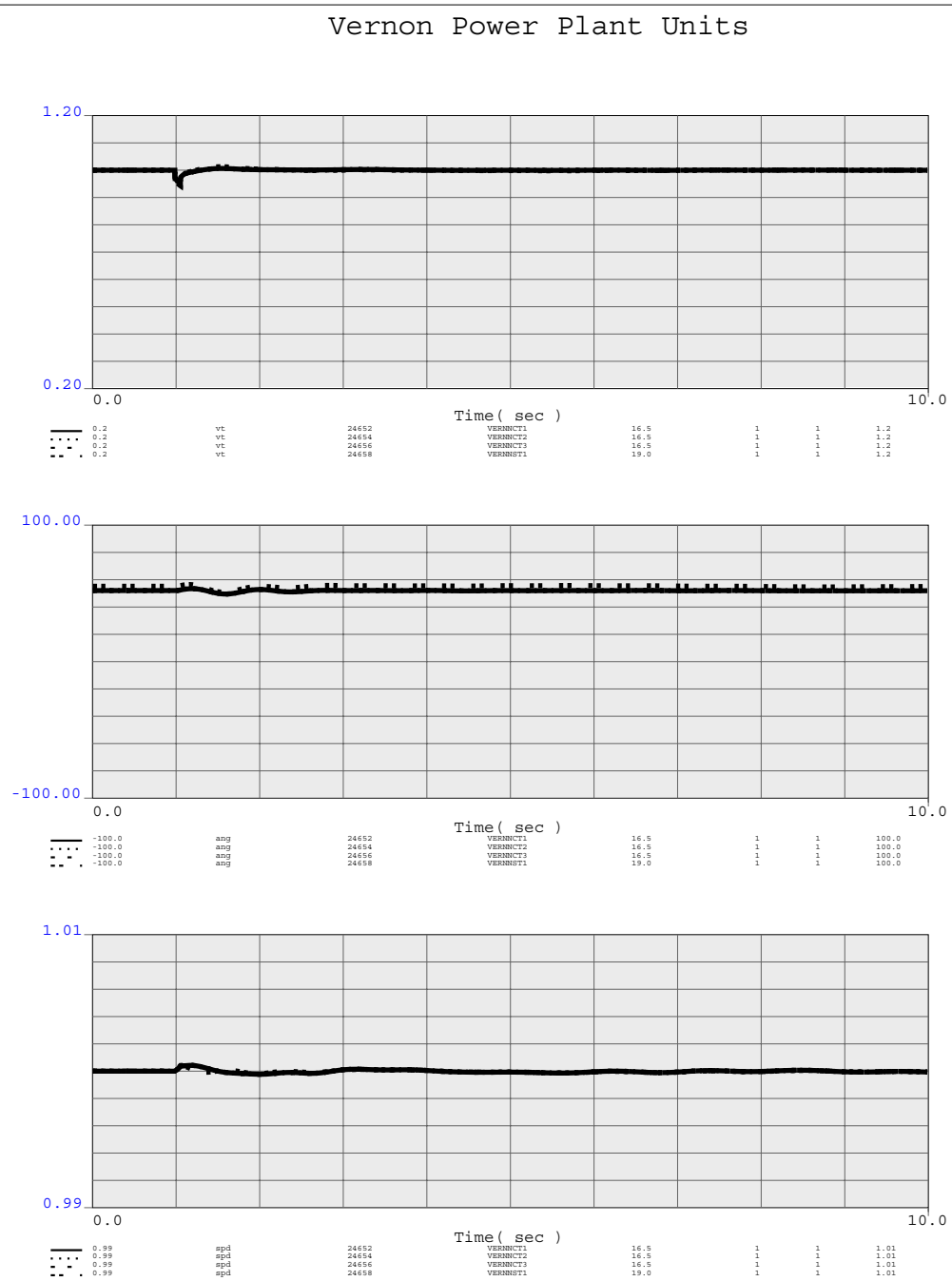
Page 1

	09lsp_pst-vpp304-rev1_Midpoint-Devers-1-slo.chf	c:\upslf16\mypslf Wed Nov 15 09:27:56 2006

Plot 11 - 2: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.



Plot 11 - 3: Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint - Devers 500 kV #1 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_Midpoint-Devers-1-slo.chf

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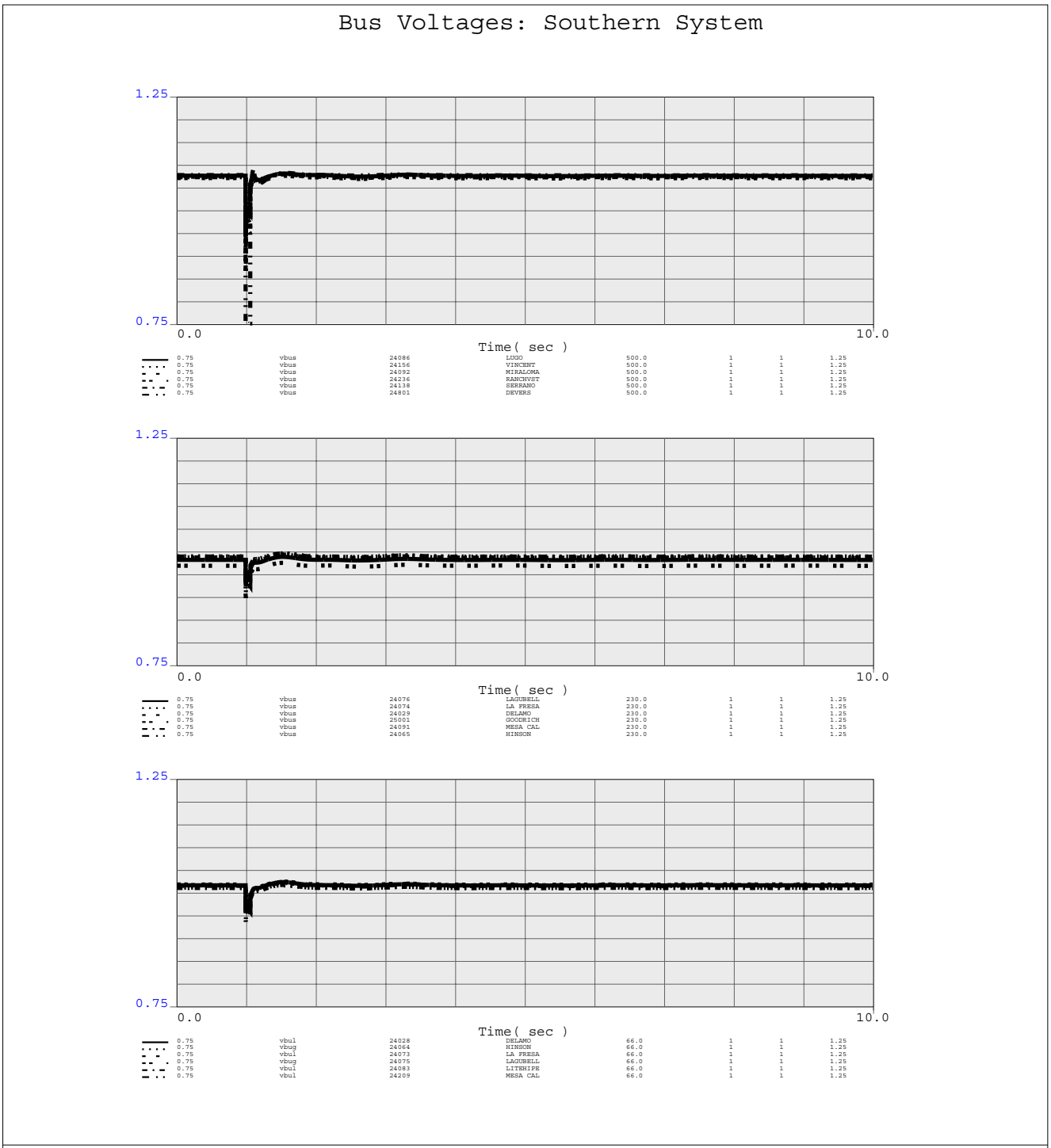
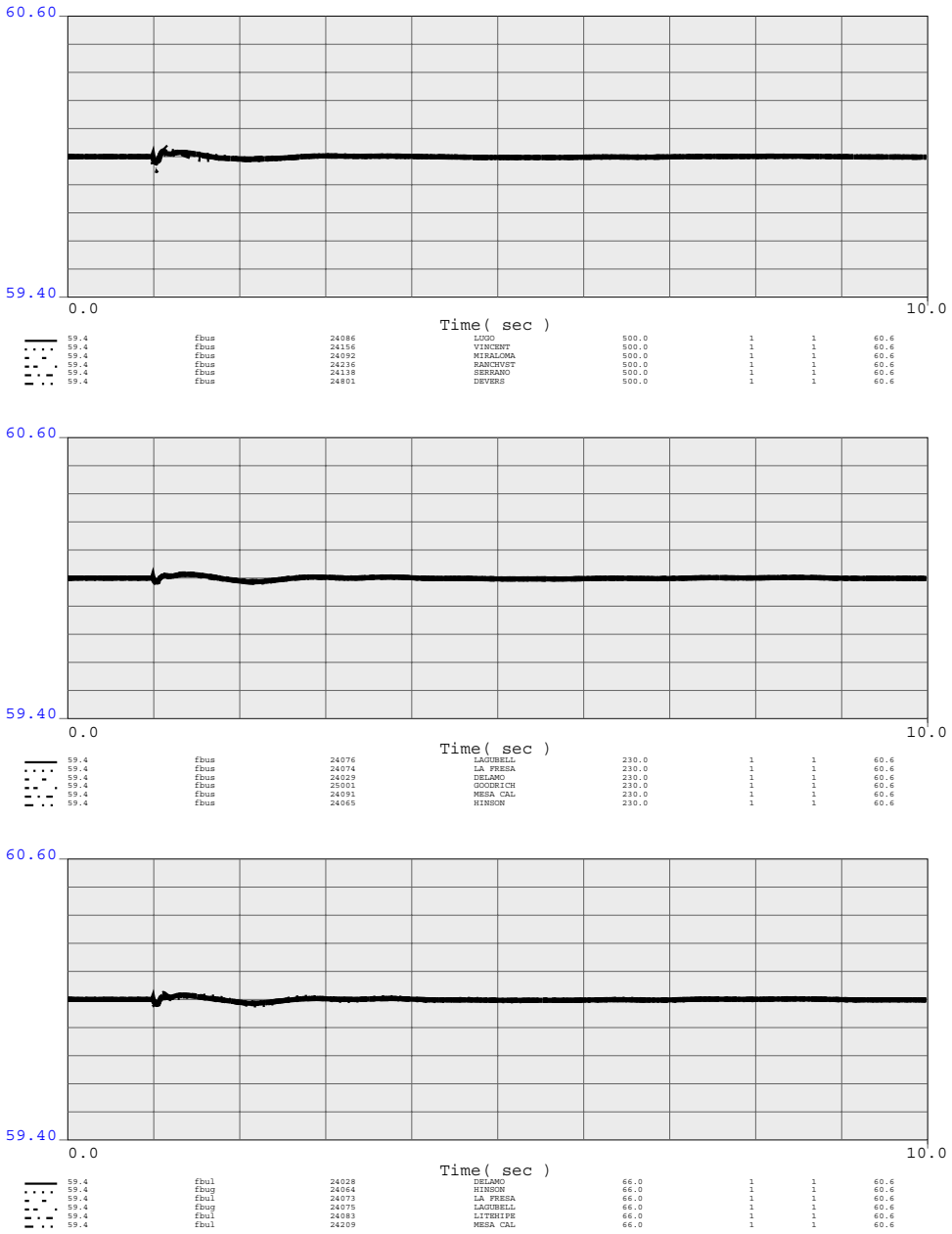
Wed Nov 15 09:27:56 2006

Plot 12 - 1: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.



Plot 12 - 2: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.

Bus-Frequency: Southern System



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 2

09lsp_pst-vpp304-rev1_Midpoint-Harquahala-slo.chf

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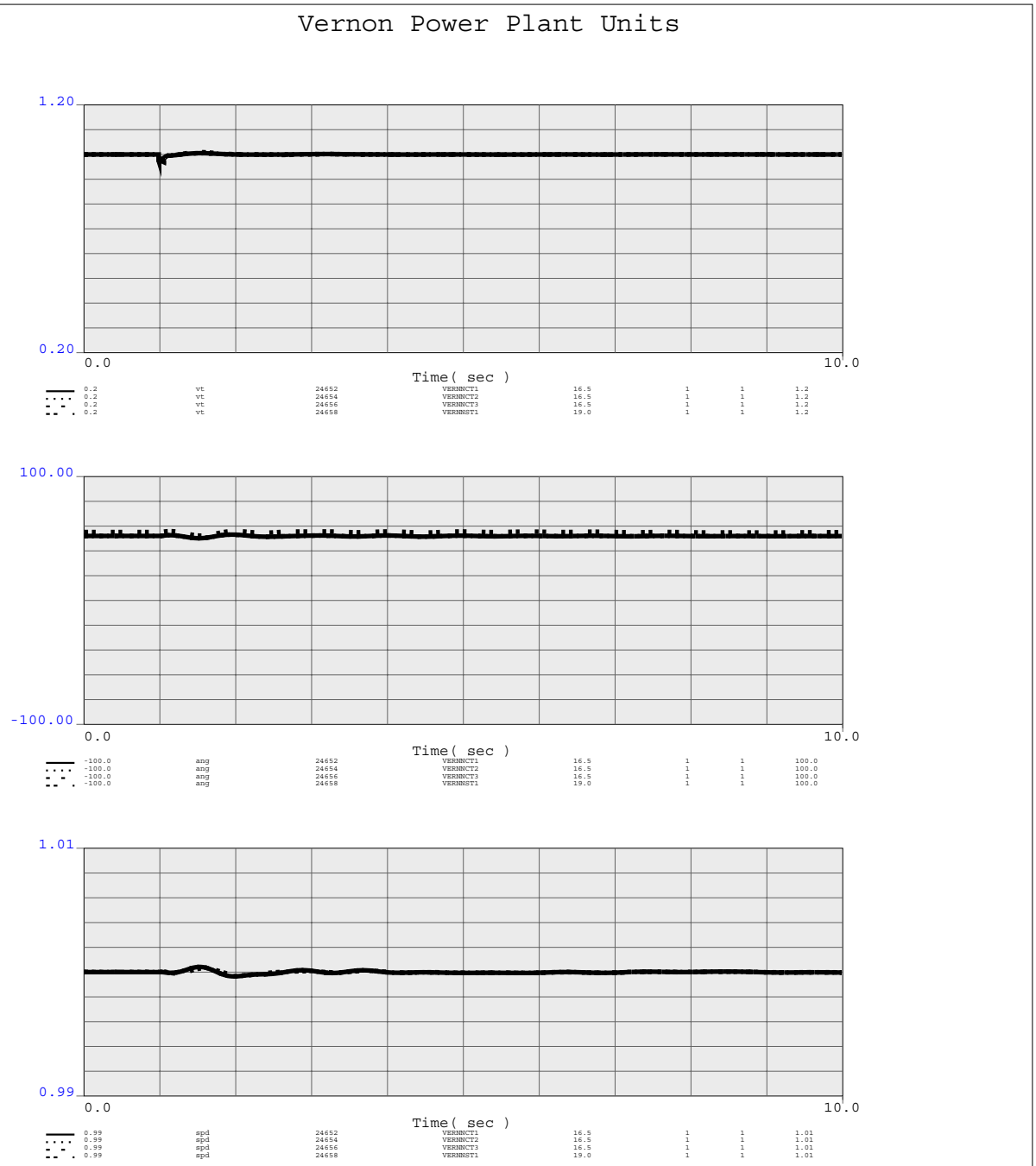
Wed Nov 15 09:28:00 2006

Plot 12 - 3: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Harquahala 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_Midpoint-Harquahala-slo.chf

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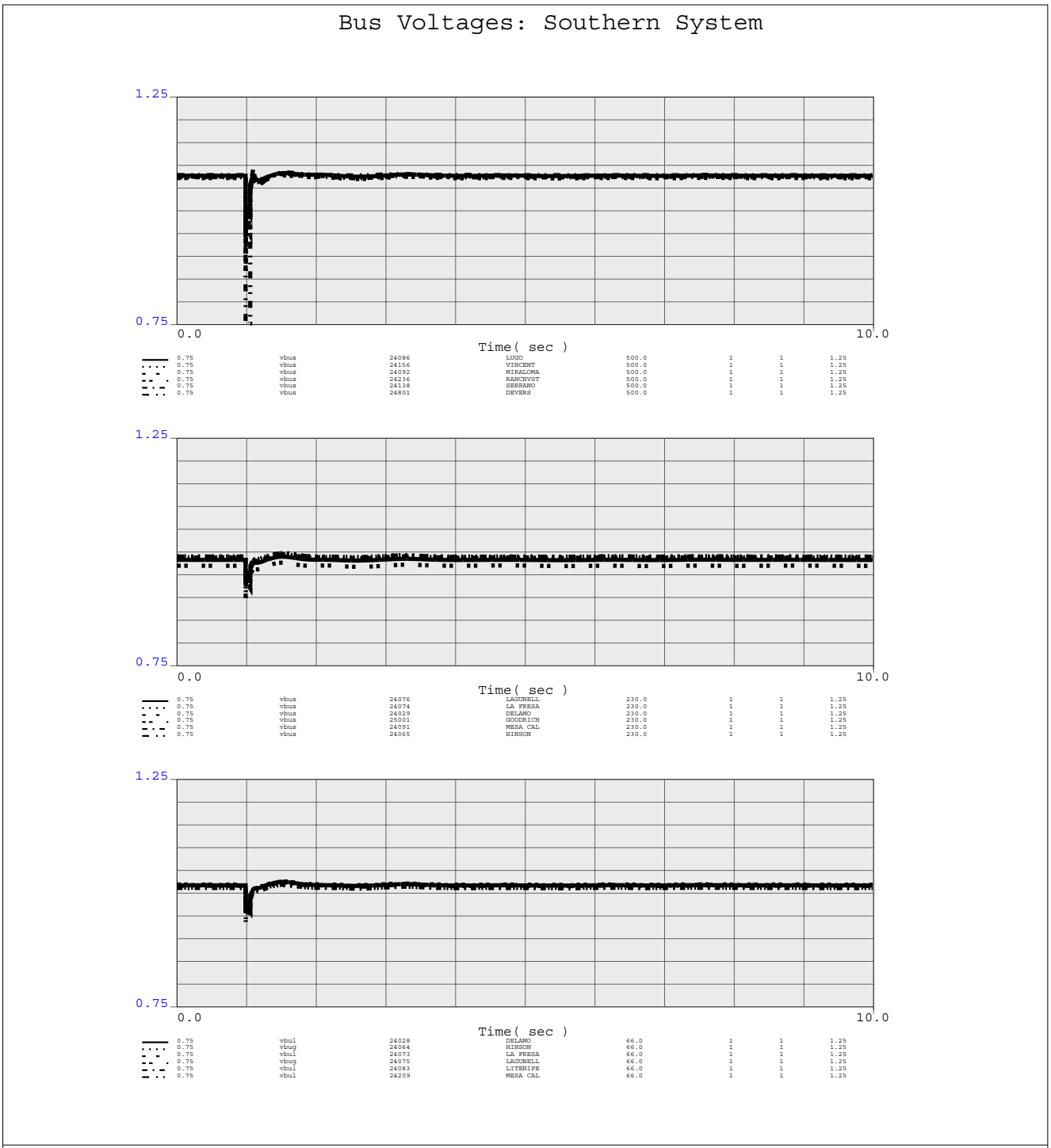
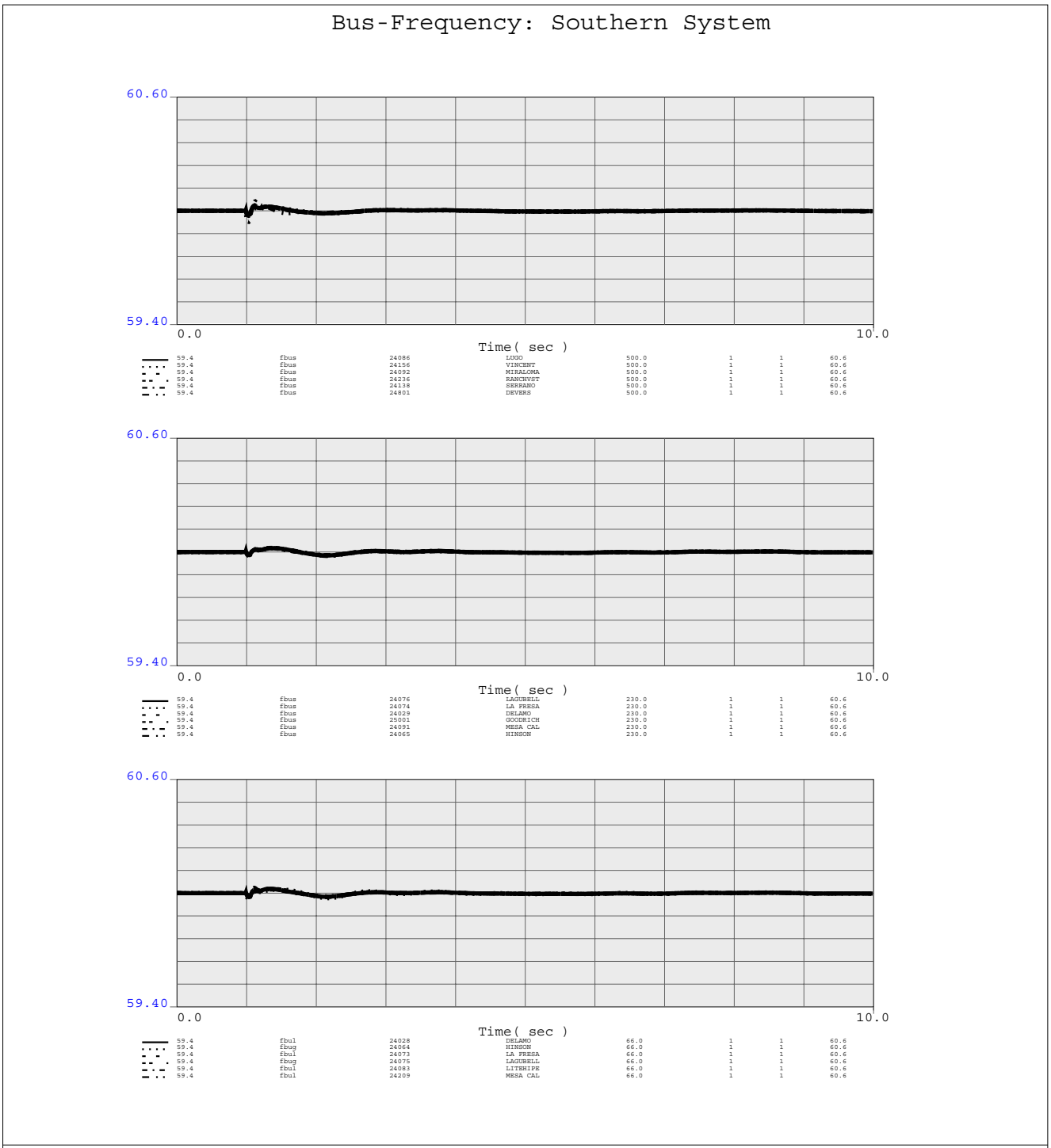
Wed Nov 15 09:28:00 2006

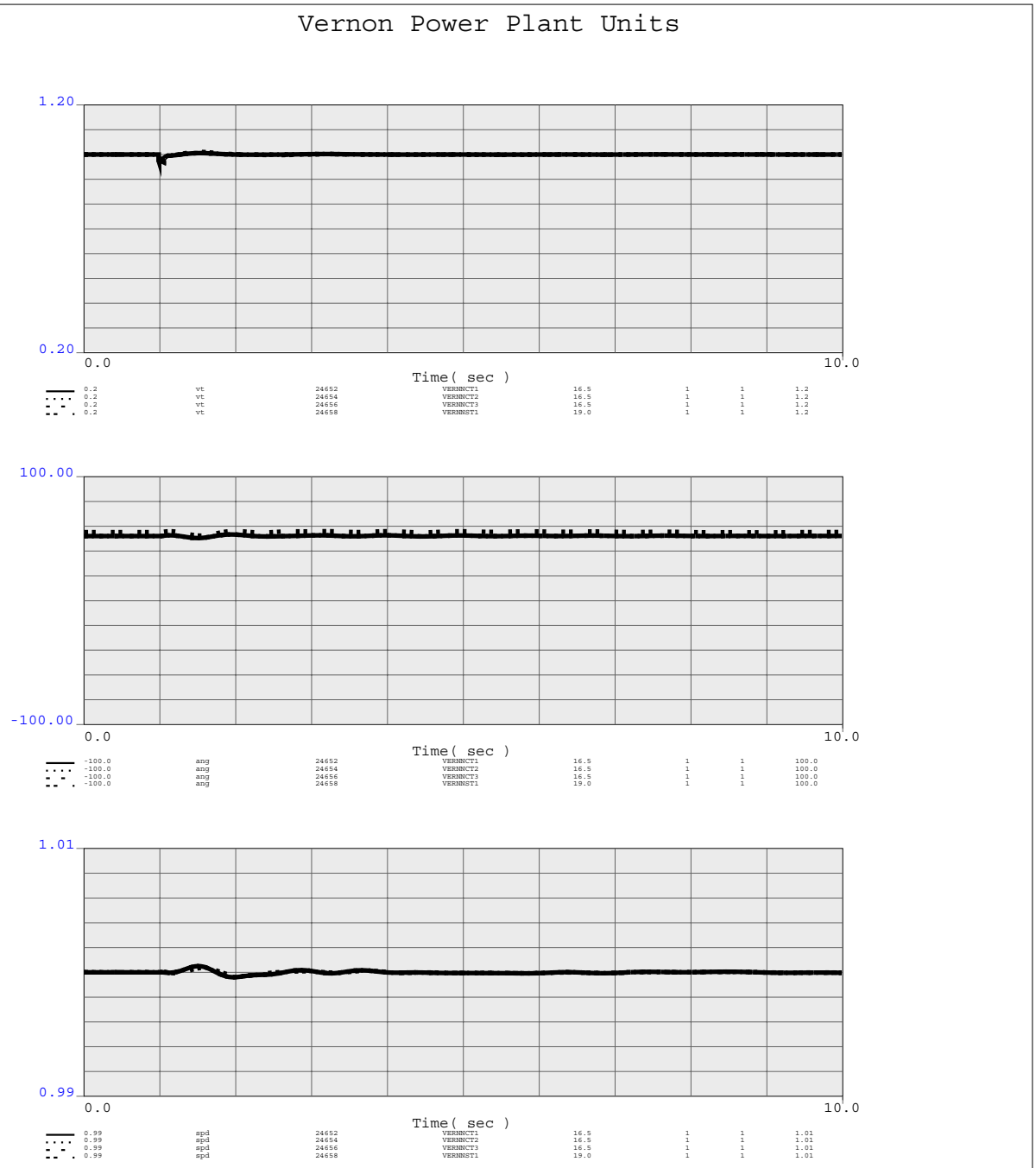
Plot 13 - 1: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.



Plot 13 - 2: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.



Plot 13 - 3: Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint - Palo Verde 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_Midpoint-PV-slo.chf

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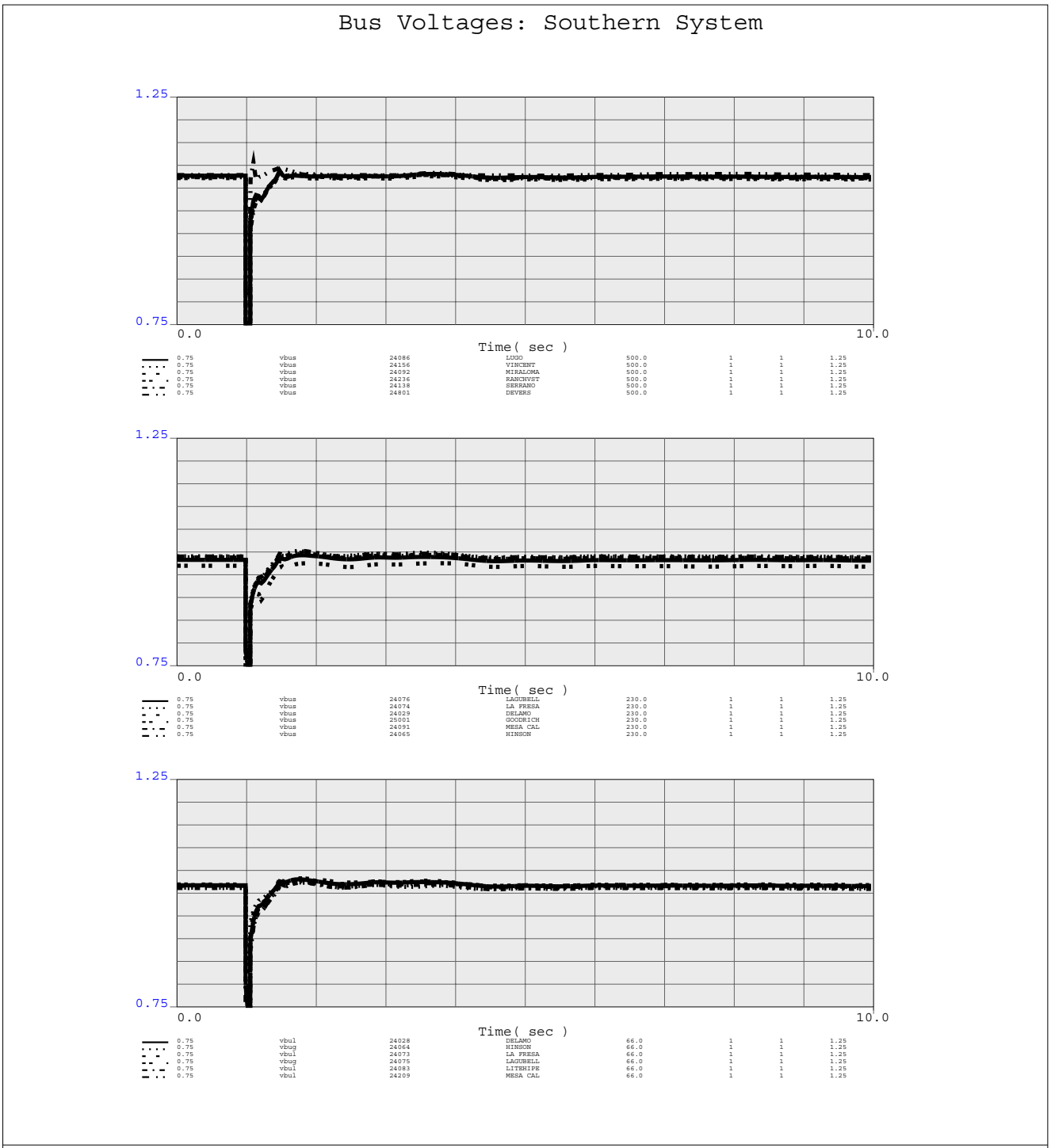
Wed Nov 15 09:28:04 2006

Plot 14 - 1: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

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09lsp_pst-vpp304-rev1_LeeLake-Serrano-slo.chf

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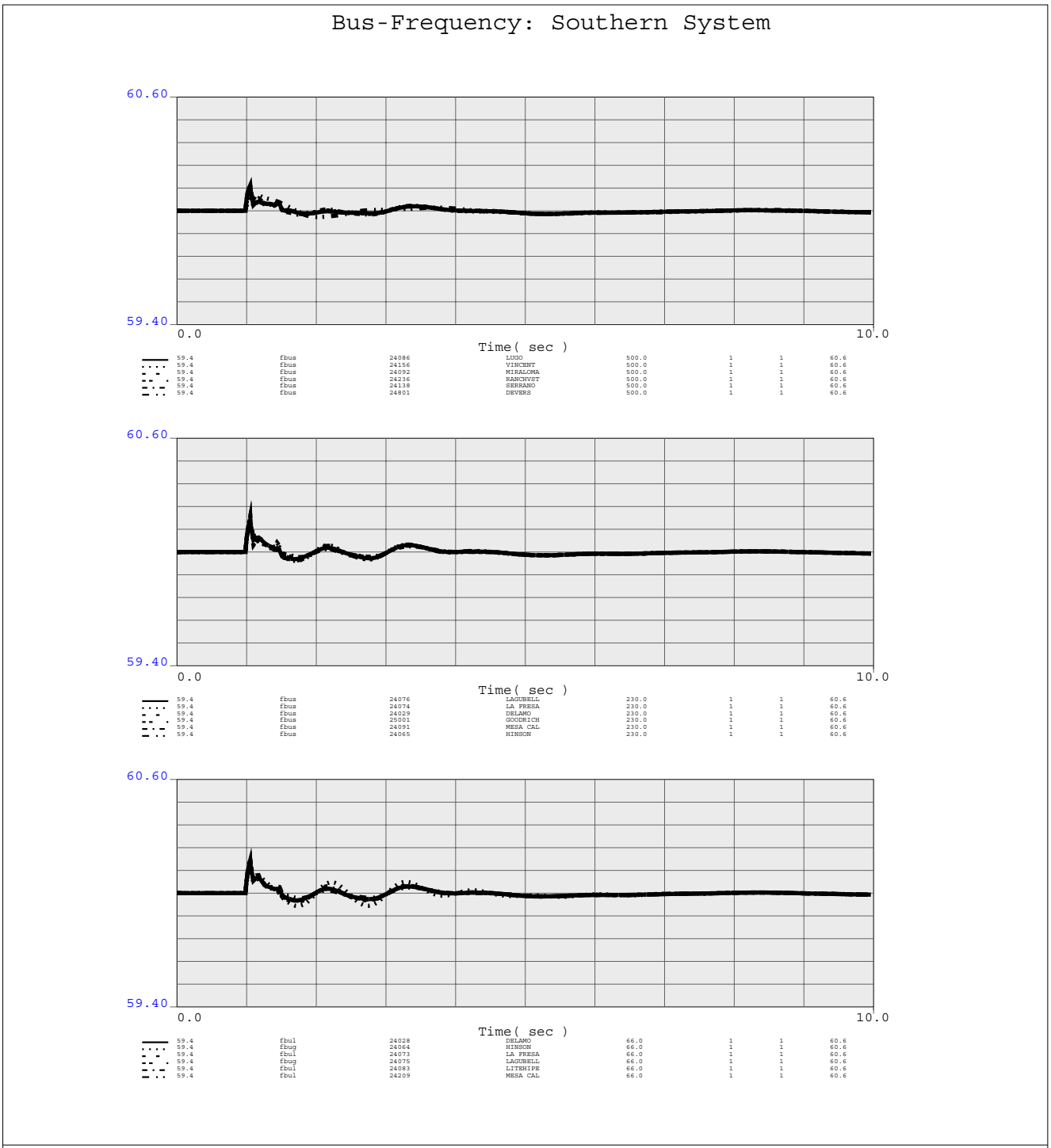
Wed Nov 15 09:28:07 2006

Plot 14 - 2: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

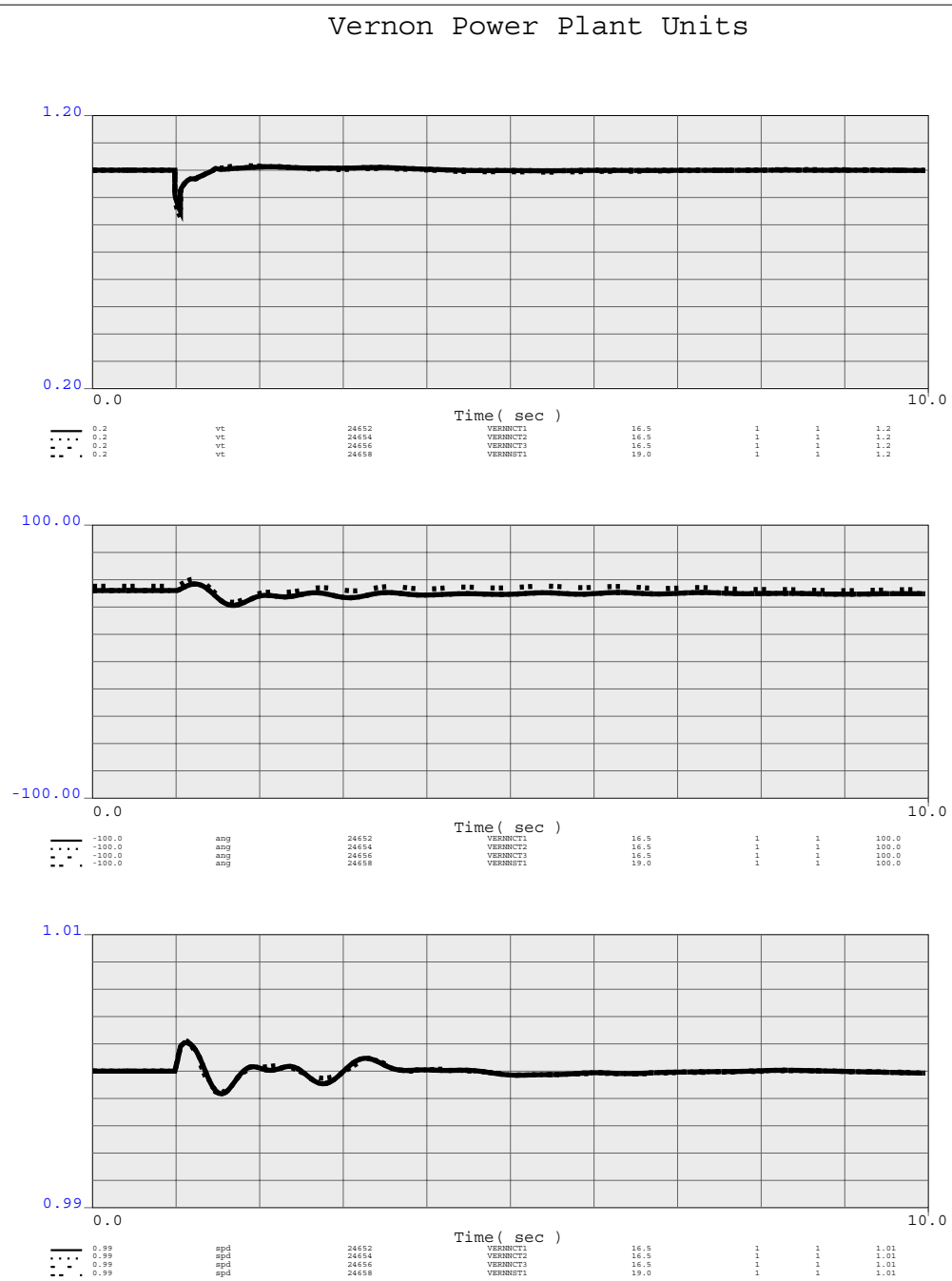
Page 2

09lsp_pst-vpp304-rev1_LeeLake-Serrano-slo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:07 2006

Plot 14 - 3: Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake - Serrano 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_LeeLake-Serrano-slo.chf

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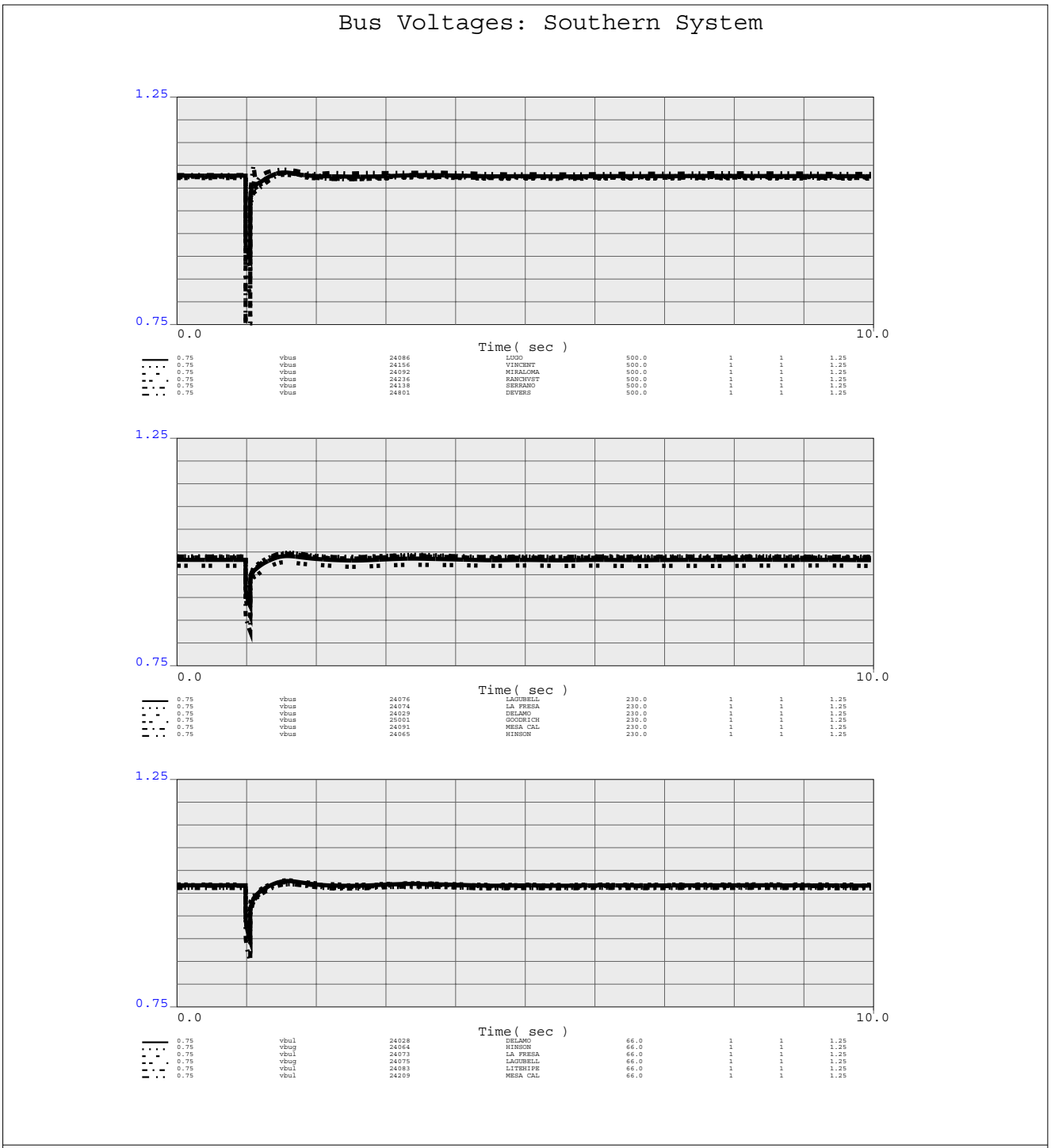
Wed Nov 15 09:28:07 2006

Plot 15 - 1: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

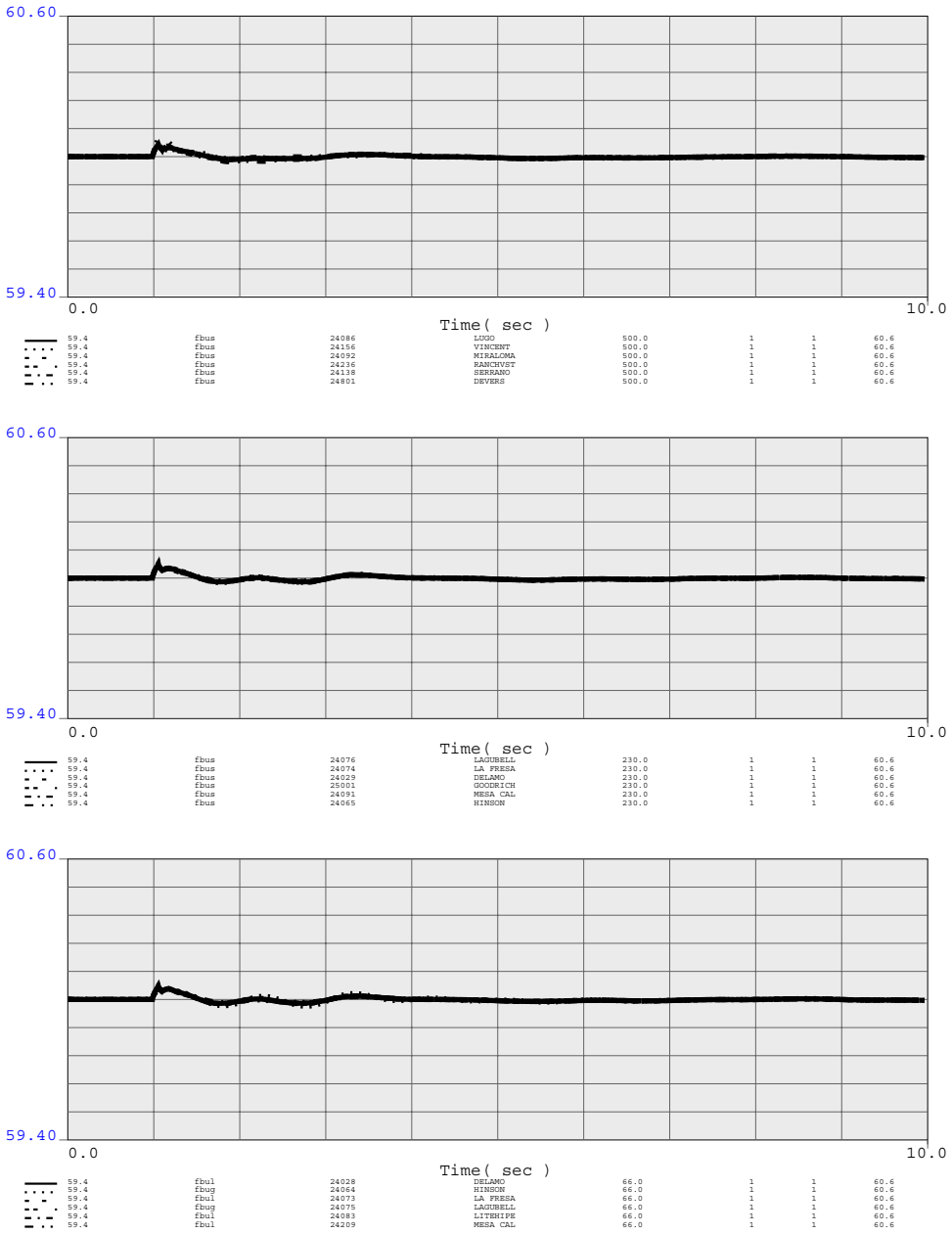
09lsp_pst-vpp304-rev1_LeeLake-Valley-slo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:11 2006

Plot 15 - 2: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.

Bus-Frequency: Southern System



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

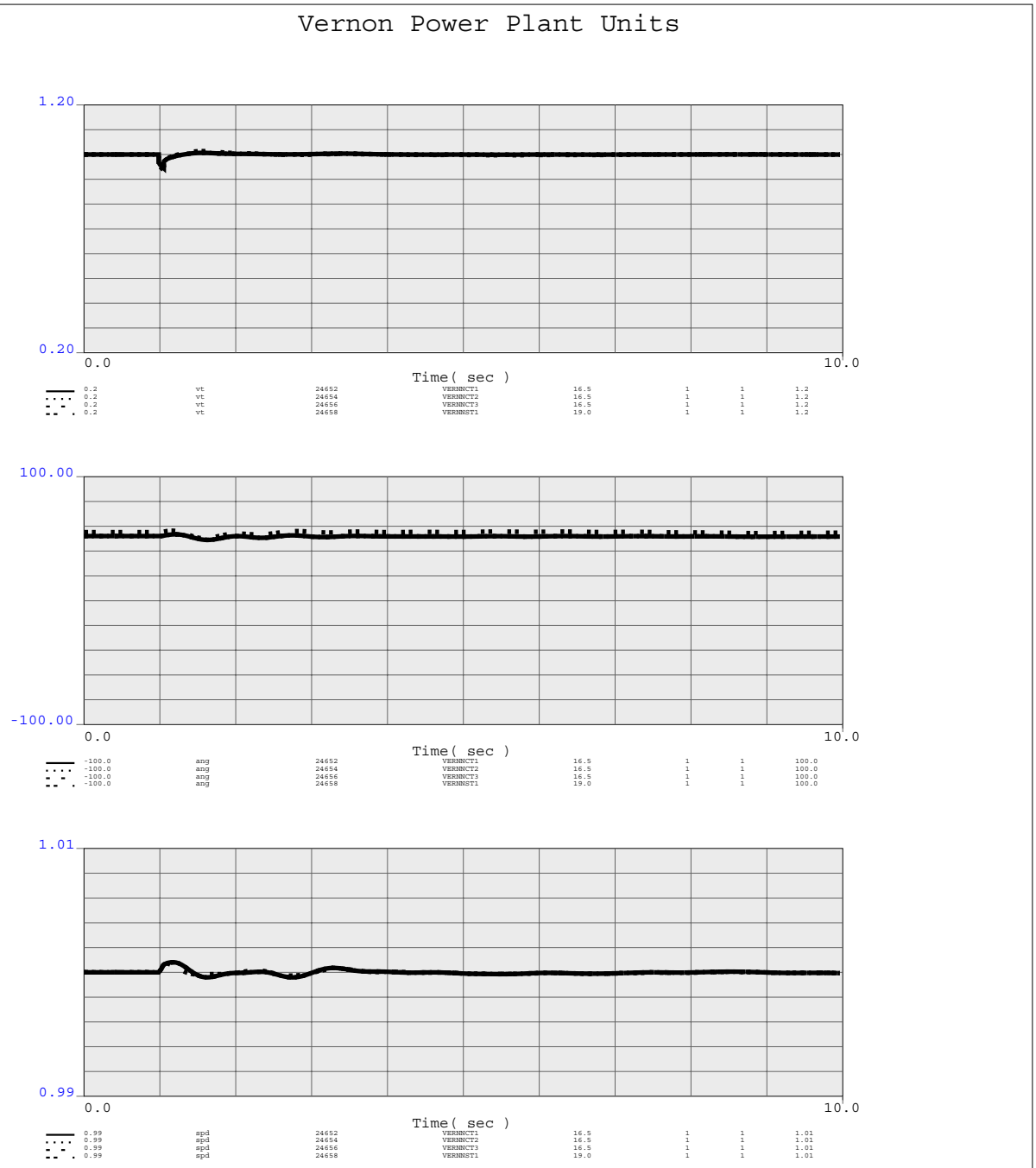
Page 2

09lsp_pst-vpp304-rev1_LeeLake-Valley-slo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:11 2006

Plot 15 - 3: Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake - Valley 500 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

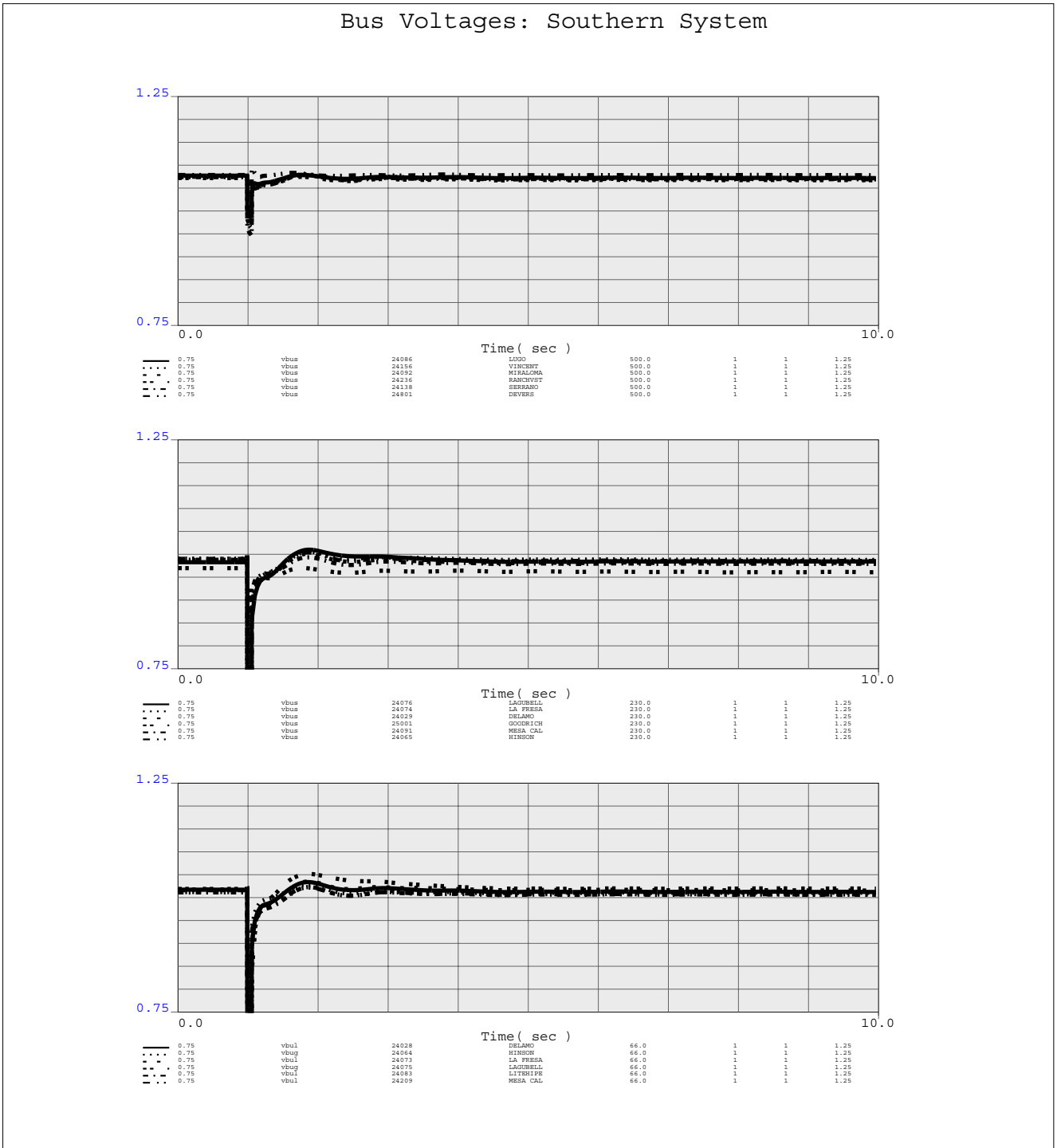
Page 3

09lsp_pst-vpp304-rev1_LeeLake-Valley-slo.chf

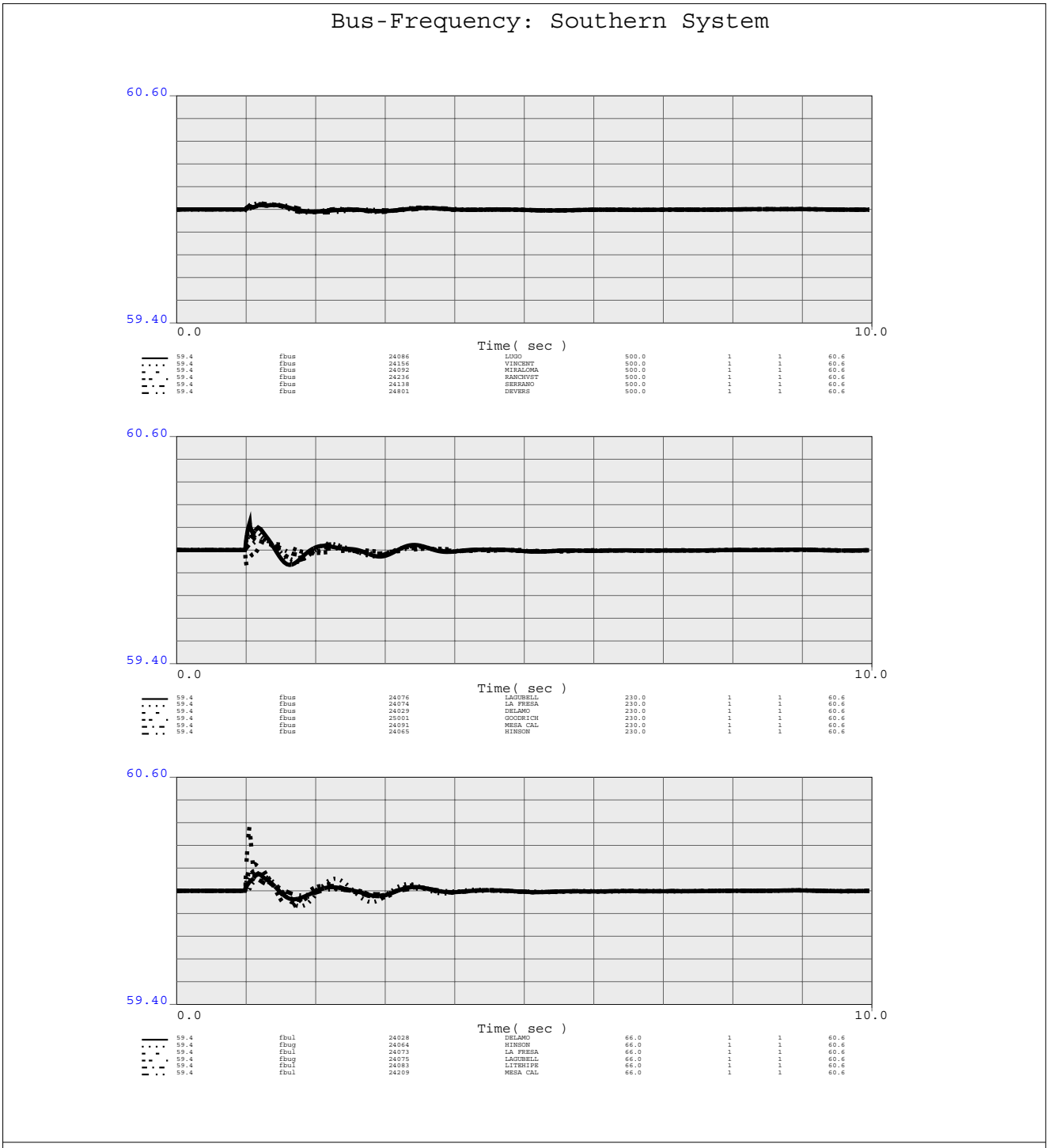
c:\upslf16\mypslf

Wed Nov 15 09:28:11 2006

Plot 16 - 1: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.



Plot 16 - 2: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

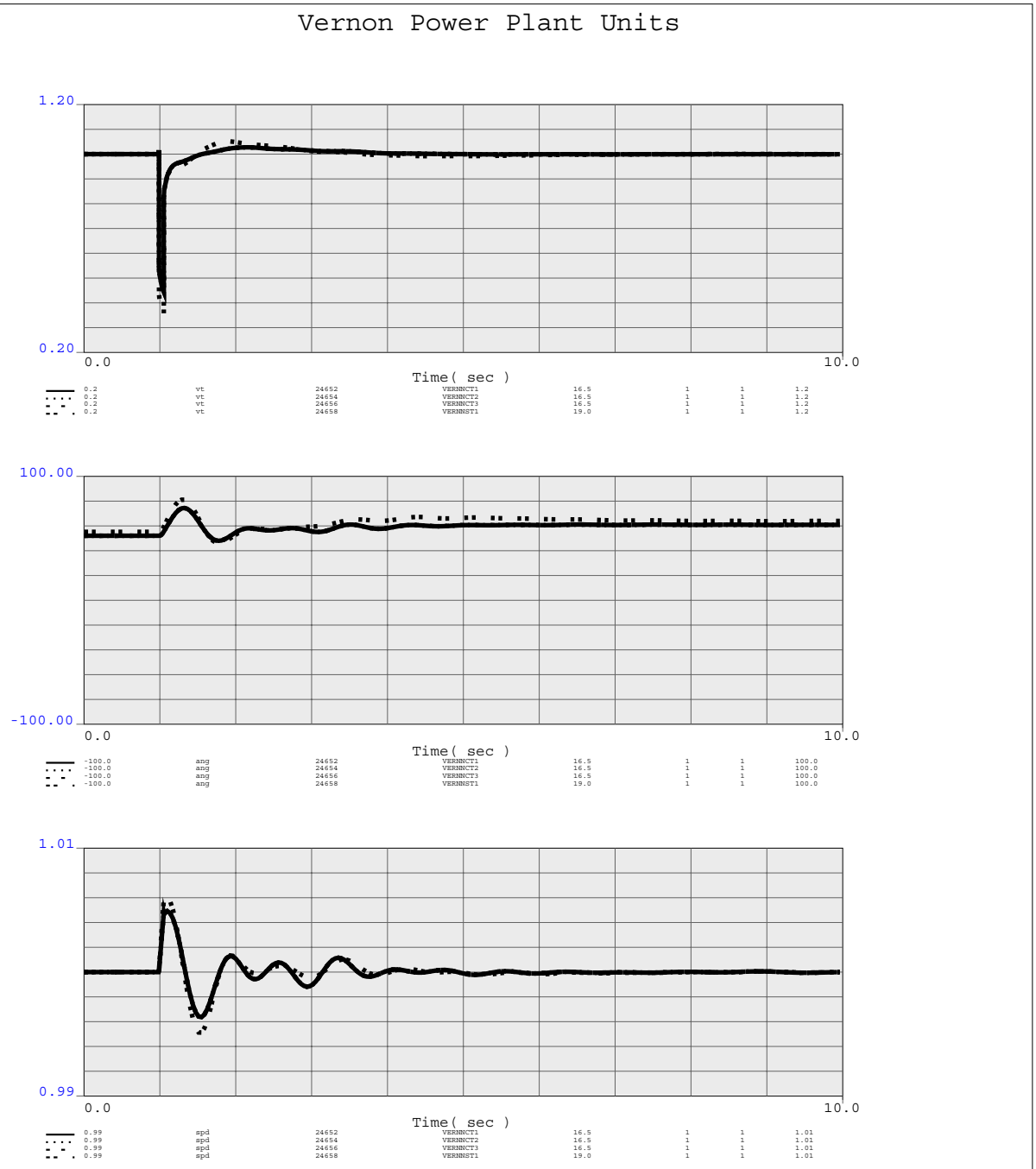
Page 2

09lsp_pst-vpp304-rev1_LBell-Gdrich_THEN_LB-Riohondo-dlo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:14 2006

Plot 16 - 3: Pre-fault outage of the Laguna Bell - Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - Rio Hondo 230 kV circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

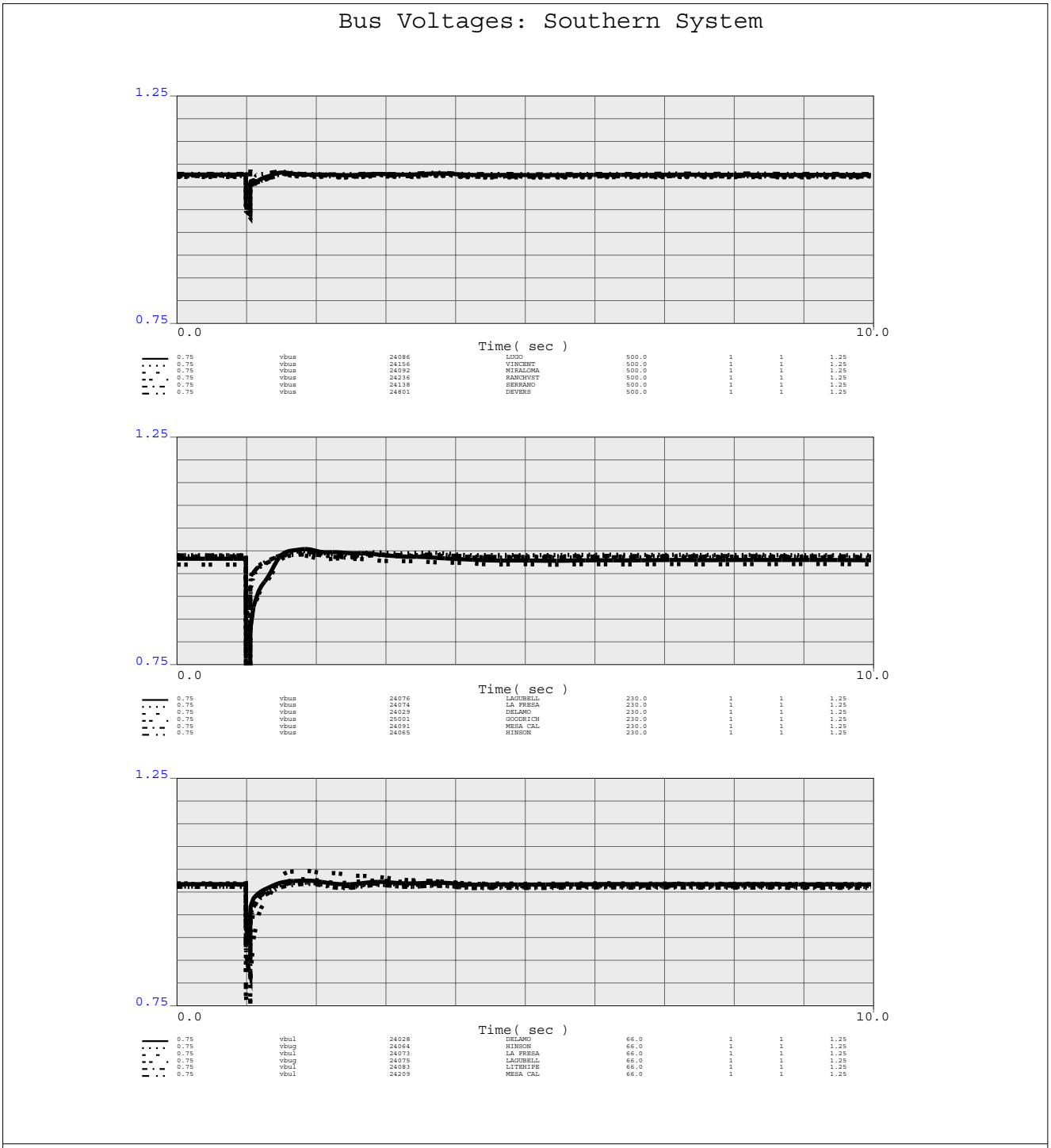
Page 3

09lsp_pst-vpp304-rev1_LBell-Gdrich_THEN_LB-Riohondo-dlo.chf

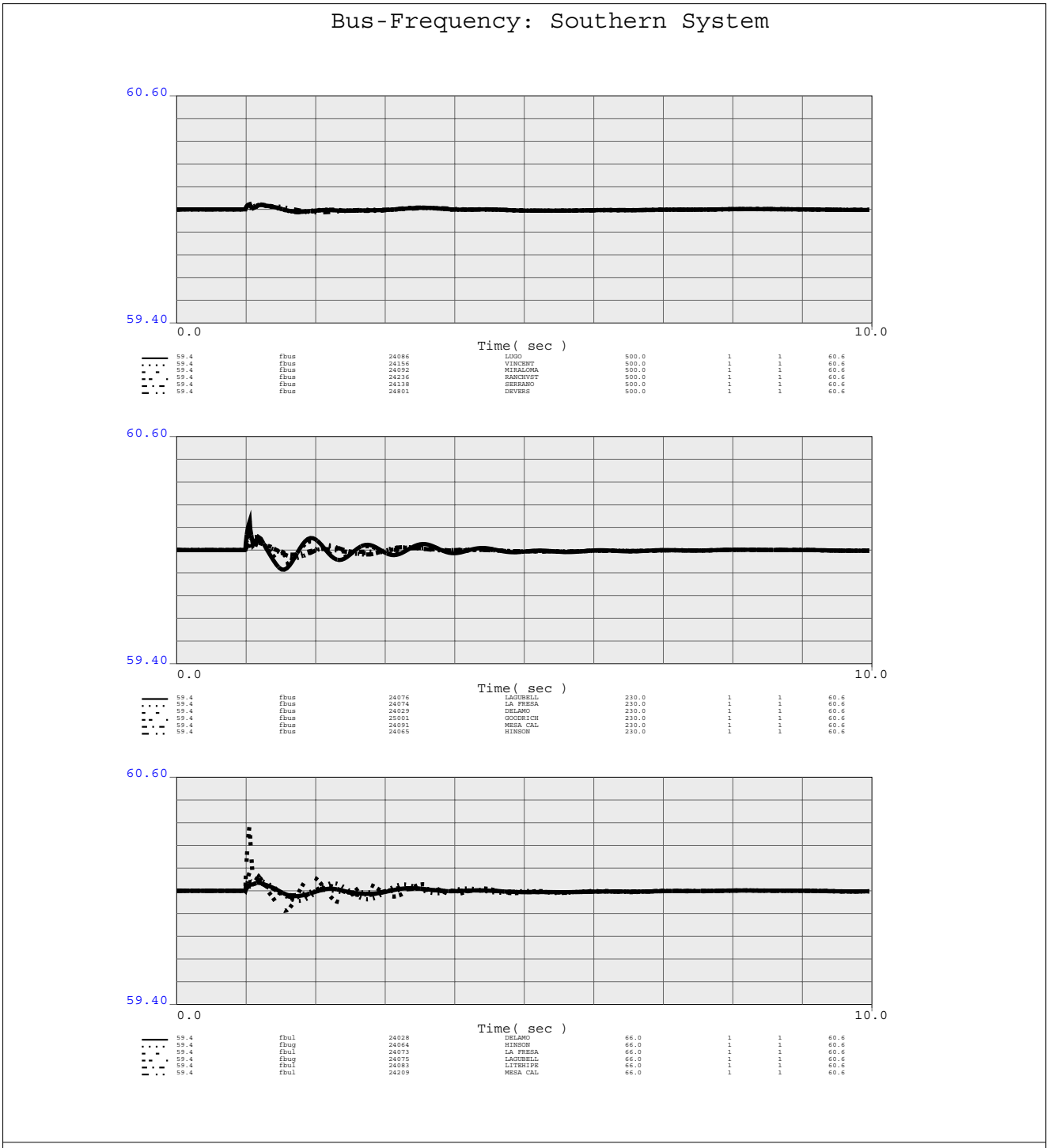
c:\upslf16\mypslf

Wed Nov 15 09:28:14 2006

Plot 17 - 1: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



Plot 17 - 2: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

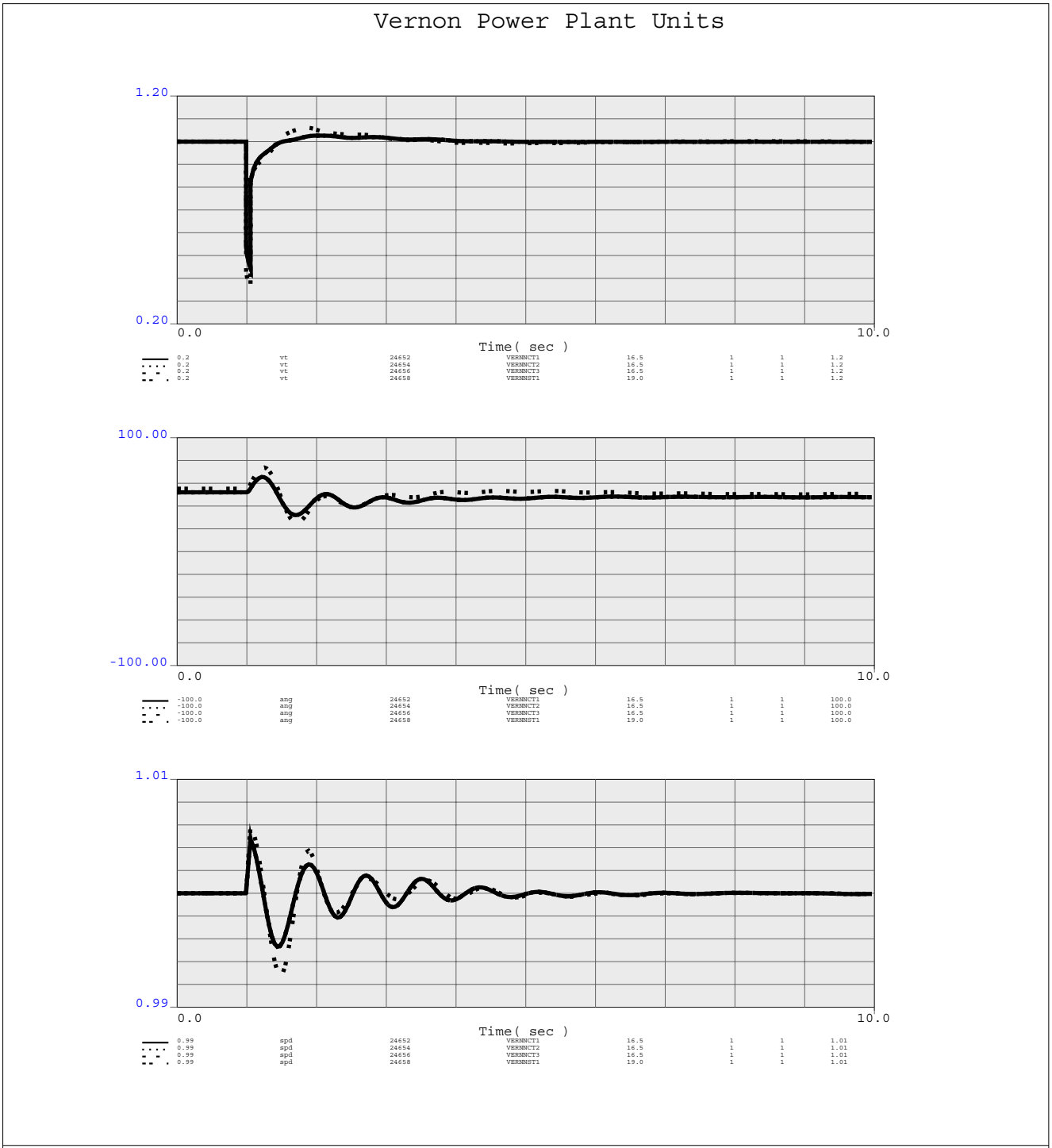
Page 2

09lsp_pst-vpp304-rev1_LBell-DelAmo_THEN_LB-LaFresa-dlo.chf

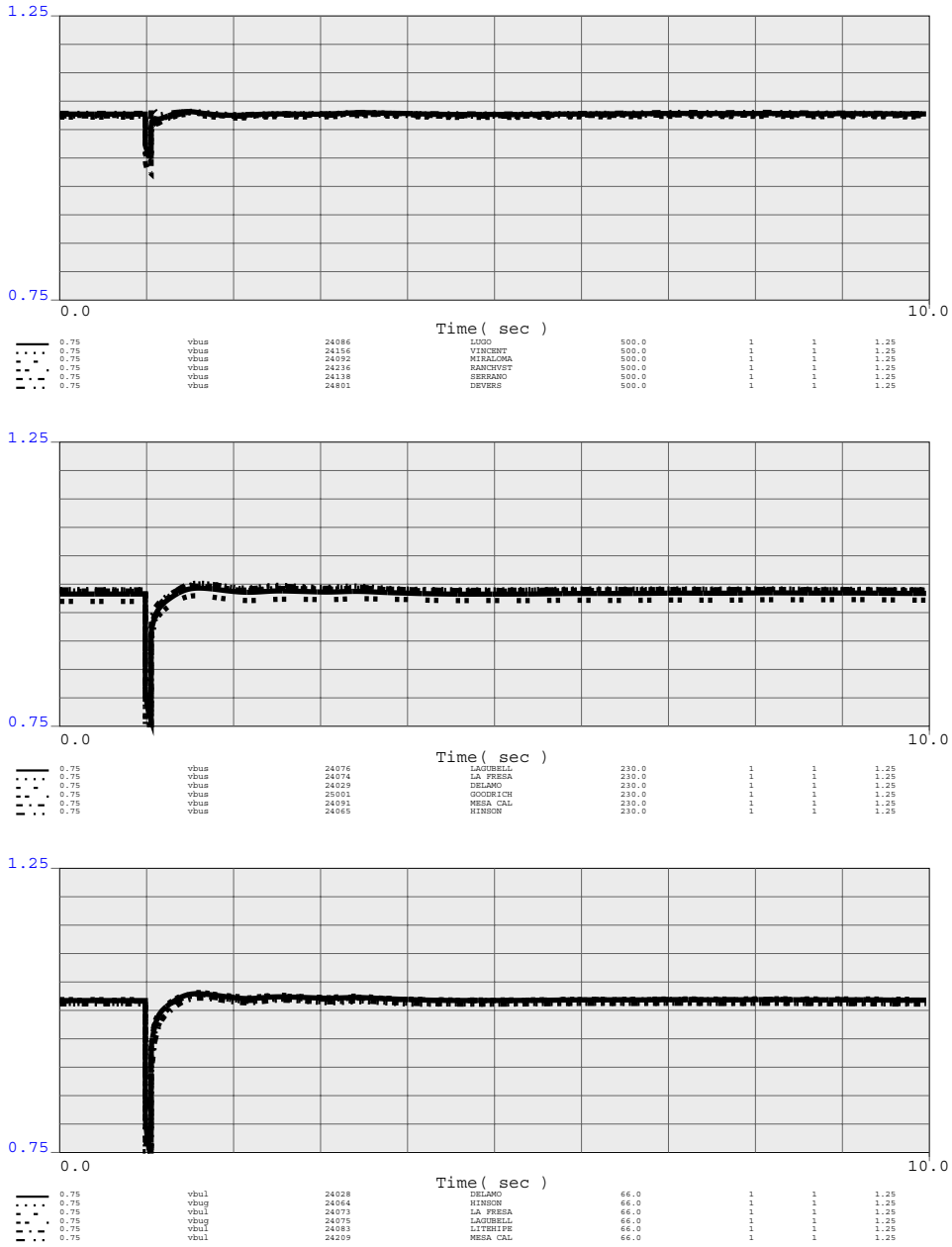
c:\upslf16\mypslf

Wed Nov 15 09:28:18 2006

Plot 17 - 3: Pre-fault outage of the Laguna Bell - Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell - La Fresa 230 kV #2 circuit.



Plot 18 - 1: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.

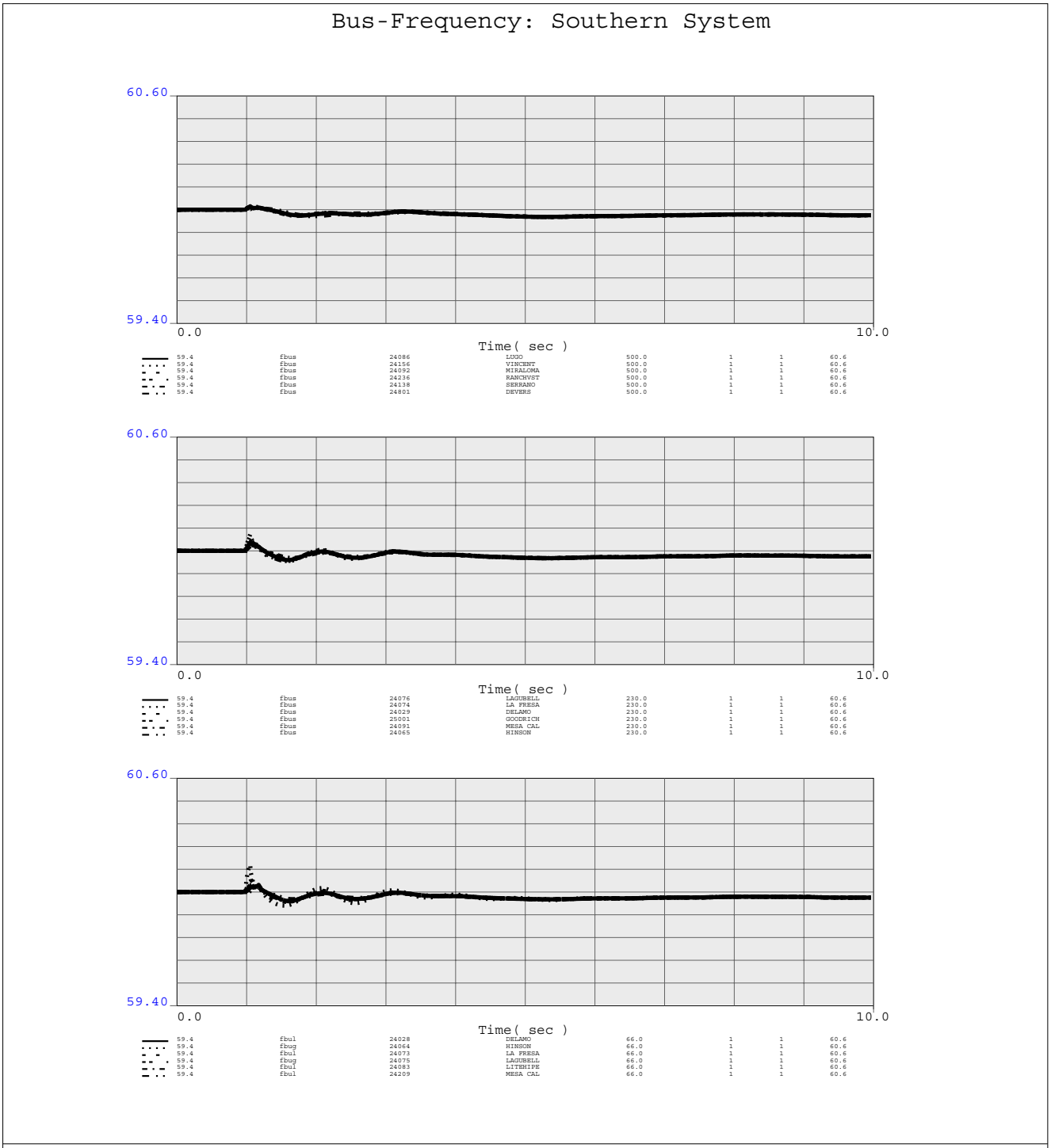


2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

	09lsp_pst-vpp304-rev1_LB-Litehipe_Hrbr-Hinson230-dlo.chf	c:\upslf16\mypslf Wed Nov 15 09:28:22 2006

Plot 18 - 2: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

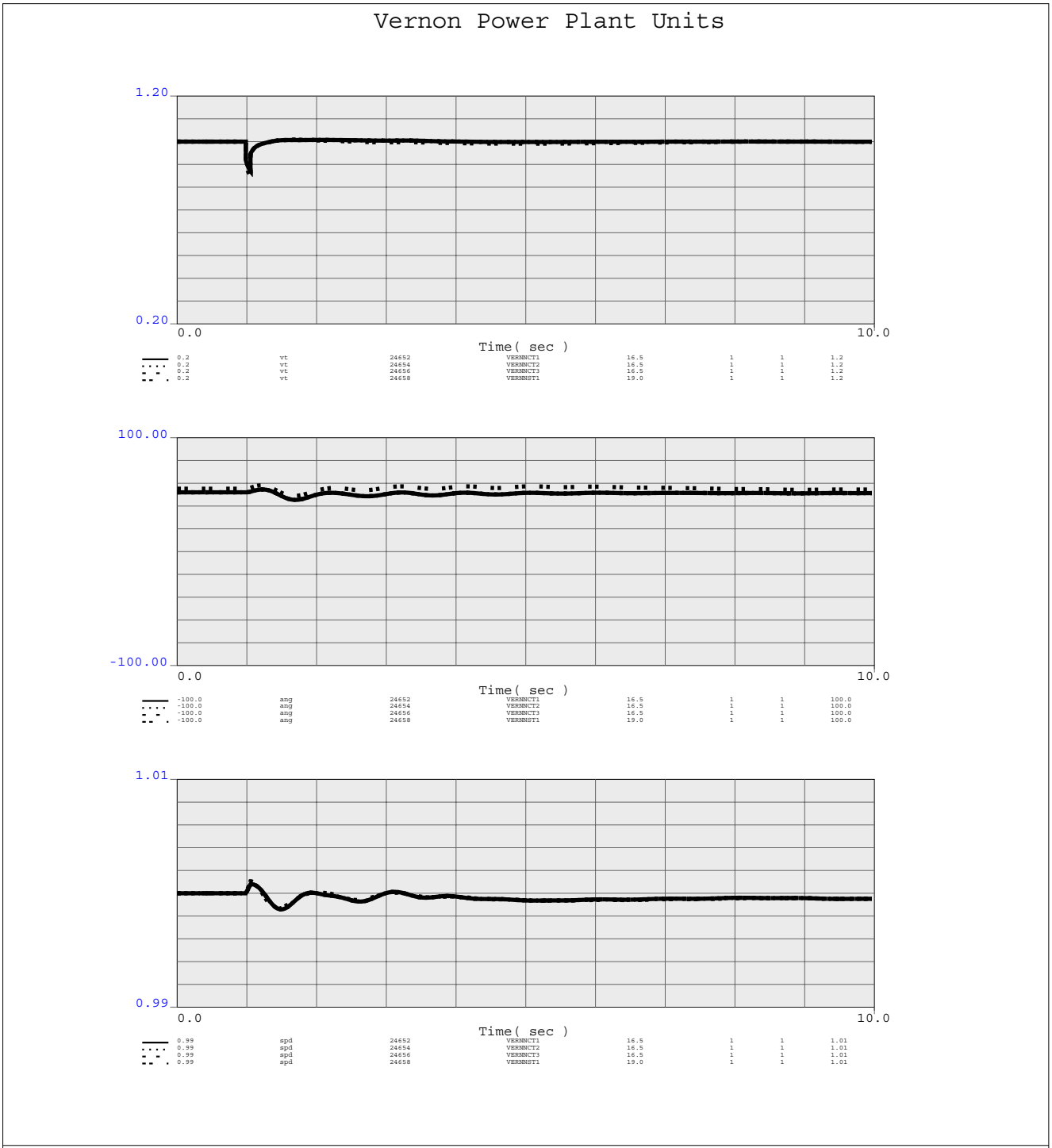
Page 2

09lsp_pst-vpp304-rev1_LB-Litehipe_Hrbr-Hinson230-dlo.chf

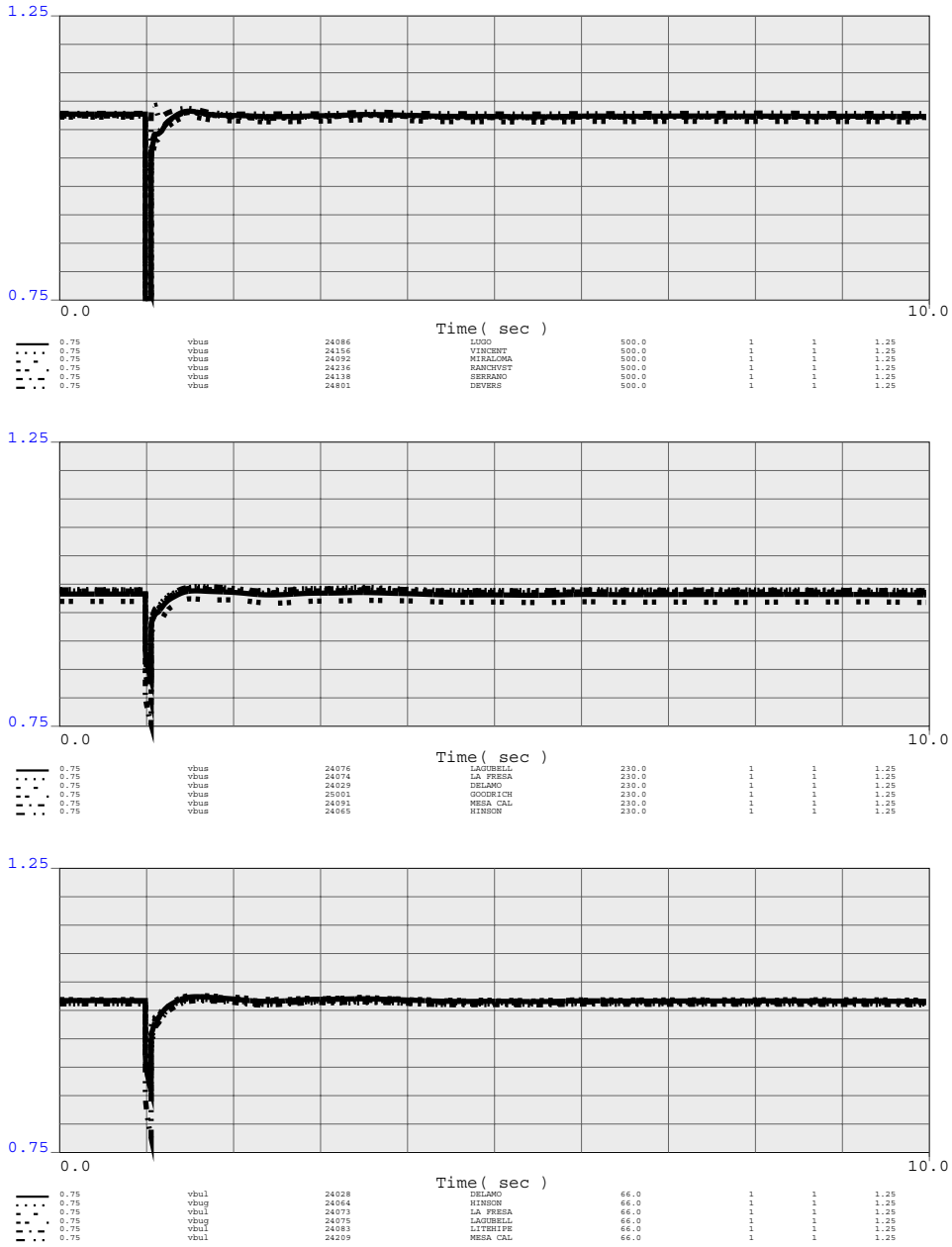
c:\upslf16\mypslf

Wed Nov 15 09:28:22 2006

Plot 18 - 3: Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach - Lighthipe 230 kV and Harbor Gen - Hinson 230 kV transmission lines.



Plot 19 - 1: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.

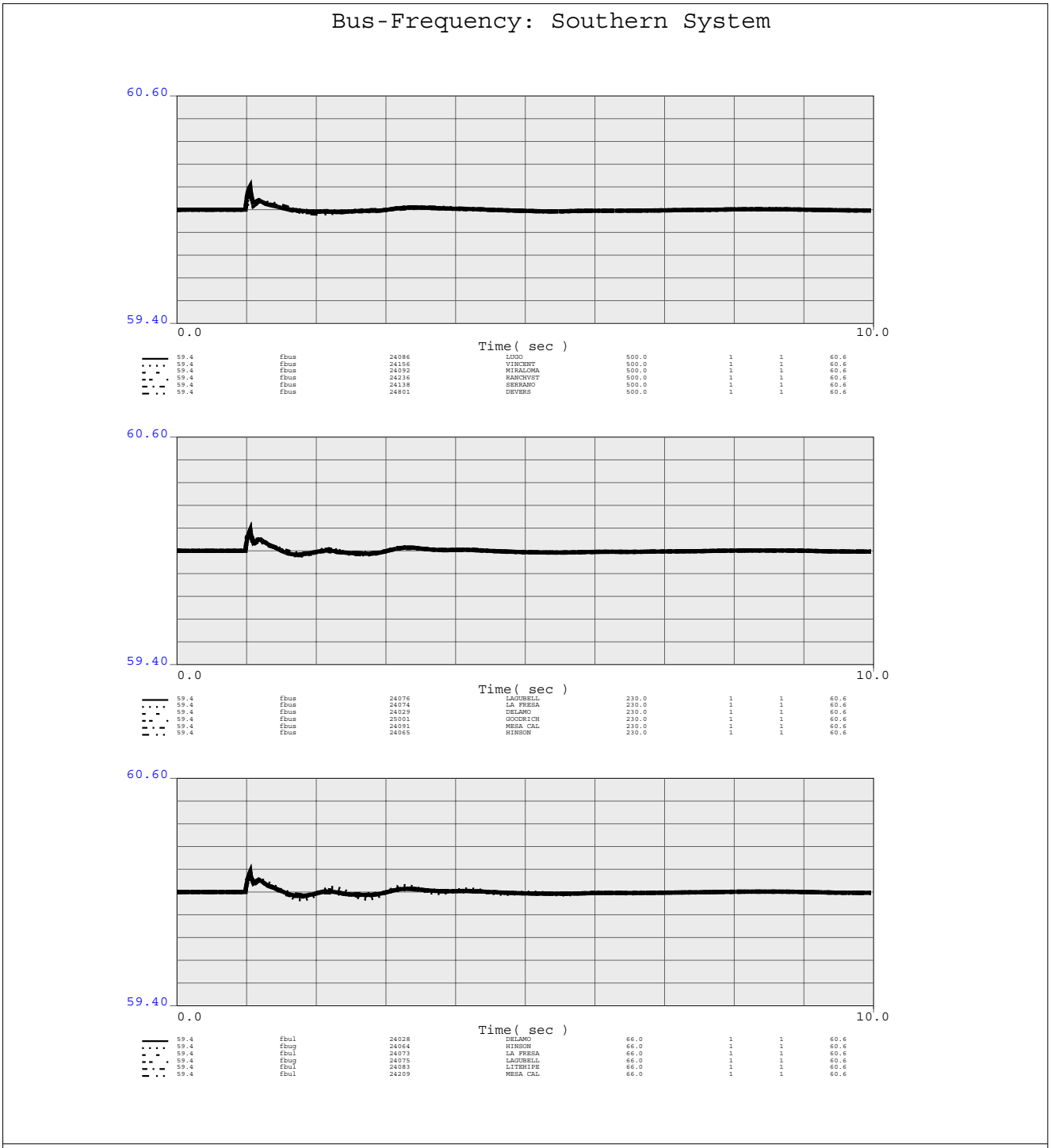


2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

	09lsp_pst-vpp304-rev1_Ranchvst-Vincent_ML-Wlnt-dlo.chf	c:\upslf16\mypslf Wed Nov 15 09:28:25 2006

Plot 19 - 2: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

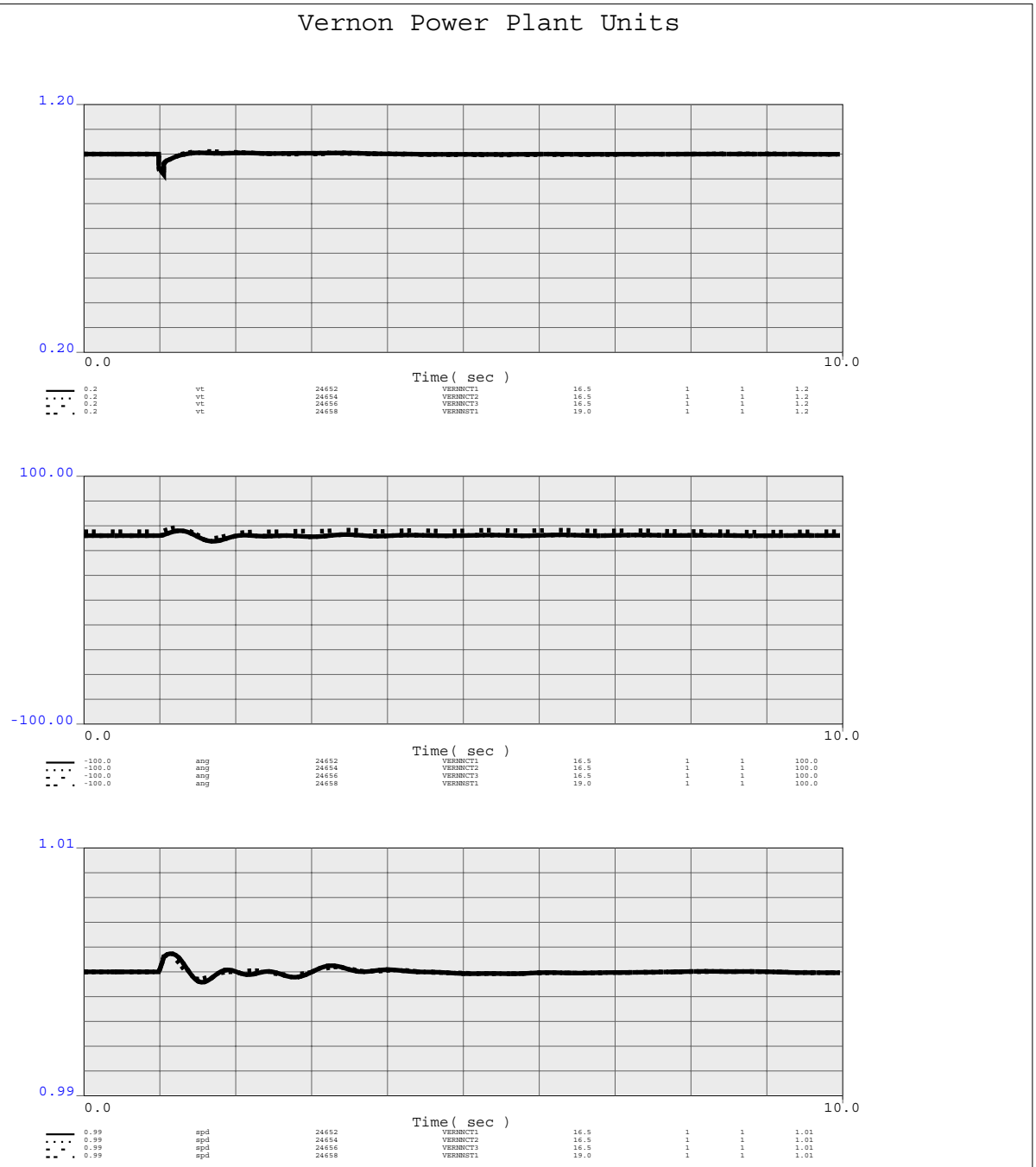
Page 2

09lsp_pst-vpp304-rev1_Ranchvst-Vincent_ML-Wlnt-dlo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:25 2006

Plot 19 - 3: Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Walnut 230 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

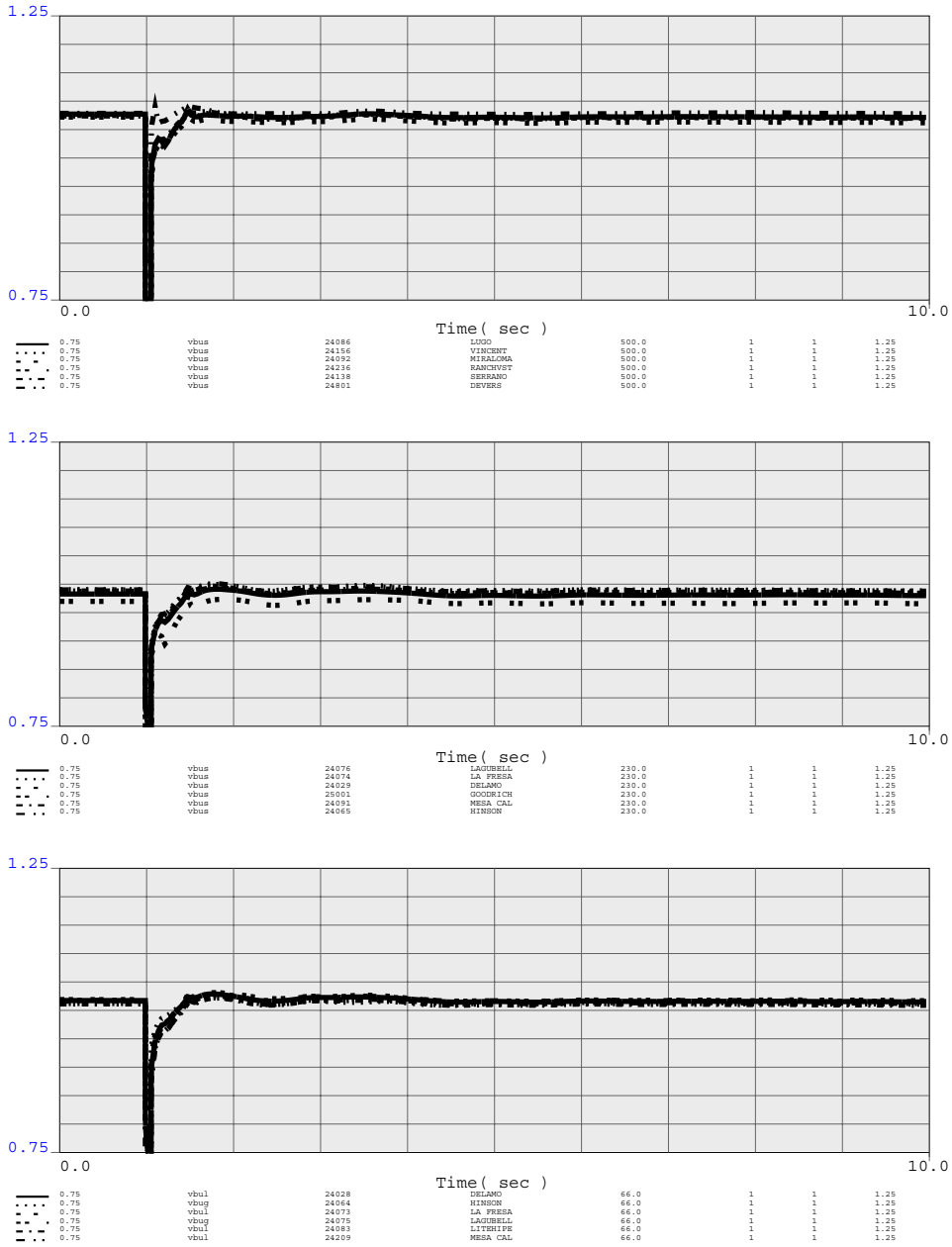
Page 3

09lsp_pst-vpp304-rev1_Ranchvst-Vincent_ML-Wlnt-dlo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:25 2006

Plot 20 - 1: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.

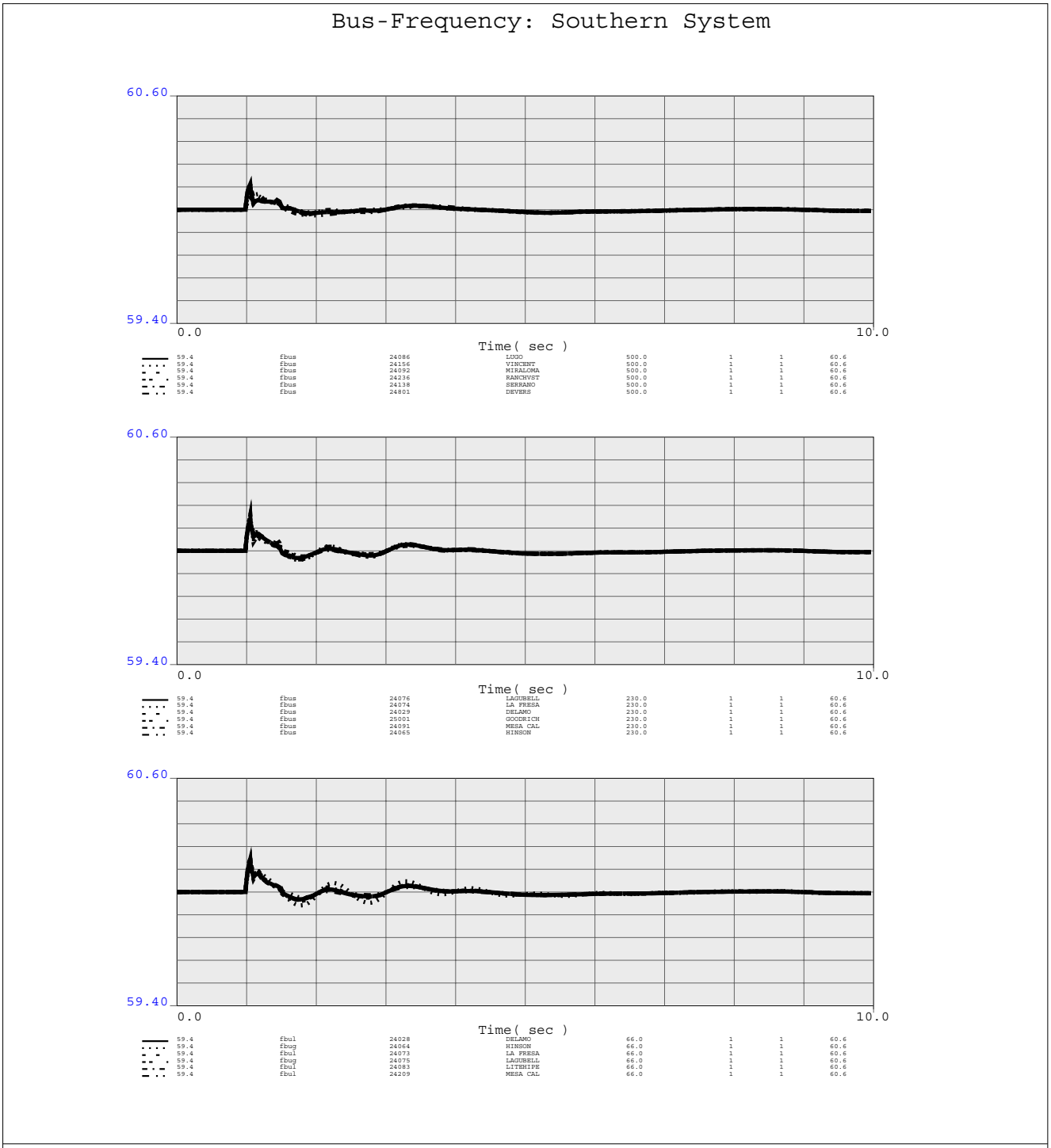


2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 1

	09lsp_pst-vpp304-rev1_ML-Serrano_Rnchvst-Vincent-dlo.chf	c:\upslf16\mypslf Wed Nov 15 09:28:29 2006

Plot 20 - 2: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

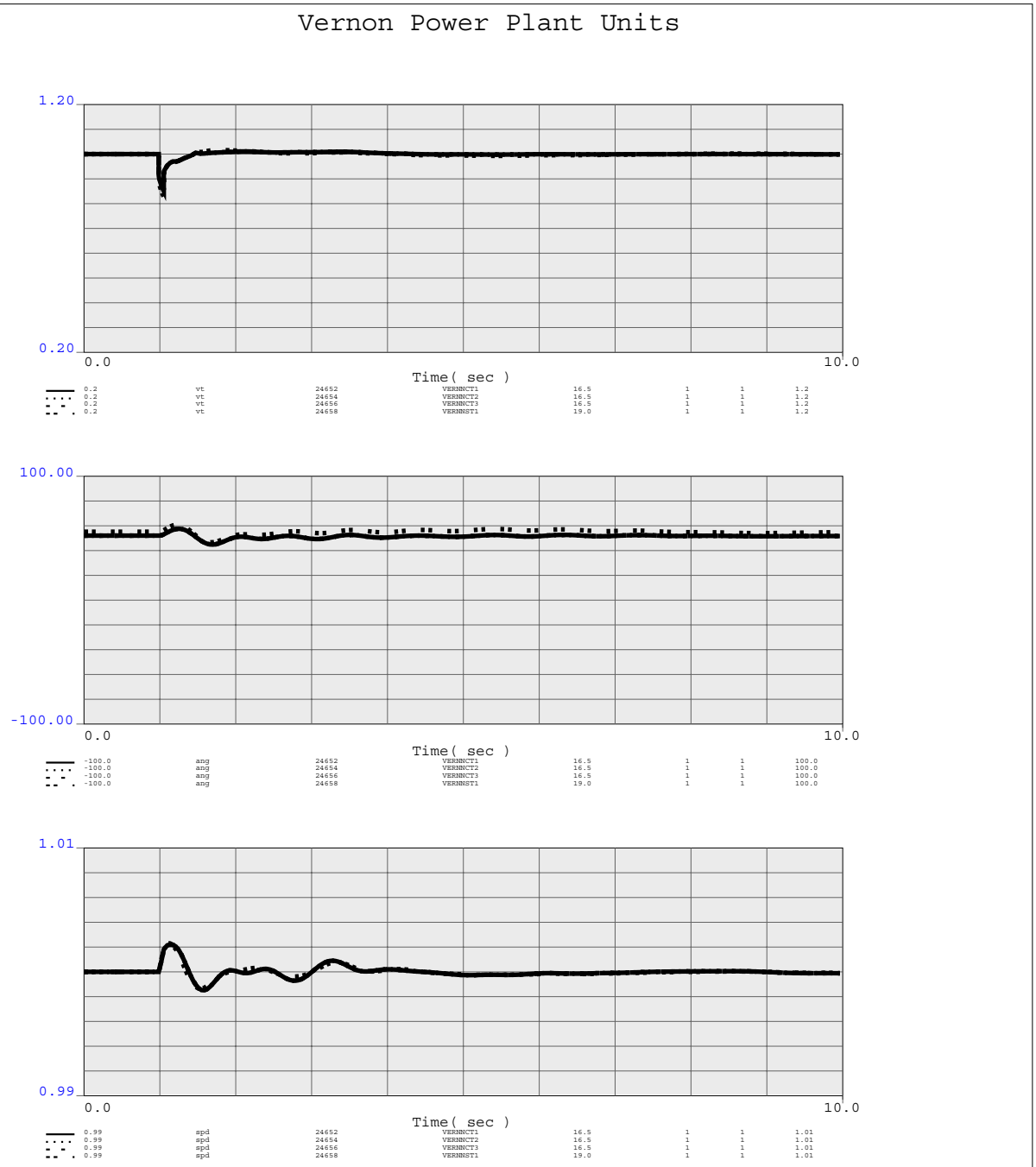
Page 2

09lsp_pst-vpp304-rev1_ML-Serrano_Rnchvst-Vincent-dlo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:29 2006

Plot 20 - 3: Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista - Vincent 500 kV and Mira Loma - Serrano 500 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

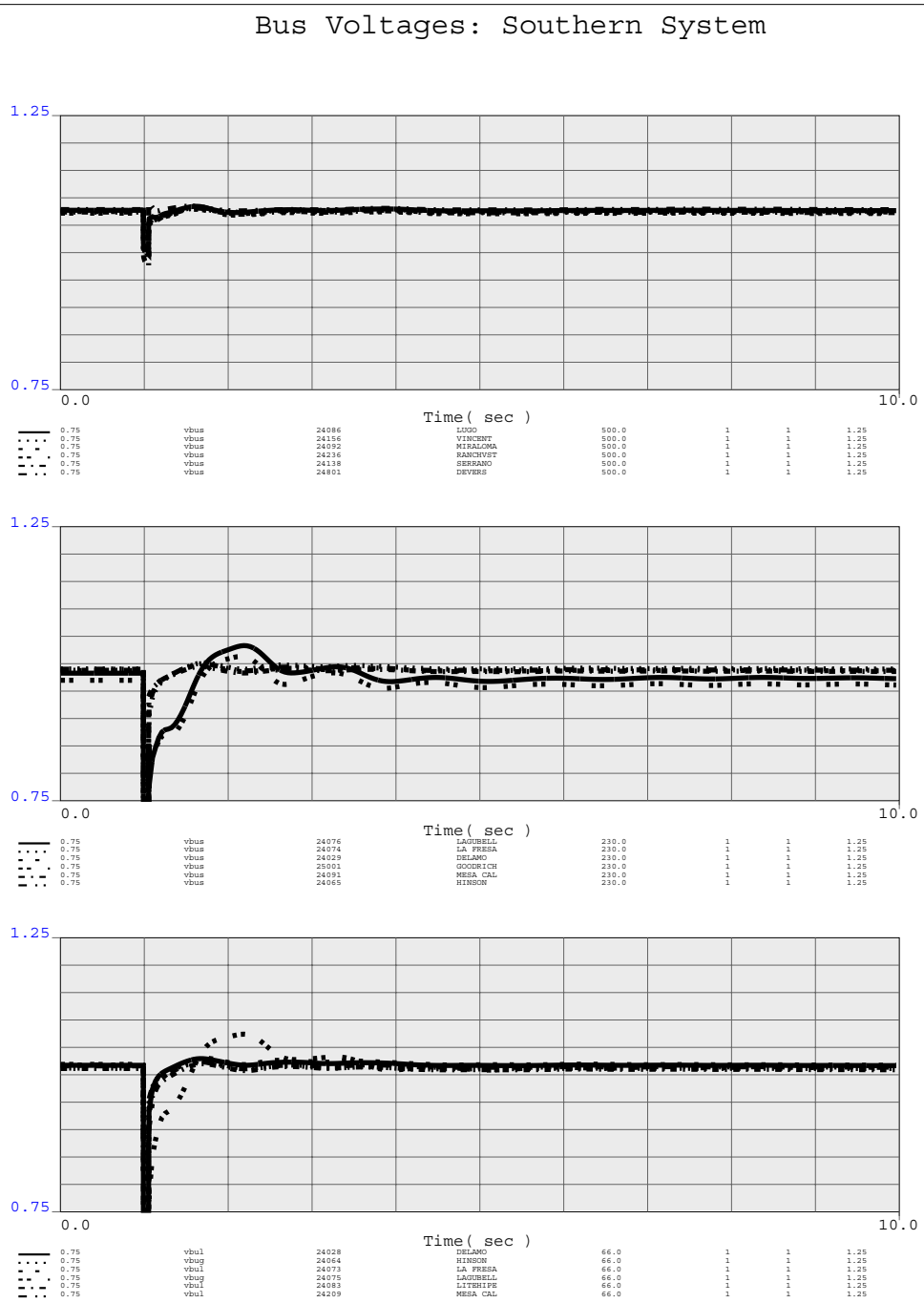
Page 3

09lsp_pst-vpp304-rev1_ML-Serrano_Rnchvst-Vincent-dlo.chf

c:\upslf16\mypslf

Wed Nov 15 09:28:29 2006

Plot 21 - 1: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

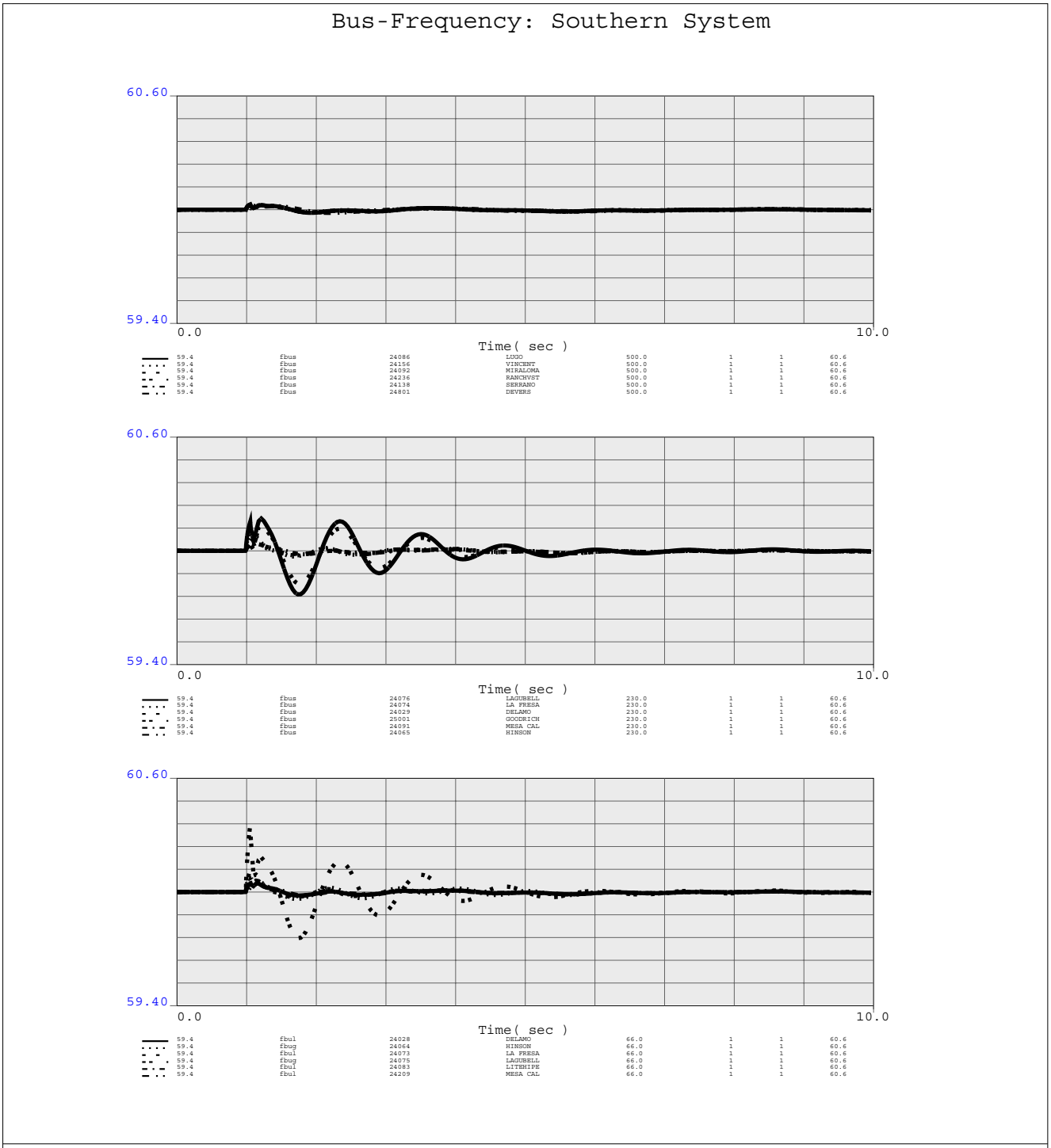
Page 1

09lsp_pst-vpp304-rev1_CatD-LB-RH_LB-DelAmo_LB-LFresa.chf

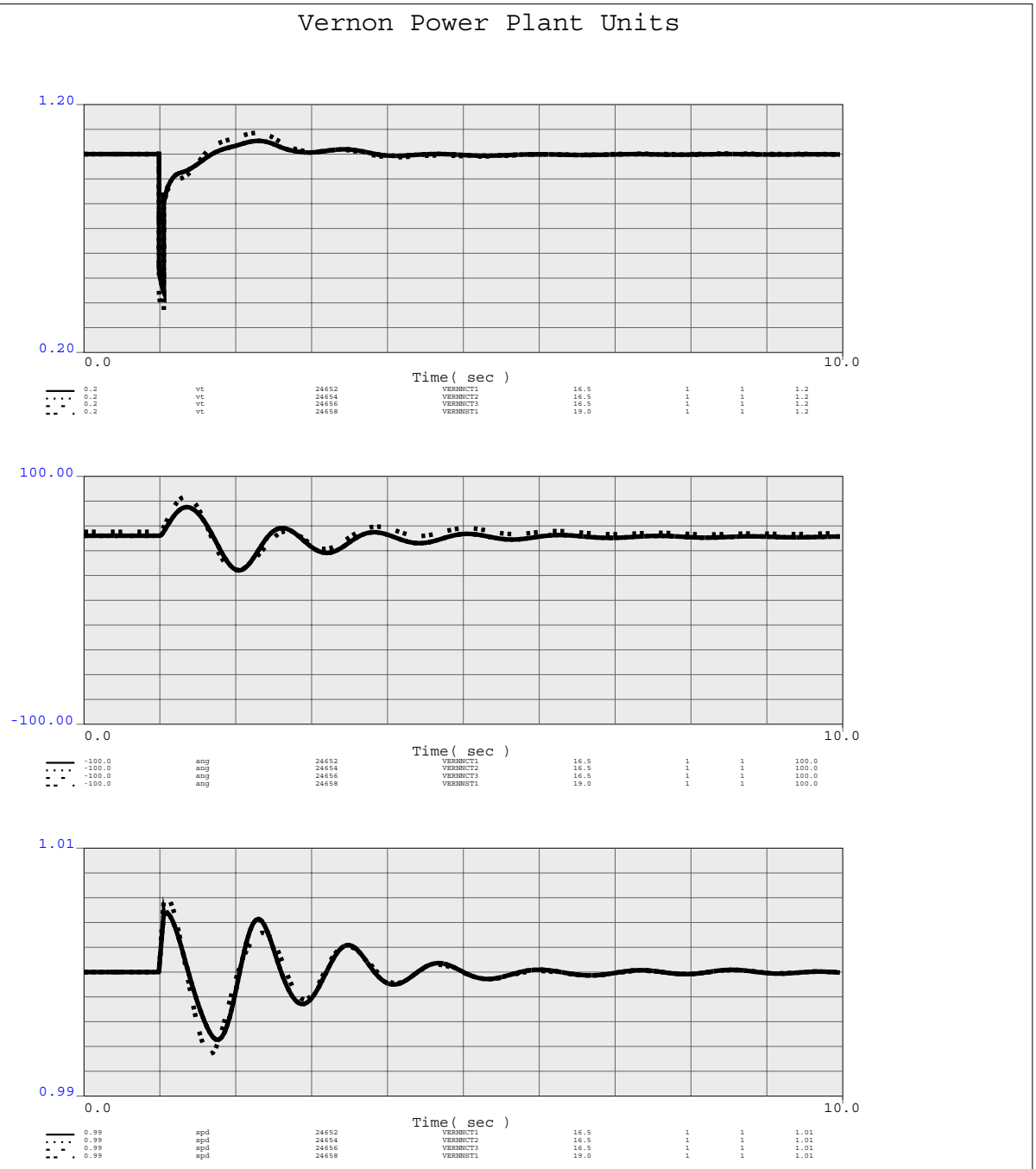
c:\upslf16\mypslf

Wed Nov 15 09:28:32 2006

Plot 21 - 2: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



Plot 21 - 3: Pre-fault outage of the Laguna Bell - Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell - Del Amo 230 kV and the Laguna Bell - La Fresa 230 kV transmission lines.



2009 Light Spring: POST Vernon 304 MW Expansion Project
Case: 09lsp_pst-vpp304-rev1.sav
Load scaled from 2008 LSP to 2009 LSP (65% of 2009 HS)
Vernon Power Project Gross Output is 943 MW.
Mohave Units Off-Line

Page 3

09lsp_pst-vpp304-rev1_CatD-LB-RH_LB-DelAmo_LB-LFresa.chf

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Wed Nov 15 09:28:33 2006

Appendix E

Transient Stability Modeling

```
# General transient stability models used for the Vernon Power Plant SIS study.
#
#MACHINES
gentpf  24652 "VERNNCT1"  16.50 "1" : #9  mva=220.0000  10.480 0.0480 1.1640 0.0850 5.80  0.0000 1.8260 1.7786 0.2318 0.4098 0.1742 0.1719 0.1480 0.1140 0.4890 0.0019 0.0000 0.0000 0.4000
gentpf  24654 "VERNNCT2"  16.50 "1" : #9  mva=220.0000  10.480 0.0480 1.1640 0.0850 5.80  0.0000 1.8260 1.7786 0.2318 0.4098 0.1742 0.1719 0.1480 0.1140 0.4890 0.0019 0.0000 0.0000 0.4000
gentpf  24656 "VERNNCT3"  16.50 "1" : #9  mva=220.0000  10.480 0.0480 1.1640 0.0850 5.80  0.0000 1.8260 1.7786 0.2318 0.4098 0.1742 0.1719 0.1480 0.1140 0.4890 0.0019 0.0000 0.0000 0.4000
gentpf  24658 "VERNNST1"  19.00 "1" : #9  mva=405.0000  7.1370 0.0470 0.7930 0.0680 4.70  0.0000 1.9272 1.9016 0.3921 0.5572 0.2959 0.2918 0.2442 0.0700 0.3810 0.0032 0.0000 0.0000 0.4000
#
#EXCITERS
esac2a  24652 "VERNNCT1"  16.50 "1" : #9  0.0  0.0  0.0  400.0  0.0200 115.0 -115.0  1.0000  47.90 -38.30 0.8000 18.5 0.0 0.0300 1.0 0.6400  2.4800 1.0  6.04 0.2200 4.5300 0.0700  0.0
esac2a  24654 "VERNNCT2"  16.50 "1" : #9  0.0  0.0  0.0  400.0  0.0200 115.0 -115.0  1.0000  47.90 -38.30 0.8000 18.5 0.0 0.0300 1.0 0.6400  2.4800 1.0  6.04 0.2200 4.5300 0.0700  0.0
esac2a  24656 "VERNNCT3"  16.50 "1" : #9  0.0  0.0  0.0  400.0  0.0200 115.0 -115.0  1.0000  47.90 -38.30 0.8000 18.5 0.0 0.0300 1.0 0.6400  2.4800 1.0  6.04 0.2200 4.5300 0.0700  0.0
exst1   24658 "VERNNST1"  19.00 "1" : #9  0.0120 10.0  -10.0   0.3760  6.3200   400.0 0.0  5.2900  -4.2300  0.0  0.0 0.000050  0.0  0.0   5.2900   -4.2300  0.0  0.0  0.0
#
#GOVERNORS
ggov1   24652 "VERNNCT1"  16.50 "1" : #9  mwcap=198.0000  0.0400  1.0  0.1  0.0500  -0.0500  18.4  3.1  0.0  1.0  1.0  0.0000  0.3000  1.2400  0.1960  0.5900   0.0  0.0  0.0  3.0  1.0  0.2000  10.  0.0  1.0  -1.0
0.0000  0.0  10.000  10.0  1.0  0.0  1.0  1.0  99.0  -99.0
ggov1   24654 "VERNNCT2"  16.50 "1" : #9  mwcap=198.0000  0.0400  1.0  0.1  0.0500  -0.0500  18.4  3.1  0.0  1.0  1.0  0.0000  0.3000  1.2400  0.1960  0.5900   0.0  0.0  0.0  3.0  1.0  0.2000  10.  0.0  1.0  -1.0
0.0000  0.0  10.000  10.0  1.0  0.0  1.0  1.0  99.0  -99.0
ggov1   24656 "VERNNCT3"  16.50 "1" : #9  mwcap=198.0000  0.0400  1.0  0.1  0.0500  -0.0500  18.4  3.1  0.0  1.0  1.0  0.0000  0.3000  1.2400  0.1960  0.5900   0.0  0.0  0.0  3.0  1.0  0.2000  10.  0.0  1.0  -1.0
0.0000  0.0  10.000  10.0  1.0  0.0  1.0  1.0  99.0  -99.0
ieeeg1  24658 "VERNNST1"  19.00 "1" : #9  mwcap=364.5000  20.0  0.0  0.0  0.0075  1.0  -1.0  1.0  0.0  0.0300 0.2  0.0  10.0  .35  0.0000  0.6  .45  0.0000  0.0  0.0  0.0000  0.0  0.0
#
#POWER SYSTEM STABILIZERS
ieeest  24652 "VERNNCT1"  16.50 "1" : #9  3.0  0.0  10.3000  0.0590  0.0200  0.0  0.0  0.0  3.1100  0.2950  9.0800  2.3500  0.3000  0.3000  -0.720  0.1000  -0.1000  0.0  0.0  0.0
ieeest  24654 "VERNNCT2"  16.50 "1" : #9  3.0  0.0  10.3000  0.0590  0.0200  0.0  0.0  0.0  3.1100  0.2950  9.0800  2.3500  0.3000  0.3000  -0.720  0.1000  -0.1000  0.0  0.0  0.0
ieeest  24656 "VERNNCT3"  16.50 "1" : #9  3.0  0.0  10.3000  0.0590  0.0200  0.0  0.0  0.0  3.1100  0.2950  9.0800  2.3500  0.3000  0.3000  -0.720  0.1000  -0.1000  0.0  0.0  0.0
pss2a   24658 "VERNNST1"  19.00 "1" : #9  1.0  0.0  3.0  0.0  10.0  10.0  10.0  0.0  0.0  10.0  1.0638  1.0  1.0  0.30  0.15  4.0  2.0  20.0  0.1400  0.0140  0.1400  0.0140  0.1000 -0.1000  1.0  0.0  0.0
```

Following are all Models from the GE PSLF Program.

Model Name: gentpf

Description Generator represented by uniform inductance ratios rotor modeling to match WSCC type F model; shaft speed effects are neglected

Prerequisites: Generator present in load flow working case

Inputs: Network boundary variables, Field Voltage, Turbine Power

Invocation: `gentpf [<n>] {<name> <kv>} <id> :`

Parameters:

EPCL Variable	*Default Data*	*Description*
Tpdo	7.0	D-axis transient rotor time constant
Tppdo	0.035	D-axis sub-transient rotor time constant
Tpqo	0.75	Q-axis transient rotor time constant
Tppqo	0.035	Q-axis sub-transient rotor time constant
H	3.0	Inertia constant, sec
D	0.0	Damping factor, pu
Ld	2.1	D-axis synchronous reactance
Lq	2.04	Q-axis synchronous reactance
Lpd	0.21	D-axis transient reactance
Lpq	0.4	Q-axis transient reactance
Lppd	0.18	D-axis transient reactance
Lppq	0.18	Q-axis sub-transient reactance
Ll	0.12	Stator leakage reactance, pu
S1	0.05	Saturation factor at 1 pu flux
S12	0.4	Saturation factor at 1.2 pu flux
Ra	0.0	Stator resistance, pu
Rcomp	0.0	Compounding resistance for voltage control, pu
Xcomp	0.0	Compounding reactance for voltage control, pu
accel	0.5	Acceleration factor for network boundary iter.

Notes:

a) To represent a solid rotor machine:
- All rotor time constants must be non-zero
- **Lpd, Lppd, Lpq, Lppq, Ll** must be non-zero
- (**Ra** +j **Lppd**) overwrites the generator subtransient R, X from the load flow

b) To represent a salient pole machine with a single amortisseur circuit on each axis (keeping compatibility with the WSCC program's method of handling such machines)
- Set **Tpdo, Tppdo** and **Tppqo** to non-zero values
- Set **Tpqo** to zero
- Set **Lpq** = **Lq**
- Set **Lppq** to the q-axis subtransient reactance
- (**Ra** +j **Lppd**) overwrites the generator subtransient R, X from the load flow

c) To represent a salient pole machine without amortisseur circuits (keeping compatibility with the WSCC program's method of handling of such machines)
- Set **Tpdo** to a non-zero value
- Set **Tppdo** = **Tpqo** = **Tppqo** = 0
- Set **Lpd** to the transient reactance
- Set **Lppd** = **Lpd** and **Lpq** = **Lppq** = **Lq**
- (**Ra** +j **Lpd**) overwrites the generator subtransient R, X from the load flow

d) All reactances entered in the parameter list must be unsaturated values. Saturated reactances are calculated internally.

e) It is not necessary for **Lppq** to be equal to **Lppd**.

f) **D** has the dimensions p.u. ΔP/ p.u. Δspeed.

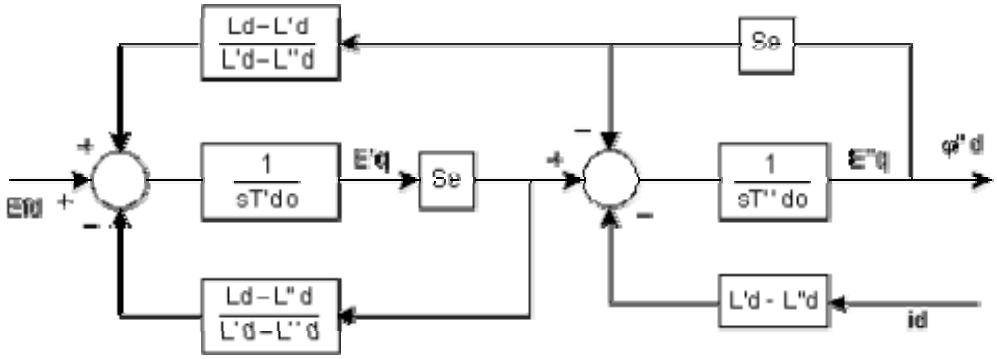
g) **S1** and **S12** are defined in Figure 3.11.2, and must be non- zero.

h) The acceleration factor, **accel**, must be less than unity and should normally be in the range 0.3 to 0.5.

i) If **accel** is absent from the data record read by RDYD, it is set to 0.4. If **Rcomp** and **Xcomp** are also absent, they are set to zero. If **Ra** is also absent, it is set to the resistance part of the machine subtransient impedance from the load flow generator data table.

Output Channels:

Record Level	*Name*	*Description*
1	ang	Rotor angle, degrees
1	vt	Terminal voltage, p.u.
2	efd	Field voltage, p.u.
3	it	Terminal current, p.u.
4	pg	Electrical power, MW
5	spd	Shaft speed, p.u.
6	qg	Reactive power, MVAR



$$Se = 1. + f_{sat}(\varphi_{ag})$$

Q – Axis similar except:

$$Se = 1. + \frac{Lq}{Ld}(\varphi_{ag})$$

Model Name: esac2a

Description IEEE (1992/2005) type AC2A excitation system

Prerequisites: Generator model ahead of this model in dynamic models table

Inputs: Compounded generator terminal voltage, generator field current, generator speed

Invocation:

```
esac2a [<n>] {<name> <kv>} <id> :
```

Parameters:

EPCL Variable	*Default Data*	*Description*
Tr	0.0	Filter time constant, sec.
Tb	0.0	TGR lag time constant, sec.
Tc	0.0	TGR lead time constant, sec.
Ka	400.0	AVR gain
Ta	0.01	AVR time constant, sec. (> 0.)
Vamax	8.0	Maximum AVR output, p.u.
Vamin	-8.0	Minimum AVR output, p.u.
Kb	25.0	Exciter field current controller gain, p.u.
Vrmax	105.0	Maximum exciter control signal, p.u.
Vrmin	-95.0	Minimum exciter control signal, p.u.
Te	0.6	Exciter time constant, sec.
Vfemax	4.4	Exciter field current limit parameter, p.u. Efd
Kh	1.0	Exciter field current feedback gain, p.u.
Kf	0.03	Rate feedback gain, p.u.
Tf	1.0	Rate feedback time constant, sec.
Kc	0.28	Rectifier regulation factor, p.u.
Kd	0.35	Exciter internal reactance, p.u.
Ke	1.0	Exciter field resistance constant, p.u.
E1	4.4	Field voltage value 1, p.u.
S(E1)	0.037	Saturation factor at E1
E2	3.3	Field voltage value 2, p.u.
S(E2)	0.012	Saturation factor at E2
spdmlt	0	If = 1, multiply output (Efd) by generator speed

Notes:

a) For modeling high initial-response alternator-rectifier excitation system with non-controlled rectifiers and feedback from exciter field current, e.g. Westinghouse HIR Brushless system.

b) **Tr, Tb**, and **Tc** may be zero. **Ta, Te**, and **Tf** must be non-zero.

c) To disable the forward path transient gain reduction, set **Tb = Tc = 0**. To disable the rate feedback, set **Kf = 0**.

d) **Se** is given by the standard saturation factor definition of Figure 3.11.2 using the open circuit magnetization of the exciter.

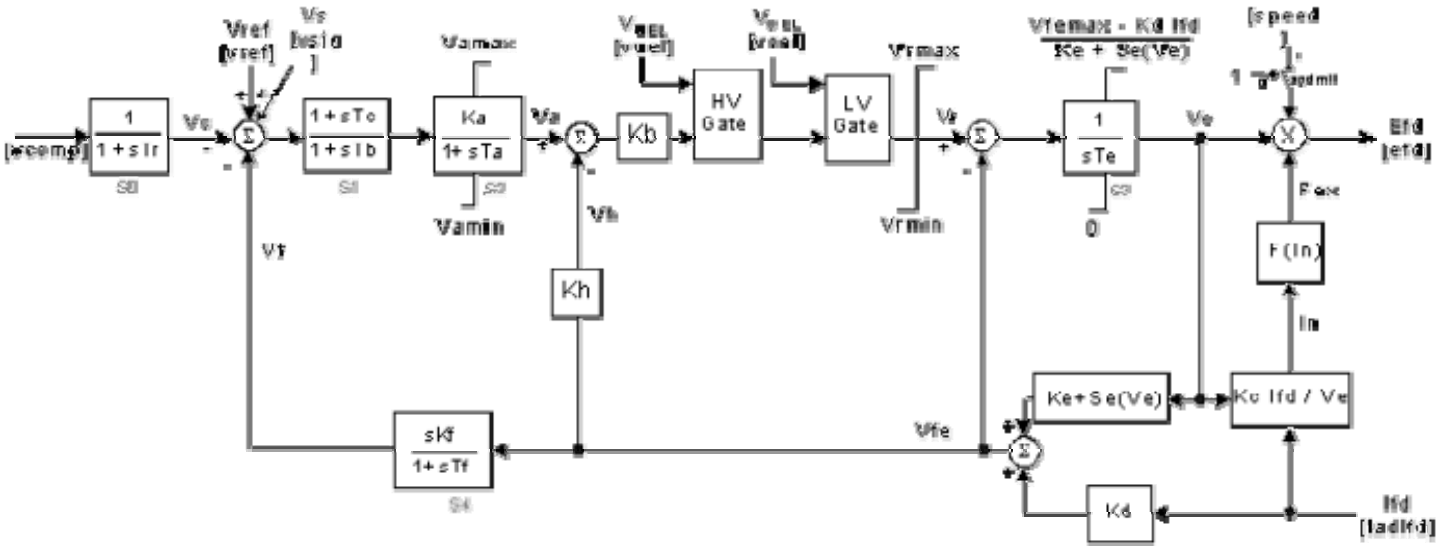
e) The upper limit on Ve (s3) represents the effect of the field current limiter. If **Vfemax** is zero, this limit will not be enforced. The real system, the limiter is implemented by a low value gate just before Kb. The input to this LV gate is Kl * (Vlr – Vfe). If the values of Kl and Vlr are given, Vfemax can be calculated as Vlr*Kl*Kb / (1 + Kl*Kb)

f) The "fix bad data" option will do the following:
   a. Set **Ta, Te**, and **Tf** to a minimum of 4*delt.
   b. If **Kh** in non-zero, set **Te** to a minimum of Ke * Kh * Kb * 4*delt.
   c. If non-zero, set **Tr** and **Tb** to a minimum of 4*delt
   d. If **Vfemax** is non-zero, set it to a minimum of 3.
   e. Set **Ka** and **Kb** to a minimum of 1.
   f. If **Vrmax < Vrmin**, swap the values.
   g. If **Vamax < Vamin**, swap the values.

Output Channels:

Record Level	*Name*	*Description*
1	ifd	Generator field current (LadIfd) , p.u.
2	Vr	Voltage regulator output, p.u.

Block Diagram:


Vref
[vref]
Vs
[vsig
]
1
1 + s Ir
Vc
1 + sTc
1 + s Ib
Vamax
Ka
1+ sTa
Va
Vamin
Kb
HV
Gate
LV
Gate
Vrmax
Vrmin
Vr
Vfemax - Kd Ifd
Ke + Se(Ve)
1
sTe
Ve
0
[speed
]
Efd
[efd]
F(In)
In
Kc Ifd / Ve
Ke+Se(Ve)
Vfe
Kd
Ifd
[iadifd]
Vf
Kh
Vfb
sKf
1+ sTf

Model Name: ggov1

Description General governor model

Prerequisites: Generator model ahead of this model in the dynamic models table

Inputs: Shaft speed

Invocation:

```
ggov1 [<n>] {<name> <kv>} <id> : [mwcap=<value>]
```

Parameters:

EPCL Variable	*Default Data*	*Description*
r	0.04	Permanent droop, p.u.
rselect	1.0	Feedback signal for droop = 1 selected electrical power = 0 none (isochronous governor) = -1 fuel valve stroke (true stroke) = -2 governor output (requested stroke)
Tpelec	1.0	Electrical power transducer time constant, sec.
maxerr	0.05	Maximum value for speed error signal
minerr	-0.05	Minimum value for speed error signal
Kpgov	10.0	Governor proportional gain
Kigov	2.0	Governor integral gain
Kdgov	0.0	Governor derivative gain
Tdgov	1.0	Governor derivative controller time constant
vmax	1.0	Maximum valve position limit
vmin	0.15	Minimum valve position limit
Tact	0.5	Actuator time constant
Kturb	1.5	Turbine gain
wfnl	0.2	No load fuel flow, p.u
Tb	0.5	Turbine lag time constant
Tc	0.0	Turbine lead time constant
Flag	1.0	Switch for fuel source characteristic = 0 for fuel flow independent of speed = 1 fuel flow proportional to speed
Teng	0.0	Transport lag time constant for diesel engine
Tfload	3.0	Load Limiter time constant
Kpload	2.0	Load limiter proportional gain for PI controller
Kiload	0.67	Load limiter integral gain for PI controller
Ldref	1.0	Load limiter reference value p.u.
Dm	0.0	Speed sensitivity coefficient, p.u.

ropen	.10	Maximum valve opening rate, p.u./sec.
rclose	-0.1	Minimum valve closing rate, p.u./sec.
Kimw	0.002	Power controller (reset) gain
Pmwset	80.0	Power controller setpoint, MW
aset	0.01	Acceleration limiter setpoint, p.u./sec.
Ka	10.0	Acceleration limiter Gain
Ta	0.1	Acceleration limiter time constant, sec.
db	0.0	Speed governor dead band
Tsa	4.0	Temperature detection lead time constant, sec.
Tsb	5.0	Temperature detection lag time constant, sec.
rup	99.0	Maximum rate of load limit increase
rdown	-99.0	Maximum rate of load limit decrease

Notes:

a) This model can be used to represent a variety of prime movers controlled by PID governors. It is suitable, for example, for representation of

- gas turbine and single shaft combined cycle turbines
- diesel engines with modern electronic or digital governors
- steam turbines where steam is supplied from a large boiler drum or a large header whose pressure is substantially constant over the period under study
- simple hydro turbines in dam configurations where the water column length is short and water inertia effects are minimal

b) Per unit parameters are on base of turbine MW capability. If no value is entered for "**mwcap**", the generator MVA base is used.

c) The range of fuel valve travel and of fuel flow is unity. Thus the largest possible value of **vmax** is 1.0 and the smallest possible value of **vmin** is zero. **Vmax** may, however, be reduced below unity to represent a loading limit that may be imposed by the operator or a supervisory control system. For gas turbines **vmin** should normally be greater than zero and less than **wfnl** to represent a minimum firing limit.

The value of the fuel flow at maximum output must be less than, or equal to unity, depending on the value of **Kturb**. If the initial power requires a fuel flow greater than 1.0, a warning message is written and **Kturb** is increased to permit initialization with valve position = 1.0.

d) The parameter **Teng** is provided for use in representing diesel engines where there is a small but measurable transport delay between a change in fuel flow setting and the development of torque. **Teng** should be zero in all but special cases where this transport delay is of particular concern.

e) The parameter **Flag** is provided to recognize that fuel flow, for a given fuel valve stroke, can be proportional to engine speed. This is the case for GE gas turbines and for diesel engines with positive displacement fuel injectors. **Flag** should be set to unity for all GE gas turbines and most diesel engines. **Flag** should be set to zero where it is known that the fuel control system keeps fuel flow independent of the engine speed.

f) The load limiter module may be used to impose a maximum output limit such as an exhaust temperature limit. To do this the time constant **Tfload** should be set to represent the time constant in the measurement of temperature (or other signal), and the gains of the limiter, **Kpload, Kiload**, should be set to give prompt stable control when on limit. The load limit can be deactivated by setting the parameter **Ldref** to a high value.

g) The parameter **Dm** can represent either the variation of the engine power with the shaft speed or the variation of maximum power capability with shaft speed.

If **Dm** is positive it describes the falling slope of the engine speed verses power characteristic as speed increases. A slightly falling characteristic is typical for reciprocating engines and some aero-derivative turbines.

If **Dm** is negative the engine power is assumed to be unaffected by the shaft speed, but the maximum permissible fuel flow is taken to fall with falling shaft speed. This is characteristic of single-shaft industrial turbines due to exhaust temperature limits.

h) This model includes a simple representation of a supervisory load controller. This controller is active if the parameter **Kimw** is non-zero. The load controller is a slow acting reset loop that adjusts the speed/load reference of the turbine governor to hold the electrical power output of the unit at its initial condition value. This value is stored in the parameter **Pmwset** when the model is initialized, and can be changed thereafter. The load controller must be adjusted to respond gently relative to the speed governor. A typical value for **Kimw** is 0.01, corresponding to a reset time of 100 seconds.

i) The load reference of the supervisory load control loop is accessible as the parameter, **Pmwset**. **Pmwset** is given a value automatically when the model is initialized. This value overwrites any value entered prior to initialization. This parameter should not be manipulated by the manual operation or an EPCL program prior to the execution of the "INIT' command.

j) The parameters **aset, Ka**, and **Ta** describe an acceleration limiter. Ta must be non-zero, but the acceleration limiter can be disabled by setting **aset** to a large value, such as 1.

l) The parameter, **db**, is the speed governor dead band. This parameter is stated in terms of per unit speed. In the majority of applications of **ggov1** it is recommended that this value be set to zero.

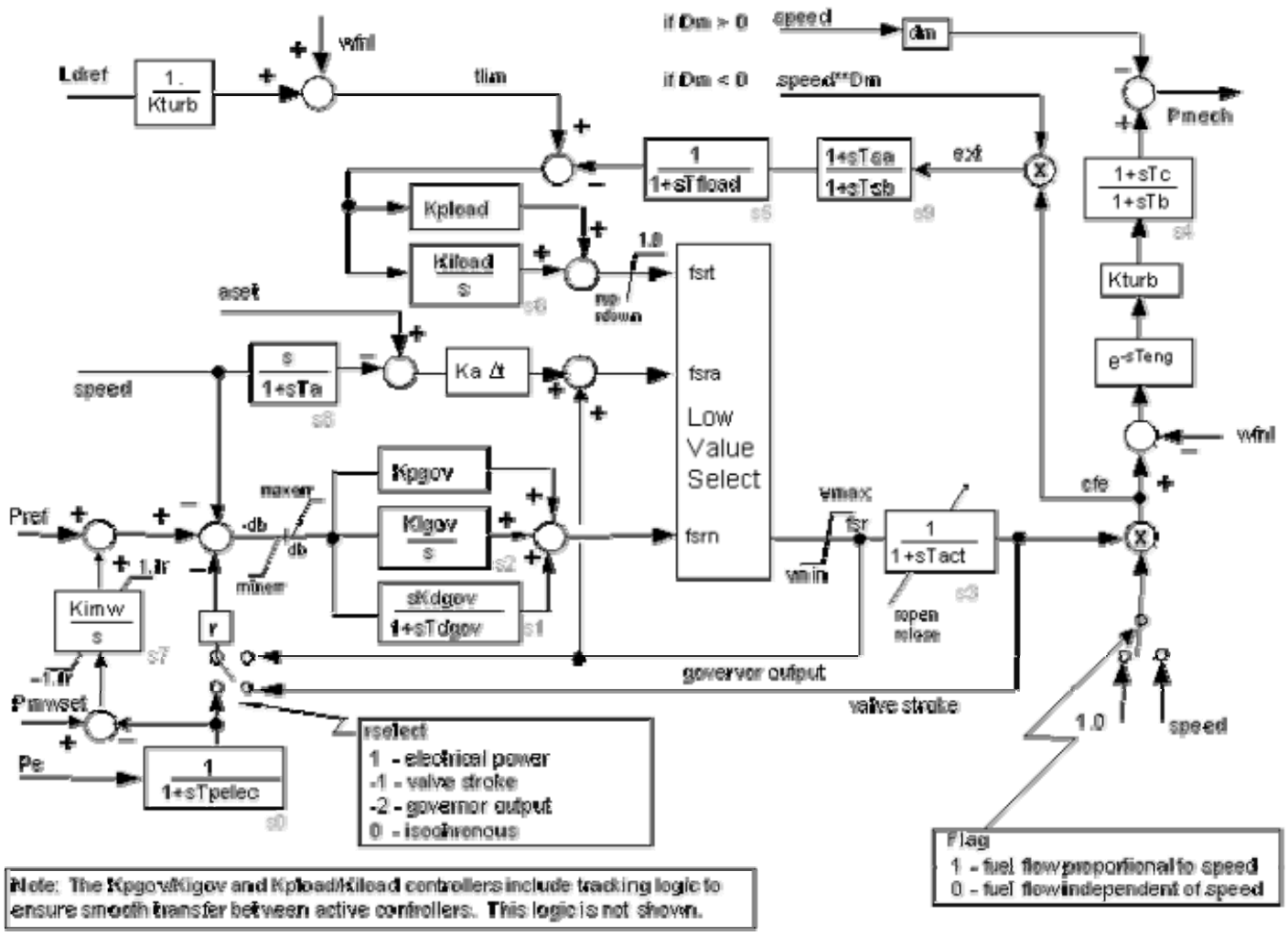
m) The parameters, **Tsa, Tsb**, are provided to augment the exhaust gas temperature measurement subsystem in gas turbines. For example, they may be set to values such as 4., 5., to represent the 'radiation shield' element of large gas turbines. If both parameters are left off the end of the parameter list, they default to 1.0.

n) The parameters, **rup, rdown,** specify the maximum rate of increase and decrease of the output of the load limit controller **(Kpload/Kiload**). These parameters should normally be set, or defaulted to 99/-99, but may be given particular values to represent the temperature limit controls of some GE heavy-duty engine controls. If both parameters are left off the end of the parameter list, they default to 99 and –99.

o) The fuel flow command (**fsr**) is determined by whichever is lowest of **fsrt**, **fsra**, and **fsrn**. Although not explicitly shown in the block diagram, the signals that are not in control track **fsr** so that they do not "windup" beyond that value. This represents GE gas turbine control practice but may not be true for other controller designs.

Output Channels:

Record Level	*Name*	*Description*
1	pm	Turbine power, MW
1	fsr	Fuel valve command, p.u.
1	fsrt	Temperature limit fuel valve command, p.u.



Model Name: ieeest

Description Power system stabilizer

Prerequisites: Generator model ahead of this model in dynamic models table

Inputs:

Generator shaft speed

Frequency of generator terminal or system bus voltage

Generator electric power or accelerating power

Voltage amplitude of generator terminal bus or system bus

Current amplitude in generator step-up transformer branch

Invocation:

```
ieeest [<n>] {<name> <kv>} <id> :
```

Parameters:

EPCL Variable	*Default Data*	*Description*
j	0.0	Input signal code
k	0.0	Remote signal bus number
A1	0.0	Notch filter parameters
A2	0.0	Notch filter parameters
A3	0.0	Notch filter parameters
A4	0.0	Notch filter parameters
A5	0.0	Notch filter parameters
A6	0.0	Notch filter parameters
T1	0.0	Lead/lag time constant, sec.
T2	0.0	Lead/lag time constant, sec.
T3	0.0	Lead/lag time constant, sec.
T4	0.0	Lead/lag time constant, sec.
T5	0.0	Washout numerator time constant, sec.
T6	0.0	Washout denominator time constant, sec.
Ks	0.0	Stabilizer gain
Lsmax	0.0	Maximum stabilizer output, p.u.
Lsmin	0.0	Minimum stabilizer output, p.u.
Vcu	0.0	Stabilizer input cutoff threshold, p.u.
Vcl	0.0	Stabilizer input cutoff threshold, p.u.
Tdelay	0.0	Time delay, sec.

Notes:

a) T2, T4, T5, T6 must be greater than zero.

b) T1, T3 and Tdelay may be zero.

c) Set T1 = T2 and/or T3 = T4 to obtain null effect from a lead/lag block.

d) Ks may be positive or negative depending on the input signal that is active. Ks should normally be:

positive	for shaft speed or frequency input
negative	for electrical power input

e) The input signal code, j, and the remote bus number, k, specify the input signal used by the stabilizer. If k is zero the signal is taken from the shaft or terminals of the generator on which the stabilizer is located. If k is non-zero the signal is taken from bus number k (for j = 1, 2, 3, 4, or 5). The input signal code, j, is:

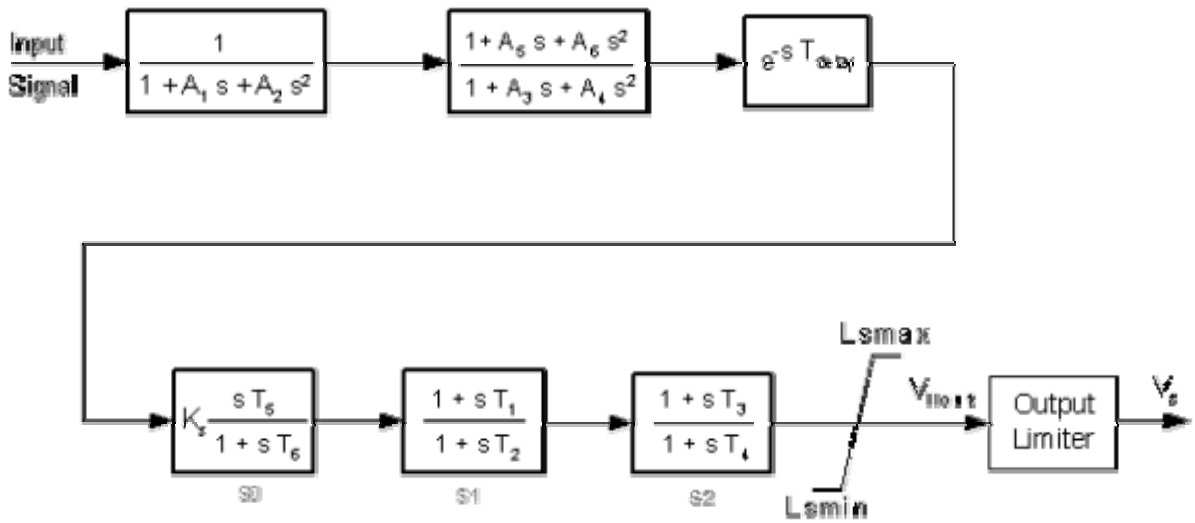
1	for shaft speed deviation
2	for frequency deviation of bus voltage
3	for generator electrical power
4	for generator accelerating power
5	for amplitude of bus voltage
6	not used
7	for amplitude of branch current

f) A1 through A6 may be zero. Set all A values to zero to ignore filter.

g) Tdelay should not exceed ten time steps.

Output Channels:

Record Level	*Name*	*Description*
1	vs	Stabilizer output signal, p.u.



Output Limiter

```
if ( Vcu && ( Vct > Vcu ) )
        Vs = 0.0
if ( Vcl && ( Vct < Vcl ) )
        Vs = 0.0
else
        Vs = Vllout


Vct = Compensating
        voltage
        ( genbc[k].vcomp )
```

Model Name: pss2a

Description Dual input Power system stabilizer (IEEE type PSS2A)

Prerequisites: Generator model ahead of this model in dynamic models table

Inputs: Generator shaft speed Frequency of generator terminal or system bus voltage
Generator electric power or accelerating power

Voltage amplitude of generator terminal bus or system bus
Current amplitude specified branch

Invocation:

```
psssa [<n>] {<name> <kv>} <id> :
```

Parameters:

EPCL Variable	*Default Data*	*Description*
J1	1.0	Input signal #1 code
K1	0.0	Input signal #1 remote bus number
J2	3.0	Input signal #2 code
K2	0.0	Input signal #2 remote bus number
Tw1	2.0	First washout on signal #1, sec.
Tw2	2.0	Second washout on signal #1, sec.
Tw3	2.0	First washout on signal #2, sec.
Tw4	0.0	Second washout on signal #2, sec.
T6	0.0	Time constant on signal #1, sec.
T7	2.0	Time constant on signal #2, sec.
Ks2	0.2	Gain on signal #2
Ks3	1.0	Gain on signal #2
Ks4	1.0	Gain on signal #2
T8	0.5	Lead of ramp tracking filter
T9	0.1	Lag of ramp tracking filter
n	1.0	Order of ramp tracking filter
m	5.0	Order of ramp tracking filter
Ks1	10.0	Stabilizer gain
T1	0.25	Lead/lag time constant, sec.
T2	0.04	Lead/lag time constant, sec.
T3	0.2	Lead/lag time constant, sec.
T4	0.03	Lead/lag time constant, sec.
Vstmax	0.1	Stabilizer output max limit, p.u.

Vstmin	-0.1	Stabilizer output min limit, p.u.
a	1.	Lead/lag num. Gain. (not in IEEE model)
Ta	0.	Lead/lag time constant, sec. (not in IEEE model)
Tb	0.	Lead/lag time constant, sec. (not in IEEE model)

Notes:

a) TW1 and TW3 must be greater than zero.

b) Setting TW2 or TW4 to zero will bypass the washout function.

c) Ta, Tb, a, T1, T2, T3, T4, T6, T7, T8, and T9 may be zero.

d) Set T9 = 0 or n = 0 to get a null effect from the ramp tracking filter.

e) The product of n*m cannot be greater than 10.

f) The input signal code, j, and the remote bus number, k, specify the input signal used by the stabilizer. If k is zero the signal is taken from the shaft or terminals of the generator on which the stabilizer is located. If k is non-zero the signal is taken from bus number k (for j = 1, 2, 3, 4, or 5).

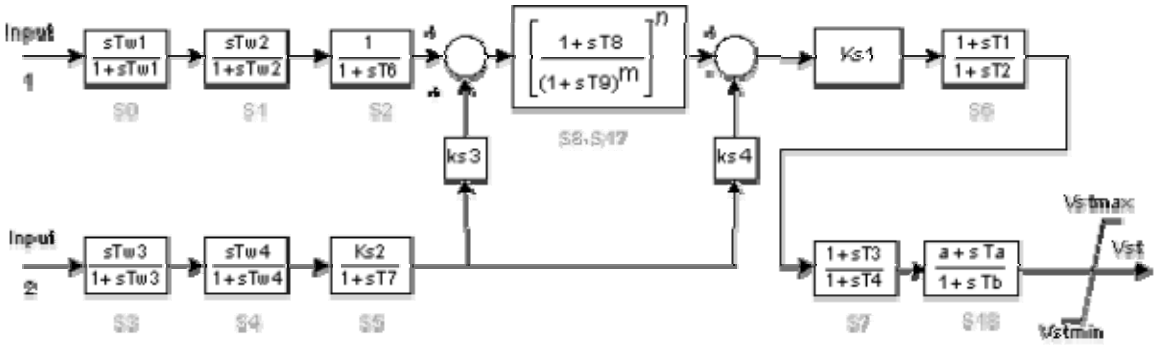
g) To use branch current as an input, the branch is specified using the ([<mon_i>] {<name> <kv>} [<mon_j>] {<name> <kv>} <ck> <sec>) data in the DYD file or in the "edds" table. Note that only one branch current may be used as input to this model.

The input signal code, j, is

1	for shaft speed
2	for frequency of bus voltage
3	for generator electrical power
4	for generator accelerating power
5	for amplitude of bus voltage
6	or amplitude of branch current

Output Channels:

Record Level	***Name***	***Description***
1	vs	Stabilizer output signal, p.u.


Input
1
sTw1
1+sTw1
S0
sTw2
1+sTw2
S1
1
1+sT6
S2
1+sT8
(1+sT9)m
n
S8,S17
ks3
ks4
Ks1
1+sT1
1+sT2
S6
Input
2
sTw3
1+sTw3
S3
sTw4
1+sTw4
S4
Ks2
1+sT7
S5
1+sT3
1+sT4
S7
a+sTa
1+sTb
S18
Vstmax
Vst
Vstmin

Appendix F

Transient Stability Switching Sequences

Full load rejection of the VPP.

```
RUN
*   Vernon Power Plant Full Load Rejection
*
*  CC cards for post-transient only
CC  DRP 908
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*
*   Trip Vernon Power Plant - Laguna Bell 230kV lines
*
DL   60.0 "LAGUBELL" 230. "VPWRPLNT" 230. "1 "
DL   60.0 "LAGUBELL" 230. "VPWRPLNT" 230. "2 "
*
```

Three-phase fault at the VPP 230 kV bus followed by loss of the VPP STG.

```
RUN
*   Vernon Power Plant, Loss of the VPP STG
*   3 phase 4 cycle fault at VPP 230kV bus
*
*  CC cards for post-transient only
CC  DRP 344
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at VPP 230kV bus
*
FB   60.0 "VPWRPLNT" 230.
*
*   Clear fault at VPP 230kV bus
CFB  64.0 "VPWRPLNT" 230.
*
*   Trip Vernon Power Plant STG
*
TG   64.0 "VERNNST1"  19.00 "1 "
*
```

Three-phase fault at the VPP 230 kV bus followed by loss of the VPP – Laguna Bell 230 kV #1 circuit.

```
RUN
*   Vernon Power Plant, Loss of VPP-Laguna Bell 230kV Line
*   3 phase 4 cycle fault at VPP 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at VPP 230kV bus
*
FB   60.0 "VPWRPLNT" 230.
*
*   Clear fault at VPP 230kV bus
CFB  64.0 "VPWRPLNT" 230.
*
*   Trip Vernon Power Plant - Laguna Bell 230kV lines
*
DL   64.0 "LAGUBELL" 230. "VPWRPLNT" 230. "1 "
*
```

Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Rio Hondo 230 kV #1 circuit.

```
RUN
*   Vernon Power Plant, Loss of Laguna Bell - Rio Hondo 230kV Line
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - Rio Hondo 230kV lines
*
DL   64.0 "LAGUBELL" 230. "RIOHONDO" 230. "1 "
*
```

Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Goodrich 230 kV #1 circuit.

```
RUN
*   Vernon Power Plant, Loss of Laguna Bell - Goodrich 230kV Line
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - Goodrich 230kV lines
*
DL   64.0 "LAGUBELL" 230. "GOODRICH" 230. "1 "
*
```

Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV #1 circuit.

```
RUN
*   Vernon Power Plant, Loss of Laguna Bell - Del Amo 230kV Line
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - Del Amo 230kV lines
*
DL   64.0 "LAGUBELL" 230. "DELAMO  " 230. "1 "
*
```

Three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – La Fresa 230 kV circuit.

```
RUN
*   Vernon Power Plant, Loss of Laguna Bell - La Fresa 230kV Line
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - La Fresa 230kV lines
*
DL   64.0 "LAGUBELL" 230. "LA FRESA" 230. "1 "
*
```

Three-phase fault at the Harbor Gen 230 kV bus followed by loss of the Long Beach – Harbor Gen 230 kV circuit.

```
RUN
*   Loss of Long Beach - Harbor 230 kV Line
*   3 phase 4 cycle fault at Long Beach 230-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Long Beach 230-kV bus
FB   60.0 "HARBOR  " 230.
*
*   Clear fault at Long Beach 230-kV bus
CFB  64.0 "HARBOR  " 230.
*
*   Trip Long Beach - Harbor 230 kV Line
*
DL   64.0 "HARBOR  " 230. "LBEACH  " 230. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Lighthipe 230 kV bus followed by loss of the Long Beach – Lighthipe 230 kV circuit.

```
RUN
*   Loss of Long Beach - Litehipe 230 kV Line
*   3 phase 4 cycle fault at Litehipe 230-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Litehipe 230-kV bus
FB   60.0 "LITEHIPE" 230.
*
*   Clear fault at Litehipe 230-kV bus
CFB  64.0 "LITEHIPE" 230.
*
*   Trip Long Beach - Litehipe 230 kV Line
*
DL   64.0 "LBEACH  " 230. "LITEHIPE" 230. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Rio Hondo 230 kV bus followed by loss of the Vincent – Rio Hondo 230 kV circuit.

```
RUN
*   Loss of Vincent - Rio Hondo 230 kV Line
*   3 phase 4 cycle fault at Rio Hondo 230-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Rio Hondo 230-kV bus
FB   60.0 "RIOHONDO" 230.
*
*   Clear fault at Rio Hondo 230-kV bus
CFB  64.0 "RIOHONDO" 230.
*
*   Trip Vincent - Rio Hondo 230 kV Line
*
DL   64.0 "VINCENT " 230. "RIOHONDO" 230. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Devers 500 kV bus followed by loss of the Midpoint – Devers 500 kV #1 circuit.

```
RUN
*   Loss of Devers - Midpoint #1 500-kV Line
*
*  CC cards for post-transient only
*
*   Readjust Northwest SVC's
*
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Devers
*
FB   60.0 "DEVERS  " 500.
*
*  Apply fault damping to each Palo Verde Unit
*
GFD   60.0 "PALOVRD1" 24. "1 "  0.072485
GFD   60.0 "PALOVRD2" 24. "1 "  0.072485
GFD   60.0 "PALOVRD3" 24. "1 "  0.072485
*
*   Flash series capacitors in following 500 kV Lines
*
*FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
FC   60.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
FC   60.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
FC   60.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
FC   60.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
FC   60.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
FC   60.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
FC   60.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*   Clear fault at Devers
CFB  64.0 "DEVERS  " 500.
*
*   Trip Devers - Midpoint #1 500 kV Line
*
DL   64.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 1
*
*  Remove fault damping to each Palo Verde Unit
*
GFD   64.0 "PALOVRD1" 24. "1 " 0.0
GFD   64.0 "PALOVRD2" 24. "1 " 0.0
GFD   64.0 "PALOVRD3" 24. "1 " 0.0
*
*   Reinsert series capacitors in following 500 kV Lines
*
*RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
```

```
RC   64.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
RC   64.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
RC   64.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
RC   64.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
RC   64.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
RC   68.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
RC   68.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
```

Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint – Harquahala 500 kV circuit.

```
RUN
*   Loss of Midpoint - Harquahala #1 500-kV Line
*
*  CC cards for post-transient only
*
*   Readjust Northwest SVC's
*
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Midpoint
*
FB   60.0 "MIDPINTS" 500.
*
*  Apply fault damping to each Palo Verde Unit
*
GFD   60.0 "PALOVRD1" 24. "1 "  0.072485
GFD   60.0 "PALOVRD2" 24. "1 "  0.072485
GFD   60.0 "PALOVRD3" 24. "1 "  0.072485
*
*   Flash series capacitors in following 500 kV Lines
*
FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
FC   60.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
*FC   60.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
FC   60.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
FC   60.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
FC   60.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
FC   60.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
FC   60.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*   Clear fault at Midpoint
CFB  64.0 "MIDPINTS" 500.
*
*   Trip Midpoint - Harquahala #1 500 kV Line
*
DL   64.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 1
*
*  Remove fault damping to each Palo Verde Unit
*
GFD   64.0 "PALOVRD1" 24. "1 " 0.0
GFD   64.0 "PALOVRD2" 24. "1 " 0.0
GFD   64.0 "PALOVRD3" 24. "1 " 0.0
*
*   Reinsert series capacitors in following 500 kV Lines
*
RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
```

```
RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
RC   64.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
*RC   64.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
RC   64.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
RC   64.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
RC   64.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
RC   68.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
RC   68.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
```

Three-phase fault at the Midpoint 500 kV bus followed by loss of the Midpoint – Palo Verde 500 kV circuit.

```
RUN
*   Loss of Palo Verde - Midpoint #1 500-kV Line
*
*  CC cards for post-transient only
*
*   Readjust Northwest SVC's
*
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Midpoint
*
FB   60.0 "MIDPINTS" 500.
*
*  Apply fault damping to each Palo Verde Unit
*
GFD   60.0 "PALOVRD1" 24. "1 "  0.072485
GFD   60.0 "PALOVRD2" 24. "1 "  0.072485
GFD   60.0 "PALOVRD3" 24. "1 "  0.072485
*
*   Flash series capacitors in following 500 kV Lines
*
FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
FC   60.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
*FC   60.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
FC   60.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
FC   60.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
FC   60.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
FC   60.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
FC   60.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
FC   60.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
FC   60.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
FC   60.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*   Clear fault at Midpoint
CFB  64.0 "MIDPINTS 500.
*
*   Trip Devers - Midpoint #1 500 kV Line
*
DL   64.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 1
*
*  Remove fault damping to each Palo Verde Unit
*
GFD   64.0 "PALOVRD1" 24. "1 " 0.0
GFD   64.0 "PALOVRD2" 24. "1 " 0.0
GFD   64.0 "PALOVRD3" 24. "1 " 0.0
*
*   Reinsert series capacitors in following 500 kV Lines
*
RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "1 " 2
RC   64.0 "MIDPINTS" 500. "DEVERS  " 500. "2 " 2
```

```
*RC   64.0 "PALOVRDE" 500. "MIDPINTS" 500. "1 " 2
RC   64.0 "HARQUAHA" 500. "MIDPINTS" 500. "2 " 2
RC   64.0 "HASSYAMP" 500. "N.GILA  " 500. "1 " 3
RC   64.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
RC   64.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
RC   68.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
RC   68.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
RC   68.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 1
RC   68.0 "MEAD    " 500. "PERKINS " 500. "1 " 3
*
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
```

Three-phase fault at the Serrano 500 kV bus followed by loss of the Lee Lake – Serrano 500 kV circuit.

```
RUN
*   Loss of Serrano - Lee Lake 500 kV Line
*   3 phase 4 cycle fault at Serrano 500-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Serrano 500-kV bus
FB   60.0 "SERRANO " 500.
*
*   Clear fault at Serrano 500-kV bus
CFB  64.0 "SERRANO " 500.
*
*   Trip Serrano - Lee Lake 500 kV Line
*
DL   64.0 "SERRANO " 500. "LEELAKE" 500. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Valley 500 kV bus followed by loss of the Lee Lake – Valley 500 kV circuit.

```
RUN
*   Loss of Lee Lake - Valley 500 kV Line
*   3 phase 4 cycle fault at Valley 500-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Valley 500-kV bus
FB   60.0 "VALLEYSC" 500.
*
*   Clear fault at Valley 500-kV bus
CFB  64.0 "VALLEYSC" 500.
*
*   Trip Lee Lake - Valley 500 kV Line
*
DL   64.0 "LEELAKE " 500. "VALLEYSC" 500. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Pre-fault outage of the Laguna Bell – Goodrich 230 kV circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – Rio Hondo 230 kV circuit.

```
RUN
*   Vernon Power Plant, Pre-fault loss of Laguna Bell - Goodrich 230kV Line THEN
*   post-fault loss of the Laguna Bell - Rio Hondo 230kV Line.
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Trip Laguna Bell - Goodrich 230kV lines
*
DL   60.0 "LAGUBELL" 230. "GOODRICH" 230. "1 "
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - Rio Hondo 230kV lines
*
DL   64.0 "LAGUBELL" 230. "RIOHONDO" 230. "1 "
*
```

Pre-fault outage of the Laguna Bell – Del Amo 230 kV #1 circuit, then a three-phase fault at the Laguna Bell 230 kV bus followed by loss of the Laguna Bell – La Fresa 230 kV #2 circuit.

```
RUN
*   Vernon Power Plant, Pre-fault loss of Laguna Bell - Del Amo 230kV Line THEN
*   post-fault loss of the Laguna Bell - La Fresa 230kV Line.
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Trip Laguna Bell - Del Amo 230kV lines
*
DL   60.0 "LAGUBELL" 230. "DELAMO  " 230. "1 "
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - La Fresa 230kV line
*
DL   64.0 "LAGUBELL" 230. "LA FRESA" 230. "1 "
*
```

Three-phase fault at the Long Beach 230 kV bus followed by loss of the Long Beach – Lighthipe 230 kV and Harbor Gen – Hinson 230 kV transmission lines.

```
RUN
*   Loss of Long Beach - Litehipe 230 kV and Harborgen - Hinson 230 kV Lines
*   3 phase 4 cycle fault at Long Beach 230-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Long Beach 230-kV bus
FB   60.0 "LBEACH  " 230.
*
*   Clear fault at Long Beach 230-kV bus
CFB  64.0 "LBEACH  " 230.
*
*   Trip Long Beach - Litehipe 230 kV and Harborgen - Hinson 230 kV Lines
*
DL   64.0 "LBEACH  " 230. "LITEHIPE" 230. "1 "
DL   64.0 "HARBOR  " 230. "HINSON  " 230. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Rancho Vista 500 kV bus followed by loss of the Rancho Vista – Serrano 500 kV and Mira Loma – Walnut 230 kV transmission lines.

```
RUN
*   Loss of Rancho Vista - Serrano 500 kV Line & Mira Loma - Walnut 230 kV Line
*   3 phase 4 cycle fault at Rancho Vista 500-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Rancho Vista 500-kV bus
FB   60.0 "RANCHVST" 500.
*
*   Clear fault at Rancho Vista 500-kV bus
CFB  64.0 "RANCHVST" 500.
*
*   Trip Rancho Vista - Serrano 500 kV Line & Mira Loma - Walnut 230 kV Line
*
DL   64.0 "RANCHVST" 500. "VINCENT " 500. "1 "
DL   64.0 "MIRALOMW" 230. "WALNUT  " 230. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Three-phase fault at the Serrano 500 kV bus followed by loss of the Rancho Vista – Vincent 500 kV and Mira Loma – Serrano 500 kV transmission lines.

```
RUN
*   Loss of Mira Loma - Serrano 500 kV & Rancho Vista - Serrano 500 kV Lines
*   3 phase 4 cycle fault at Serrano 500-kV bus
*
*  CC cards for post-transient only
*
DRP 0
*
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Fault bus at Serrano 500-kV bus
FB   60.0 "SERRANO " 500.
*
*   Clear fault at Serrano 500-kV bus
CFB  64.0 "SERRANO " 500.
*
*   Trip Mira Loma - Serrano 500 kV & Rancho Vista - Serrano 500 kV Lines
*
DL   64.0 "MIRALOMA" 500. "SERRANO " 500. "2 "
DL   64.0 "RANCHVST" 500. "VINCENT " 500. "1 "
*
*  Add SVC's at Marketplace and Adelanto
*
CC  MBS  180.0 "ADELSVC " 500. "sv" "A" 0.0 1.320
CC  MBS  180.0 "MKTPSVC " 500. "sv" "A" 0.0 1.320
*
```

Pre-fault outage of the Laguna Bell – Rio Hondo 230 kV circuit, then three-phase fault at the VPP 230 kV bus followed by loss of the Laguna Bell – Del Amo 230 kV and the Laguna Bell – La Fresa 230 kV transmission lines.

```
RUN
*   Vernon Power Plant, Pre-fault loss of Laguna Bell - Rio Hondo 230kV Line THEN
*   post-fault loss of the Laguna Bell - Del Amo and Laguna Bell - La Fresa 230kV Lines.
*   3 phase 4 cycle fault at Laguna Bell 230kV bus
*
*  CC cards for post-transient only
CC  DRP 0
*
*  Readjust Northwest SVC's
CC  MSV 60.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 60.0 "MV-SVC  " 19.60 "1 "  350. -300.
*  CC  RG  60.0 "DALLES 3"  13.8 "1 "  180. -270.
*
*   Trip Laguna Bell - Rio Hondo 230kV lines
*
DL   60.0 "LAGUBELL" 230. "RIOHONDO" 230. "1 "
*
*   Fault bus at Laguna Bell 230kV bus
*
FB   60.0 "LAGUBELL" 230.
*
*   Clear fault at Laguna Bell 230kV bus
CFB  64.0 "LAGUBELL" 230.
*
*   Trip Laguna Bell - Del Amo and Laguna Bell - La Fresa 230kV Lines
*
DL   64.0 "LAGUBELL" 230. "DELAMO  " 230. "1 "
DL   64.0 "LAGUBELL" 230. "LA FRESA" 230. "1 "
*
```

Appendix G

SCE Project Queue

Following is a list of the SCE project queue that is ahead of the City of Vernon Project. All projects listed were modeled in base cases used for the City of Vernon SIS analysis.

Table G-1. SCE Project Queue.

Project ID	Queue Position Date	Project Type	Project Size (MW)	Current Service Date	Connection Point	Included in Study?
TOT005	06/10/97	Gen	830	04/21/03	Victor 230 KV	included
TOT004	05/17/99	Gen	1000	10/01/05	San Bernardino 230 KV	included
TOT010	06/22/99	Gen	450	07/17/01	Alamitos / Huntington Beach 230 KV	included
TOT018	07/21/99	Gen	750	05/01/05	Pastoria 230 KV	may be
WDT044	08/10/99	Gen	49.9	01/01/00	Vestal 230 KV: Pandol 66 KV	may be
WDT038	09/22/99	Gen	110	10/12/99	Pardee 230 KV: Appgen 66 KV	may be
WDT040	10/06/99	Gen	17.1	05/30/00	Santiago 230 KV: Santiago 66 KV	included
WDT041	12/01/99	Gen	34	03/17/00	Hinson 230 KV: Carbogen 66 KV	included
WDT042	01/07/00	Gen	40	12/31/03	Devers - Garnet 115 KV: Seawind 115 KV	may be
TOT019	01/25/00	Gen	44.4	03/22/01	Devers - Farrell - Windland 115 KV	may be
TOT021	01/25/00	Gen	22.2	09/15/01	Devers - Farrell - Windland 115 KV	may be
TOT051	01/25/00	Gen	22.44	10/01/03	near Altwind 115 KV	may be
TRA001	06/06/00	Trans	n/a	01/01/02	Reconductor Barre - Lewis & Barre - Villa Park 230 KV	included
TOT032	06/14/00	Gen	850	05/01/07	Devers 230 KV	may be
TOT040	08/30/00	Gen	110	11/10/00	Harborgen 230 KV	may be
TOT041	10/06/00	Gen	280	08/31/07	El Segundo 230 KV	included
WDT054	01/08/01	Gen	16.9	06/01/05	Devers 230 KV: Venwind 33 KV	may be
TRA002	01/11/01	Trans		06/01/05	Loop into San Onofre - Chino 230 KV	included
TOT048	02/16/01	Gen	45.3	07/25/01	Devers - Garnet 115 KV	may be
TOT056	02/27/01	Gen	90.6	07/25/01	Devers - Garnet 115 KV	may be
WDT073	03/01/01	Gen	80	12/01/03	Vista 230 KV: Colton 66 KV	may be
WDT075	03/09/01	Gen	39.6	01/01/01	Valley 500 KV: Eastside 115 KV	may be
WDT082	04/20/01	Gen	19.8	05/31/02	Pardee 230 KV: Tengen 66 KV	may be
WDT080	04/24/01	Gen	28.5	07/04/01	Vista 230 KV: Colton 66 KV	may be
TOT005	05/01/01	Gen	20	04/21/03	Victor 230 kV	included
WDT086	05/08/01	Gen	8	07/01/01	La Fresa 230 KV: Sanitreat 66 KV	included
TOT081	05/11/01	Trans	0	01/01/08	Pastoria 230 KV	included
TRA003	05/24/01	Trans	0	06/01/06	Series capacitor upgrades to 500 KV lines	included
WDT053	06/14/01	Gen	42.6	08/16/02	Garnet 115 KV	may be
TOT067	06/14/01	Gen	330	05/01/05	Sylmar 230 KV	may be
WDT092	07/03/01	Gen	66	08/22/02	Devers 230 KV: Sanwind 33 KV	may be

Project ID	Queue Position Date	Project Type	Project Size (MW)	Current Service Date	Connection Point	Included in Study?
7068	10/18/01	Gen	47	06/01/02	Pico 66 KV	included
TRA004	01/08/02	Trans	n/a	06/01/04	4th Mira Loma Substation AA 1120-MVA 500/230 kV Transformer Bank and Split 230 kV Bus[1]	included
WDT098	01/14/02	Gen	40	06/05/02	Vista 230 KV: 66 KV	included
TOT089	01/17/02	Trans	1200	06/01/09	Devers 500 KV to Hassayampa or Harquahala 500 KV	included
2521	04/26/02	Gen	10.6		Rio Hondo 230 KV: 66 KV	included
EAK049	04/29/02	Gen	134	06/01/05	Vernon 66 kV	included
~~TOT017~~	~~05/02/02~~	~~Gen~~	~~1260~~	~~01/01/06~~	~~Palo Verde - Devers 500 KV~~	~~included~~
TRA005	05/13/02	Trans		2005	Valley 500/115 KV (split low side with 2 A banks on each side)	included
2538	06/21/02	Gen	14.66	07/31/02	Villa Park 230 KV: 66 KV	included
WDT018	08/26/02	Load	28	02/01/04	Rio Hondo 230 KV: 66 KV	included
WDT122	09/25/02	Load	21	02/01/04	Etiwanda 230 KV: 66 KV	included
WDT123	12/12/02	Gen	8.73	08/01/04	Garnet 115 kV: 33 KV	may be
WDT123	12/12/02	Gen	3	08/01/04	Garnet 115 kV: 33 KV	may be
WDT123	12/12/02	Gen	6.75	07/01/04	Garnet 115 kV: 33 KV	may be
WDT115	12/17/02	Load	40	04/01/06	Walnut 230 KV: 66 KV	included
WDT124	02/11/03	Gen	32	10/01/04	Mira Loma 230 KV: Cleargen 66 KV	included
TOT004	02/26/03	Gen	0	10/01/05	San Bernardino 230 KV	included
TOT101	04/03/03	Trans	520	01/01/07	Palo Verde - Devers 500 KV Line	included
TRA006	04/03/03	Trans		2005	Pastoria/Pardee 230 KV	included
~~TOT099~~	~~04/15/03~~	~~Gen~~	~~201~~	~~12/12/07~~	~~Antelope 230 KV~~	~~included~~
TOT079	04/22/03	Gen	520	01/01/07	Palo Verde - Devers 500 KV Line	may be
TOT106	05/06/03	Trans	520	01/01/07	Palo Verde - Devers 500 KV Line	may be
TOT104	05/07/03	Trans	1140	01/01/07	Devers 500 KV	may be
TOT108	09/04/03	Gen	300	08/01/06	New Tehachapi Sub. 5	included
TRA007	09/19/03	Trans		06/01/05	Mira Loma/Etiwanda 230 KV	included
WDT147	12/31/03	Gen	45.6	11/15/04	Valley 115 KV	may be
TOT109	01/06/04	Gen	72	10/01/05	San Bernardino 230 KV	may be
WDT156	03/08/04	Gen	120	01/01/05	Vista 115 KV: Devil Canyon 115 KV	may be
WDT157	03/08/04	Gen	160	01/01/05	Vista 115 KV: Calectric 115 KV	may be

Project ID	Queue Position Date	Project Type	Project Size (MW)	Current Service Date	Connection Point	Included in Study?
TRA008	04/19/04	Trans		06/01/06	Split 115 KV system and new transformer at Mirage	included
TRA009	04/19/04	Trans		06/01/05	Antelope 230/66 KV (120 MVA to 280 MVA No. 3 A bank turned off)	included
TOT113	05/11/04	Gen	201		New Tehachapi Sub. 2	included
TRA010	06/18/04	Trans		2009	Rector 230 KV	may be
TOT117	07/19/04	Gen	300		New Tehachapi Sub. 2	included
TRA011	09/02/04	Trans		06/01/06	Mira Loma 500 KV	included
TRA012	11/01/04	Trans		2009	Loop into Lugo - Serrano 500 KV (includes de-loop of Lugo -Serrano into Mira Loma and several 230 KV line re-arrangements)	included
TOT119	11/18/04	Gen	157	05/01/06	Pastoria Substation	may be
WDT165	11/23/04	Gen	325	01/01/07	Vista 115 kV bus	may be
TOT120	12/14/04	Gen	100.5		Devers Substation	may be
WDT177	01/06/05	Gen	96	08/01/05	City of Riverside	may be
TOT121	01/31/05	Gen	599	04/01/06	El Dorado Substation	may be
~~WDT169~~	~~02/08/05~~	~~Gen~~	~~49.9~~	~~06/01/05~~	-	~~may be~~
~~WDT170~~	~~02/08/05~~	~~Gen~~	~~49.9~~	~~06/01/06~~	~~66kV bus at Saugus Substation~~	~~may be~~
TOT037	02/14/05	Gen	810	12/01/06	Valley Substation	may be
TOT107	02/24/05	Trans	560	01/01/08	Mira Loma-Vista line	may be
WDT168	03/07/05	Trans	56	04/01/06	New 115 kV substation looping the Moreno-Valley 115 kV line	may be
WDT179	03/18/05	Gen	49.9	03/01/06	66kV line tap between Colton and Bloomington Substations at the project site	may be
~~TOT130~~	~~04/12/05~~	~~Gen~~	~~314~~	-	~~Magunden Substation~~	~~may be~~
~~TOT128~~	~~04/15/05~~	~~Gen~~	~~1412~~	~~01/01/08~~	~~Rancho Vista 500kV Substation~~	~~may be~~
TOT138	05/06/05	Gen	424.8	01/01/07	Long Beach 220 kV substation bus	included
TOT135	05/06/05	Gen	500.5	09/01/07	Walnut Substation 230 kV Switchyear	included
WDT182	05/06/05	Gen	507	09/01/07	Valley Sub 115 kV	included
~~TOT137~~	~~05/06/05~~	~~Gen~~	~~200.2~~	~~09/01/07~~	~~Lighthipe Substation~~	~~May withdraw~~
~~WDT188~~	~~05/13/05~~	~~Gen~~	~~49.9~~	~~05/01/06~~	~~66kV line between Pedley and Chino Substation~~	~~may be~~
~~TOT139~~	~~06/07/05~~	~~Gen~~	~~543~~	~~05/01/08~~	~~Etiwanda 220 kV substation~~	~~may be~~

Project ID	Queue Position Date	Project Type	Project Size (MW)	Current Service Date	Connection Point	Included in Study?
~~TOT143~~	~~06/09/05~~	~~Gen~~	~~492.5~~	~~05/01/08~~	~~Devers Substation 115kV bus~~	~~may be~~
~~TOT142~~	~~06/15/05~~	~~Gen~~	~~591~~	~~01/01/07~~	~~Eldorado Substation 230kV bus~~	~~may be~~
TOT132	06/16/05	Gen	500	09/01/07	New substation looping the Valley-Serrano 500 kV line	may be
~~WDT187~~	~~06/17/05~~	~~Gen~~	~~49.9~~	~~06/01/06~~	~~66kV line from FedGen into Laguna Bell~~	~~may be~~
WDT190	06/17/05	Gen	49.9	05/01/06	Tap into 66kV line into Browning Substation	may be
TOT148	06/27/05	Gen	250	08/01/07	New Tehachapi Substation No. 5	included
~~TOT072~~	~~07/13/05~~	~~Gen~~	~~50~~	~~11/01/06~~	~~Devers-Farrell-Windland 115 kV line~~	~~may be~~
TRA13	07/19/05	Trans		2009	Devers - San Bernardino 230 KV No. 2	may be
~~WDT206~~	~~08/22/05~~	~~Gen~~	~~174~~	-	~~Etiwanda 66 kV Sub~~	~~may be~~
TRA14	?	Trans		2011	Vincent/Mira Loma 500 KV	may be
~~WDT207~~	~~08/24/05~~	~~Gen~~	~~49.9~~	~~05/01/06~~	~~Walnut 66 kV Sub~~	~~included~~
~~WDT208~~	~~08/24/05~~	~~Gen~~	~~49.9~~	~~05/01/06~~	~~Vista 66 kV Sub~~	~~may be~~
~~WDT209~~	~~08/30/05~~	~~Gen~~	~~49.9~~	~~05/01/06~~	~~Padua 66 kV Sub~~	~~may be~~
TOT146	09/14/05	Gen	51	04/01/06	New Dutchwind Sub	included
Vernon Project	09/12/05	GEN	610	03/31/09	Laguna Bell Sub	Included
TOT151	11/22/05	Gen	400	08/01/09	New Tehachapi Sub. 5	included
TOT152	12/28/05	Gen	120	09/30/07	New Tehachapi Sub. 1	included
TOT166	02/10/06	Gen	613.5	06/01/10	Hinson 230 kV	included
TOT153	02/22/06	Gen	51	12/31/09	New Tehachapi Sub. 1	included
TOT154	02/24/06	Gen	570	03/01/09	Vincent 230 kV	included
TOT161	03/01/06	Gen	220	10/31/08	Tehachapi Substation #1	included
TOT164	03/01/06	Gen	180	10/31/08	Tehachapi Substation #2	included
TOT162	03/01/06	Gen	550	10/31/08	Tehachapi Substation #1	included
TOT163	03/01/06	Gen	600	10/31/09	Tehachapi Substation #1	included
TOT165	03/01/06	Gen	160	10/31/09	Tehachapi Substation #5 (Cottonwind Sub)	included
TOT167	04/17/06	Gen	120	09/30/07	Vincent-Westwind-Eastwind (Sagebrush) 230 kV line at Vincent Substation.	included

Project ID	Queue Position Date	Project Type	Project Size (MW)	Current Service Date	Connection Point	Included in Study?
Vernon Project Expansion	05/10/06	GEN	304	03/31/09	Laguna Bell Sub	Included