SOUTHERN CALIFORNIA
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Brian Katz
Vice President

June 24, 2005

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **San Onofre Nuclear Generating Station, Units 2 and 3**
Docket Nos. 50-361 and 50-362
Additional Information Regarding
Proposed Change Number (PCN) 561
Degraded Voltage Setpoints

Reference: Letter from Brian Katz (SCE) to Document Control Desk (NRC), dated May 27, 2005, Subject: "San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362, Proposed Change Number (PCN) 561, Degraded Voltage Setpoints"

Dear Sir or Madam:

The referenced letter (PCN-561) requested changes to Technical Specification Surveillance Requirement 3.3.7.3.a to revise the allowable values for the degraded voltage relays. During a meeting with the Nuclear Regulatory Commission (NRC) on June 10, 2005, additional information was requested regarding PCN-561. Responses to NRC questions are provided in the Enclosure to this letter.

The information provided in the Enclosure to this letter does not change the conclusions of the No Significant Hazards Consideration contained in the referenced letter (PCN 561).

P.O. Box 128
San Clemente, CA 92674-0128
949-368-9275
Fax 949-368-9881

A001

If you have any questions or require additional information, please contact Jack Rainsberry at (949) 368-7420.

Sincerely,

Brian Katz

State of California
County of San Diego

FRANCES M. THURBER
Commission #1565776
Notary Public - California
San Diego County
My Commission Exp. Mar. 31, 2009

Brian Katz
Brian Katz, Vice President

Subscribed and sworn to (or affirmed) before me on this 24th day of

June, 2005,

by Brian Katz,

personally known to me or proved to me on the basis of satisfactory evidence to be the person who appeared before me.

Frances M. Thurber
Notary Public

Enclosure: PCN 561 NRC Questions and SCE Responses

Attachment 1:	DVGSS/SDVS Logic Diagram
Attachment 2:	Elementary Diagram, Electrical Auxiliary – 4.16 kV
Attachment 3:	Selected Pages of ETAP Dynamic Stability Report
Attachment 4:	Calculation E4C-082, PCCN N-19, "System Dynamic Voltages During DBA"
Attachment 5:	Calculation E4C-082, "System Dynamic Voltages During DBA," Section 3.0, "Assumptions"
Attachment 6:	Calculation E4C-090, "Auxiliary System Voltage Regulation," Section 3.0, "Assumptions"

cc: B. S. Mallett, Regional Administrator, NRC Region IV
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 & 3
B. M. Pham, NRC Project Manager, San Onofre Units 2 and 3
S. Y. Hsu, Department of Health Services, Radiologic Health Branch

bcc: via hard copy w/enclosures

M. L. Edwards (City of Anaheim)
D. H. Wright (City of Riverside)
G. L. Nolff (City of Riverside)
M. R. Olson (SDG&E)
E. M. Teichert, Esq. (City of Riverside)
H. B. Ray, Executive Vice President
A. E. Scherer
J. L. Rainsberry
CDM Files
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Licensing Log

bcc: via e-mail w/o enclosure

B. Katz
D. E. Nunn
R. W. Waldo
D. P. Breig
D. K. Porter
T. J. Vogt
P. D. Myers
T. R. Yackle
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NRC CORRESPONDENCE

REVIEW Req.	ORGANIZATION	APPROVALS	DATE
	VP – NO & RA		
X	VP – E&TS		6/24/05
X	Mgr. – NRA		6/24/05
X	Mgr. - Plant Licensing	*	
	Mgr. – Nuclear Fuel Mgmt.		
X	Mgr. - Design Eng.	* *	
	Mgr. – Maint. Eng.		
X	Mgr. – System Eng.	KJ for MPS	6/24/5
	Project Mgmt./Eng. Support		
X	Mgr. – Operations	* *	
	Mgr. – Maint.		
	Mgr. – HP		
	Mgr. – Chem.		
	Compliance		
X	Author	[illegible]	6/24/05
X	RCTS Completed	[illegible]	6/24/05
X	Verified RCTS	TDM	6/24/05
	OTHER APPROVALS		
X	NSG - Supervisor	* *	
Affected RCTS: 050500724-10 - 41			
~~No New Commitments~~			

* Jack Rainsberry verbal approval 6/23/05, 4:50 pm.

** Approved by Raidy
Joon Kim
Kali Hara
Tom Rak
Tom Yackle
Art Sheen
Mike Jones
Tod Vogt

Tier 1 NCRP conducted 6/23/05, 3:00 pm
Jack Rainsberry - Chair
Tom Yackle
Ken Johnson
Kali Hara
Tom Rak
Joon Kim
Tom Raidy

Enclosure

PCN 561 NRC Questions and SCE Responses

PCN 561 NRC Questions and SCE Responses

NRC Question 1:

Provide 4160V and 480 V continuous (operating) voltage ranges (i.e. 4160± 10%) and minimum rated starting voltage for motors. State that the analysis using ~215 kV in the switchyard shows adequate voltages for starting and continuous operation. Provide a summary table of the results including where they came from.

SCE Response:

1. Voltages for continuous operation are provided below. The loads listed in this table are those with the lowest calculated voltage in the analysis:

Voltage level	Rated minimum continuous voltage		Analysis results		References
	Load type	**Voltage	Load	Min. voltage	
4.16 kV	Motor	3744	3P504	98.52% (4098.43 V)	Sheet 55 of E4C-090, CCN #117
	Static load	3744	N/A	N/A	N/A
480 V	Motor	414	2E546	90.13% (414.6 V)	Sheet 10 of E4C-090, CCN #117
	Static load	432	3L270	*89.26% (428.5 V)	Sheet 48 of E4C-090, CCN #117
			E297	*89.93% (431.7 V)	Sheet 49 of E4C-090, CCN #117
			3E465	*89.97% (431.9 V)	Sheet 57 of E4C-090, CCN #117

* As identified in calculation E4C-090, CCN 117, the voltages at the three loads are acceptable because these loads are HVAC heater and heat tracing.

** For rated voltage range see Question 3.

The minimum voltages above are based on the following Class 1E 4.16 kV buses and switchyard voltages:

Bus	Voltage at 1E 4.16 kV bus	Switchyard voltage (kV)	Reference
Unit 2 Train A bus 2A04	4106 V	214.774	Sheets 5 & 8 of E4C-090, CCN #117
Unit 2 Train B bus 2A06		214.912	Sheets 14 & 18 of E4C-090, CCN #117
Unit 3 Train A bus 3A04		215.234	Sheets 41 & 44 of E4C-090, CCN #117
Unit 3 Train B bus 3A06		214.015	Sheet 50 & 54 of E4C-090, CCN #117

As shown in the Table above, the analysis using ~215 kV in the switchyard shows adequate voltages for continuous operation.

2. Starting voltage

All motors (4160 V & 460 V) are capable of starting at 75% of the rated voltage. But the motor terminal voltage dip during starting could be lower than 75% of the rated voltage. The acceptability of the motor terminal voltage dipping below 75% is based on NEMA MG1-12-44.2 (1991), which states, " The limiting values of voltage and frequency under which a motor will successfully start and accelerate to running speed depend on the margin between the speed-torque curve of the motor at rated voltage and frequency and the speed-torque curve of the load under starting conditions. Since the torque developed by the motor at any speed is approximately proportional to the square of the voltage and inversely proportional to the square of frequency, it is generally desirable to determine what voltage and frequency variations will actually occur at each installation, taking into account any voltage drop resulting from the starting current drawn by the motor."

Therefore, section 1.2.1 (Acceptance criteria) of calculation E4C-082 (System dynamic voltage during DBA) states "the motor terminal voltage during the starting and accelerating period should be adequate such that the corresponding motor torque is constantly more than the load required, allowing the motor to accelerate to its rated speed."

As shown in calculation E4C-082, ICCN C-51, Study Case I.B-A215 was done to calculate initial voltage, minimum voltage at motor terminals, and post accident voltage at motor terminals for Unit 3 train A at a switchyard voltage of 215.234 kV (sheet 30 of calculation E4C-082, ICCN C-51). The results show that all Class 1E motors accelerate to their rated speed within the required acceleration time and the results are summarized in Table 2.1.2.2 of calculation E4C-082, ICCN C-51.

NRC Question 2:

Provide a summary of the ongoing evaluation of voltages at the 208V/120V levels and address how these loads will have adequate terminal voltages during all conditions.

SCE Response:

1. Class 1E 120 V AC power distribution panels

   Voltage ratio of the transformers for Class 1E 120 V systems are 480 – 208/120 V. However, the 208 V system is not used at SONGS. Voltages at Class 1E 120 V AC power distribution panels and load terminals were evaluated to verify adequacy of the voltage for the application when voltages at Class 1E 4.16 kV buses are 4106 V. The lower analysis limit voltage of 4106 V was determined in calculation E4C-090, CCN 117 (Attachment J to PCN 561).

   It was determined that 8 cables (between power distribution panels and loads) should be changed from 12 AWG to 8 AWG or 1/0 AWG to supply adequate voltage to loads. Design change packages for the cable changes have been issued.

2. 120 V AC control circuit of Class 1E 480 V MCCs

   Voltages at starter coil terminals of Class 1E 480 V MCCs were evaluated to verify adequacy of the voltage for motor control when voltages at Class 1E 4.16 kV buses are 4106 V. The results of the evaluation show that voltages at some 120 V AC control circuits are not enough for the application due to the long field cable.

   Seven starters for Units 2 & 3 require the following modification:

   * Interposing relay installation in MCC control schemes for 1 starter
   * Control Power Transformer (CPT) replacements with lower impedance and higher power rating (100VA to 300VA). Six CPTs are being replaced .

   Thirty starters for Units 2 & 3 require the following tests to determine if any design modification is required:

   * MCC 480/120V Control Power Transformers (CPT) performance validation tests

     The nominal voltage ratio of the CPT is 480/120 V, but actual secondary voltage with a primary voltage of 480 V is a range of 122.4 V to 126 V. For conservatism CPT ratio of 480/122.4 = 3.922 was used for the voltage evaluation. Therefore, if the tested CPT ratio is low enough to provide required voltage to the starter terminal, no design modification is required.

* Motor Control Center (MCC) Starter Open/Close Coils Pickup Voltage performance validation tests

  The minimum starter terminal voltage used for the voltage evaluation is 96 V. The tests are being performed to verify the minimum starter pickup voltage.

NRC Question 3:

Provide rated voltages for transformers that supply the 4kV buses (RATs), motors, and the EDG, including DG AVR setting

SCE Response:

1. Reserve Auxiliary Transformers 2(3)XR1/ 2(3)XR2

   Rated MVA: H winding – 30 OA / 40 FOA
   X winding - 10 OA / 13.3 FOA – Class 1E Train bus
   Y winding - 20 OA / 26.7 FOA – Non - 1E buses

   Voltage ratio: 230 kV (-2.5% tap) – 4.36 kV / 4.36 kV

2. Motor

Equipment	Rated voltage range for continuous running	Minimum Voltage for momentary operation
4 kV system	4.16 kV ± 10%	75% of 4.16 kV for 60 second
480 V system	460 V ± 10%	75% of 460 V for 60 second

3. Diesel generator

   kVA rating: 5875
   Rated voltage: 4.36 kV ± 10%
   AVR setting: 4460 V ± 80 V

NRC Question 4:

Discuss and provide the SDVS/DGVSS logic diagram from the design basis document (DBD), and also provide the schematic and E.D. for these relays.

SCE Response:

SCE letter dated November 16, 1993 (Reference 1), Section 4.2.2, provided a detailed description of the Degraded Grid Voltage with SIAS Signal (DGVSS) and Sustained Degraded Voltage Signal (SDVS) schemes. An updated summary of this discussion was provided in SCE's letter dated May 27, 2005 (Reference 2), Section 3.0, "Background." Attachment 1 of this letter provides a logic diagram depicting the DGVSS/SDVS schemes. Attachment 2 of this letter provides an Elementary Diagram of the 4.16 kV Degraded Voltage Detection Scheme, Drawing 32220, Sheet 2.

Reference 1: Letter from W. C. Marsh (SCE) to Document Control Desk (NRC), dated November 16, 1993, Subject: "Additional Information for Amendment Applications 136 and 120, Degraded Grid Voltage, San Onofre Nuclear Generating Station, Units 2 and 3"

Reference 2: Letter from Brian Katz (SCE) to Document Control Desk (NRC), dated May 27, 2005, Subject: "San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362, Proposed Change Number (PCN) 561, Degraded Voltage Setpoints"

NRC Question 5:

Submit the applicable pages of the ETAP report for one 4kV and one 480V motor starting that shows the initial, starting and post-starting voltages.

SCE Response:

Reference Table 2.1.2.2 in page 5 of E4C-082, ICCN C-51 (Attachment I to PCN 561)

Equipment	Base voltage (kV)	Minimum voltage						
		T (sec)	Initial condition		Voltage dip (1)		Post sequence	
			Per Unit	Volt (kV)	Per Unit	Volt (kV)	Per Unit	Volt (kV)
Cont. Spray Pump P012	4.16	10	0.9833 (2)	4.09	0.9648 (3)	4.01	0.9876 (4)	4.11
Cont. Emerg. Fan E401	0.46	5	0.9700 (5)	0.446	0.7361 (6)	0.354	0.9573 (7)	0.44

(1) This voltage is the minimum voltage at the motor during the entire load sequencing period. The minimum voltage dip could occur during the motor starting or during starting of other motors.
(2) This Initial voltage is the voltage at bus 3A04 before the circuit breaker for P012 closes. See pages 203 & 320 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 42 of E4C-082, ICCN C-51 (Attachment I to PCN 561).
(3) The lowest motor terminal occurs at T = 30.101. See page 208 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 42 of E4C-082, ICCN C-51 (Attachment I to PCN 561).
(4) See page 213 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 42 of E4C-082, ICCN C-51 (Attachment I to PCN 561).
(5) This initial voltage is the voltage at bus 3B04 before the circuit breaker for E401 closes. See pages 280 and 319 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 51 of E4C-082, ICCN C-51 (Attachment I to PCN 561). Page 319 shows bus 3B04 voltage as 92.96% of bus base voltage (480V). 92.96% of 480V is 446.2V which is 97% of motor base voltage (460V).
(6) See page 280 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 51 of E4C-082, ICCN C-51 (Attachment I to PCN 561).
(7) See page 291 of the ETAP Dynamic Stability Report (Attachment 3 of this letter) and sheet 51 of E4C-082, ICCN C-51 (Attachment I to PCN 561).

NRC Question 6:

Send a copy of the sequencing overlap calculation graph that demonstrates the imprecise (but within allowable value) sequence timer operation is acceptable.

SCE Response:

See Attachment 4, "Calculation E4C-082, PCCN N-19, 'System Dynamic Voltages During DBA.'"

NRC Question 7:

State that there are no random loads that will come on at the 480VAC and 208V/120V levels during load sequencing or if there are some random loads, explain how they are accounted for in the calc.

SCE Response:

A complete review of the unit 3 train A loads (typical of both trains of both units) was conducted. It was concluded from a review that only a few small 480V loads listed below are random. All of the required 480V loads including HVAC loads are designed to start at the assigned sequence steps. Motor Control Center (MCC) loads that might be started or running have been treated as running or started in load group 1 for conservatism. In addition, margin for future load additions, approximately 25kVA for motor load has been treated as starting with load group 1 and approximately 25kVA of non-motor load is treated as running load. All of the Motor Operated Valves (MOVs) that could start during the load sequence are considered in closing or opening mode with inrush current (start mode) during the entire load sequence cycle.

A few small loads, Intake structure fans A370 & 373 (5HP), DG fuel transfer pumps P093 & P096 (1HP), and Battery room emergency exhaust fan A173(5HP) that are treated as running in the analysis are random and are not expected to start during sequencing. The margin added by considering the additional loading listed above is much more than additional loading imposed if any of the random loads starts during the load sequencing.

SONGS has 208/120V transformers installed in the MCCs. All the loads are 120V. Conservative loading is used in the calculation that envelops any momentary inrush current of permanently connected and random120V loads.

NRC Question 8:

Explain the 4.11 second timer setpoint in Technical Specification (TS) 3.3.7 and the basis for the 4.11 seconds in Calculation E4C-082. Also, describe how one timer opens the voltage check window with a SIAS present and another timer closes the voltage check window.

SCE Response:

The time delays for the Degraded Grid Voltage with SIAS Signal (DGVSS) were selected to meet the following design requirements:

1. The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analyses;

2. The time delay shall minimize the effect of short duration disturbances from reducing the availability of the offsite power source(s); and

3. The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components.

The time delay settings of the DGVSS detection timing relays (162S-1, 162S-2, 162S-3, 162S-4, 162T-1, 162T-2, 162T-3, and 162T-4) are selected to comply with the design objectives with due consideration to the tolerances associated with these timers, Emergency Safety Feature (ESF) load sequencing timing relays, and the response time of the degraded voltage relays (127D-1, 127D-2, 127D-3, and 127D-4).

- Timing relays 162S-1, 162S-2, 162S-3, 162S-4

  These timers are used to "open" the DGVSS window. The DGVSS window opening time has been analyzed to be adequate time for the grid voltage to recover from a short term voltage transient due to system disturbance or SONGS unit trip. ESF load group 2 starts at 5 seconds after initiation of an SIAS. ESF load sequencing uses Agastat relays with a tolerance of ± 10% (0.5 seconds for the second load group). Therefore, the 162S timing should be less than 4.5 seconds after initiation of an SIAS so that the DGVSS window opens before load group 2 sequencing begins. With a setting of 4.3 sec, the DGVSS window could open any time between 4.11 seconds and 4.49 seconds after initiation of an SIAS.

- Timing relays 162T-1, 162T-2, 162T-3, 162T-4

  These timers are used to "close" the DGVSS window. The timers must be set to ensure that 1) load shedding and transfer of the bus to the EDGs occurs

within the time allowed in the safety analyses, and 2) the voltage dip caused by the starting of the ESF load group 2 does not generate a spurious DGVSS. Therefore, a time delay setting of 1.25 ± 0.40 sec. is chosen. With this time delay setting the earliest the DGVSS window could close is 4.96 seconds after initiation of an SIAS (4.3 sec - 0.19 sec + 1.25 sec - 0.40 sec = 4.96 sec). The latest the DGVSS window could close is 6.14 seconds after initiation of an SIAS (4.3 sec + 0.19 sec + 1.25 sec + 0.40 sec = 6.14 sec). The DGVSS window will enable detection of the degraded voltage in the first ESF load group sequence and will not be affected by the subsequent ESF load starting transients.

The DGVSS trips the 4.16 kV Class 1E source breakers. Because the latest a DGVSS bus trip may be initiated is 6.14 seconds after initiation of an SIAS, all ESF loads were analyzed for operation with a complete loss of voltage condition for up to 6.14 seconds and found acceptable.

Following initiation of a DGVSS, there is an additional time delay of 2.0 ± 0.20 sec. provided for load shedding. Following the 2 second time delay, the EDG breaker will close provided the EDG has attained normal voltage and speed. The EDG breaker will close within 10 seconds after initiation of an SIAS, which is the safety analysis time limit for EDG breaker closure.

NRC Question 9:

Submit the assumption sections from the base calc for E4C-082 & 090.

SCE Response:

See Attachment 5, "Calculation E4C-082, 'System Dynamic Voltages During DBA,' Section 3.0, 'Assumptions,'" and Attachment 6, "Calculation E4C-090, 'Auxiliary System Voltage Regulation,' Section 3.0, 'Assumptions.'"

NRC Question 10:

Explain, column by column, what is on Calculation E4C-090 CCN 117 page 8, as well the last column on page 37 of the same calculation.

SCE Response:

1. ETAP report (Reference sheet 8 of calc. E4C-090, CCN 117)

The sheet shows the following data for bus B10:

Voltage		Generation		Load		Load Flow				
kV	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF
0.440	-7.9	0	0	0.322	0.148	BP	0.267	0.145	398.9	87.9
						BQ	0.259	0.033	342.6	99.2
						ZTB45	0.008	0.000	9.9	100.0
						B10XAHS	-0.855	-0.325	1201.3	93.5

A. Voltage column

0.440 (kV) – Voltage at bus B10 when switchyard voltage is 214.774 kV (sheet 8 of E4C-090, CCN 117)
-7.9 (Ang) – The angle between voltage and current of bus B10

B. Generation column

0 (MW) – No MW output of generator at bus B10
0 (Mvar) – No Mvar output of generator at bus B10

C. Load column

MW & Mvar of total loads connected directly to bus B10 are shown in this column. Two motors (75 HP & 200 HP) and a heater (90 KW) are connected directly to loadcenter B10

0.322 (MW) - Total MW of motor and static loads connected directly to bus B10. The losses in the load cables are included in the MW.
0.148 (Mvar) - Total Mvar of motor and static loads connected directly to bus B10. The losses in the load cables are included in the Mvar.

D. Load Flow column

MW, Mvar, Amp, and %PF of each downstream bus connected directly to bus B10 are shown in this column. Motor Control Centers BP & BQ and panel ZTB45 are connected directly to loadcenter B10.

(1) Bus BP

0.267 (MW) -	Total MW of motor and static loads connected directly to bus BP. The losses in the load cables are included in the MW.
0.145 (Mvar) -	Total Mvar of motor and static loads connected directly to bus BP. The losses in the load cables are included in the Mvar.
398.9 (Amp) -	Total current of the loads connected directly to bus BP.
87.9 (%PF) -	Power factor of total load of bus BP

(2) Bus BQ

0.259 (MW) -	Total MW of motor and static loads connected directly to bus BQ. The losses in the load cables are included in the MW.
0.033 (Mvar) -	Total Mvar of motor and static loads connected directly to bus BQ. The losses in the load cables are included in the Mvar.
342.6 (Amp) -	Total current of the loads connected directly to bus BQ.
99.2 (%PF) -	Power factor of total load of bus BQ

(3) Bus ZTB45

0.008 (MW) -	Total MW of motor and static loads connected directly to bus ZTB45. The losses in the load cables are included in the MW.
0.000 (Mvar) -	Total Mvar of motor and static loads connected directly to bus ZTB45. The losses in the load cables are included in the Mvar.
9.9 (Amp) -	Total current of the loads connected directly to bus ZTB45.
100.0 (%PF) -	Power factor of total load of bus ZTB45

(4) Primary winding of B10XAHS

-0.855 (MW) -	Total incoming MW from primary winding of transformer B10XA to bus B10. The 0.855 MW is equal to MW sum of items C, D.(1), D.(2), & D.(3) above.
-0.325 (Mvar) -	Total incoming Mvar from primary winding of transformer B10XA to bus B10. The 0.325 Mvar is equal to Mvar sum of items C, D.(1), D.(2), & D.(3) above.
1201.3 (Amp) -	Total current from transformer B10XA (secondary winding) to bus B10
93.5 (%PF) -	Power factor of total load of bus B10

2. % Vst / Starting (Reference sheet 37 of calc. E4C-090, CCN 117)

Motor terminal voltages during the associated motor starting (single motor starting) are provided in this column as the ETAP standard format, based on the bus voltage, cable impedance, and motor starting current. However, the motor starting voltages listed in this column have not been used for this 27N relay setting change because the voltage during a single motor starting is not the limiting case, therefore, voltages at each motor terminal under the limiting condition (multi–motor starting during load sequencing) were calculated in calculation E4C-082, ICCN C-51 (Attachment I to PCN 561).

NRC Question 11:

Submit general criteria to determine new settings of the degraded voltage protection relay (dropout and pickup values).

SCE Response:

1. Requirements of the proposed degraded voltage protection relays scheme

   a) Class 1E 4.16 kV buses with the proposed degraded voltage relay scheme must not separate from the normal preferred offsite power source and transfer to the DG when the switchyard voltage is 218 kV and above.

   b) Class 1E 4.16 kV buses with the proposed degraded voltage protection relays scheme provide adequate voltage to support operability of plant equipment.

2. Degraded voltage relay setting

   a) Maximum pickup (PU) setting of degraded voltage protection relay

      In order to ensure that 4.16 kV bus remains connected to the normal preferred offsite power source when the switchyard voltage is 218 kV and above, the following conditions should be met:

      - The maximum reset voltage of the degraded voltage protection relay should be less than the voltage corresponding to the minimum switchyard voltage of 218 kV.

        The voltage at the 4.16 kV level corresponding to the minimum switchyard voltage of 218 kV is the upper analysis limit voltage for the maximum reset voltage of the degraded voltage protection relay.

        Calculation E4C-090, ICCN C-134 (Attachment K to PCN 561), determines the upper analysis limit voltage (4161 V).

      - The 4.16 kV bus voltage at 4.11 seconds during load sequencing (refer to question 8 for an explanation of the 4.11 second time delay) should be greater than the maximum reset voltage of the degraded voltage protection relay when the switchyard voltage is 218 kV.

        Calculation E4C-082, ICCN C-51 (Attachment I to PCN 561), verifies that 4.16 kV bus voltage at 4.11 seconds during load sequencing is greater than the upper analysis limit voltage (4161 V) for conservatism.

b) Minimum dropout (DO) setting of degraded voltage protection relay

Operation of the Class 1E system with the voltage corresponding to the minimum dropout voltage of the degraded voltage protection relay must be adequate to ensure operability of plant equipment. Therefore, the minimum dropout voltage of the proposed degraded voltage protection relay must be greater than the lower analysis limit voltage.

Calculation E4C-090, CCN 117 (Attachment J to PCN 561), determines the lower analysis limit voltage (4106 V) and verifies that the lower analysis limit voltage is adequate for continuous operation of 4.16 kV & 480 V electrical equipment.

120 V power distribution systems and 120 V control circuit of Class 1E 480 V MCCs were evaluated to determine that 4106 V at the Class 1E 4.16 kV buses is adequate for Class 1E 120 V circuits. It was concluded that the Class 1E 4.16 kV buses with 4106 V does not provide adequate voltage to some 120 V power circuits and 120 V control circuit of 480 V MCC. As indicated in PCN 561, design modifications and testing are being done to improve voltages at 120V power distribution systems and Class 1E 120 V control circuit of Class 1E 480 V MCCs.

Calculation E4C-082, ICCN C-51 (Attachment I to PCN 561), verifies that with a switchyard voltage of 215.234 kV (for Unit 3 Train A) corresponding to the lower analysis limit voltage of 4106 V, all Class 1E motors accelerate to their rated speed within the required acceleration.

c) Nominal PU & DO setting and Allowable Value of the degraded voltage protection relay

The nominal PU and dropout DO of the degraded voltage protection relays were determined based on the upper analysis limit voltage and low analysis limit voltage, Total Loop Uncertainty (TLU), and design margin. See calculation E4C-130, ICCN C-6 (Attachment G to PCN 561) for detailed TLU and the nominal PU & DO calculation.

The minimum allowable DO setting and maximum allowable PU setting were determined based on the nominal PU & DO settings and allowable value tolerance (AVT). See calculation E4C-130, ICCN C-6 (Attachment G to PCN 561) for detailed AVT calculation.

NRC Question 12:

Because it takes approximately 6.6 seconds (i.e., 4.44 seconds delay plus the 2.17 seconds relay time) for the degraded grid relays to disconnect from the offsite power source when the SIAS signal is present, discuss what happens to those loads that are already sequenced on the safety buses assuming concurrent SIAS and degraded grid conditions. In addition, discuss the operation of the loads if SIAS occurs first in the above scenario and if there may be any problem in re-starting those loads on the DG.

SCE Response:

The response to Question 8 and the DGVSS/SDVS Logic Diagram (Attachment 1) explain that the time delay 162S for DGVSS window opening time delay is started by SIAS and independent of time delay of the degraded grid relay. The Window opens if 162S relay & associated 127D have operated. The window is closed when time delay 162T operates. Thus the DGVSS window opens between 4.11 and 4.49 seconds (4.3 +/- 0.19 sec) and closes between 4.96 and 6.14 sec from initiation of SIAS. All motor loads that were running or started in load group 1 will be tripped if the DGVSS is initiated. Following initiation of a DGVSS, there is an additional time delay of 2.0 ± 0.20 sec. provided for breaker tripping and decaying of voltage at the loads prior to re-energizing. Following the 2 second time delay, the EDG breaker will close provided the bus voltage has decayed to 25% (detected by 127R relays) and the EDG has attained normal voltage and speed. Then the loads of load group 1 will restart and all other loads will start in proper sequence.

The motors are designed for two starts in succession with the motor at ambient temperature or one restart from running temperature condition per parts 12 and 20 of NEMA MG-1. There will be no degradation such that would prevent the restarting of these pumps. Therefore, there is no problem to restart these motors on the EDG.

NRC Question 13:

It was stated in the meeting that on a sustained degraded grid condition, the SDVS will separate safety buses from the offsite power system if the degraded grid conditions are not improved within 130 seconds. Discuss if the plant is tripped under these conditions and indicate, if the plant is tripped, what signal trips the reactor in this scenario. If not, what actions are taken to prevent sequencing of safe shutdown loads on the safety bus when supplied by DG.

SCE Response:

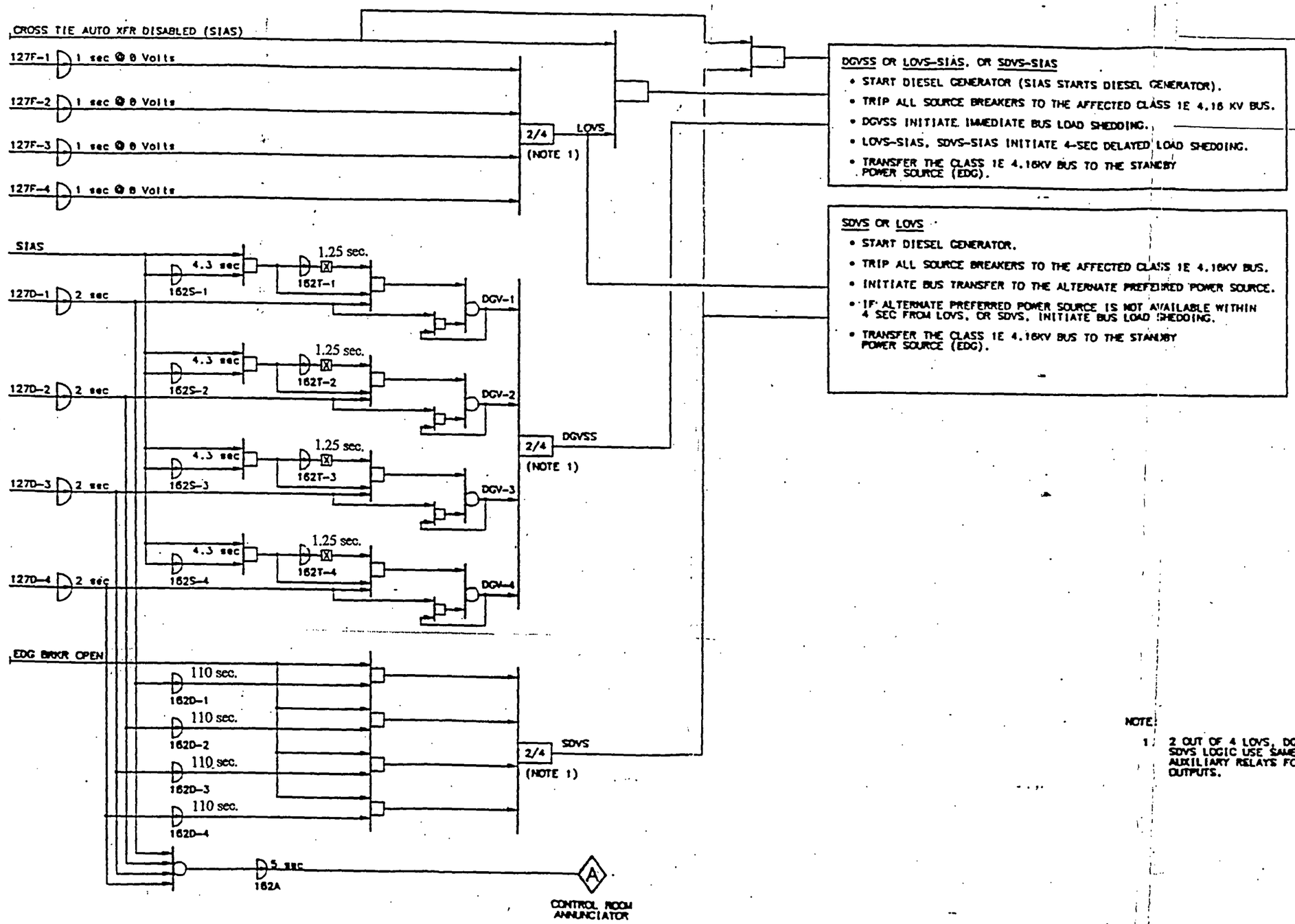
Under a sustained degraded grid condition, the SDVS will separate the safety buses from the switchyard. There is no signal to automatically trip the plant under this condition. After separation of the safety buses following either a degraded grid condition or a loss of offsite power condition, the 4160 Volt buses are stripped of all motor loads and then connected to the diesel generators. If there is no accident, there is no automatic sequencing of loads onto the 4160 Volt or 480V buses. The safe shutdown loads are permanently connected to the 4160 Volt and 480 volt buses with the exception of the Component Cooling, Salt Water Cooling, and Shutdown Cooling (if required) pumps which the operators will manually reconnect onto the buses. In addition, Auxiliary Feed Water Pumps will auto connect if EFAS is present.

In the event of a degraded grid condition, the effects on specific plant loads may cause the operator to manually trip the plant. The last paragraph of SONGS UFSAR section 8.3.1.1.4.6 states "Following diesel start and connection to the Class 1E bus, the required safety-related loads are connected to the bus at programmed time interval as shown in table 8.3-1".

The UFSAR will be revised to clarify that this sentence applies only if an auto actuation signal is present.

Attachment 1

DGVSS/SDVS Logic Diagram



NOTE:

1. 2 OUT OF 4 LOVS, DGVSS AND SDVS LOGIC USE SAME SET OF AUXILIARY RELAYS FOR CONTACT OUTPUTS.

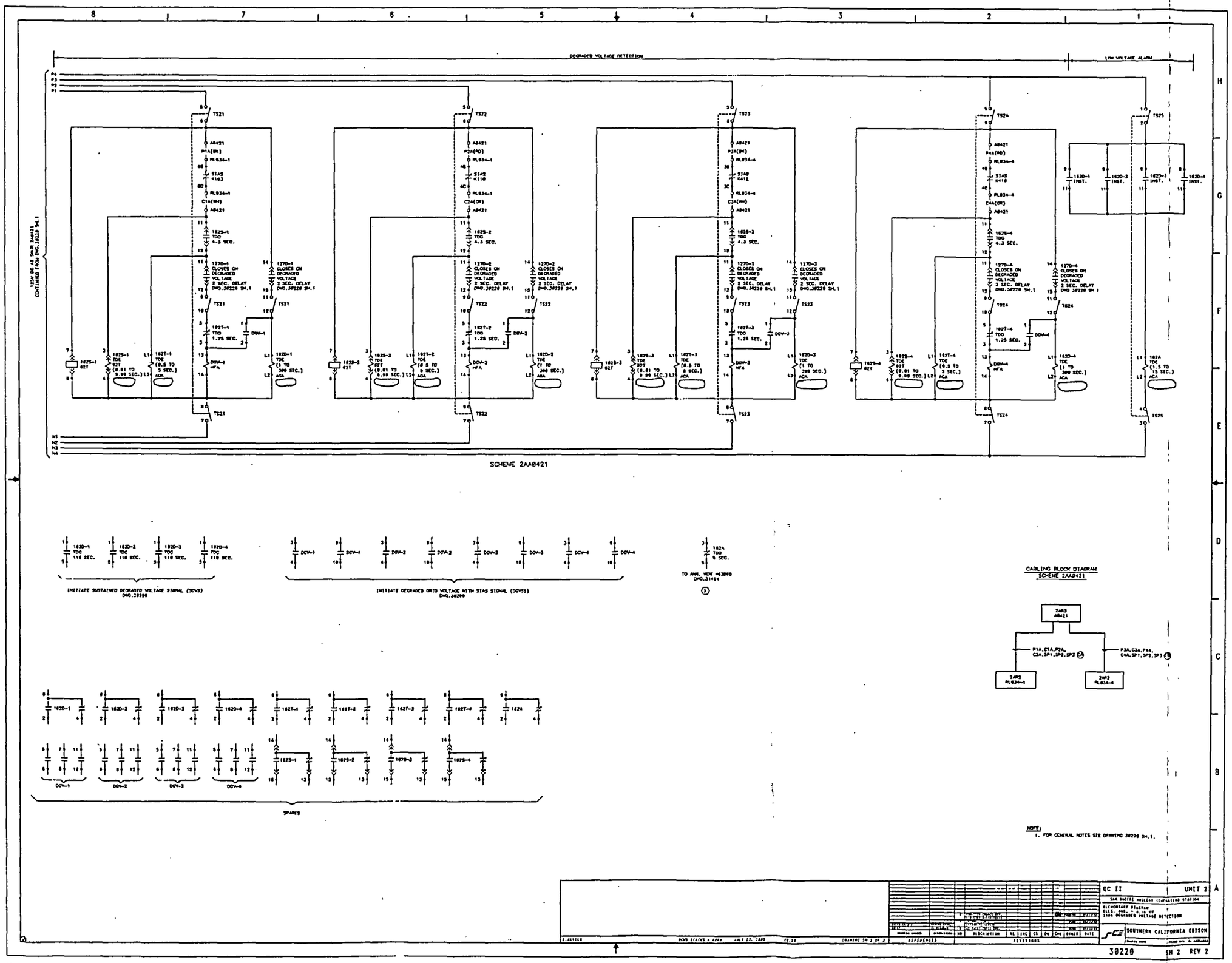
FIG. D-17

Attachment 2

Elementary Diagram,

Electrical Auxiliary – 4.16 kV

3A04 Degraded Voltage Detection



Site File Copy

30220

Attachment 3

Selected Pages of the ETAP Dynamic Stability Report

DYNAMIC STABILITY

Project: E4C-082,R2-ICCN C-51 Sht _____
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation 4.0.4N
Study Case: CASEI.B-A215

Page: 203
Date: 05-24-2005
SN: SCALEDISON
File: Songs23

Section 11.2D - Unit 3 Train A ESP bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
8.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.16	60.8	1.97	0.39	0.40	98.15	62.2
8.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.17	60.8	1.97	0.39	0.40	98.16	62.2
8.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.17	60.8	1.97	0.39	0.40	98.17	62.2
8.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.18	60.8	1.97	0.39	0.40	98.17	62.2
8.501	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.18	60.8	1.97	0.39	0.40	98.18	62.2
8.601	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.19	60.8	1.97	0.39	0.40	98.18	62.2
8.701	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.19	60.8	1.97	0.39	0.40	98.19	62.2
8.801	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.20	60.8	1.97	0.39	0.40	98.20	62.2
8.901	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.21	60.8	1.97	0.39	0.40	98.20	62.2
9.001	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.21	60.8	1.97	0.39	0.40	98.21	62.2
9.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.22	60.8	1.97	0.39	0.40	98.22	62.2
9.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.23	60.8	1.96	0.39	0.40	98.22	62.2
9.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.23	60.8	1.96	0.39	0.40	98.23	62.2
9.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.24	60.8	1.96	0.39	0.40	98.23	62.2
9.501	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.25	60.8	1.96	0.39	0.40	98.24	62.2
9.601	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.25	60.8	1.96	0.39	0.40	98.25	62.2
9.701	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.26	60.8	1.96	0.39	0.40	98.26	62.2
9.801	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.27	60.8	1.96	0.39	0.40	98.27	62.2
9.901	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.28	60.8	1.96	0.39	0.40	98.28	62.1
10.001	100.00	0.06	0.16	96.73	331.3	2.25	0.37	0.37	96.85	58.8	1.96	0.39	0.39	96.85	59.8
10.101	91.26	0.04	0.53	96.62	330.5	2.32	0.37	0.38	96.78	61.5	2.02	0.39	0.40	96.77	62.7
10.201	81.97	0.04	0.53	96.66	322.9	2.32	0.37	0.38	96.81	61.5	2.03	0.39	0.40	96.81	63.0
10.301	72.31	0.04	0.54	96.70	315.1	2.32	0.37	0.38	96.86	61.5	2.02	0.39	0.40	96.85	62.9
10.401	62.43	0.05	0.55	96.76	307.1	2.31	0.37	0.38	96.91	61.5	2.02	0.39	0.40	96.90	62.9
10.501	52.35	0.07	0.57	96.81	298.7	2.31	0.37	0.38	96.96	61.5	2.02	0.39	0.40	96.96	62.9
10.601	42.01	0.10	0.61	96.88	289.0	2.31	0.37	0.38	97.03	61.4	2.02	0.39	0.40	97.02	62.9
10.701	31.10	0.15	0.68	96.97	276.0	2.31	0.37	0.38	97.11	61.4	2.02	0.39	0.40	97.11	62.8
10.801	18.86	0.21	0.79	97.14	250.5	2.30	0.37	0.38	97.27	61.4	2.01	0.39	0.40	97.27	62.8
10.901	5.27	0.28	0.77	97.63	164.4	2.28	0.37	0.38	97.72	61.5	2.00	0.39	0.40	97.71	63.0
11.001	1.20	0.31	0.26	98.19	47.8	2.25	0.37	0.38	98.18	60.9	1.97	0.39	0.40	98.17	62.5
11.101	1.46	0.31	0.32	98.28	52.8	2.25	0.37	0.38	98.28	60.9	1.97	0.39	0.40	98.27	62.2
11.201	1.47	0.31	0.31	98.38	50.9	2.24	0.37	0.38	98.37	60.8	1.96	0.39	0.40	98.37	62.2
11.301	1.45	0.31	0.31	98.48	50.9	2.23	0.37	0.38	98.47	60.7	1.96	0.39	0.40	98.47	62.1
11.401	1.45	0.31	0.31	98.58	50.9	2.23	0.37	0.38	98.57	60.7	1.95	0.39	0.40	98.56	62.1
11.501	1.45	0.31	0.31	98.66	50.9	2.23	0.37	0.38	98.65	60.6	1.95	0.39	0.40	98.64	62.0
11.601	1.45	0.31	0.31	98.72	50.8	2.22	0.37	0.38	98.70	60.6	1.95	0.39	0.40	98.70	62.0
11.701	1.44	0.31	0.31	98.75	50.8	2.22	0.37	0.38	98.74	60.5	1.94	0.39	0.40	98.73	61.9
11.801	1.44	0.31	0.31	98.78	50.8	2.22	0.37	0.38	98.77	60.5	1.94	0.39	0.40	98.76	61.9
11.901	1.44	0.31	0.31	98.80	50.8	2.22	0.37	0.38	98.79	60.5	1.94	0.39	0.40	98.79	61.9
12.001	1.44	0.31	0.31	98.83	50.8	2.22	0.37	0.38	98.82	60.5	1.94	0.39	0.40	98.81	61.9
12.101	1.44	0.31	0.31	98.85	50.8	2.22	0.37	0.38	98.84	60.5	1.94	0.39	0.40	98.83	61.9

ACCELERATION TIME FOR 3P012 (1 sec)

INITIAL COND FOR 3P012 SEE BUS 3A04

FOOT NOTE (2)

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
28.601	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
28.701	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
28.801	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
28.901	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.93	61.8
29.001	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.93	61.8
29.101	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.94	61.8
29.201	1.44	0.31	0.31	98.96	50.7	2.21	0.37	0.38	98.95	60.4	1.94	0.39	0.40	98.94	61.8
29.301	1.44	0.31	0.31	98.97	50.7	2.21	0.37	0.38	98.96	60.4	1.93	0.39	0.40	98.95	61.8
29.401	1.44	0.31	0.31	98.98	50.7	2.21	0.37	0.38	98.97	60.4	1.93	0.39	0.40	98.97	61.8
29.501	1.44	0.31	0.31	99.00	50.7	2.21	0.37	0.38	98.99	60.4	1.93	0.39	0.40	98.99	61.8
29.601	1.44	0.31	0.31	99.03	50.7	2.21	0.37	0.38	99.02	60.4	1.93	0.39	0.40	99.02	61.8
29.701	1.43	0.31	0.31	99.06	50.7	2.21	0.37	0.38	99.05	60.4	1.93	0.39	0.40	99.05	61.8
29.801	1.43	0.31	0.31	99.08	50.7	2.21	0.37	0.38	99.07	60.4	1.93	0.39	0.40	99.06	61.8
29.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.4	1.93	0.39	0.40	99.07	61.7
30.001	1.44	0.31	0.30	96.72	47.5	2.21	0.37	0.37	96.71	57.3	1.93	0.39	0.39	96.71	58.2
30.101	1.51	0.31	0.31	96.48	51.6	2.33	0.37	0.38	96.47	61.6	2.03	0.39	0.40	96.47	62.5
30.201	1.52	0.31	0.31	96.48	51.6	2.33	0.37	0.38	96.47	61.7	2.04	0.39	0.40	96.47	63.1
30.301	1.52	0.31	0.31	96.50	51.7	2.33	0.37	0.38	96.49	61.7	2.04	0.39	0.40	96.48	63.1
30.401	1.51	0.31	0.31	96.52	51.7	2.33	0.37	0.38	96.51	61.7	2.04	0.39	0.40	96.50	63.1
30.501	1.51	0.31	0.31	96.54	51.7	2.33	0.37	0.38	96.53	61.7	2.04	0.39	0.40	96.52	63.1
30.601	1.51	0.31	0.31	96.56	51.7	2.33	0.37	0.38	96.55	61.7	2.04	0.39	0.40	96.54	63.1
30.701	1.51	0.31	0.31	96.58	51.6	2.33	0.37	0.38	96.57	61.6	2.04	0.39	0.40	96.56	63.1
30.801	1.51	0.31	0.31	96.60	51.6	2.33	0.37	0.38	96.59	61.6	2.04	0.39	0.40	96.58	63.1
30.901	1.51	0.31	0.31	96.62	51.6	2.33	0.37	0.38	96.61	61.6	2.03	0.39	0.40	96.60	63.0
31.001	1.51	0.31	0.31	96.63	51.6	2.33	0.37	0.38	96.62	61.6	2.03	0.39	0.40	96.62	63.0
31.101	1.51	0.31	0.31	96.65	51.6	2.33	0.37	0.38	96.64	61.6	2.03	0.39	0.40	96.64	63.0
31.201	1.51	0.31	0.31	96.67	51.6	2.33	0.37	0.38	96.66	61.6	2.03	0.39	0.40	96.66	63.0
31.301	1.51	0.31	0.31	96.69	51.6	2.32	0.37	0.38	96.68	61.6	2.03	0.39	0.40	96.67	63.0
31.401	1.51	0.31	0.31	96.71	51.6	2.32	0.37	0.38	96.70	61.6	2.03	0.39	0.40	96.69	63.0
31.501	1.51	0.31	0.31	96.72	51.6	2.32	0.37	0.38	96.71	61.6	2.03	0.39	0.40	96.71	63.0
31.601	1.51	0.31	0.31	96.74	51.6	2.32	0.37	0.38	96.73	61.6	2.03	0.39	0.40	96.72	63.0
31.701	1.51	0.31	0.31	96.75	51.6	2.32	0.37	0.38	96.75	61.5	2.03	0.39	0.40	96.74	63.0
31.801	1.51	0.31	0.31	96.77	51.6	2.32	0.37	0.38	96.76	61.5	2.03	0.39	0.40	96.75	63.0
31.901	1.51	0.31	0.31	96.79	51.6	2.32	0.37	0.38	96.78	61.5	2.03	0.39	0.40	96.77	63.0
32.001	1.51	0.31	0.31	96.80	51.5	2.32	0.37	0.38	96.79	61.5	2.03	0.39	0.40	96.78	63.0
32.101	1.51	0.31	0.31	96.81	51.5	2.32	0.37	0.38	96.81	61.5	2.02	0.39	0.40	96.80	62.9
32.201	1.50	0.31	0.31	96.83	51.5	2.32	0.37	0.38	96.82	61.5	2.02	0.39	0.40	96.81	62.9
32.301	1.50	0.31	0.31	96.84	51.5	2.32	0.37	0.38	96.83	61.5	2.02	0.39	0.40	96.83	62.9
32.401	1.50	0.31	0.31	96.86	51.5	2.32	0.37	0.38	96.85	61.5	2.02	0.39	0.40	96.84	62.9
32.501	1.50	0.31	0.31	96.87	51.5	2.31	0.37	0.38	96.86	61.5	2.02	0.39	0.40	96.86	62.9
32.601	1.50	0.31	0.31	96.89	51.5	2.31	0.37	0.38	96.88	61.5	2.02	0.39	0.40	96.87	62.9

VOLTAGE DIP FOR 3P012

FOOT NOTE (3)

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
49.101	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.201	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.301	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.401	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.501	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.601	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.701	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.801	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
49.901	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
50.000	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9

FOOT NOTE (4)

POST SEQ FOR 3P012

DYNAMIC STABILITY

Project: E4C-082,R2-ICCN C-51 Sht ____
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation 4.0.4N

Study Case: CASEI.B-A215

Page: 280
Date: 05-24-2005
SN: SCALEDISON
File: Songs23

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
4.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.501	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.601	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.701	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.801	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
4.901	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
5.001	100.00	0.00	0.00	0.00	0.0	100.00	0.01	0.04	75.86	643.0	100.00	0.01	0.04	75.85	642.8
5.101	100.00	0.00	0.00	0.00	0.0	98.16	0.00	0.10	73.62	624.8	98.16	0.00	0.10	73.61	624.7
5.201	100.00	0.00	0.00	0.00	0.0	96.34	0.00	0.10	73.66	618.7	96.34	0.00	0.10	73.64	618.6
5.301	100.00	0.00	0.00	0.00	0.0	94.52	0.00	0.10	73.79	613.4	94.53	0.00	0.10	73.77	613.2
5.401	100.00	0.00	0.00	0.00	0.0	92.71	0.00	0.10	73.96	608.5	92.71	0.00	0.10	73.95	608.4
5.501	100.00	0.00	0.00	0.00	0.0	90.89	0.00	0.10	74.15	603.8	90.90	0.00	0.10	74.13	603.7
5.601	100.00	0.00	0.00	0.00	0.0	89.08	0.00	0.09	74.35	599.4	89.09	0.00	0.09	74.34	599.2
5.701	100.00	0.00	0.00	0.00	0.0	87.28	0.00	0.09	74.62	595.5	87.28	0.00	0.09	74.61	595.4
5.801	100.00	0.00	0.00	0.00	0.0	85.47	0.00	0.09	75.11	593.5	85.47	0.00	0.09	75.10	593.4
5.901	100.00	0.00	0.00	0.00	0.0	83.65	0.00	0.09	75.52	590.9	83.66	0.00	0.09	75.50	590.8
6.001	100.00	0.00	0.00	0.00	0.0	81.84	0.00	0.09	75.68	586.4	81.85	0.00	0.09	75.66	586.3
6.101	100.00	0.00	0.00	0.00	0.0	80.05	0.00	0.09	75.82	581.8	80.06	0.00	0.09	75.80	581.8
6.201	100.00	0.00	0.00	0.00	0.0	78.27	0.00	0.09	75.96	577.4	78.28	0.00	0.09	75.94	577.3
6.301	100.00	0.00	0.00	0.00	0.0	76.50	0.00	0.09	76.09	573.1	76.51	0.00	0.09	76.07	573.0
6.401	100.00	0.00	0.00	0.00	0.0	74.76	0.00	0.09	76.22	568.8	74.77	0.00	0.09	76.20	568.8
6.501	100.00	0.00	0.00	0.00	0.0	73.03	0.00	0.09	76.35	564.7	73.04	0.00	0.09	76.33	564.6
6.601	100.00	0.00	0.00	0.00	0.0	71.32	0.00	0.09	76.47	560.7	71.34	0.00	0.09	76.46	560.6
6.701	100.00	0.00	0.00	0.00	0.0	69.64	0.00	0.09	76.59	556.7	69.65	0.00	0.09	76.58	556.6
6.801	100.00	0.00	0.00	0.00	0.0	67.97	0.00	0.09	76.72	552.9	67.98	0.00	0.09	76.70	552.8
6.901	100.00	0.00	0.00	0.00	0.0	66.32	0.01	0.09	76.83	549.1	66.33	0.01	0.09	76.82	549.1
7.001	100.00	0.00	0.00	0.00	0.0	64.69	0.01	0.09	76.95	545.5	64.71	0.01	0.09	76.93	545.4
7.101	100.00	0.00	0.00	0.00	0.0	63.09	0.01	0.09	77.06	541.9	63.10	0.01	0.09	77.05	541.8
7.201	100.00	0.00	0.00	0.00	0.0	61.50	0.01	0.09	77.17	538.4	61.52	0.01	0.09	77.16	538.3
7.301	100.00	0.00	0.00	0.00	0.0	59.94	0.01	0.09	77.28	535.0	59.95	0.01	0.09	77.27	534.9
7.401	100.00	0.00	0.00	0.00	0.0	58.40	0.01	0.09	77.39	531.6	58.41	0.01	0.09	77.38	531.6
7.501	100.00	0.00	0.00	0.00	0.0	56.87	0.01	0.09	77.50	528.4	56.89	0.01	0.09	77.48	528.3
7.601	100.00	0.00	0.00	0.00	0.0	55.37	0.01	0.09	77.60	525.2	55.38	0.01	0.09	77.59	525.1
7.701	100.00	0.00	0.00	0.00	0.0	53.88	0.01	0.09	77.70	522.0	53.90	0.01	0.09	77.69	522.0
7.801	100.00	0.00	0.00	0.00	0.0	52.42	0.01	0.09	77.81	518.9	52.43	0.01	0.09	77.79	518.9
7.901	100.00	0.00	0.00	0.00	0.0	50.97	0.01	0.09	77.90	515.9	50.99	0.01	0.09	77.89	515.9
8.001	100.00	0.00	0.00	0.00	0.0	49.54	0.01	0.09	78.00	512.9	49.56	0.01	0.09	77.99	512.9

INITIAL COND FOR 3E401 SEE BUS 3B04

VOLTAGE DIP FOR 3E401

FOOT NOTES (5) (6)

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
49.101	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.201	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.301	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.401	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.501	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.601	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.701	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.801	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
49.901	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0
50.000	0.95	0.03	0.03	91.96	48.6	0.77	0.05	0.05	95.73	87.0	0.77	0.05	0.05	95.73	87.0

POST SEQ FOR 3E401

FOOT NOTE (7)

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
4.001	1.78	0.02	0.02	94.69	40.2	99.44	-0.87	0.00	0.00	100.0	92.90	-3.85	0.00	0.00	100.0
4.101	1.78	0.02	0.02	94.71	40.2	99.44	-0.87	0.00	0.00	100.0	92.91	-3.84	0.00	0.00	100.0
4.201	1.78	0.02	0.02	94.72	40.2	99.44	-0.87	0.00	0.00	100.0	92.91	-3.84	0.00	0.00	100.0
4.301	1.78	0.02	0.02	94.73	40.2	99.44	-0.87	0.00	0.00	100.0	92.92	-3.84	0.00	0.00	100.0
4.401	1.78	0.02	0.02	94.74	40.2	99.44	-0.87	0.00	0.00	100.0	92.93	-3.84	0.00	0.00	100.0
4.501	1.78	0.02	0.02	94.75	40.2	99.44	-0.87	0.00	0.00	100.0	92.94	-3.84	0.00	0.00	100.0
4.601	1.77	0.02	0.02	94.75	40.2	99.45	-0.87	0.00	0.00	100.0	92.94	-3.84	0.00	0.00	100.0
4.701	1.77	0.02	0.02	94.76	40.2	99.45	-0.87	0.00	0.00	100.0	92.95	-3.84	0.00	0.00	100.0
4.801	1.77	0.02	0.02	94.77	40.2	99.45	-0.87	0.00	0.00	100.0	92.96	-3.84	0.00	0.00	100.0
4.901	1.77	0.02	0.02	94.78	40.2	99.45	-0.87	0.00	0.00	100.0	92.96	-3.84	0.00	0.00	100.0
5.001	1.80	0.02	0.02	78.80	29.0	97.02	-0.87	0.00	0.00	100.0	77.04	-3.94	0.00	0.00	100.0
5.101	2.69	0.02	0.02	76.61	45.9	96.84	-1.12	0.00	0.00	100.0	75.70	-5.96	0.00	0.00	100.0
5.201	2.87	0.02	0.02	76.55	46.9	96.86	-1.12	0.00	0.00	100.0	75.67	-5.93	0.00	0.00	100.0
5.301	2.85	0.02	0.02	76.62	47.1	96.91	-1.13	0.00	0.00	100.0	75.75	-5.93	0.00	0.00	100.0
5.401	2.84	0.02	0.02	76.74	47.1	96.96	-1.14	0.00	0.00	100.0	75.86	-5.92	0.00	0.00	100.0
5.501	2.83	0.02	0.02	76.88	47.0	97.02	-1.16	0.00	0.00	100.0	76.00	-5.91	0.00	0.00	100.0
5.601	2.82	0.02	0.02	77.04	46.9	97.11	-1.19	0.00	0.00	100.0	76.15	-5.92	0.00	0.00	100.0
5.701	2.80	0.02	0.02	77.28	46.9	97.28	-1.23	0.00	0.00	100.0	76.37	-5.95	0.00	0.00	100.0
5.801	2.77	0.02	0.02	77.74	46.8	97.73	-1.22	0.00	0.00	100.0	76.82	-5.91	0.00	0.00	100.0
5.901	2.73	0.02	0.02	78.14	46.4	98.06	-1.11	0.00	0.00	100.0	77.18	-5.76	0.00	0.00	100.0
6.001	2.72	0.02	0.02	78.25	46.3	98.07	-1.11	0.00	0.00	100.0	77.29	-5.75	0.00	0.00	100.0
6.101	2.71	0.02	0.02	78.36	46.2	98.08	-1.11	0.00	0.00	100.0	77.38	-5.73	0.00	0.00	100.0
6.201	2.70	0.02	0.02	78.45	46.1	98.09	-1.11	0.00	0.00	100.0	77.47	-5.71	0.00	0.00	100.0
6.301	2.69	0.02	0.02	78.55	46.1	98.10	-1.11	0.00	0.00	100.0	77.56	-5.70	0.00	0.00	100.0
6.401	2.68	0.02	0.02	78.64	46.1	98.10	-1.11	0.00	0.00	100.0	77.65	-5.68	0.00	0.00	100.0
6.501	2.68	0.02	0.02	78.73	46.0	98.11	-1.11	0.00	0.00	100.0	77.74	-5.67	0.00	0.00	100.0
6.601	2.67	0.02	0.02	78.82	46.0	98.12	-1.11	0.00	0.00	100.0	77.82	-5.66	0.00	0.00	100.0
6.701	2.66	0.02	0.02	78.91	45.9	98.12	-1.11	0.00	0.00	100.0	77.91	-5.65	0.00	0.00	100.0
6.801	2.65	0.02	0.02	79.00	45.9	98.13	-1.11	0.00	0.00	100.0	77.99	-5.64	0.00	0.00	100.0
6.901	2.65	0.02	0.02	79.09	45.8	98.14	-1.11	0.00	0.00	100.0	78.07	-5.63	0.00	0.00	100.0
7.001	2.64	0.02	0.02	79.18	45.8	98.14	-1.11	0.00	0.00	100.0	78.15	-5.62	0.00	0.00	100.0
7.101	2.63	0.02	0.02	79.26	45.8	98.15	-1.11	0.00	0.00	100.0	78.23	-5.61	0.00	0.00	100.0
7.201	2.63	0.02	0.02	79.35	45.7	98.16	-1.11	0.00	0.00	100.0	78.31	-5.60	0.00	0.00	100.0
7.301	2.62	0.02	0.02	79.43	45.7	98.16	-1.11	0.00	0.00	100.0	78.39	-5.60	0.00	0.00	100.0
7.401	2.62	0.02	0.02	79.52	45.6	98.17	-1.11	0.00	0.00	100.0	78.47	-5.60	0.00	0.00	100.0
7.501	2.61	0.02	0.02	79.60	45.6	98.18	-1.10	0.00	0.00	100.0	78.55	-5.59	0.00	0.00	100.0
7.601	2.60	0.02	0.02	79.68	45.5	98.18	-1.10	0.00	0.00	100.0	78.62	-5.59	0.00	0.00	100.0
7.701	2.60	0.02	0.02	79.76	45.5	98.19	-1.10	0.00	0.00	100.0	78.70	-5.59	0.00	0.00	100.0
7.801	2.59	0.02	0.02	79.84	45.5	98.19	-1.10	0.00	0.00	100.0	78.78	-5.59	0.00	0.00	100.0
7.901	2.59	0.02	0.02	79.92	45.4	98.20	-1.10	0.00	0.00	100.0	78.85	-5.59	0.00	0.00	100.0
8.001	2.58	0.02	0.02	80.00	45.4	98.20	-1.11	0.00	0.00	100.0	78.93	-5.59	0.00	0.00	100.0

INITIAL COND FOR 3E401 BUS 3B04

FOOT NOTE (5)

Section 11.2D - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 215.2 kV.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
8.101	2.57	0.02	0.02	80.08	45.4	98.21	-1.11	0.00	0.00	100.0	79.00	-5.60	0.00	0.00	100.0
8.201	2.57	0.02	0.02	80.16	45.3	98.22	-1.11	0.00	0.00	100.0	79.08	-5.60	0.00	0.00	100.0
8.301	2.56	0.02	0.02	80.24	45.3	98.22	-1.11	0.00	0.00	100.0	79.15	-5.60	0.00	0.00	100.0
8.401	2.56	0.02	0.02	80.32	45.2	98.23	-1.11	0.00	0.00	100.0	79.22	-5.61	0.00	0.00	100.0
8.501	2.55	0.02	0.02	80.40	45.2	98.23	-1.11	0.00	0.00	100.0	79.30	-5.62	0.00	0.00	100.0
8.601	2.54	0.02	0.02	80.48	45.2	98.24	-1.11	0.00	0.00	100.0	79.38	-5.63	0.00	0.00	100.0
8.701	2.54	0.02	0.02	80.57	45.1	98.25	-1.11	0.00	0.00	100.0	79.45	-5.64	0.00	0.00	100.0
8.801	2.53	0.02	0.02	80.65	45.1	98.25	-1.11	0.00	0.00	100.0	79.53	-5.65	0.00	0.00	100.0
8.901	2.53	0.02	0.02	80.73	45.0	98.26	-1.11	0.00	0.00	100.0	79.61	-5.67	0.00	0.00	100.0
9.001	2.52	0.02	0.02	80.82	45.0	98.26	-1.11	0.00	0.00	100.0	79.69	-5.68	0.00	0.00	100.0
9.101	2.52	0.02	0.02	80.91	45.0	98.27	-1.11	0.00	0.00	100.0	79.77	-5.70	0.00	0.00	100.0
9.201	2.51	0.02	0.02	81.00	44.9	98.28	-1.11	0.00	0.00	100.0	79.85	-5.72	0.00	0.00	100.0
9.301	2.50	0.02	0.02	81.09	44.9	98.28	-1.11	0.00	0.00	100.0	79.94	-5.74	0.00	0.00	100.0
9.401	2.50	0.02	0.02	81.19	44.9	98.29	-1.11	0.00	0.00	100.0	80.03	-5.76	0.00	0.00	100.0
9.501	2.49	0.02	0.02	81.29	44.8	98.30	-1.12	0.00	0.00	100.0	80.12	-5.79	0.00	0.00	100.0
9.601	2.48	0.02	0.02	81.39	44.8	98.31	-1.12	0.00	0.00	100.0	80.22	-5.82	0.00	0.00	100.0
9.701	2.48	0.02	0.02	81.50	44.7	98.31	-1.12	0.00	0.00	100.0	80.32	-5.84	0.00	0.00	100.0
9.801	2.47	0.02	0.02	81.62	44.7	98.32	-1.12	0.00	0.00	100.0	80.43	-5.88	0.00	0.00	100.0
9.901	2.46	0.02	0.02	81.75	44.6	98.33	-1.12	0.00	0.00	100.0	80.55	-5.92	0.00	0.00	100.0
10.001	2.46	0.02	0.02	78.82	41.0	96.90	-1.11	0.00	0.00	100.0	77.63	-5.96	0.00	0.00	100.0
10.101	2.68	0.02	0.02	78.41	45.9	96.83	-1.27	0.00	0.00	100.0	77.38	-6.46	0.00	0.00	100.0
10.201	2.70	0.02	0.02	78.55	46.1	96.87	-1.27	0.00	0.00	100.0	77.52	-6.50	0.00	0.00	100.0
10.301	2.68	0.02	0.02	78.75	46.1	96.91	-1.28	0.00	0.00	100.0	77.71	-6.54	0.00	0.00	100.0
10.401	2.66	0.02	0.02	78.98	46.0	96.96	-1.28	0.00	0.00	100.0	77.92	-6.60	0.00	0.00	100.0
10.501	2.65	0.02	0.02	79.24	45.9	97.01	-1.30	0.00	0.00	100.0	78.16	-6.66	0.00	0.00	100.0
10.601	2.62	0.02	0.02	79.54	45.7	97.08	-1.32	0.00	0.00	100.0	78.44	-6.75	0.00	0.00	100.0
10.701	2.60	0.02	0.02	79.91	45.6	97.16	-1.35	0.00	0.00	100.0	78.79	-6.86	0.00	0.00	100.0
10.801	2.56	0.02	0.02	80.42	45.5	97.33	-1.40	0.00	0.00	100.0	79.26	-6.99	0.00	0.00	100.0
10.901	2.51	0.02	0.02	81.27	45.4	97.77	-1.42	0.00	0.00	100.0	80.07	-7.10	0.00	0.00	100.0
11.001	2.43	0.02	0.02	82.38	44.8	98.23	-1.27	0.00	0.00	100.0	81.11	-7.02	0.00	0.00	100.0
11.101	2.36	0.02	0.02	83.41	44.5	98.33	-1.29	0.00	0.00	100.0	82.08	-7.06	0.00	0.00	100.0
11.201	2.28	0.02	0.02	84.66	44.1	98.42	-1.28	0.00	0.00	100.0	83.26	-6.92	0.00	0.00	100.0
11.301	2.19	0.02	0.02	85.98	43.6	98.52	-1.27	0.00	0.00	100.0	84.50	-6.64	0.00	0.00	100.0
11.401	2.12	0.02	0.02	87.23	43.1	98.62	-1.25	0.00	0.00	100.0	85.68	-6.33	0.00	0.00	100.0
11.501	2.06	0.02	0.02	88.31	42.6	98.70	-1.23	0.00	0.00	100.0	86.69	-6.02	0.00	0.00	100.0
11.601	2.03	0.02	0.02	89.05	42.1	98.76	-1.21	0.00	0.00	100.0	87.39	-5.83	0.00	0.00	100.0
11.701	2.01	0.02	0.02	89.51	41.9	98.79	-1.21	0.00	0.00	100.0	87.82	-5.83	0.00	0.00	100.0
11.801	1.99	0.02	0.02	89.87	41.7	98.82	-1.21	0.00	0.00	100.0	88.16	-5.79	0.00	0.00	100.0
11.901	1.97	0.02	0.02	90.23	41.6	98.84	-1.21	0.00	0.00	100.0	88.50	-5.70	0.00	0.00	100.0
12.001	1.96	0.02	0.02	90.55	41.5	98.87	-1.20	0.00	0.00	100.0	88.80	-5.60	0.00	0.00	100.0
12.101	1.94	0.02	0.02	90.82	41.4	98.89	-1.19	0.00	0.00	100.0	89.06	-5.52	0.00	0.00	100.0

INITIAL COND FOR 3P012 BUS 3A04

FOOT NOTE (2)

Attachment 4

Calculation E4C-082, PCCN N-19, "System Dynamic Voltages During DBA"

Southern California Edison Company **INTERIM CALCULATION CHANGE NOTICE (ICCN)/ CALCULATION CHANGE NOTICE (CCN) COVER PAGE** SUMMARY CHANGE ☐ NO ☒ YES	CALC NO. E4C-082	ICCN NO./ PRELIM. CCN NO. N – 19	PAGE 1	TOTAL NO. OF PAGES 75
	BASE CALC. REV. 2	UNIT 3	CCN CONVERSION: CCN NO. CCN-	CALC. REV.
	CALCULATION SUBJECT: SYSTEM DYNAMIC VOLTAGES DURING DBA			
CALCULATION CROSS-INDEX ☒ New/Updated Index Included ☐ Existing Index Is Complete	ENGINEERING SYSTEM NUMBER/PRIMARY STATION SYSTEM DESIGNATOR 1804 & 1805 / PBA-PHJ		Q-CLASS II	
Site Programs / Procedure Impact? ☒ NO ☐ YES, AR No.	CONTROLLED PROGRAM OR DATABASE ACCORDING TO SO123-XXIV-5.1 ☒ PROGRAM ☐ DATABASE	PROGRAM/DATABASE NAME(S) ETAP ☐ ALSO, LISTED BELOW	VERSION/RELEASE NO.(S) 4.04N	
10CFR50.59 / 72.48 Review: AR No. 050500724-5				

1. BRIEF DESCRIPTION OF ICCN/CCN:

1.1 PURPOSE:

Case I.B-A-OR (with overlapping relay timer) of this PCCN evaluates acceptability of minimum design limit voltage of 4106 V (reference E4C-130 ICCN C-7, Table 2.1.4) at the 4 kV bus to meet the base calculation acceptance criteria 1.2.1.

1.2 ACCEPTANCE CRITERIA:

Acceptance criteria 1.2.1 shall apply.

Note:
Case I.B-A-OR analysis is performed only on Unit 3 Train A to support PCN 561. Unit 3 Train A represents the worst case (maximum voltage drop). Hence the results of this analysis are therefore bounding for Unit 2 Train A & B and Unit 3 Train B.

INITIATING DOCUMENT (ECP, OTHER) AR 050301091 - 63 Rev. ____

2. OTHER AFFECTED DOCUMENTS (CHECK AS APPLICABLE FOR CCN ONLY);
☐ YES ☐ NO OTHER AFFECTED DOCUMENTS EXIST AND ARE IDENTIFIED ON ATTACHED FORM 26-503.

3. APPROVED BY:

R. Cabiling / R. Cabiling 6/14/05
ORIGINATOR (Print name/sign/date)
Approval requires PQS T3EN64 Qualification Verified: ____ Initial

W. Lennartz / W. P. Lennartz 6/14/05
IRE (Print name/sign/date)
Approval requires PQS T3EN64 Qualification Verified: ____ Initial

DISCIPLINE / ESC: Electrical / DEO
6/14/05
FLS (Signature/date)
Approval requires PQS T3EN64 Qualification Verified: ____ Initial

4. CONVERSION TO CCN DATE ____ ____ SCE CDM-SONGS

SCE 26-122-1 REV. 8 4/05 [REFERENCE: SO123-XXIV-7.15]

CALCULATION CROSS-INDEX

ICCN NO./ N-19
PRELIM. CCN NO.

CCN CONVERSION:
CCN NO. CCN--

Calculation No. E4C-082

Sheet _____ of _____

Calc. rev. number and responsible FLS initials and date	INPUTS These interfacing calculations and/or documents provide input to the subject calculation, and if revised may require revision of the subject calculation.		OUTPUTS Results and conclusion of the subject calculation are used in these interfacing calculations and/or documents.		Does the output interface calc/document require Change?	Identify output interface calc/document CCN, ECP,TCN/Rev., or tracking number.
	Calc / Document No.	Rev. No.	Calc / Document No.	Rev. No.	YES / NO	
2 Lyn 6/14/05	E4C-090, CCN #117 E4C-130, ICCN C-7	3 1	NONE			

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

1.2 ACCEPTANCE CRITERIA (for reference only)

1.2.1. All ESF motors that are required to mitigate the consequences of a DBA should accelerate to their rated operating speeds within the required response time when supplied from the preferred power supplies under credible worst case (emergency) loading conditions. These motors loads include all ESF motors that are started via automatic sequence and some manually connected loads which are credited in the safety analysis.

The motor terminal voltage during the starting and accelerating period should be adequate such that the corresponding motor torque is constantly more than the load requires, allowing the motor to accelerate to its rated speed. Note that the torque developed by the motor at any speed is directly proportional to the square of the voltage and inversely proportional to the frequency.

2.1 RESULTS

2.1.9.1 CASE I.B-A-OR - Summary of the results are indicated in Tables 2.1.9.1 & 2.1.23.1.

Project or ECP AR 050301091-63 Calc No. E4C-082

Subject SYSTEM DYNAMIC VOLTAGES DURING DBA Sheet ____ of ____

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

ALIGNMENT DIAGRAM FOR CASES I.B-A-OR

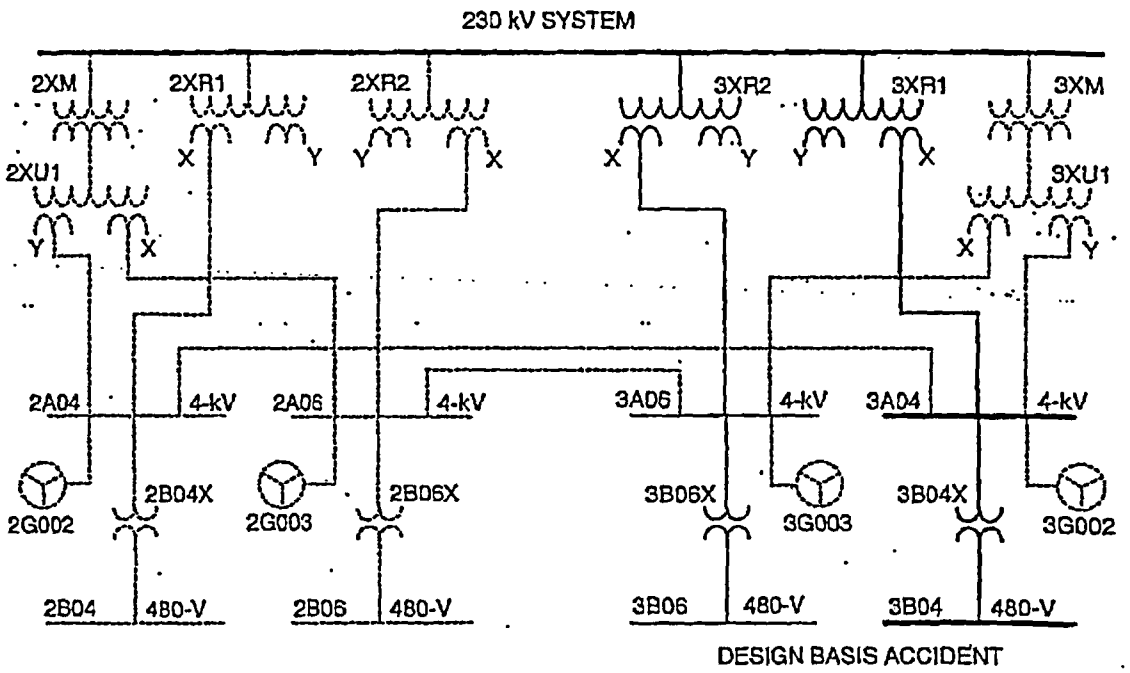


FIGURE 2.1.9.1

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

TABLE 2.1.9.1 – CASE I.B-A-OR SUMMARY OF RESULTS

EQUIPMENT	BASE VOLT (kV)	MINIMUM VOLTAGE						
		T SEC	INITIAL COND		VOLTAGE DIP		POST SEQ	
			P.U.	VOLTS (kV)	P.U.	VOLTS (kV)	P.U.	VOLTS (kV)
4-kV BUS 3A04	4.16	R	0.996	4.14	0.952	3.96	0.987	4.11
AUX BLDG EMERG CHILL E336	4.16	32.5	0.991	4.12	0.950	3.95	0.987	4.11
CNTMT SPRAY PUMP P012	4.16	12.5	0.992	4.13	0.951	3.96	0.987	4.11
AUX FEEDWATER PUMP P141	4.16	32.5	0.991	4.12	0.945	3.93	0.986	4.10
CCW PUMP P024	4.16	R/12.5	0.992	4.13	0.951	3.96	0.987	4.11
CCW PUMP P025	4.16	-	-	-	-	-	-	-
LO PRESS SI PUMP P015	4.16	2.5	0.994	4.14	0.951	3.96	0.987	4.11
HI PRESS SI PUMP P017	4.16	0	0.996	4.14	0.951	3.96	0.987	4.11
HI PRESS SI PUMP P018	4.16	-	-	-	-	-	-	-
SWC PUMP P112	4.16	-	-	-	-	-	-	-
SWC PUMP P307	4.16	R/17.5	0.990	4.12	0.951	3.96	0.987	4.11
NON-1E UPS	4.16	-	-	-	-	-	-	-

NOTES (For information Only)

1. A dashed line in the table indicates loads that are not operating. The "T" column contains the starting time (seconds) during a SIAS with LOVS, or from the initiation of the SIAS signal when LOVS is not present. An R in the starting-time column indicates that the load was running before the accident signal occurred and may be tripped or continues to run during sequencing of ESF loads. An R/2.5 in the starting-time column indicates that the load was running before the accident signal occurred and restarted during sequencing (2.5 seconds) to simulate starting of the motor at its designated starting time. A 12.5+ in the starting-time column indicates that the load started at T=12.5 seconds and has subsequent start after the indicated sequence time as indicated in Table 10.1.

TABLE 2.1.9.1 – CASE I.B-A-OR SUMMARY OF RESULTS (CONT'D)

EQUIPMENT	BASE VOLT (kV)	MINIMUM VOLTAGE						
		T	INITIAL COND		VOLTAGE DIP		POST SEQ	
		SEC	P.U.	VOLTS (kV)	P.U.	VOLTS (kV)	P.U.	VOLTS (kV)
480-V BUS 3B04	0.48	R	0.967	0.464	0.754	0.362	0.917	0.400
PZR HTR E615-E618 (3BHP04)	0.48	-	-	-	-	-	-	-
MCC 3BRA	0.48	R	0.967	0.464	0.753	0.361	0.917	0.400
CHARGING PUMP P191	0.46	R	0.997	0.459	0.772	0.355	0.945	0.435
H2 RECOMBINER E145	0.48	-	-	-	-	-	-	-
MCC 3BD	0.48	R	0.959	0.460	0.685	0.329	0.875	0.420
DSL BLD EMER FAN A274	0.46	12.5+	0.934	0.430	0.711	0.327	0.911	0.419
DSL BLD EMER FAN A275	0.46	12.5+	0.934	0.430	0.706	0.325	0.909	0.418
DSL RADIATOR FAN E550	0.46	12.5	0.934	0.430	0.702	0.323	0.907	0.417
DSL RADIATOR FAN E546	0.46	12.5	0.934	0.430	0.702	0.323	0.908	0.418
UPPER DOME AIR CIRC A071	0.46	R/2.5	0.989	0.455	0.725	0.334	0.942	0.433
CNTMT EMERG FAN E399	0.46	2.5	0.945	0.435	0.733	0.337	0.947	0.436
CNTMT EMERG FAN E401	0.46	2.5	0.945	0.435	0.733	0.337	0.947	0.436
CHARGING PUMP P190	0.46	0	0.989	0.455	0.769	0.354	0.944	0.434
MCC 3BE	0.48	R	0.966	0.464	0.752	0.361	0.915	0.439
MCC 3BY	0.48	R	0.966	0.464	0.751	0.360	0.916	0.440
SPENT FUEL POOL PUMP P009	0.46	R	0.988	0.454	0.768	0.353	0.944	0.434
MCC BQ	0.48	R	0.964	0.463	0.745	0.358	0.911	0.437
CTRL BLDG WTR PUMP P162	0.46	0	0.986	0.454	0.762	0.351	0.938	0.431
CONT RM EMER AC UNIT E418	0.46	2.5	0.945	0.435	0.650	0.299	0.923	0.425
UPPER DOME AIR CIRC A074	0.46	R/2.5	0.989	0.455	0.719	0.331	0.940	0.432

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

TABLE 2.1.23.1-ACCELERATION TIME IN SECONDS FOR UNIT 3 ESF MOTORS FED FROM RAT WITH OUT OF SEQ. STARTING DUE TO OVERLAPPING OPERATION OF RELAY TIMER

UNIT 2	SEQ\ TIME	CASE I.B-A-OR	Ts **	REQ'D ACC TIME *
4-kV MOTOR LOADS				
HIGH PRESSURE SI PUMP 3P017/3P018/3P019	1\0	1.4	1.42	20
LOW PRESSURE SI PUMP 3P015/3P016	2\2.5	0.9	0.92	22.5
CONTAINMENT SPRAY PUMP 3P012/3P013	4\12.5	1.0	0.92	1.9
COMPONENT CLG WTR PUMP 3P024/3P025/3P026	4\12.5	0.9	0.7	2.5
SALTWATER COOLING PUMP 3P112/3P113/3P307/3P114	5\17.5	1.4	0.5	N/A
AUX FEEDWATER PUMP 3P141/3P504	8\32.5	3.8	3.54	8.8
AUX BLDG EMER CHILLER E335/E336	8\32.5	0.7	1.09	N/A
480-V MOTOR LOADS				
CHARGING PUMP 3P190/3P191/3P192	1\0	1.1	N/A	20
CONT EMERGENCY FAN 3E399/3E400/3E401/3E402	2\2.5	6.3	1.3	10.8
DOME AIR CIRC FAN 3A071/3A072/3A073/3A074	2\2.5	7.2	N/A	N/A
CONT ROOM EMER AC UNIT E418/E419	2\2.5	6.5	1.3	N/A
DIESEL BLDG EMER FAN 3A274/3A275/3A276/3A277**	4\12.5	4.8	3	N/A
	5\17.5	4.8		
	6\22.5	4.8		
DIESEL RADIATOR FAN 3E546/3E547/3E549/3E550	4\12.5	3.3	0.8	N/A
CONT BLDG EMER CHILLED WTR PUMP 3P160/3P162	1\0	0.7	0.4	N/A

* From DBD-SO23-TR-PL, Rev. 4, ESF Equipment Response Time (acceleration time acceptance criteria).

** Ts - motor starting time supplied by motor vendor based on rated voltage.

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

2.2 CONCLUSIONS:

The results of the this analysis show that all ESF motors accelerated to their rated speeds and meet the required acceleration time (Table 2.1.23.1). Successful acceleration to their rated speeds indicate that the calculated motor terminal voltages are adequate to maintain the corresponding motors to accelerate to their rated speeds. The motor starting times at the 3A04 bus voltage of 4106 V are longer than the motor starting time at rated voltage.

3.0 ASSUMPTIONS:

See the base calculation for overall assumptions. No additional assumptions are introduced in this ICCN.

4.0 DESIGN DATA:

4.14 Per calculations E4C-130, degraded bus voltage relays 127D-1, 127D-2, 127D-3, and 127D-4 analysis limit is 4106 V.

4.15 Per calculation E4C-090 CCN 117, minimum switchyard voltage is determined to be 215.234 kV with 4106 V at the bus (3A04).

5.0 METHODOLOGY:

5.12

e.1 CASE I.B-A-OR - This case considers a Unit 3 ESF bus alignment for Train A with ESF bus connected to the X-winding of its dedicated Reserve Auxiliary Transformer. A lumped load of 20 MVA is considered in the Y-winding per Section 3.1 of the base calculation. A Design Basis Accident is postulated for Unit 3. This case is established to perform dynamic simulation during the out-of-sequence starting of ESF loads due to a possible overlapping operation of the Agastat relay timer. The most limiting overlap cases were chosen on the basis of maximum loading at the buses. The maximum loading at the buses due to the possible overlapping operation of the Agastat relay timer would occur when operating time tolerance of the Agastat relay is ± 2.5 seconds.

E&TS DEPARTMENT

CALCULATION SHEET

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Subject SYSTEM DYNAMIC VOLTAGES DURING DBA Sheet ____ of ____

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

This case was established to verify voltages at buses & motors, and the capability of motors of Unit 3 to start, based on a predetermined sequence. All ESF loads are operating that are required to mitigate the consequences of a Design Basis Accident (DBA) when connected to the normal preferred power source. Loading sequence is based on Table 10.1, Case I.B-A-OR

The switchyard voltage used in this analysis is 215.234 kV, which corresponds to the design limit voltage of 4106 V at bus 3A04 (reference E4C-090, R3 CCN-117).

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Subject SYSTEM DYNAMIC VOLTAGES DURING DBA

Sheet ____ of ____

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR

THE FOLLOWING ARE THE TABLE AND SECTIONS ATTACHED TO THIS ICCN:

1. Table 10.1 – CASE I.B-A-OR, this load schedule shows the loading sequences.

2. Section 11.9
   a. ETAP Initial Load Flow Report which shows the switchyard voltage.
   b. ETAP Sample 4 kV Dynamic Stability Report for 3P012.
   c. ETAP Sample 480 V Dynamic Stability Report for 3E401.
   d. ETAP Sample Dynamic Stability Report for busses 3A04 & 3B04.
   e. ETAP TS Action Summary Report which shows breaker action for all the loading sequences.
   f. ETAP Transient Stabilty Analysis Graph which shows voltages vesus time for all buses and votages.

Table 10.1 CONT

CASE I.B-A-OR, Unit 3 ESF Load Schedule for Unit 3 Design Basis Accident with Normal Bus Alignment [1]
Out of Seq. Starting of ESF Loads Due to a Possible Overlapping Operation of Agastat Relay Timer

Tag No.	Equipment	Breaker	Initial Condition	Loading Sequence Sequence/Seconds 1/ 0.0	2/ 2.5	3/ 7.5	4/ 12.5	5/ 17.5	6/ 22.5	7/ 27.5	8/ 32.5	Post Accident
3A04	4.16 KV ESF Switchgear											
E335	Aux. Bldg. Chiller (Swing/2A0412)	3A0402	Off	Off	Off	Off	Off	Off	Off	Off	Start	On
3P012	CS Pump	3A0403	Off	Off	Off	Off	Start	On	On	On	On	On
3P141	AFW Pump	3A0404	On	Trip	Off	Off	Off	Off	Off	Off	Start	On
3P024[2,3]	CCW Pump	3A0405	On	On	On	On	Start	On	On	On	On	On
3P025	CCW Pump (Swing/3A0606)	3A0406	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P015	LPSI Pump	3A0407	Off	Off	Start	On	On	On	On	On	On	On
3P017	HPSI Pump	3A0408	Off	Start	On	On	On	On	On	On	On	On
3P018	HPSI Pump (Swing/3A0609)	3A0409	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P112	SWC Pump	3A0410	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P307[2,3]	SWC Pump	3A0411	On	On	On	On	On	Start	On	On	On	On
3T014	Non-1E UPS XFMR	3A0412	On	Trip	Off	Off	Off	Off	Off	Off	Off	Off
3B04	480 V Load Center											
3BHP04	Pressurizer Heater Panel	3B0402	On	Trip	Off	Off	Off	Off	Off	Off	Off	Off
3P191	Charging Pump (Swing/2B0617)	3B0405	On	On	On	On	On	On	On	On	On	On
3E145	H2 Recombiner	3B0406	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3A071[2]	Dome Air Circulator	3B0409	On	On	Start	On	On	On	On	On	On	On
3E399	Containment Emerg. Fan	3B0410	Off	Off	Start	On	On	On	On	On	On	On
3E401	Containment Emerg. Fan	3B0411	Off	Off	Start	On	On	On	On	On	On	On
3P190	Charging Pump	3B0413	Off	Start	On	On	On	On	On	On	On	On
E418	Control Room ACU (Swing/2B0418)	3B0418	Off	Off	Start	On	On	On	On	On	On	On
3A074[2]	Dome Air Circulator	3B0419	On	On	Start	On	On	On	On	On	On	On
3BRA	480 V MCC											
3L707 / 3HV9377	Shutdown Cooling Iso Viv. (3BRB21)	3BRA06	On	On	On	On	On	On	On	On	On	On
3HV0396	Shutdown Clg Cntrl Viv	3BRA13	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV8161	Shutdown Clg Bypass Ctrl.	3BRA15	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV8163	LPSI Pmp. P016 Min. Recirc. Viv.	3BRA16	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3L708	Shutdown Clng Iso Viv. (3BRB06)	3BRA21	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3Q074	480-208/120 Panel	3BRA22	On	On	On	On	On	On	On	On	On	On
3BRASM	Margin for Static Load	3BRAS	On	On	On	On	On	On	On	On	On	On
3BRAMM	Margin for Motor Load	3BRAM	Off	Start	On	On	On	On	On	On	On	On
3BD	480 V MCC (DG)											
3E654	DG Immersion Heater	3BD06	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E655	DG Immersion Heater	3BD07	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3EG002	DG Space Heater	3BD08	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P996 / 3P1015	DG Lube Oil/Turbocharger	3BD10	On	On	On	On	On	On	On	On	On	On
3P997 / 3P1014	DG Lube Oil/Turbocharger	3BD11	On	On	On	On	On	On	On	On	On	On
3A274[4]	Diesel Bldg. Emg. Sup. Fan	3BD12	Off	Off	Off	Off	Start	Start	Start	On	On	On
3A275[4]	Diesel Bldg. Emg. Sup. Fan	3BD13	Off	Off	Off	Off	Start	Start	Start	On	On	On
3P093H	Diesel Fuel Xfr. Pmp. Motor Htr.	3BD18-A	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P096H	Diesel Fuel Xfr. Pmp. Motor Htr.	3BD18-B	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E550H	Diesel Radiator Fan Motor Htr.	3BD18-C	On	On	On	Off	Off	Off	Off	Off	Off	Off

Table 10.1 CONT

CASE I.B-A-OR, Unit 3 ESF Load Schedule for Unit 3 Design Basis Accident with Normal Bus Alignment (1)
Out of Seq. Starting of ESF Loads Due to a Possible Overlapping Operation of Agastat Relay Timer

Tag No.	Equipment	Breaker	Initial Condition	Loading Sequence Sequence/Seconds								Post Accident
				1/ 0.0	2/ 2.5	3/ 7.5	4/ 12.5	5/ 17.5	6/ 22.5	7/ 27.5	8/ 32.5	
3E546H	Diesel Radiator Fan Motor Htr.	3BD18-D	On	On	On	Off	Off	Off	Off	Off	Off	Off
3E550	Diesel Radiator Fan	3BD21	Off	Off	Off	Off	Start	On	On	On	On	On
3E546	Diesel Radiator Fan	3BD22	Off	Off	Off	Off	Start	On	On	On	On	On
3P093	Diesel Fuel Transfer Pmp.	3BD23	Off	Start	On	On	On	On	On	On	On	On
3P096	Diesel Fuel Transfer Pmp.	3BD24	Off	Start	On	On	On	On	On	On	On	On
3Q020	480-208/120 Panel	3BD26	On	On	On	On	On	On	On	On	On	On
3BDSM	Margin for Static Load	3BDS	On	On	On	On	On	On	On	On	On	On
3BDMM	Margin for Motor Load	3BDM	Off	Start	On	On	On	On	On	On	On	On
3BE	480 V MCC											
3RU7822	FHB Airborne Monitor	3BE02	On	On	On	On	On	On	On	On	On	On
3E464	FHB Emerg. Htr.	3BE03	On	On	On	On	On	On	On	On	On	On
3B003	125 V Battery Charger D3	3BE04	On	On	On	On	On	On	On	On	On	On
3HV4713	AFW to Steam Gen. Control	3BE06	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9334	SI Tank Drain to RWST	3BE09	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV9350	SI Tank T007 To RC Loop 1B	3BE10	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9360	SI Tank T009 To RC Loop 2A	3BE11	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9325	LPSI Hdr. To RC Loop 1B	3BE14	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9328	LPSI Hdr. To RC Loop 2A	3BE15	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9201	Aux. Spray To Pressurizer	3BE17	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9327	HPSI Hdr. To RC Loop 1B	3BE18	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9330	HPSI Hdr. To RC Loop 2A	3BE19	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV6223	CCW Cntnm Inlet Iso.	3BE21	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV9324	HPSI Hdr. To RC Loop 1A	3BE22	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9333	HPSI Hdr. To RC Loop 2B	3BE23	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV9337	Shtdwn Flow Frm RC Loop 2	3BE25	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV0516	RC Drain Tank Cntnm Iso	3BE26	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV7512	Cntnm Iso RC Drain To Rdwst	3BE27	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV9367	Shutdown Ht Exch. To Spray Hdr 1	3BE29	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV0514	Quench Tk Vap Smpl Cntnm Iso	3BE30	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV5803	Cntnm Sump To Rdwst. Sump	3BE31	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV9949	Containment Purge Inlet	3BE33	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9305	Cntnm Emerg Sump Outlet	3BE35	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV4731	AFW To Steam Gen. E089 Iso	3BE36	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV8150	Shtdwn Clg. Sys Ht Exch. Outlet	3BE38	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV8152	Shtdwn Clng Sys Ht Exch. Inlet	3BE39	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3RU7804	Containment Airborne Mon.	3BE41	On	On	On	On	On	On	On	On	On	On
3L266	BA Make-Up Heat Trace Pnl	3BE42	On	On	On	On	On	On	On	On	On	On
3HV6366	CCW To Emg Cooling Unit	3BE44	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV6367	CCW To Emg Cooling Unit	3BE45	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3HV6236	CCW Non Critical Cntnm Iso	3BE46	Off	Close	Close	Close	Close	Close	Close	Close	Close	Close
3HV6370	CCW To Emg Clng Unit	3BE47	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV6371	CCW To Emg Clng Unit	3BE48	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3E652	Post Accident Cleanup Unit	3BE49	On	On	On	On	On	On	On	On	On	On
3Q063	Vital Bus Backup Panel	3BE51	On	On	On	On	On	On	On	On	On	On
3BESM	Margin for Static Load	3BES	On	On	On	On	On	On	On	On	On	On
3BEMM	Margin for Motor Load	3BEM	Off	Start	On	On	On	On	On	On	On	On

Table 10.1 CONT

CASE I.B-A-OR, Unit 3 ESF Load Schedule for Unit 3 Design Basis Accident with Normal Bus Alignment [1]
Out of Seq. Starting of ESF Loads Due to a Possible Overlapping Operation of Agastat Relay Timer

Tag No.	Equipment	Breaker	Initial Condition	Loading Sequence Sequence/Seconds								Post Accident
				1/ 0.0	2/ 2.5	3/ 7.5	4/ 12.5	5/ 17.5	6/ 22.5	7/ 27.5	8/ 32.5	
3BY	480 V MCC											
3B001	125 V Battery Charger D1	3BY03	On	On	On	On	On	On	On	On	On	On
3A370	Intake Structure Clng. Fan	3BY07	Off	Start	On	On	On	On	On	On	On	On
3A373	Intake Structure Clng. Fan	3BY08	Off	Start	On	On	On	On	On	On	On	On
3HV9306	SI Pmp. Mini Flow	3BY09	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P1018	CCW Seismic Makeup Pmp. P1018	3BY10	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E439	BA Makeup Emg. ACU	3BY11	Off	Start	On	On	On	On	On	On	On	On
3E440	BA Makeup Emg. ACU	3BY12	Off	Start	On	On	On	On	On	On	On	On
3HV9307	SI Pmp. Mini Flow	3BY13	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P174	BA Makeup Pmp. P174	3BY14	On	On	On	On	On	On	On	On	On	On
3P175	BA Makeup Pmp. P175	3BY15	Off	Start	On	On	On	On	On	On	On	On
3HV9247	BA Pmps to Chrg Pmp. Suction	3BY16	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
LP35A	CR Essential Lighting Panel	3BY19	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E437	Charging Pmp. Area Emergency ACU	3BY20	Off	Start	On	On	On	On	On	On	On	On
3E438	Charging Pmp. Area Emergency ACU	3BY21	Off	Start	On	On	On	On	On	On	On	On
3E427	CR Cabinet Emergency ACU	3BY22	Off	Start	On	On	On	On	On	On	On	On
3L411	EPPM Panel	3BY23	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E417	SEB Emergency ACU	3BY24	Off	Start	On	On	On	On	On	On	On	On
3E517	SEB Emergency ACU	3BY25	Off	Start	On	On	On	On	On	On	On	On
3HV9378	Shutdown Clng Flow to LPSI	3BY26	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9353	Shutdown Clng Warm-up	3BY27	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9303	Cntnm Emerg Sump Outlet	3BY28	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9420	HPSI Hdr To RC Loop 2	3BY29	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E453	CCW Bldg. Pmp. Room Emg ACU	3BY30	Off	Start	On	On	On	On	On	On	On	On
3E454	CCW Bldg. Pmp. Room Emg ACU	3BY31	Off	Start	On	On	On	On	On	On	On	On
3Q071/ 2/3Q072	Panels	3BY33	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P009	Spent Fuel Pool Pump	3BY34	On	On	On	On	On	On	On	On	On	On
3HV6497	SW From CCW Heat Exchg	3BY35	Off	Open	Open	Open	Open	Open	Open	Open	Open	Open
3A394	FW Pmp. Room Fan	3BY36	Off	Start	On	On	On	On	On	On	On	On
3E441	FHB Emergency ACU	3BY37	Off	Start	On	On	On	On	On	On	On	On
3E370	FHB Accident ACU	3BY38	Off	Start	On	On	On	On	On	On	On	On
3P015H	LPSI Pmp. Motor Htr.	3BY39-A	On	On	Off	Off	Off	Off	Off	Off	Off	Off
3P017H	HPSI Pmp. Motor Htr.	3BY39-B	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P018H	HPSI Pmp. Motor Htr.	3BY39-C	On	On	On	On	On	On	On	On	On	Off
3P112H	SWC Pmp. Motor Htr.	3BY39-D	On	On	On	On	On	On	On	On	On	On
3P307H	SWC Pmp. Motor Htr.	3BY39-E	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E370H	FHB ACU Motor Htr.	3BY39-F	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P1018H	PPMU to CCW Makeup Pmp Htr	3BY39-G	On	On	On	On	On	On	On	On	On	On
3P141H	AFW Pmp. Motor Htr.	3BY39-H	Off	On	On	On	On	On	On	Off	Off	Off
3P012H	Cntmnt Spray Pmp. Motor Htr.	3BY40-A	On	On	On	Off	Off	Off	Off	Off	Off	Off
3E399H	CB Emrg. ACU Motor Htr.	3BY40-B	On	On	Off	Off	Off	Off	Off	Off	Off	Off
3P174H	BA Makeup Pmp. Motor Htr.	3BY40-C	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P175H	BA Makeup Pmp. Motor Htr.	3BY40-D	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3P191H	Charging Pmp. Motor Htr.	3BY40-E	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3E401H	CB Emrg. ACU Motor Htr.	3BY40-F	On	On	Off	Off	Off	Off	Off	Off	Off	Off

Table 10.1 CONT

CASE I.B-A-OR, Unit 3 ESF Load Schedule for Unit 3 Design Basis Accident with Normal Bus Alignment (1)
Out of Seq. Starting of ESF Loads Due to a Possible Overlapping Operation of Agastat Relay Timer

Tag No.	Equipment	Breaker	Initial Condition	Loading Sequence Sequence/Seconds								Post Accident
				1/ 0.0	2/ 2.5	3/ 7.5	4/ 12.5	5/ 17.5	6/ 22.5	7/ 27.5	8/ 32.5	
3P190H	Charging Pmp. Motor Htr.	3BY40-G	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
3HV9300	RWST East Outlet	3BY41	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3Q039	480-208/120 Panel	3BY42	On	On	On	On	On	On	On	On	On	On
3BYSM	Margin for Static Load	3BYS	On	On	On	On	On	On	On	On	On	On
3BYMM	Margin for Motor Load	3BYM	Off	Start	On	On	On	On	On	On	On	On
BQ	480 V MCC											
E297	CB Rmg Vent Elect Htr. E297	BQ04	On	On	On	On	On	On	On	On	On	On
2L270	Cntnm Spray Chem HT Pnl	BQ05	On	On	On	On	On	On	On	On	On	On
3L270	Cntnm Spray Chem HT Pnl	BQ06	On	On	On	On	On	On	On	On	On	On
2A173	Battery Room Emg Exh Fan	BQ07	On	On	On	On	On	On	On	On	On	On
2E255	ESF Swgr Rm Emrg ACU	BQ08	On	On	On	On	On	On	On	On	On	On
A207	CR Emg Supply Fan	BQ09	Off	Start	On	On	On	On	On	On	On	On
L437	HP Comp HVAC Panel	BQ11	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
L211-1	Emerg Siren Control Panel	BQ13	On	On	On	On	On	On	On	On	On	On
3A173	Battery Rm Emrg Exh Fan	BQ14	Off	Start	On	On	On	On	On	On	On	On
3E255	ESF Swgr Rm Emerg ACU	BQ15	Off	Start	On	On	On	On	On	On	On	On
P445	Chiller E336 Oil Pump	BQ20	Off	Start	On	On	On	On	On	On	On	On
A053	CB Chiller Rm Supply Fan	BQ22	Off	Start	On	On	On	On	On	On	On	On
A056	CB Chiller Rm Exhaust Fan	BQ23	Off	Start	On	On	On	On	On	On	On	On
P162	CB Emrg. Chilled Wtr Pump	BQ24	Off	Start	On	On	On	On	On	On	On	On
W310	Chiller E336 Pumpout	BQ25	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
L211-4	Emer Siren Control Panel	BQ26	On	On	On	On	On	On	On	On	On	On
Q033	480-208/120 Panel	BQ27	On	On	On	On	On	On	On	On	On	On
BQSM	Margin for Static Load	BQS	On	On	On	On	On	On	On	On	On	On
BQMM	Margin for Motor Load	BQM	Off	Start	On	On	On	On	On	On	On	On

(1) Unit 3 ESF busses are connected to Unit 3 Reserve Auxiliary Transformers.
(2) Re-started during sequencing to simulate starting of the motor as its designated starting time.
(3) Pump is postulated as operating because of its longer feeder cable.
(4) For description of multiple start methodology see section 5.13.

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 15 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASE1.B-A-DR

Page: 7B
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information			Voltage		Generation		Motor Load		Static Load		Load Flow					XFRM
ID :	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	% Tap
2A173B	Load	0.46	99.67	-3.0	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	4	67.7	
											2A173	0.00	0.00	4	67.7	
2E255B	Load	0.46	99.67	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	BQ	-0.01	-0.01	10	79.5	
											2E255	0.01	0.01	10	79.5	
*2G002 BUS	Swng	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	2G002	0.00	0.00	0	0.0	
*2G003 BUS	Swng	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	2G003	0.00	0.00	0	0.0	
2L270B	Load	0.48	95.05	-3.1	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	5	85.0	
3A04	Load	4.16	99.61	-1.0	0.00	0.00	0.00	0.00	0.00	0.00	3P141B	0.69	0.33	106	89.9	
											3PD24B	0.47	0.23	72	89.5	
											3F307B	0.33	0.24	57	81.1	
											3B04XHS	0.69	0.34	107	89.6	
											3T024, NON1E	0.13	0.08	20	85.0	
											3XR1-X	-2.30	-1.23	363	88.3	
3A071-3BLP03	Load	0.48	96.19	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.05	-0.03	69	81.1	
											3BP09-3A071	0.05	0.03	69	81.1	
3A071B	Load	0.46	99.33	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BP09-3A071	-0.04	-0.03	69	81.0	
											3A071	0.04	0.03	69	81.0	
3A074-3BLP03	Load	0.48	96.21	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.05	-0.03	69	81.2	
											3BP11-3A074	0.05	0.03	69	81.2	
3A074B	Load	0.46	99.14	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BP11-3A074	-0.04	-0.03	69	81.0	
											3A074	0.04	0.03	69	81.0	
3B001B	Load	0.48	96.22	-3.5	0.00	0.00	0.00	0.00	0.04	0.03	3BY	-0.04	-0.03	64	80.0	
3B003B	Load	0.48	96.25	-3.4	0.00	0.00	0.00	0.00	0.04	0.03	3BE	-0.04	-0.03	64	80.0	
3B04	Load	0.48	95.71	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BRA	0.01	0.01	19	85.5	
											3F191-3DB041	0.06	0.05	91	78.6	
											3BD	0.04	0.01	50	96.0	
											3A071-3BLP03	0.05	0.03	69	81.2	
											3BE	0.10	0.05	134	88.4	
											3BY	0.14	0.08	197	85.3	
											BQ	0.06	0.04	85	85.1	
											3A074-3BLP03	0.05	0.03	69	81.3	

* Regulated (constant voltage) buses.

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Project: E4C-082,R2-PCCN N-19 Sht 16 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information			Voltage		Generation		Motor Load		Static Load		Load Flow					XFRM
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	& Tap
											3E128(3BHP04	0.19	0.00	241	100.0	
											3B04XHS	-0.68	-0.30	930	91.5	
3B04XHS	Load	4.16	99.59	-1.0	0.00	0.00	0.00	0.00	0.00	0.00	3A04	-0.69	-0.34	107	89.6	
											3B04	0.69	0.34	107	89.6	
3BD	Load	0.48	95.91	-3.8	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.04	-0.01	50	96.2	
											3P996/3P1015	0.00	0.00	3	70.4	
											3P997/3P1014	0.00	0.00	3	70.3	
											3BDSMB	0.00	0.00	4	85.3	
											3T020B	0.01	0.01	12	85.0	
											3E654(X)B	0.01	0.00	12	100.0	
											3E655(X)B	0.01	0.00	12	100.0	
											3EG002(X)B	0.00	0.00	1	100.0	
											3BD18 HTRS	0.00	0.00	2	100.0	
3BD18 HTRS	Load	0.48	95.91	-3.8	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	2	100.0	
3BDSMB	Load	0.48	95.12	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	4	85.0	
3BE	Load	0.48	96.62	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.10	-0.05	134	88.6	
											3RU7822-1B	0.00	0.00	1	85.2	
											3E464B	0.02	0.00	24	100.0	
											3B0D3B	0.04	0.03	64	80.1	
											3Q063B	0.01	0.01	21	85.0	
											3RU7804-1B	0.00	0.00	1	85.1	
											3L266B	0.01	0.01	15	85.2	
											3E652B	0.00	0.00	3	100.0	
											3BESMB	0.00	0.00	4	86.2	
3BESMB	Load	0.48	95.81	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	4	85.0	
3BP09-3A071	Load	0.48	95.99	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3A071-3BLP03	-0.05	-0.03	69	81.1	
											3A071B	0.05	0.03	69	81.1	
3BP11-3A074	Load	0.48	96.00	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3A074-3BLP03	-0.05	-0.03	69	81.2	
											3A074B	0.05	0.03	69	81.2	
3BRA	Load	0.48	96.69	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.01	-0.01	19	85.6	
											3L707-3BRA06	0.00	0.00	1	90.0	
											3T074B	0.01	0.01	13	85.0	
											3BRASMB	0.00	0.00	4	85.3	

* Regulated (constant voltage) buses.

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Project: E4C-082,R2-PCCN N-19 Sht 17 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 80
Date: 06-13-2005
SN: SCALEDISCN
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information			Voltage		Generation		Motor Load		Static Load		Load Flow					XFRM
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	% Tap
3BRASMB	Load	0.48	95.89	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BRA	0.00	0.00	4	85.0	
3BY	Load	0.48	96.61	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.14	-0.08	197	85.3	
											3B001B	0.04	0.03	64	80.1	
											3P174B	0.02	0.01	32	85.0	
											3P009B	0.02	0.01	33	86.3	
											3T039B	0.02	0.01	26	85.0	
											3BYSMB	0.00	0.00	4	85.3	
											LP35A(X)-B	0.00	0.00	4	85.1	
											3L411(X)B	0.00	0.00	0	0.0	
											3T110/3Q071(	0.01	0.01	21	85.3	
											3BY39 HTRS	0.01	0.00	7	100.0	
											3BY40 HTRS	0.00	0.00	3	100.0	
3BY39 HTRS	Load	0.48	96.61	-3.5	0.00	0.00	0.00	0.00	0.01	0.00	3BY	-0.01	0.00	7	100.0	
3BY40 HTRS	Load	0.48	96.61	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	3	100.0	
3BYSMB	Load	0.48	95.81	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	4	85.0	
3E12B(3EHP04	Load	0.48	95.63	-4.1	0.00	0.00	0.00	0.00	0.19	0.00	3B06	-0.19	0.00	241	100.0	
3E464B	Load	0.48	95.80	-3.6	0.00	0.00	0.00	0.00	0.02	0.00	3BE	-0.02	0.00	24	100.0	
3E652B	Load	0.48	95.45	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	3	-100.0	
3E654(X)B	Load	0.48	95.36	-3.8	0.00	0.00	0.00	0.00	0.01	0.00	3BD	-0.01	0.00	12	-100.0	
3E555(X)B	Load	0.48	94.94	-3.8	0.00	0.00	0.00	0.00	0.01	0.00	3BD	-0.01	0.00	12	-100.0	
3EG002(X)B	Load	0.48	95.80	-3.8	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	1	100.0	
*3G002 BUS	Swng	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	3G002	0.00	0.00	0	0.0	
*3G003 BUS	Swng	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	3G003	0.00	0.00	0	0.0	
3L256B	Load	0.48	95.73	-3.2	0.00	0.00	0.00	0.00	0.01	0.01	3BE	-0.01	-0.01	15	85.0	
3L270B	Load	0.48	94.31	-2.8	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	5	85.0	
3L411(X)B	Load	0.48	96.56	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	0	0.0	

* Regulated (constant voltage) buses.

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 18 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 81
Date: 05-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information		Voltage			Generation		Motor Load		Static Load		Load Flow					XFRM
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	% Tap
3L707-3BRA06	Load	0.48	96.60	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BRA	0.00	0.00	1	90.0	
											3L707X-3L707	0.00	0.00	1	90.0	
3L707X-3L707	Load	0.48	96.60	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3L707-3BRA06	0.00	0.00	1	90.0	
3P009B	Load	0.46	99.69	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3BY	-0.02	-0.01	33	86.1	
											3P009	0.02	0.01	33	86.1	
3P024B	Load	4.16	99.54	-1.0	0.00	0.00	0.00	0.00	0.00	0.00	3AD4	-0.47	-0.23	72	89.5	
											3P024	0.47	0.23	72	89.5	
3P141B	Load	4.16	99.45	-1.0	0.00	0.00	0.00	0.00	0.00	0.00	3AD4	-0.68	-0.33	106	89.9	
											3P141	0.68	0.33	106	89.9	
3P174B	Load	0.46	99.04	-3.0	0.00	0.00	0.00	0.00	0.00	0.00	3BY	-0.02	-0.01	32	84.5	
											3P174	0.02	0.01	32	84.5	
3P191-3DBD41	Load	0.46	99.81	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BD4	-0.06	-0.04	91	78.5	
											3P191A-B	0.06	0.04	91	78.5	
3P191A-B	Load	0.46	99.70	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3P191-3DBD41	-0.06	-0.04	91	78.5	
											3P191-A	0.06	0.04	91	78.5	
3P307B	Load	4.16	99.54	-1.0	0.00	0.00	0.00	0.00	0.00	0.00	3AD4	-0.33	-0.24	57	81.1	
											3P307	0.33	0.24	57	81.1	
3P996/3P1D15	Load	0.46	99.88	-3.7	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	3	70.2	
											3P996/3P1D15	0.00	0.00	3	70.2	
3P997/3P1D14	Load	0.46	99.87	-3.7	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	3	70.2	
											3P997/3P1D14	0.00	0.00	3	70.2	
3QD63B	Load	0.48	96.61	-3.5	0.00	0.00	0.00	0.00	0.01	0.01	3BE	-0.01	-0.01	21	85.0	
3RU7804-1B	Load	0.46	100.48	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	1	85.0	
3RU7822-1B	Load	0.48	96.06	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	1	85.0	
3T014, NON1E	Load	4.16	99.58	-1.0	0.00	0.00	0.00	0.00	0.13	0.08	3AD4	-0.13	-0.08	20	85.0	
3T020B	Load	0.48	95.90	-3.8	0.00	0.00	0.00	0.00	0.01	0.01	3BD	-0.01	-0.01	12	85.0	

* Regulated (constant voltage) buses.

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 19 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASE1.B-A-CR

Page: 82
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information			Voltage		Generation		Motor Load		Static Load		Load Flow					XFRM
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	% Tap
3T039B	Load	0.48	96.60	-3.5	0.00	0.00	0.00	0.00	0.02	0.01	3BY	-0.02	-0.01	26	85.0	
3T074B	Load	0.48	96.68	-3.5	0.00	0.00	0.00	0.00	0.01	0.01	3BRA	-0.01	-0.01	13	85.0	
3T110/3Q071(	Load	0.48	95.14	-3.2	0.00	0.00	0.00	0.00	0.01	0.01	3BY	-0.01	-0.01	21	85.0	
3XR1-X	Load	4.16	99.71	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04	2.31	1.23	363	88.2	
											3XR1-Y	-2.31	-1.23	363	88.2	
											& SWYRD U3					
3XR1-Y	Load	4.16	95.63	-4.0	0.00	0.00	13.60	8.43	3.11	1.93	SWYRD U3	-16.71	-10.36	2852	85.0	
											& 3XR1-X					
BQ	Load	0.48	96.35	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	E297B	0.00	0.00	4	100.0	
											2L270B	0.00	0.00	5	85.4	
											3L270B	0.00	0.00	5	85.6	
											2A173B	0.00	0.00	4	68.4	
											2E255B	0.01	0.01	10	79.8	
											L211-1B	0.01	0.01	16	85.1	
											L211-4B	0.01	0.01	16	85.1	
											BQSMB	0.00	0.00	4	85.3	
											T033B	0.01	0.01	13	85.0	
											L437(X)B	0.00	0.00	6	85.2	
											3BD4	-0.06	-0.04	85	85.1	
BQSMB	Load	0.48	95.56	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	4	85.0	
E297B	Load	0.48	94.84	-3.6	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	4	100.0	
L211-1B	Load	0.48	96.12	-3.5	0.00	0.00	0.00	0.00	0.01	0.01	BQ	-0.01	-0.01	16	85.0	
L211-4B	Load	0.48	96.04	-3.4	0.00	0.00	0.00	0.00	0.01	0.01	BQ	-0.01	-0.01	16	85.0	
L437(X)B	Load	0.48	95.58	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	6	85.0	
LP35A(X)-B	Load	0.48	96.37	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	4	85.0	
*SWYRD	Swng	230.00	93.58	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	SWYRD U3	19.09	13.35	62	81.9	
											U2 or U3 ON	-19.09	-13.35	62	81.9	
SWYRD U3	Load	230.00	93.58	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	SWYRD	-19.09	-13.35	62	81.9	

* Regulated (constant voltage) buses.

CCN No. _____

Project: E4C-D82,R2-PCCN N-19 Sht 20 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

INITIAL LOAD FLOW
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Bus/Machine Information			Voltage		Generation		Motor Load		Static Load		Load Flow					XFRM
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	% Tap
											3XR1-X & 3XR1-Y	19.09	13.35	62	81.9	-2.500
T033B	Load	0.48	96.35	-3.5	0.00	0.00	0.00	0.00	0.01	0.01	BQ	-0.01	-0.01	13	85.0	
2G002	SynG	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	2G002 BUS	0.00	0.00	0	0.0	
2G003	SynG	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	2G003 BUS	0.00	0.00	0	0.0	
3G002	SynG	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	3G002 BUS	0.00	0.00	0	0.0	
3G003	SynG	4.36	100.46	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	3G003 BUS	0.00	0.00	0	0.0	
U2 or U3 CN	Utly	230.00	93.69	0.0	19.09	13.40	0.00	0.00	0.00	0.00	SWYRD	19.09	13.40	62	81.9	
3P024	IndM	4.16	91.34	-12.3	0.00	0.00	0.46	0.13	0.00	0.00	3P024B	-0.46	-0.13	72	96.5	
3P141	IndM	4.16	91.78	-12.1	0.00	0.00	0.68	0.18	0.00	0.00	3P141B	-0.68	-0.18	106	96.7	
3P307	IndM	4.16	81.54	-17.3	0.00	0.00	0.32	0.11	0.00	0.00	3P307B	-0.32	-0.11	57	94.3	
2A173	IndM	0.46	88.88	-9.8	0.00	0.00	0.00	0.00	0.00	0.00	2A173B	0.00	0.00	4	75.9	
2E255	IndM	0.46	86.72	-16.2	0.00	0.00	0.01	0.00	0.00	0.00	2E255B	-0.01	0.00	10	51.1	
3A071	IndM	0.46	89.17	-11.5	0.00	0.00	0.04	0.02	0.00	0.00	3A071B	-0.04	-0.02	69	88.5	
3A074	IndM	0.46	88.99	-11.5	0.00	0.00	0.04	0.02	0.00	0.00	3A074B	-0.04	-0.02	69	88.6	
3P009	IndM	0.46	89.24	-15.0	0.00	0.00	0.02	0.01	0.00	0.00	3P009B	-0.02	-0.01	33	94.6	
3P174	IndM	0.46	84.36	-18.4	0.00	0.00	0.02	0.01	0.00	0.00	3P174B	-0.02	-0.01	32	95.7	
3P191-A	IndM	0.46	88.09	-13.0	0.00	0.00	0.06	0.03	0.00	0.00	3P191A-B	-0.06	-0.03	91	87.7	
3P996/3P1015	IndM	0.46	81.62	-13.9	0.00	0.00	0.00	0.00	0.00	0.00	3P996/3P1015	0.00	0.00	3	81.7	
3P997/3P1014	IndM	0.46	81.70	-13.9	0.00	0.00	0.00	0.00	0.00	0.00	3P997/3P1014	0.00	0.00	3	81.7	

* Regulated (constant voltage) buses.

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 21 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR [3P012					IndMTR [3P015					IndMTR [3P017				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
0.000	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.08	0.23	97.12	407.0
0.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	93.78	0.06	0.86	97.02	410.9
0.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	87.20	0.05	0.87	97.07	405.2
0.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	80.36	0.05	0.88	97.13	401.3
0.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	73.28	0.05	0.90	97.18	396.0
0.501	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	65.98	0.06	0.92	97.24	390.1
0.601	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	58.49	0.07	0.95	97.32	383.6
0.701	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	50.76	0.10	0.99	97.41	375.8
0.801	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	42.76	0.13	1.05	97.49	366.1
0.901	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	34.37	0.17	1.12	97.62	352.4
1.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	25.41	0.23	1.21	97.84	330.3
1.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	15.83	0.29	1.28	98.18	285.6
1.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	6.83	0.36	1.08	98.72	191.2
1.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	2.37	0.39	0.55	99.19	86.7
1.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.90	0.39	0.40	99.29	61.6
1.501	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.30	61.6
1.601	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.30	61.6
1.701	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.31	61.6
1.801	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.32	61.6
1.901	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.33	61.6
2.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.34	61.6
2.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.34	61.6
2.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.35	61.6
2.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.35	61.6
2.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	1.92	0.39	0.40	99.35	61.6
2.501	100.00	0.00	0.00	0.00	0.0	100.00	0.08	0.16	96.81	330.3	1.92	0.39	0.39	96.94	57.7
2.601	100.00	0.00	0.00	0.00	0.0	90.55	0.05	0.54	96.60	329.6	2.02	0.39	0.40	96.76	62.5
2.701	100.00	0.00	0.00	0.00	0.0	80.22	0.04	0.54	96.63	320.9	2.03	0.39	0.40	96.78	62.9
2.801	100.00	0.00	0.00	0.00	0.0	69.26	0.05	0.56	96.67	311.6	2.02	0.39	0.40	96.83	63.0
2.901	100.00	0.00	0.00	0.00	0.0	57.87	0.07	0.59	96.73	301.7	2.02	0.39	0.40	96.88	62.9
3.001	100.00	0.00	0.00	0.00	0.0	46.07	0.11	0.63	96.79	290.3	2.02	0.39	0.40	96.94	62.9
3.101	100.00	0.00	0.00	0.00	0.0	33.62	0.17	0.71	96.88	274.7	2.02	0.39	0.40	97.03	62.9
3.201	100.00	0.00	0.00	0.00	0.0	19.79	0.25	0.83	97.06	243.4	2.01	0.39	0.40	97.20	62.9
3.301	100.00	0.00	0.00	0.00	0.0	5.59	0.35	0.74	97.58	147.6	2.00	0.39	0.40	97.65	63.0
3.401	100.00	0.00	0.00	0.00	0.0	2.15	0.37	0.35	97.99	59.2	1.97	0.39	0.40	97.98	62.5
3.501	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.00	61.3	1.97	0.39	0.40	98.00	62.3
3.601	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.01	60.9	1.97	0.39	0.40	98.01	62.3
3.701	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.02	60.9	1.97	0.39	0.40	98.02	62.3
3.801	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.03	60.9	1.97	0.39	0.40	98.02	62.3
3.901	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.03	60.9	1.97	0.39	0.40	98.03	62.3

CCN No. _____

22of75

Project: E4C-D82,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASE1.B-A-OR

Page: 173
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
4.001	100.00	0.00	0.00	0.00	0.0	2.26	0.37	0.38	98.04	60.9	1.97	0.39	0.40	98.04	62.3
4.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.05	60.9	1.97	0.39	0.40	98.04	62.3
4.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.06	60.9	1.97	0.39	0.40	98.05	62.3
4.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.06	60.9	1.97	0.39	0.40	98.06	62.3
4.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.07	60.9	1.97	0.39	0.40	98.07	62.3
4.501	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.08	60.9	1.97	0.39	0.40	98.07	62.3
4.601	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.08	60.9	1.97	0.39	0.40	98.08	62.2
4.701	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.09	60.9	1.97	0.39	0.40	98.09	62.2
4.801	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.10	60.8	1.97	0.39	0.40	98.09	62.2
4.901	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.11	60.8	1.97	0.39	0.40	98.10	62.2
5.001	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.11	60.8	1.97	0.39	0.40	98.11	62.2
5.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.12	60.8	1.97	0.39	0.40	98.11	62.2
5.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.12	60.8	1.97	0.39	0.40	98.12	62.2
5.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.13	60.8	1.97	0.39	0.40	98.13	62.2
5.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.14	60.8	1.97	0.39	0.40	98.13	62.2
5.501	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.14	60.8	1.97	0.39	0.40	98.14	62.2
5.601	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.15	60.8	1.97	0.39	0.40	98.14	62.2
5.701	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.16	60.8	1.97	0.39	0.40	98.15	62.2
5.801	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.16	60.8	1.97	0.39	0.40	98.16	62.2
5.901	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.17	60.8	1.97	0.39	0.40	98.16	62.2
6.001	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.17	60.8	1.97	0.39	0.40	98.17	62.2
6.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.18	60.8	1.97	0.39	0.40	98.17	62.2
6.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.18	60.8	1.97	0.39	0.40	98.18	62.2
6.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.19	60.8	1.97	0.39	0.40	98.19	62.2
6.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.20	60.8	1.97	0.39	0.40	98.19	62.2
6.501	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.20	60.8	1.97	0.39	0.40	98.20	62.2
6.601	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.21	60.8	1.97	0.39	0.40	98.20	62.2
6.701	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.22	60.8	1.97	0.39	0.40	98.21	62.2
6.801	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.22	60.8	1.97	0.39	0.40	98.22	62.2
6.901	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.23	60.8	1.96	0.39	0.40	98.22	62.2
7.001	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.23	60.8	1.96	0.39	0.40	98.23	62.2
7.101	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.24	60.8	1.96	0.39	0.40	98.24	62.2
7.201	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.25	60.8	1.96	0.39	0.40	98.25	62.2
7.301	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.26	60.8	1.96	0.39	0.40	98.25	62.2
7.401	100.00	0.00	0.00	0.00	0.0	2.25	0.37	0.38	98.27	60.8	1.96	0.39	0.40	98.26	62.2
7.501	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.28	60.8	1.96	0.39	0.40	98.27	62.1
7.601	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.29	60.8	1.96	0.39	0.40	98.28	62.1
7.701	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.30	60.7	1.96	0.39	0.40	98.29	62.1
7.801	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.31	60.7	1.96	0.39	0.40	98.30	62.1
7.901	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.32	60.7	1.96	0.39	0.40	98.32	62.1
8.001	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.34	60.7	1.96	0.39	0.40	98.34	62.1

CCN No. _____

23-175

DYNAMIC STABILITY

Project: E4C-082,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation 4.0.4N

Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012				)	IndMTR (3P015				)	IndMTR (3P017				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
8.101	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.36	60.7	1.96	0.39	0.40	98.36	62.1
8.201	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.39	60.7	1.96	0.39	0.40	98.39	62.1
8.301	100.00	0.00	0.00	0.00	0.0	2.24	0.37	0.38	98.43	60.7	1.96	0.39	0.40	98.42	62.1
8.401	100.00	0.00	0.00	0.00	0.0	2.23	0.37	0.38	98.48	60.7	1.96	0.39	0.40	98.48	62.1
8.501	100.00	0.00	0.00	0.00	0.0	2.23	0.37	0.38	98.56	60.7	1.95	0.39	0.40	98.56	62.1
8.601	100.00	0.00	0.00	0.00	0.0	2.23	0.37	0.38	98.67	60.6	1.95	0.39	0.40	98.66	62.0
8.701	100.00	0.00	0.00	0.00	0.0	2.22	0.37	0.38	98.78	60.6	1.94	0.39	0.40	98.78	62.0
8.801	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	98.89	60.5	1.94	0.39	0.40	98.88	61.9
8.901	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	98.97	60.4	1.93	0.39	0.40	98.96	61.9
9.001	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	99.01	60.4	1.93	0.39	0.40	99.00	61.8
9.101	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	99.04	60.4	1.93	0.39	0.40	99.03	61.8
9.201	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	99.06	60.4	1.93	0.39	0.40	99.06	61.8
9.301	100.00	0.00	0.00	0.00	0.0	2.21	0.37	0.38	99.09	60.4	1.93	0.39	0.40	99.09	61.8
9.401	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.11	60.3	1.93	0.39	0.40	99.11	61.7
9.501	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.13	60.3	1.93	0.39	0.40	99.12	61.7
9.601	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.14	60.3	1.93	0.39	0.40	99.13	61.7
9.701	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.15	60.3	1.93	0.39	0.40	99.14	61.7
9.801	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.15	60.3	1.93	0.39	0.40	99.14	61.7
9.901	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.15	60.3	1.93	0.39	0.40	99.15	61.7
10.001	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.16	60.3	1.93	0.39	0.40	99.15	61.7
10.101	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.16	60.3	1.93	0.39	0.40	99.15	61.7
10.201	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.16	60.3	1.93	0.39	0.40	99.15	61.7
10.301	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.16	60.3	1.93	0.39	0.40	99.16	61.7
10.401	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.16	60.3	1.93	0.39	0.40	99.16	61.7
10.501	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.16	61.7
10.601	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.16	61.7
10.701	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.16	61.7
10.801	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
10.901	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
11.001	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
11.101	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
11.201	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
11.301	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.17	60.3	1.93	0.39	0.40	99.17	61.7
11.401	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
11.501	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
11.601	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
11.701	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
11.801	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
11.901	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
12.001	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.17	61.7
12.101	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.18	61.7

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 24 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling.

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-DR

Page: 175
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
12.201	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.18	61.7
12.301	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.18	60.3	1.93	0.39	0.40	99.18	61.7
12.401	100.00	0.00	0.00	0.00	0.0	2.20	0.37	0.38	99.19	60.3	1.93	0.39	0.40	99.18	61.7
12.501	100.00	0.06	0.15	95.92	328.4	2.20	0.37	0.37	96.05	56.9	1.93	0.39	0.39	96.04	57.9
12.601	91.45	0.05	0.52	95.72	327.6	2.37	0.37	0.38	95.88	61.9	2.05	0.39	0.39	95.88	62.7
12.701	82.35	0.04	0.52	95.79	320.3	2.36	0.37	0.38	95.95	62.0	2.06	0.39	0.40	95.94	63.5
12.801	72.90	0.04	0.53	95.88	312.9	2.36	0.37	0.38	96.03	62.0	2.06	0.39	0.40	96.03	63.4
12.901	63.21	0.05	0.54	95.98	305.3	2.35	0.37	0.38	96.13	61.9	2.06	0.39	0.40	96.12	63.4
13.001	53.33	0.07	0.56	96.08	297.3	2.35	0.37	0.38	96.22	61.9	2.05	0.39	0.40	96.22	63.3
13.101	43.21	0.10	0.60	96.19	288.2	2.35	0.37	0.38	96.34	61.8	2.05	0.39	0.40	96.33	63.3
13.201	32.57	0.14	0.66	96.36	276.6	2.34	0.37	0.38	96.50	61.8	2.04	0.39	0.40	96.50	63.2
13.301	20.74	0.20	0.77	96.78	255.1	2.33	0.37	0.38	96.92	61.8	2.04	0.39	0.40	96.91	63.3
13.401	7.08	0.27	0.82	97.87	185.2	2.26	0.37	0.38	97.98	61.7	1.99	0.39	0.40	97.97	63.5
13.501	0.99	0.31	0.27	98.61	52.2	2.23	0.37	0.38	98.60	60.9	1.95	0.39	0.40	98.59	62.5
13.601	1.50	0.31	0.33	98.69	53.1	2.23	0.37	0.38	98.68	60.6	1.95	0.39	0.40	98.67	61.9
13.701	1.45	0.31	0.31	98.70	50.5	2.22	0.37	0.38	98.69	60.5	1.95	0.39	0.40	98.69	61.9
13.801	1.44	0.31	0.31	98.71	50.8	2.22	0.37	0.38	98.70	60.5	1.95	0.39	0.40	98.70	61.9
13.901	1.45	0.31	0.31	98.72	50.8	2.22	0.37	0.38	98.71	60.5	1.94	0.39	0.40	98.71	61.9
14.001	1.44	0.31	0.31	98.73	50.8	2.22	0.37	0.38	98.72	60.5	1.94	0.39	0.40	98.72	61.9
14.101	1.44	0.31	0.31	98.74	50.8	2.22	0.37	0.38	98.73	60.5	1.94	0.39	0.40	98.72	61.9
14.201	1.44	0.31	0.31	98.75	50.8	2.22	0.37	0.38	98.74	60.5	1.94	0.39	0.40	98.73	61.9
14.301	1.44	0.31	0.31	98.76	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.74	61.9
14.401	1.44	0.31	0.31	98.77	50.8	2.22	0.37	0.38	98.75	60.5	1.94	0.39	0.40	98.75	61.9
14.501	1.44	0.31	0.31	98.77	50.8	2.22	0.37	0.38	98.76	60.5	1.94	0.39	0.40	98.76	61.9
14.601	1.44	0.31	0.31	98.78	50.8	2.22	0.37	0.38	98.77	60.5	1.94	0.39	0.40	98.76	61.9
14.701	1.44	0.31	0.31	98.78	50.8	2.22	0.37	0.38	98.77	60.5	1.94	0.39	0.40	98.77	61.9
14.801	1.44	0.31	0.31	98.79	50.8	2.22	0.37	0.38	98.78	60.5	1.94	0.39	0.40	98.77	61.9
14.901	1.44	0.31	0.31	98.79	50.8	2.22	0.37	0.38	98.78	60.5	1.94	0.39	0.40	98.78	61.9
15.001	1.44	0.31	0.31	98.79	50.8	2.22	0.37	0.38	98.78	60.5	1.94	0.39	0.40	98.78	61.9
15.101	1.44	0.31	0.31	98.80	50.8	2.22	0.37	0.38	98.79	60.5	1.94	0.39	0.40	98.78	61.9
15.201	1.44	0.31	0.31	98.80	50.8	2.22	0.37	0.38	98.79	60.5	1.94	0.39	0.40	98.79	61.9
15.301	1.44	0.31	0.31	98.81	50.8	2.22	0.37	0.38	98.80	60.5	1.94	0.39	0.40	98.79	61.9
15.401	1.44	0.31	0.31	98.82	50.8	2.22	0.37	0.38	98.81	60.5	1.94	0.39	0.40	98.80	61.9
15.501	1.44	0.31	0.31	98.83	50.8	2.22	0.37	0.38	98.82	60.5	1.94	0.39	0.40	98.81	61.9
15.601	1.44	0.31	0.31	98.85	50.8	2.22	0.37	0.38	98.84	60.5	1.94	0.39	0.40	98.83	61.9
15.701	1.44	0.31	0.31	98.87	50.8	2.22	0.37	0.38	98.85	60.5	1.94	0.39	0.40	98.86	61.9
15.801	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.5	1.94	0.39	0.40	98.88	61.9
15.901	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
16.001	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
16.101	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
16.201	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8

ACCELERATION TIME FOR 3P012 (15sec)

INITIAL COND FOR 3P012 SEE BUS 3A04

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 25 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI,B-A-OR

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SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012				)	IndMTR (3P015				)	IndMTR (3P017				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
16.301	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
16.401	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
16.501	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
16.601	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
16.701	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
16.801	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
16.901	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
17.001	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.93	61.8
17.101	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.93	61.8
17.201	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.94	61.8
17.301	1.44	0.31	0.31	98.96	50.7	2.21	0.37	0.38	98.95	60.4	1.94	0.39	0.40	98.94	61.8
17.401	1.44	0.31	0.31	98.97	50.7	2.21	0.37	0.38	98.96	60.4	1.93	0.39	0.40	98.96	61.8
17.501	1.44	0.31	0.31	97.95	49.3	2.21	0.37	0.37	97.94	59.1	1.93	0.39	0.39	97.93	60.2
17.601	1.47	0.31	0.31	97.94	51.1	2.26	0.37	0.38	97.93	60.9	1.97	0.39	0.40	97.92	62.1
17.701	1.47	0.31	0.31	97.98	51.1	2.26	0.37	0.38	97.97	60.9	1.98	0.39	0.40	97.97	62.3
17.801	1.47	0.31	0.31	98.03	51.1	2.26	0.37	0.38	98.03	60.9	1.97	0.39	0.40	98.02	62.3
17.901	1.47	0.31	0.31	98.08	51.1	2.25	0.37	0.38	98.07	60.9	1.97	0.39	0.40	98.07	62.3
18.001	1.46	0.31	0.31	98.13	51.0	2.25	0.37	0.38	98.12	60.9	1.97	0.39	0.40	98.11	62.3
18.101	1.46	0.31	0.31	98.17	51.0	2.25	0.37	0.38	98.16	60.8	1.97	0.39	0.40	98.15	62.2
18.201	1.46	0.31	0.31	98.20	51.0	2.25	0.37	0.38	98.19	60.8	1.97	0.39	0.40	98.19	62.2
18.301	1.46	0.31	0.31	98.23	51.0	2.25	0.37	0.38	98.22	60.8	1.97	0.39	0.40	98.22	62.2
18.401	1.46	0.31	0.31	98.27	51.0	2.25	0.37	0.38	98.26	60.8	1.96	0.39	0.40	98.25	62.2
18.501	1.46	0.31	0.31	98.30	51.0	2.24	0.37	0.38	98.29	60.8	1.96	0.39	0.40	98.28	62.2
18.601	1.46	0.31	0.31	98.34	51.0	2.24	0.37	0.38	98.33	60.8	1.96	0.39	0.40	98.33	62.2
18.701	1.46	0.31	0.31	98.41	51.0	2.24	0.37	0.38	98.40	60.7	1.96	0.39	0.40	98.40	62.1
18.801	1.45	0.31	0.31	98.57	51.0	2.23	0.37	0.38	98.56	60.7	1.96	0.39	0.40	98.56	62.2
18.901	1.44	0.31	0.31	98.82	50.9	2.22	0.37	0.38	98.81	60.6	1.94	0.39	0.40	98.81	62.1
19.001	1.44	0.31	0.31	98.89	50.8	2.22	0.37	0.38	98.88	60.5	1.94	0.39	0.40	98.87	61.9
19.101	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.89	61.8
19.201	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
19.301	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
19.401	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
19.501	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
19.601	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
19.701	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
19.801	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
19.901	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
20.001	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
20.101	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
20.201	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
20.301	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 26 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-DR

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SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012				)	IndMTR (3P015				)	IndMTR (3P017				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
20.401	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
20.501	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
20.601	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
20.701	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
20.801	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
20.901	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
21.001	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
21.101	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
21.201	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
21.301	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
21.401	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.93	61.8
21.501	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.93	61.8
21.601	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.94	61.8
21.701	1.44	0.31	0.31	98.96	50.7	2.21	0.37	0.38	98.95	60.4	1.94	0.39	0.40	98.94	61.8
21.801	1.44	0.31	0.31	98.97	50.7	2.21	0.37	0.38	98.95	60.4	1.93	0.39	0.40	98.95	61.8
21.901	1.44	0.31	0.31	98.98	50.7	2.21	0.37	0.38	98.97	60.4	1.93	0.39	0.40	98.96	61.8
22.001	1.44	0.31	0.31	99.00	50.7	2.21	0.37	0.38	98.99	60.4	1.93	0.39	0.40	98.98	61.8
22.101	1.44	0.31	0.31	99.02	50.7	2.21	0.37	0.38	99.02	60.4	1.93	0.39	0.40	99.01	61.8
22.201	1.43	0.31	0.31	99.05	50.7	2.21	0.37	0.38	99.04	60.4	1.93	0.39	0.40	99.04	61.8
22.301	1.43	0.31	0.31	99.08	50.7	2.21	0.37	0.38	99.07	60.4	1.93	0.39	0.40	99.06	61.8
22.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.4	1.93	0.39	0.40	99.07	61.7
22.501	1.43	0.31	0.31	98.95	50.5	2.21	0.37	0.38	98.94	60.2	1.93	0.39	0.40	98.94	61.5
22.601	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.88	61.8
22.701	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.87	61.8
22.801	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.87	61.8
22.901	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.87	61.8
23.001	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.87	61.8
23.101	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.88	61.8
23.201	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.88	61.8
23.301	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.88	60.4	1.94	0.39	0.40	98.88	61.8
23.401	1.44	0.31	0.31	98.89	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.88	61.8
23.501	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.88	61.8
23.601	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.88	61.8
23.701	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.89	61.8
23.801	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.89	61.8
23.901	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.89	61.8
24.001	1.44	0.31	0.31	98.90	50.7	2.21	0.37	0.38	98.89	60.4	1.94	0.39	0.40	98.89	61.8
24.101	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
24.201	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
24.301	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8
24.401	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.89	61.8

CCN No. _____

Project: E4C-082,R2-FCCN N-19 Sht 27 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASE1.B-A-DR

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Date: 05-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012				)	IndMTR (3P015				)	IndMTR (3P017				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
24.501	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
24.601	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
24.701	1.44	0.31	0.31	98.91	50.7	2.21	0.37	0.38	98.90	60.4	1.94	0.39	0.40	98.90	61.8
24.801	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
24.901	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
25.001	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
25.101	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.90	61.8
25.201	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
25.301	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
25.401	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.91	60.4	1.94	0.39	0.40	98.91	61.8
25.501	1.44	0.31	0.31	98.92	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
25.601	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
25.701	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
25.801	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.91	61.8
25.901	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
26.001	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
26.101	1.44	0.31	0.31	98.93	50.7	2.21	0.37	0.38	98.92	60.4	1.94	0.39	0.40	98.92	61.8
26.201	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
26.301	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.92	61.8
26.401	1.44	0.31	0.31	98.94	50.7	2.21	0.37	0.38	98.93	60.4	1.94	0.39	0.40	98.93	61.8
26.501	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.93	61.8
26.601	1.44	0.31	0.31	98.95	50.7	2.21	0.37	0.38	98.94	60.4	1.94	0.39	0.40	98.94	61.8
26.701	1.44	0.31	0.31	98.96	50.7	2.21	0.37	0.38	98.95	60.4	1.94	0.39	0.40	98.94	61.8
26.801	1.44	0.31	0.31	98.97	50.7	2.21	0.37	0.38	98.96	60.4	1.93	0.39	0.40	98.95	61.8
26.901	1.44	0.31	0.31	98.98	50.7	2.21	0.37	0.38	98.97	60.4	1.93	0.39	0.40	98.97	61.8
27.001	1.44	0.31	0.31	99.00	50.7	2.21	0.37	0.38	98.99	60.4	1.93	0.39	0.40	98.99	61.8
27.101	1.44	0.31	0.31	99.03	50.7	2.21	0.37	0.38	99.02	60.4	1.93	0.39	0.40	99.02	61.8
27.201	1.43	0.31	0.31	99.06	50.7	2.21	0.37	0.38	99.05	60.4	1.93	0.39	0.40	99.05	61.8
27.301	1.43	0.31	0.31	99.08	50.7	2.21	0.37	0.38	99.07	60.4	1.93	0.39	0.40	99.05	61.8
27.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.4	1.93	0.39	0.40	99.07	61.7
27.501	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
27.601	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
27.701	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
27.801	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
27.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.001	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.101	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.201	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.301	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.501	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7

CCN No. _____

DYNAMIC STABILITY

Project: E4C-082,R2-PCCN N-19 Sht 28 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation 4.0.4N
Study Case: CASE1.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
28.601	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.701	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.801	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
28.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.001	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.101	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.201	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.301	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.501	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.601	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.701	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.801	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
29.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.001	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.101	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.201	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.301	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.501	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.601	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.701	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.801	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
30.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.001	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.101	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.201	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.301	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.501	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.601	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.701	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.801	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
31.901	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.001	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.101	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.201	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.301	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.401	1.43	0.31	0.31	99.09	50.6	2.21	0.37	0.38	99.08	60.3	1.93	0.39	0.40	99.08	61.7
32.501	1.44	0.31	0.30	95.42	46.0	2.21	0.37	0.36	95.41	55.9	1.93	0.39	0.38	95.41	55.7
32.601	1.55	0.31	0.31	95.12	52.2	2.40	0.37	0.38	95.11	62.4	2.08	0.39	0.39	95.10	63.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 29 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASE1.B-A-OR

Page: 180
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012)					IndMTR (3P015)					IndMTR (3P017)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
32.701	1.56	0.31	0.31	95.16	52.2	2.41	0.37	0.38	95.15	62.4	2.10	0.39	0.40	95.14	63.9
32.801	1.56	0.31	0.31	95.24	52.2	2.40	0.37	0.38	95.23	62.4	2.10	0.39	0.40	95.22	63.9
32.901	1.55	0.31	0.31	95.35	52.2	2.40	0.37	0.38	95.34	62.4	2.10	0.39	0.40	95.34	63.8
33.001	1.55	0.31	0.31	95.70	52.3	2.39	0.37	0.38	95.69	62.5	2.09	0.39	0.40	95.69	64.0
33.101	1.51	0.31	0.31	96.32	51.9	2.34	0.37	0.38	96.31	62.0	2.05	0.39	0.40	96.31	63.6
33.201	1.52	0.31	0.31	96.39	51.9	2.34	0.37	0.38	96.39	61.8	2.04	0.39	0.40	96.38	63.3
33.301	1.52	0.31	0.31	96.42	51.7	2.34	0.37	0.38	96.41	61.8	2.04	0.39	0.40	96.40	63.2
33.401	1.52	0.31	0.31	96.44	51.7	2.34	0.37	0.38	96.43	61.7	2.04	0.39	0.40	96.42	63.1
33.501	1.52	0.31	0.31	96.46	51.7	2.34	0.37	0.38	96.45	61.7	2.04	0.39	0.40	96.44	63.1
33.601	1.52	0.31	0.31	96.48	51.7	2.33	0.37	0.38	96.47	61.7	2.04	0.39	0.40	96.46	63.1
33.701	1.52	0.31	0.31	96.50	51.7	2.33	0.37	0.38	96.49	61.7	2.04	0.39	0.40	96.48	63.1
33.801	1.51	0.31	0.31	96.51	51.7	2.33	0.37	0.38	96.50	61.7	2.04	0.39	0.40	96.50	63.1
33.901	1.51	0.31	0.31	96.53	51.7	2.33	0.37	0.38	96.52	61.7	2.04	0.39	0.40	96.52	63.1
34.001	1.51	0.31	0.31	96.55	51.7	2.33	0.37	0.38	96.54	61.7	2.04	0.39	0.40	96.53	63.1
34.101	1.51	0.31	0.31	96.56	51.6	2.33	0.37	0.38	96.55	61.7	2.04	0.39	0.40	96.55	63.1
34.201	1.51	0.31	0.31	96.58	51.6	2.33	0.37	0.38	96.57	61.6	2.04	0.39	0.40	96.56	63.1
34.301	1.51	0.31	0.31	96.59	51.6	2.33	0.37	0.38	96.58	61.6	2.04	0.39	0.40	96.58	63.1
34.401	1.51	0.31	0.31	96.61	51.6	2.33	0.37	0.38	96.60	61.6	2.03	0.39	0.40	96.59	63.0
34.501	1.51	0.31	0.31	96.62	51.6	2.33	0.37	0.38	96.61	61.6	2.03	0.39	0.40	96.61	63.0
34.601	1.51	0.31	0.31	96.64	51.6	2.33	0.37	0.38	96.63	61.6	2.03	0.39	0.40	96.62	63.0
34.701	1.51	0.31	0.31	96.65	51.6	2.33	0.37	0.38	96.64	61.6	2.03	0.39	0.40	96.64	63.0
34.801	1.51	0.31	0.31	96.67	51.6	2.33	0.37	0.38	96.66	61.6	2.03	0.39	0.40	96.65	63.0
34.901	1.51	0.31	0.31	96.68	51.6	2.33	0.37	0.38	96.67	61.6	2.03	0.39	0.40	96.67	63.0
35.001	1.51	0.31	0.31	96.70	51.6	2.32	0.37	0.38	96.69	61.6	2.03	0.39	0.40	96.68	63.0
35.101	1.51	0.31	0.31	96.71	51.6	2.32	0.37	0.38	96.70	61.6	2.03	0.39	0.40	96.70	63.0
35.201	1.51	0.31	0.31	96.73	51.6	2.32	0.37	0.38	96.72	61.6	2.03	0.39	0.40	96.71	63.0
35.301	1.51	0.31	0.31	96.75	51.6	2.32	0.37	0.38	96.73	61.6	2.03	0.39	0.40	96.73	63.0
35.401	1.51	0.31	0.31	96.76	51.6	2.32	0.37	0.38	96.75	61.5	2.03	0.39	0.40	96.75	63.0
35.501	1.51	0.31	0.31	96.78	51.6	2.32	0.37	0.38	96.77	61.5	2.03	0.39	0.40	96.77	63.0
35.601	1.51	0.31	0.31	96.81	51.6	2.32	0.37	0.38	96.80	61.5	2.03	0.39	0.40	96.79	63.0
35.701	1.51	0.31	0.31	96.83	51.5	2.32	0.37	0.38	96.83	61.5	2.03	0.39	0.40	96.82	62.9
35.801	1.50	0.31	0.31	96.87	51.5	2.32	0.37	0.38	96.86	61.5	2.02	0.39	0.40	96.86	62.9
35.901	1.50	0.31	0.31	96.93	51.5	2.31	0.37	0.38	96.92	61.5	2.02	0.39	0.40	96.92	62.9
36.001	1.50	0.31	0.31	97.04	51.5	2.31	0.37	0.38	97.03	61.5	2.02	0.39	0.40	97.02	62.9
36.101	1.50	0.31	0.31	97.28	51.5	2.30	0.37	0.38	97.27	61.5	2.01	0.39	0.40	97.26	62.9
36.201	1.47	0.31	0.31	97.82	51.6	2.27	0.37	0.38	97.81	61.5	1.99	0.39	0.40	97.80	63.1
36.301	1.45	0.31	0.31	98.42	51.2	2.23	0.37	0.38	98.41	61.0	1.96	0.39	0.40	98.41	62.5
36.401	1.46	0.31	0.31	98.61	50.9	2.24	0.37	0.38	98.59	60.6	1.95	0.39	0.40	98.59	62.0
36.501	1.45	0.31	0.31	98.64	50.9	2.23	0.37	0.38	98.63	60.6	1.95	0.39	0.40	98.63	62.1
36.601	1.45	0.31	0.31	98.66	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.66	61.9
36.701	1.45	0.31	0.31	98.67	50.8	2.23	0.37	0.38	98.67	60.6	1.95	0.39	0.40	98.66	62.0

CCN No. _____

Project: E4C-082.R2-PCCN N-19 Sht 30 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 181
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESP bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3P012				)	IndMTR (3P015				)	IndMTR (3P017				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
36.801	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
36.901	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.001	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.101	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.201	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.301	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.401	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.501	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.601	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.701	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.801	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
37.901	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.001	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.101	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.201	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.301	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.401	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.501	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.601	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.701	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.801	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
38.901	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.001	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.101	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.201	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.301	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.401	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.501	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.601	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.701	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.801	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
39.901	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9
40.000	1.45	0.31	0.31	98.68	50.8	2.23	0.37	0.38	98.67	60.5	1.95	0.39	0.40	98.67	61.9

POST SEQ. FOR 3P012

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 31 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASBI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit'3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR [3A275-2]					IndMTR [3E399]					IndMTR [3E401]				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
0.000	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.501	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.601	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.701	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.801	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
0.901	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.501	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.601	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.701	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.801	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
1.901	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.101	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.201	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.301	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.401	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0
2.501	100.00	0.00	0.00	0.00	0.0	100.00	0.01	0.04	75.48	639.7	100.00	0.01	0.04	75.47	639.6
2.601	100.00	0.00	0.00	0.00	0.0	98.18	0.00	0.10	73.31	622.2	98.18	0.00	0.10	73.29	622.1
2.701	100.00	0.00	0.00	0.00	0.0	96.38	0.00	0.10	73.35	616.3	96.38	0.00	0.10	73.33	616.1
2.801	100.00	0.00	0.00	0.00	0.0	94.57	0.00	0.10	73.49	611.1	94.58	0.00	0.10	73.48	611.0
2.901	100.00	0.00	0.00	0.00	0.0	92.77	0.00	0.10	73.67	606.3	92.78	0.00	0.10	73.66	605.2
3.001	100.00	0.00	0.00	0.00	0.0	90.97	0.00	0.09	73.87	601.8	90.98	0.00	0.09	73.85	601.7
3.101	100.00	0.00	0.00	0.00	0.0	89.17	0.00	0.09	74.09	597.5	89.18	0.00	0.09	74.07	597.4
3.201	100.00	0.00	0.00	0.00	0.0	87.38	0.00	0.09	74.37	593.8	87.38	0.00	0.09	74.35	593.7
3.301	100.00	0.00	0.00	0.00	0.0	85.58	0.00	0.09	74.86	591.9	85.59	0.00	0.09	74.85	591.8
3.401	100.00	0.00	0.00	0.00	0.0	83.78	0.00	0.09	75.28	589.4	83.78	0.00	0.09	75.26	589.3
3.501	100.00	0.00	0.00	0.00	0.0	81.98	0.00	0.09	75.44	585.0	81.98	0.00	0.09	75.43	584.9
3.601	100.00	0.00	0.00	0.00	0.0	80.19	0.00	0.09	75.59	580.5	80.20	0.00	0.09	75.58	580.4
3.701	100.00	0.00	0.00	0.00	0.0	78.42	0.00	0.09	75.73	576.1	78.43	0.00	0.09	75.71	576.1
3.801	100.00	0.00	0.00	0.00	0.0	76.67	0.00	0.09	75.86	571.9	76.68	0.00	0.09	75.85	571.8
3.901	100.00	0.00	0.00	0.00	0.0	74.93	0.00	0.09	76.00	567.7	74.94	0.00	0.09	75.98	567.6

INITIAL COND FOR 3E401 SEE BUS 3B04

VOLTAGE DIP FOR 3E401

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 32 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 233
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESP bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
4.001	100.00	0.00	0.00	0.00	0.0	73.21	0.00	0.09	76.13	563.6	73.22	0.00	0.09	76.11	563.5
4.101	100.00	0.00	0.00	0.00	0.0	71.51	0.00	0.09	76.26	559.6	71.52	0.00	0.09	76.24	559.6
4.201	100.00	0.00	0.00	0.00	0.0	69.83	0.00	0.09	76.39	555.8	69.84	0.00	0.09	76.37	555.7
4.301	100.00	0.00	0.00	0.00	0.0	68.17	0.00	0.09	76.51	552.0	68.18	0.00	0.09	76.50	551.9
4.401	100.00	0.00	0.00	0.00	0.0	66.53	0.01	0.09	76.64	548.3	66.54	0.01	0.09	76.62	548.2
4.501	100.00	0.00	0.00	0.00	0.0	64.91	0.01	0.09	76.76	544.7	64.92	0.01	0.09	76.75	544.7
4.601	100.00	0.00	0.00	0.00	0.0	63.30	0.01	0.09	76.89	541.2	63.32	0.01	0.09	76.87	541.2
4.701	100.00	0.00	0.00	0.00	0.0	61.72	0.01	0.09	77.01	537.8	61.74	0.01	0.09	76.99	537.8
4.801	100.00	0.00	0.00	0.00	0.0	60.16	0.01	0.09	77.13	534.5	60.18	0.01	0.09	77.11	534.4
4.901	100.00	0.00	0.00	0.00	0.0	58.62	0.01	0.09	77.24	531.2	58.64	0.01	0.09	77.23	531.2
5.001	100.00	0.00	0.00	0.00	0.0	57.10	0.01	0.09	77.35	528.0	57.12	0.01	0.09	77.34	527.9
5.101	100.00	0.00	0.00	0.00	0.0	55.60	0.01	0.09	77.46	524.8	55.62	0.01	0.09	77.45	524.8
5.201	100.00	0.00	0.00	0.00	0.0	54.12	0.01	0.09	77.57	521.7	54.14	0.01	0.09	77.55	521.7
5.301	100.00	0.00	0.00	0.00	0.0	52.66	0.01	0.09	77.67	518.6	52.67	0.01	0.08	77.66	518.6
5.401	100.00	0.00	0.00	0.00	0.0	51.21	0.01	0.09	77.77	515.6	51.23	0.01	0.09	77.76	515.5
5.501	100.00	0.00	0.00	0.00	0.0	49.78	0.01	0.09	77.87	512.7	49.80	0.01	0.09	77.85	512.6
5.601	100.00	0.00	0.00	0.00	0.0	48.37	0.01	0.09	77.97	509.7	48.39	0.01	0.09	77.95	509.7
5.701	100.00	0.00	0.00	0.00	0.0	46.98	0.02	0.09	78.06	506.9	47.00	0.02	0.09	78.05	506.8
5.801	100.00	0.00	0.00	0.00	0.0	45.60	0.02	0.09	78.16	504.0	45.62	0.02	0.09	78.14	504.0
5.901	100.00	0.00	0.00	0.00	0.0	44.23	0.02	0.09	78.25	501.2	44.25	0.02	0.09	78.24	501.2
6.001	100.00	0.00	0.00	0.00	0.0	42.87	0.02	0.09	78.34	498.4	42.89	0.02	0.09	78.33	498.4
6.101	100.00	0.00	0.00	0.00	0.0	41.53	0.02	0.09	78.44	495.6	41.55	0.02	0.09	78.42	495.5
6.201	100.00	0.00	0.00	0.00	0.0	40.20	0.02	0.09	78.53	492.9	40.22	0.02	0.09	78.52	492.8
6.301	100.00	0.00	0.00	0.00	0.0	38.87	0.02	0.09	78.62	490.1	38.89	0.02	0.09	78.61	490.1
6.401	100.00	0.00	0.00	0.00	0.0	37.55	0.02	0.09	78.71	487.4	37.57	0.02	0.09	78.70	487.3
6.501	100.00	0.00	0.00	0.00	0.0	36.24	0.02	0.09	78.81	484.6	36.26	0.02	0.09	78.79	484.6
6.601	100.00	0.00	0.00	0.00	0.0	34.92	0.02	0.09	78.90	481.8	34.95	0.02	0.09	78.89	481.8
6.701	100.00	0.00	0.00	0.00	0.0	33.62	0.03	0.09	79.00	478.9	33.64	0.03	0.09	78.98	478.9
6.801	100.00	0.00	0.00	0.00	0.0	32.30	0.03	0.09	79.09	476.1	32.33	0.03	0.09	79.08	476.0
6.901	100.00	0.00	0.00	0.00	0.0	30.98	0.03	0.09	79.19	473.1	31.01	0.03	0.09	79.18	473.1
7.001	100.00	0.00	0.00	0.00	0.0	29.66	0.03	0.09	79.29	470.1	29.69	0.03	0.09	79.28	470.1
7.101	100.00	0.00	0.00	0.00	0.0	28.32	0.03	0.09	79.39	466.9	28.35	0.03	0.09	79.38	466.9
7.201	100.00	0.00	0.00	0.00	0.0	26.97	0.03	0.10	79.50	463.6	27.00	0.03	0.10	79.49	463.6
7.301	100.00	0.00	0.00	0.00	0.0	25.60	0.03	0.10	79.62	460.1	25.63	0.03	0.10	79.60	460.2
7.401	100.00	0.00	0.00	0.00	0.0	24.21	0.03	0.10	79.73	456.4	24.24	0.03	0.10	79.72	456.5
7.501	100.00	0.00	0.00	0.00	0.0	22.78	0.03	0.10	79.86	452.4	22.81	0.03	0.10	79.85	452.4
7.601	100.00	0.00	0.00	0.00	0.0	21.31	0.03	0.10	80.00	448.0	21.34	0.03	0.10	79.99	448.0
7.701	100.00	0.00	0.00	0.00	0.0	19.79	0.04	0.11	80.16	443.0	19.83	0.04	0.11	80.14	443.0
7.801	100.00	0.00	0.00	0.00	0.0	18.21	0.04	0.11	80.33	437.2	18.25	0.04	0.11	80.32	437.3
7.901	100.00	0.00	0.00	0.00	0.0	16.56	0.04	0.11	80.53	430.3	16.60	0.04	0.11	80.52	430.4
8.001	100.00	0.00	0.00	0.00	0.0	14.81	0.04	0.12	80.78	421.8	14.85	0.04	0.12	80.77	421.9

ACCELERATION TIME FOR 3E401 (6.3 SECS)

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 33 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.0N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
8.101	100.00	0.00	0.00	0.00	0.0	12.94	0.04	0.12	81.09	410.6	12.98	0.04	0.12	81.08	410.9
8.201	100.00	0.00	0.00	0.00	0.0	10.92	0.04	0.13	81.52	395.2	10.97	0.04	0.13	81.50	395.6
8.301	100.00	0.00	0.00	0.00	0.0	8.75	0.04	0.13	82.15	372.4	8.80	0.04	0.13	82.13	373.0
8.401	100.00	0.00	0.00	0.00	0.0	6.43	0.05	0.14	83.13	336.5	6.49	0.05	0.14	83.11	337.6
8.501	100.00	0.00	0.00	0.00	0.0	4.11	0.05	0.13	84.69	280.4	4.16	0.05	0.13	84.67	282.0
8.601	100.00	0.00	0.00	0.00	0.0	2.17	0.05	0.11	86.89	203.9	2.21	0.05	0.11	86.86	205.8
8.701	100.00	0.00	0.00	0.00	0.0	1.09	0.05	0.07	89.20	132.4	1.10	0.05	0.07	89.18	133.7
8.801	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	90.98	97.0	0.81	0.05	0.05	90.97	97.3
8.901	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.06	89.5	0.82	0.05	0.05	92.06	89.5
9.001	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	92.65	89.1	0.83	0.05	0.05	92.64	89.1
9.101	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.02	89.2	0.82	0.05	0.05	93.02	89.2
9.201	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.38	89.0	0.81	0.05	0.05	93.37	89.0
9.301	100.00	0.00	0.00	0.00	0.0	0.80	0.05	0.05	93.72	88.6	0.80	0.05	0.05	93.72	88.6
9.401	100.00	0.00	0.00	0.00	0.0	0.80	0.05	0.05	94.00	88.3	0.80	0.05	0.05	94.00	88.3
9.501	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.20	88.0	0.79	0.05	0.05	94.20	88.0
9.601	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.35	87.8	0.79	0.05	0.05	94.34	87.8
9.701	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.44	87.6	0.79	0.05	0.05	94.44	87.6
9.801	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.50	87.5	0.79	0.05	0.05	94.50	87.5
9.901	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.54	87.5	0.79	0.05	0.05	94.54	87.5
10.001	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.57	87.4	0.79	0.05	0.05	94.57	87.4
10.101	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.60	87.4	0.79	0.05	0.05	94.59	87.4
10.201	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.62	87.4	0.79	0.05	0.05	94.62	87.4
10.301	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.64	87.4	0.79	0.05	0.05	94.64	87.4
10.401	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.67	87.4	0.79	0.05	0.05	94.66	87.4
10.501	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.69	87.4	0.79	0.05	0.05	94.69	87.4
10.601	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.72	87.4	0.79	0.05	0.05	94.71	87.4
10.701	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.74	87.4	0.79	0.05	0.05	94.73	87.4
10.801	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.76	87.4	0.79	0.05	0.05	94.75	87.4
10.901	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.77	87.3	0.79	0.05	0.05	94.77	87.3
11.001	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.79	87.3	0.79	0.05	0.05	94.78	87.3
11.101	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.80	87.3	0.79	0.05	0.05	94.80	87.3
11.201	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.81	87.3	0.78	0.05	0.05	94.81	87.3
11.301	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.82	87.3	0.78	0.05	0.05	94.82	87.3
11.401	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.83	87.3	0.78	0.05	0.05	94.83	87.3
11.501	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.84	87.3	0.78	0.05	0.05	94.84	87.3
11.601	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.85	87.3	0.78	0.05	0.05	94.85	87.3
11.701	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.86	87.3	0.78	0.05	0.05	94.86	87.3
11.801	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.87	87.3	0.78	0.05	0.05	94.87	87.3
11.901	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.89	87.3	0.78	0.05	0.05	94.88	87.3
12.001	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.90	87.3	0.78	0.05	0.05	94.90	87.3
12.101	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.91	87.3	0.78	0.05	0.05	94.91	87.3

CCN No. _____

Project: EMC-082,R2-PCCN N-19 Sht 34 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-DR

Page: 235
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
12.201	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.93	87.3	0.78	0.05	0.05	94.93	87.3
12.301	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.95	87.3	0.78	0.05	0.05	94.94	87.3
12.401	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.96	87.3	0.78	0.05	0.05	94.96	87.3
12.501	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.04	88.57	65.6	0.78	0.05	0.04	88.57	65.6
12.601	100.00	0.00	0.00	0.00	0.0	0.93	0.05	0.05	86.93	84.0	0.93	0.05	0.05	86.93	84.0
12.701	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	86.72	90.1	0.94	0.05	0.05	86.71	90.1
12.801	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	86.79	90.9	0.94	0.05	0.05	86.79	90.9
12.901	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	86.92	91.1	0.94	0.05	0.05	86.92	91.1
13.001	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	87.06	91.2	0.94	0.05	0.05	87.06	91.2
13.101	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	87.23	91.2	0.94	0.05	0.05	87.22	91.2
13.201	100.00	0.00	0.00	0.00	0.0	0.94	0.05	0.05	87.44	91.1	0.94	0.05	0.05	87.44	91.1
13.301	100.00	0.00	0.00	0.00	0.0	0.93	0.05	0.05	87.88	91.5	0.93	0.05	0.05	87.87	91.5
13.401	100.00	0.00	0.00	0.00	0.0	0.91	0.05	0.05	88.88	93.1	0.91	0.05	0.05	88.88	93.1
13.501	100.00	0.00	0.00	0.00	0.0	0.89	0.05	0.05	89.63	91.5	0.89	0.05	0.05	89.63	91.5
13.601	100.00	0.00	0.00	0.00	0.0	0.88	0.05	0.05	89.88	89.8	0.88	0.05	0.05	89.88	89.8
13.701	100.00	0.00	0.00	0.00	0.0	0.88	0.05	0.05	90.00	89.6	0.88	0.05	0.05	90.00	89.7
13.801	100.00	0.00	0.00	0.00	0.0	0.88	0.05	0.05	90.11	89.6	0.88	0.05	0.05	90.11	89.6
13.901	100.00	0.00	0.00	0.00	0.0	0.87	0.05	0.05	90.23	89.5	0.87	0.05	0.05	90.22	89.5
14.001	100.00	0.00	0.00	0.00	0.0	0.87	0.05	0.05	90.34	89.5	0.87	0.05	0.05	90.34	89.5
14.101	100.00	0.00	0.00	0.00	0.0	0.87	0.05	0.05	90.47	89.4	0.87	0.05	0.05	90.46	89.4
14.201	100.00	0.00	0.00	0.00	0.0	0.86	0.05	0.05	90.58	89.3	0.86	0.05	0.05	90.58	89.3
14.301	100.00	0.00	0.00	0.00	0.0	0.86	0.05	0.05	90.69	89.3	0.86	0.05	0.05	90.69	89.3
14.401	100.00	0.00	0.00	0.00	0.0	0.86	0.05	0.05	90.79	89.2	0.86	0.05	0.05	90.79	89.2
14.501	100.00	0.00	0.00	0.00	0.0	0.86	0.05	0.05	90.88	89.1	0.85	0.05	0.05	90.87	89.1
14.601	100.00	0.00	0.00	0.00	0.0	0.86	0.05	0.05	90.95	89.0	0.86	0.05	0.05	90.95	89.0
14.701	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.01	89.0	0.85	0.05	0.05	91.01	89.0
14.801	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.07	88.9	0.85	0.05	0.05	91.06	88.9
14.901	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.12	88.9	0.85	0.05	0.05	91.12	88.9
15.001	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.17	88.9	0.85	0.05	0.05	91.17	88.9
15.101	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.23	88.9	0.85	0.05	0.05	91.23	88.9
15.201	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.30	88.9	0.85	0.05	0.05	91.30	88.9
15.301	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.38	88.9	0.85	0.05	0.05	91.38	88.9
15.401	100.00	0.00	0.00	0.00	0.0	0.85	0.05	0.05	91.49	88.9	0.85	0.05	0.05	91.49	88.9
15.501	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.65	89.0	0.84	0.05	0.05	91.65	89.0
15.601	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.90	89.1	0.84	0.05	0.05	91.90	89.1
15.701	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	92.25	89.3	0.83	0.05	0.05	92.24	89.3
15.801	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.57	89.0	0.82	0.05	0.05	92.57	89.0
15.901	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.76	88.4	0.82	0.05	0.05	92.75	88.4
16.001	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.82	88.1	0.82	0.05	0.05	92.82	88.2
16.101	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.85	88.2	0.82	0.05	0.05	92.85	88.2
16.201	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.88	88.1	0.82	0.05	0.05	92.88	88.1

CCN No. _____

Project: E&C-DB2,R2-PCCN N-19 Sht 35 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 236
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
16.301	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.91	88.1	0.82	0.05	0.05	92.91	88.1
16.401	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.93	88.1	0.82	0.05	0.05	92.93	88.1
16.501	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.96	88.1	0.82	0.05	0.05	92.96	88.1
16.601	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.99	88.0	0.82	0.05	0.05	92.99	88.0
16.701	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.02	88.0	0.82	0.05	0.05	93.02	88.0
16.801	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.06	88.0	0.82	0.05	0.05	93.06	88.0
16.901	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.10	88.0	0.82	0.05	0.05	93.10	88.0
17.001	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.15	88.0	0.81	0.05	0.05	93.14	88.0
17.101	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.21	88.0	0.81	0.05	0.05	93.20	88.0
17.201	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.28	88.0	0.81	0.05	0.05	93.28	88.0
17.301	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.39	88.1	0.81	0.05	0.05	93.38	88.1
17.401	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.53	88.1	0.81	0.05	0.05	93.53	88.1
17.501	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	91.95	83.8	0.81	0.05	0.05	91.94	83.8
17.601	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	91.56	86.5	0.83	0.05	0.05	91.56	86.5
17.701	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.51	88.0	0.84	0.05	0.05	91.51	88.0
17.801	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.55	88.7	0.84	0.05	0.05	91.54	88.7
17.901	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.61	88.7	0.84	0.05	0.05	91.60	88.7
18.001	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.67	88.7	0.84	0.05	0.05	91.67	88.7
18.101	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.73	88.7	0.84	0.05	0.05	91.73	88.7
18.201	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.79	88.6	0.84	0.05	0.05	91.79	88.6
18.301	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.84	88.6	0.84	0.05	0.05	91.84	88.6
18.401	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.90	88.6	0.84	0.05	0.05	91.89	88.6
18.501	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	91.95	88.5	0.84	0.05	0.05	91.95	88.5
18.601	100.00	0.00	0.00	0.00	0.0	0.84	0.05	0.05	92.02	88.5	0.84	0.05	0.05	92.01	88.5
18.701	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	92.10	88.5	0.83	0.05	0.05	92.10	88.5
18.801	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	92.27	88.7	0.83	0.05	0.05	92.26	88.7
18.901	100.00	0.00	0.00	0.00	0.0	0.83	0.05	0.05	92.52	88.9	0.83	0.05	0.05	92.52	88.9
19.001	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.64	88.3	0.82	0.05	0.05	92.63	88.3
19.101	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.68	88.2	0.82	0.05	0.05	92.68	88.2
19.201	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.70	88.2	0.82	0.05	0.05	92.70	88.2
19.301	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.73	88.1	0.82	0.05	0.05	92.72	88.2
19.401	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.75	88.1	0.82	0.05	0.05	92.74	88.1
19.501	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.76	88.1	0.82	0.05	0.05	92.76	88.1
19.601	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.78	88.1	0.82	0.05	0.05	92.78	88.1
19.701	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.80	88.1	0.82	0.05	0.05	92.80	88.1
19.801	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.82	88.1	0.82	0.05	0.05	92.81	88.1
19.901	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.83	88.1	0.82	0.05	0.05	92.83	88.1
20.001	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.85	88.1	0.82	0.05	0.05	92.85	88.1
20.101	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.87	88.1	0.82	0.05	0.05	92.87	88.1
20.201	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.89	88.1	0.82	0.05	0.05	92.88	88.1
20.301	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.90	88.1	0.82	0.05	0.05	92.90	88.1

CCN No. _____

Project: E4C-082.R2-PCCN N-19 Sht 36 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-DR

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File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-Z					IndMTR (3E399					IndMTR (3E401				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip. (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
20.401	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.92	88.0	0.82	0.05	0.05	92.92	88.0
20.501	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.94	88.0	0.82	0.05	0.05	92.94	88.0
20.601	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.96	88.0	0.82	0.05	0.05	92.96	88.0
20.701	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	92.98	88.0	0.82	0.05	0.05	92.98	88.0
20.801	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.00	88.0	0.82	0.05	0.05	93.00	88.0
20.901	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.02	88.0	0.82	0.05	0.05	93.02	88.0
21.001	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.05	88.0	0.82	0.05	0.05	93.04	88.0
21.101	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.07	88.0	0.82	0.05	0.05	93.07	88.0
21.201	100.00	0.00	0.00	0.00	0.0	0.82	0.05	0.05	93.10	88.0	0.82	0.05	0.05	93.10	88.0
21.301	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.14	88.0	0.81	0.05	0.05	93.13	88.0
21.401	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.18	88.0	0.81	0.05	0.05	93.17	88.0
21.501	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.23	88.0	0.81	0.05	0.05	93.22	88.0
21.601	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.29	88.0	0.81	0.05	0.05	93.28	88.0
21.701	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.37	88.0	0.81	0.05	0.05	93.37	88.0
21.801	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.49	88.1	0.81	0.05	0.05	93.48	88.1
21.901	100.00	0.00	0.00	0.00	0.0	0.81	0.05	0.05	93.66	88.2	0.81	0.05	0.05	93.66	88.2
22.001	100.00	0.00	0.00	0.00	0.0	0.80	0.05	0.05	93.92	88.3	0.80	0.05	0.05	93.91	88.3
22.101	100.00	0.00	0.00	0.00	0.0	0.80	0.05	0.05	94.27	88.5	0.80	0.05	0.05	94.27	88.5
22.201	100.00	0.00	0.00	0.00	0.0	0.79	0.05	0.05	94.66	88.4	0.79	0.05	0.05	94.66	88.4
22.301	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	94.96	87.9	0.78	0.05	0.05	94.95	87.9
22.401	100.00	0.00	0.00	0.00	0.0	0.78	0.05	0.05	95.10	87.4	0.78	0.05	0.05	95.10	87.4
22.501	100.00	0.00	0.00	83.53	267.3	0.78	0.05	0.05	93.22	80.8	0.78	0.05	0.05	93.22	80.8
22.601	97.41	0.00	0.05	81.17	261.2	0.82	0.05	0.05	92.62	85.9	0.82	0.05	0.05	92.61	85.9
22.701	94.80	0.00	0.05	80.94	258.2	0.82	0.05	0.05	92.47	87.7	0.82	0.05	0.05	92.47	87.7
22.801	92.21	0.00	0.05	80.95	256.0	0.83	0.05	0.05	92.45	88.1	0.83	0.05	0.05	92.44	88.1
22.901	89.63	0.00	0.05	81.05	254.1	0.83	0.05	0.05	92.46	88.2	0.83	0.05	0.05	92.45	88.2
23.001	87.06	0.00	0.05	81.14	252.3	0.83	0.05	0.05	92.47	88.2	0.83	0.05	0.05	92.47	88.2
23.101	84.50	0.00	0.04	81.24	250.5	0.83	0.05	0.05	92.49	88.2	0.83	0.05	0.05	92.49	88.2
23.201	81.95	0.00	0.04	81.34	248.7	0.83	0.05	0.05	92.51	88.2	0.83	0.05	0.05	92.51	88.2
23.301	79.44	0.00	0.04	81.43	246.9	0.83	0.05	0.05	92.53	88.2	0.83	0.05	0.05	92.53	88.2
23.401	76.95	0.00	0.04	81.52	245.2	0.82	0.05	0.05	92.56	88.2	0.82	0.05	0.05	92.55	88.2
23.501	74.49	0.00	0.04	81.61	243.6	0.82	0.05	0.05	92.58	88.2	0.82	0.05	0.05	92.58	88.2
23.601	72.07	0.00	0.04	81.70	241.9	0.82	0.05	0.05	92.60	88.2	0.82	0.05	0.05	92.60	88.2
23.701	69.68	0.00	0.04	81.78	240.3	0.82	0.05	0.05	92.62	88.2	0.82	0.05	0.05	92.62	88.2
23.801	67.33	0.00	0.04	81.86	238.8	0.82	0.05	0.05	92.64	88.2	0.82	0.05	0.05	92.64	88.2
23.901	65.02	0.00	0.04	81.94	237.2	0.82	0.05	0.05	92.66	88.2	0.82	0.05	0.05	92.66	88.2
24.001	62.75	0.00	0.04	82.02	235.7	0.82	0.05	0.05	92.68	88.2	0.82	0.05	0.05	92.67	88.2
24.101	60.53	0.00	0.04	82.09	234.3	0.82	0.05	0.05	92.70	88.2	0.82	0.05	0.05	92.69	88.2
24.201	58.34	0.01	0.04	82.16	232.8	0.82	0.05	0.05	92.72	88.1	0.82	0.05	0.05	92.71	88.1
24.301	56.20	0.01	0.04	82.23	231.4	0.82	0.05	0.05	92.73	88.1	0.82	0.05	0.05	92.73	88.1
24.401	54.10	0.01	0.04	82.30	230.0	0.82	0.05	0.05	92.75	88.1	0.82	0.05	0.05	92.75	88.1

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Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
24.501	52.04	0.01	0.04	82.36	228.7	0.82	0.05	0.05	92.77	88.1	0.82	0.05	0.05	92.77	88.1
24.601	50.02	0.01	0.04	82.42	227.3	0.82	0.05	0.05	92.79	88.1	0.82	0.05	0.05	92.78	88.1
24.701	48.04	0.01	0.04	82.48	226.0	0.82	0.05	0.05	92.81	88.1	0.82	0.05	0.05	92.80	88.1
24.801	46.10	0.01	0.04	82.54	224.7	0.82	0.05	0.05	92.82	88.1	0.82	0.05	0.05	92.82	88.1
24.901	44.19	0.01	0.04	82.60	223.4	0.82	0.05	0.05	92.84	88.1	0.82	0.05	0.05	92.84	88.1
25.001	42.32	0.01	0.04	82.65	222.1	0.82	0.05	0.05	92.86	88.1	0.82	0.05	0.05	92.85	88.1
25.101	40.48	0.01	0.04	82.70	220.8	0.82	0.05	0.05	92.87	88.1	0.82	0.05	0.05	92.87	88.1
25.201	38.67	0.01	0.04	82.76	219.5	0.82	0.05	0.05	92.89	88.1	0.82	0.05	0.05	92.89	88.1
25.301	36.89	0.01	0.04	82.81	218.2	0.82	0.05	0.05	92.91	88.1	0.82	0.05	0.05	92.91	88.1
25.401	35.12	0.01	0.04	82.86	216.8	0.82	0.05	0.05	92.93	88.0	0.82	0.05	0.05	92.92	88.0
25.501	33.38	0.01	0.04	82.91	215.5	0.82	0.05	0.05	92.95	88.0	0.82	0.05	0.05	92.94	88.0
25.601	31.66	0.01	0.04	82.95	214.1	0.82	0.05	0.05	92.97	88.0	0.82	0.05	0.05	92.96	88.0
25.701	29.95	0.02	0.05	83.00	212.7	0.82	0.05	0.05	92.98	88.0	0.82	0.05	0.05	92.98	88.0
25.801	28.25	0.02	0.05	83.06	211.2	0.82	0.05	0.05	93.01	88.0	0.82	0.05	0.05	93.00	88.0
25.901	26.55	0.02	0.05	83.11	209.6	0.82	0.05	0.05	93.03	88.0	0.82	0.05	0.05	93.03	88.0
26.001	24.84	0.02	0.05	83.16	207.9	0.82	0.05	0.05	93.05	88.0	0.82	0.05	0.05	93.05	88.0
26.101	23.13	0.02	0.05	83.22	206.0	0.82	0.05	0.05	93.08	88.0	0.82	0.05	0.05	93.08	88.0
26.201	21.40	0.02	0.05	83.28	204.0	0.82	0.05	0.05	93.11	88.0	0.82	0.05	0.05	93.11	88.0
26.301	19.64	0.02	0.05	83.36	201.7	0.81	0.05	0.05	93.15	88.0	0.81	0.05	0.05	93.14	88.0
26.401	17.84	0.02	0.05	83.45	199.0	0.81	0.05	0.05	93.19	88.0	0.81	0.05	0.05	93.19	88.0
26.501	15.98	0.02	0.05	83.56	195.7	0.81	0.05	0.05	93.24	88.0	0.81	0.05	0.05	93.24	88.0
26.601	14.05	0.02	0.06	83.72	191.6	0.81	0.05	0.05	93.31	88.0	0.81	0.05	0.05	93.30	88.0
26.701	12.03	0.02	0.06	83.95	186.2	0.81	0.05	0.05	93.39	88.0	0.81	0.05	0.05	93.39	88.0
26.801	9.90	0.02	0.06	84.32	178.6	0.81	0.05	0.05	93.52	88.1	0.81	0.05	0.05	93.52	88.1
26.901	7.64	0.02	0.06	84.95	167.1	0.81	0.05	0.05	93.71	88.2	0.81	0.05	0.05	93.71	88.2
27.001	5.31	0.03	0.06	86.03	148.7	0.80	0.05	0.05	94.00	88.4	0.80	0.05	0.05	93.99	88.4
27.101	3.14	0.03	0.06	87.70	120.2	0.79	0.05	0.05	94.37	88.5	0.79	0.05	0.05	94.37	88.5
27.201	1.58	0.03	0.04	89.59	84.6	0.78	0.05	0.05	94.75	88.3	0.78	0.05	0.05	94.75	88.3
27.301	0.96	0.03	0.03	90.89	57.6	0.78	0.05	0.05	95.01	87.8	0.78	0.05	0.05	95.00	87.8
27.401	0.93	0.03	0.03	91.33	48.6	0.78	0.05	0.05	95.12	87.3	0.78	0.05	0.05	95.11	87.3
27.501	0.98	0.03	0.03	91.36	48.6	0.78	0.05	0.05	95.14	87.2	0.78	0.05	0.05	95.14	87.2
27.601	0.98	0.03	0.03	91.35	49.1	0.78	0.05	0.05	95.14	87.2	0.78	0.05	0.05	95.14	87.2
27.701	0.97	0.03	0.03	91.36	48.9	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
27.801	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
27.901	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.001	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.101	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.201	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.301	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.401	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.501	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2

CCN No. _____

Project: E4C-C82,R2-PCCN N-19 Sht 38 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
28.601	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.701	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.801	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
28.901	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.001	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.101	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.201	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.301	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.401	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.501	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.601	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.701	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.801	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
29.901	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.001	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.101	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.201	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.301	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.401	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.501	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.601	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.701	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.801	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
30.901	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.001	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.101	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.201	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.301	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.401	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.501	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.601	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.701	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.801	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
31.901	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.001	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.101	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.201	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.301	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.401	0.97	0.03	0.03	91.37	48.8	0.78	0.05	0.05	95.15	87.2	0.78	0.05	0.05	95.15	87.2
32.501	0.97	0.03	0.03	88.98	44.3	0.78	0.05	0.05	92.45	76.5	0.78	0.05	0.05	92.45	76.5
32.601	1.05	0.03	0.03	87.58	47.7	0.85	0.05	0.05	91.31	85.2	0.85	0.05	0.05	91.31	85.2

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 39 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
32.701	1.07	0.03	0.03	87.29	49.6	0.85	0.05	0.05	91.13	88.3	0.85	0.05	0.05	91.12	88.3
32.801	1.07	0.03	0.03	87.29	50.0	0.85	0.05	0.05	91.15	88.7	0.85	0.05	0.05	91.15	88.7
32.901	1.07	0.03	0.03	87.37	50.1	0.85	0.05	0.05	91.25	88.8	0.85	0.05	0.05	91.24	88.8
33.001	1.07	0.03	0.03	87.66	50.4	0.85	0.05	0.05	91.55	89.4	0.85	0.05	0.05	91.55	89.4
33.101	1.05	0.03	0.03	88.24	50.7	0.83	0.05	0.05	92.15	90.0	0.83	0.05	0.05	92.14	90.0
33.201	1.04	0.03	0.03	88.44	50.0	0.83	0.05	0.05	92.30	88.6	0.83	0.05	0.05	92.30	88.6
33.301	1.04	0.03	0.03	88.50	49.8	0.83	0.05	0.05	92.35	88.3	0.83	0.05	0.05	92.35	88.3
33.401	1.04	0.03	0.03	88.53	49.8	0.83	0.05	0.05	92.38	88.3	0.83	0.05	0.05	92.37	88.3
33.501	1.04	0.03	0.03	88.55	49.7	0.83	0.05	0.05	92.40	88.3	0.83	0.05	0.05	92.40	88.3
33.601	1.04	0.03	0.03	88.58	49.7	0.83	0.05	0.05	92.42	88.3	0.83	0.05	0.05	92.42	88.3
33.701	1.04	0.03	0.03	88.60	49.7	0.83	0.05	0.05	92.44	88.2	0.83	0.05	0.05	92.44	88.2
33.801	1.04	0.03	0.03	88.61	49.7	0.83	0.05	0.05	92.46	88.2	0.83	0.05	0.05	92.46	88.2
33.901	1.04	0.03	0.03	88.63	49.7	0.83	0.05	0.05	92.48	88.2	0.83	0.05	0.05	92.47	88.2
34.001	1.04	0.03	0.03	88.65	49.7	0.83	0.05	0.05	92.50	88.2	0.83	0.05	0.05	92.49	88.2
34.101	1.03	0.03	0.03	88.67	49.7	0.83	0.05	0.05	92.51	88.2	0.83	0.05	0.05	92.51	88.2
34.201	1.03	0.03	0.03	88.69	49.7	0.83	0.05	0.05	92.53	88.2	0.83	0.05	0.05	92.53	88.2
34.301	1.03	0.03	0.03	88.70	49.6	0.83	0.05	0.05	92.55	88.2	0.83	0.05	0.05	92.54	88.2
34.401	1.03	0.03	0.03	88.72	49.6	0.82	0.05	0.05	92.56	88.2	0.82	0.05	0.05	92.56	88.2
34.501	1.03	0.03	0.03	88.74	49.6	0.82	0.05	0.05	92.58	88.2	0.82	0.05	0.05	92.58	88.2
34.601	1.03	0.03	0.03	88.75	49.6	0.82	0.05	0.05	92.59	88.2	0.82	0.05	0.05	92.59	88.2
34.701	1.03	0.03	0.03	88.77	49.6	0.82	0.05	0.05	92.61	88.2	0.82	0.05	0.05	92.61	88.2
34.801	1.03	0.03	0.03	88.78	49.6	0.82	0.05	0.05	92.62	88.2	0.82	0.05	0.05	92.62	88.2
34.901	1.03	0.03	0.03	88.80	49.6	0.82	0.05	0.05	92.64	88.2	0.82	0.05	0.05	92.64	88.2
35.001	1.03	0.03	0.03	88.81	49.6	0.82	0.05	0.05	92.66	88.2	0.82	0.05	0.05	92.65	88.2
35.101	1.03	0.03	0.03	88.83	49.6	0.82	0.05	0.05	92.67	88.2	0.82	0.05	0.05	92.67	88.2
35.201	1.03	0.03	0.03	88.85	49.6	0.82	0.05	0.05	92.69	88.1	0.82	0.05	0.05	92.68	88.1
35.301	1.03	0.03	0.03	88.86	49.6	0.82	0.05	0.05	92.70	88.1	0.82	0.05	0.05	92.70	88.1
35.401	1.03	0.03	0.03	88.88	49.6	0.82	0.05	0.05	92.72	88.1	0.82	0.05	0.05	92.72	88.1
35.501	1.03	0.03	0.03	88.90	49.6	0.82	0.05	0.05	92.74	88.1	0.82	0.05	0.05	92.74	88.1
35.601	1.03	0.03	0.03	88.93	49.6	0.82	0.05	0.05	92.77	88.1	0.82	0.05	0.05	92.76	88.1
35.701	1.03	0.03	0.03	88.96	49.6	0.82	0.05	0.05	92.80	88.1	0.82	0.05	0.05	92.79	88.1
35.801	1.03	0.03	0.03	89.00	49.6	0.82	0.05	0.05	92.83	88.1	0.82	0.05	0.05	92.83	88.1
35.901	1.03	0.03	0.03	89.05	49.6	0.82	0.05	0.05	92.89	88.1	0.82	0.05	0.05	92.89	88.1
36.001	1.03	0.03	0.03	89.15	49.6	0.82	0.05	0.05	92.99	88.2	0.82	0.05	0.05	92.99	88.2
36.101	1.02	0.03	0.03	89.37	49.7	0.82	0.05	0.05	93.21	88.5	0.82	0.05	0.05	93.21	88.5
36.201	1.01	0.03	0.03	89.84	50.0	0.81	0.05	0.05	93.71	89.2	0.81	0.05	0.05	93.71	89.2
36.301	0.99	0.03	0.03	90.46	50.1	0.79	0.05	0.05	94.32	89.2	0.79	0.05	0.05	94.32	89.2
36.401	0.98	0.03	0.03	90.79	49.2	0.79	0.05	0.05	94.60	87.5	0.79	0.05	0.05	94.60	87.5
36.501	0.99	0.03	0.03	90.85	49.1	0.79	0.05	0.05	94.66	87.6	0.79	0.05	0.05	94.66	87.6
36.601	0.98	0.03	0.03	90.90	49.1	0.79	0.05	0.05	94.70	87.5	0.79	0.05	0.05	94.70	87.5
36.701	0.98	0.03	0.03	90.92	49.0	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.71	87.3

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 40 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation'4.0.4N
Study Case: CASE1.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (3A275-2)					IndMTR (3E399)					IndMTR (3E401)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)
36.801	0.98	0.03	0.03	90.93	49.0	0.79	0.05	0.05	94.72	87.4	0.79	0.05	0.05	94.72	87.4
36.901	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.001	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.101	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.201	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.301	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.401	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.501	[illegible]	[illegible]	[illegible]	[illegible]	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.601	[illegible]	[illegible]	[illegible]	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.701	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.801	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
37.901	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.001	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.101	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.201	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.301	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.401	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.501	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.601	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.701	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.801	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
38.901	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.001	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.101	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.201	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.301	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.401	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.501	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.601	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.701	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.801	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
39.901	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3
40.000	0.98	0.03	0.03	90.93	48.9	0.79	0.05	0.05	94.72	87.3	0.79	0.05	0.05	94.72	87.3

POST SEQ FOR 3E401

CCN No. _____

Project: E4C-0B2,R2-PCCN N-19 Sht 41 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 262
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.21.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162)					Bus (3A04)					Bus (3E04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
0.000	100.00	0.00	0.00	0.00	0.0	99.60	-0.96	0.00	0.00	100.0	96.71	-3.49	0.00	0.00	100.0
0.001	100.00	0.00	0.01	83.16	239.0	97.36	-0.70	0.00	0.00	100.0	84.09	-3.11	0.00	0.00	100.0
0.101	83.31	0.00	0.04	81.86	218.5	97.33	-1.01	0.00	0.00	100.0	84.01	-4.72	0.00	0.00	100.0
0.201	66.94	0.00	0.04	82.67	202.1	97.38	-1.01	0.00	0.00	100.0	84.45	-4.64	0.00	0.00	100.0
0.301	51.42	0.01	0.04	83.37	187.8	97.44	-1.01	0.00	0.00	100.0	84.92	-4.56	0.00	0.00	100.0
0.401	36.72	0.01	0.04	83.85	173.8	97.49	-1.02	0.00	0.00	100.0	85.28	-4.55	0.00	0.00	100.0
0.501	22.15	0.01	0.04	84.29	155.0	97.55	-1.03	0.00	0.00	100.0	85.69	-4.57	0.00	0.00	100.0
0.601	7.21	0.02	0.04	85.43	108.8	97.62	-1.04	0.00	0.00	100.0	86.25	-4.58	0.00	0.00	100.0
0.701	1.98	0.02	0.02	87.95	43.6	97.71	-1.05	0.00	0.00	100.0	86.88	-4.53	0.00	0.00	100.0
0.801	2.05	0.02	0.02	88.36	42.8	97.79	-1.07	0.00	0.00	100.0	87.30	-4.60	0.00	0.00	100.0
0.901	2.05	0.02	0.02	89.10	42.3	97.91	-1.11	0.00	0.00	100.0	87.96	-4.69	0.00	0.00	100.0
1.001	1.96	0.02	0.02	90.50	42.2	98.13	-1.13	0.00	0.00	100.0	89.28	-4.56	0.00	0.00	100.0
1.101	1.92	0.02	0.02	91.64	41.4	98.45	-1.15	0.00	0.00	100.0	90.33	-4.36	0.00	0.00	100.0
1.201	1.87	0.02	0.02	92.42	41.2	98.91	-1.09	0.00	0.00	100.0	91.05	-4.27	0.00	0.00	100.0
1.301	1.84	0.02	0.02	92.97	40.8	99.27	-0.93	0.00	0.00	100.0	91.54	-4.06	0.00	0.00	100.0
1.401	1.84	0.02	0.02	93.15	40.6	99.34	-0.89	0.00	0.00	100.0	91.69	-4.01	0.00	0.00	100.0
1.501	1.84	0.02	0.02	93.24	40.6	99.35	-0.89	0.00	0.00	100.0	91.76	-4.02	0.00	0.00	100.0
1.601	1.83	0.02	0.02	93.38	40.6	99.36	-0.89	0.00	0.00	100.0	91.85	-4.02	0.00	0.00	100.0
1.701	1.82	0.02	0.02	93.56	40.6	99.37	-0.89	0.00	0.00	100.0	91.97	-4.01	0.00	0.00	100.0
1.801	1.82	0.02	0.02	93.72	40.5	99.38	-0.88	0.00	0.00	100.0	92.08	-3.99	0.00	0.00	100.0
1.901	1.81	0.02	0.02	93.85	40.5	99.39	-0.88	0.00	0.00	100.0	92.18	-3.98	0.00	0.00	100.0
2.001	1.81	0.02	0.02	93.98	40.4	99.39	-0.88	0.00	0.00	100.0	92.27	-3.96	0.00	0.00	100.0
2.101	1.80	0.02	0.02	94.08	40.4	99.40	-0.88	0.00	0.00	100.0	92.34	-3.93	0.00	0.00	100.0
2.201	1.80	0.02	0.02	94.13	40.4	99.40	-0.88	0.00	0.00	100.0	92.39	-3.92	0.00	0.00	100.0
2.301	1.80	0.02	0.02	94.17	40.3	99.40	-0.88	0.00	0.00	100.0	92.43	-3.91	0.00	0.00	100.0
2.401	1.80	0.02	0.02	94.20	40.3	99.41	-0.88	0.00	0.00	100.0	92.45	-3.91	0.00	0.00	100.0
2.501	1.82	0.02	0.02	78.35	29.1	96.89	-0.87	0.00	0.00	100.0	76.65	-3.99	0.00	0.00	100.0
2.601	2.72	0.02	0.02	76.23	46.2	96.81	-1.12	0.00	0.00	100.0	75.38	-6.00	0.00	0.00	100.0
2.701	2.90	0.02	0.02	76.18	47.1	96.84	-1.12	0.00	0.00	100.0	75.36	-5.96	0.00	0.00	100.0
2.801	2.88	0.02	0.02	76.26	47.3	96.88	-1.13	0.00	0.00	100.0	75.44	-5.96	0.00	0.00	100.0
2.901	2.87	0.02	0.02	76.40	47.3	96.93	-1.14	0.00	0.00	100.0	75.57	-5.95	0.00	0.00	100.0
3.001	2.86	0.02	0.02	76.55	47.2	97.00	-1.16	0.00	0.00	100.0	75.71	-5.94	0.00	0.00	100.0
3.101	2.85	0.02	0.02	76.72	47.1	97.08	-1.19	0.00	0.00	100.0	75.88	-5.95	0.00	0.00	100.0
3.201	2.83	0.02	0.02	76.97	47.0	97.26	-1.24	0.00	0.00	100.0	76.11	-5.97	0.00	0.00	100.0
3.301	2.79	0.02	0.02	77.44	47.0	97.71	-1.23	0.00	0.00	100.0	76.56	-5.94	0.00	0.00	100.0
3.401	2.75	0.02	0.02	77.85	46.6	98.04	-1.11	0.00	0.00	100.0	76.94	-5.79	0.00	0.00	100.0
3.501	2.74	0.02	0.02	77.97	46.4	98.06	-1.11	0.00	0.00	100.0	77.05	-5.78	0.00	0.00	100.0
3.601	2.73	0.02	0.02	78.08	46.4	98.06	-1.11	0.00	0.00	100.0	77.15	-5.75	0.00	0.00	100.0
3.701	2.72	0.02	0.02	78.18	45.3	98.07	-1.11	0.00	0.00	100.0	77.25	-5.74	0.00	0.00	100.0
3.801	2.71	0.02	0.02	78.28	46.2	98.08	-1.11	0.00	0.00	100.0	77.34	-5.72	0.00	0.00	100.0
3.901	2.71	0.02	0.02	78.38	46.2	98.09	-1.11	0.00	0.00	100.0	77.43	-5.71	0.00	0.00	100.0

INITIAL COND FOR 3E401 BUS 3B04 X480/461 X0.98 (VOLTAGED =0.945P

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 42 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 263
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
4.001	2.70	0.02	0.02	78.47	46.1	98.09	-1.11	0.00	0.00	100.0	77.52	-5.70	0.00	0.00	100.0
4.101	2.69	0.02	0.02	78.57	46.1	98.10	-1.11	0.00	0.00	100.0	77.61	-5.68	0.00	0.00	100.0
4.201	2.68	0.02	0.02	78.67	46.0	98.11	-1.11	0.00	0.00	100.0	77.70	-5.67	0.00	0.00	100.0
4.301	2.67	0.02	0.02	78.76	46.0	98.11	-1.11	0.00	0.00	100.0	77.79	-5.66	0.00	0.00	100.0
4.401	2.67	0.02	0.02	78.86	46.0	98.12	-1.11	0.00	0.00	100.0	77.88	-5.65	0.00	0.00	100.0
4.501	2.66	0.02	0.02	78.95	45.9	98.13	-1.11	0.00	0.00	100.0	77.97	-5.64	0.00	0.00	100.0
4.601	2.65	0.02	0.02	79.05	45.9	98.14	-1.11	0.00	0.00	100.0	78.06	-5.63	0.00	0.00	100.0
4.701	2.65	0.02	0.02	79.15	45.8	98.14	-1.11	0.00	0.00	100.0	78.15	-5.62	0.00	0.00	100.0
4.801	2.64	0.02	0.02	79.24	45.8	98.15	-1.11	0.00	0.00	100.0	78.24	-5.61	0.00	0.00	100.0
4.901	2.63	0.02	0.02	79.33	45.7	98.16	-1.11	0.00	0.00	100.0	78.32	-5.60	0.00	0.00	100.0
5.001	2.62	0.02	0.02	79.42	45.7	98.16	-1.11	0.00	0.00	100.0	78.41	-5.60	0.00	0.00	100.0
5.101	2.62	0.02	0.02	79.51	45.6	98.17	-1.10	0.00	0.00	100.0	78.49	-5.59	0.00	0.00	100.0
5.201	2.61	0.02	0.02	79.59	45.6	98.18	-1.10	0.00	0.00	100.0	78.57	-5.59	0.00	0.00	100.0
5.301	2.60	0.02	0.02	79.67	45.5	98.18	-1.10	0.00	0.00	100.0	78.64	-5.59	0.00	0.00	100.0
5.401	2.60	0.02	0.02	79.76	45.5	98.19	-1.10	0.00	0.00	100.0	78.72	-5.59	0.00	0.00	100.0
5.501	2.59	0.02	0.02	79.84	45.5	98.19	-1.10	0.00	0.00	100.0	78.79	-5.59	0.00	0.00	100.0
5.601	2.59	0.02	0.02	79.92	45.4	98.20	-1.10	0.00	0.00	100.0	78.87	-5.59	0.00	0.00	100.0
5.701	2.58	0.02	0.02	80.00	45.4	98.21	-1.11	0.00	0.00	100.0	78.94	-5.59	0.00	0.00	100.0
5.801	2.58	0.02	0.02	80.08	45.4	98.21	-1.11	0.00	0.00	100.0	79.02	-5.60	0.00	0.00	100.0
5.901	2.57	0.02	0.02	80.15	45.3	98.22	-1.11	0.00	0.00	100.0	79.09	-5.60	0.00	0.00	100.0
6.001	2.56	0.02	0.02	80.23	45.3	98.22	-1.11	0.00	0.00	100.0	79.16	-5.61	0.00	0.00	100.0
6.101	2.56	0.02	0.02	80.31	45.2	98.23	-1.11	0.00	0.00	100.0	79.24	-5.61	0.00	0.00	100.0
6.201	2.55	0.02	0.02	80.39	45.2	98.24	-1.11	0.00	0.00	100.0	79.31	-5.63	0.00	0.00	100.0
6.301	2.55	0.02	0.02	80.47	45.2	98.24	-1.11	0.00	0.00	100.0	79.39	-5.64	0.00	0.00	100.0
6.401	2.54	0.02	0.02	80.56	45.1	98.25	-1.11	0.00	0.00	100.0	79.47	-5.65	0.00	0.00	100.0
6.501	2.53	0.02	0.02	80.64	45.1	98.25	-1.11	0.00	0.00	100.0	79.55	-5.66	0.00	0.00	100.0
6.601	2.53	0.02	0.02	80.72	45.1	98.26	-1.11	0.00	0.00	100.0	79.63	-5.68	0.00	0.00	100.0
6.701	2.52	0.02	0.02	80.81	45.0	98.27	-1.11	0.00	0.00	100.0	79.71	-5.70	0.00	0.00	100.0
6.801	2.52	0.02	0.02	80.90	45.0	98.27	-1.11	0.00	0.00	100.0	79.79	-5.71	0.00	0.00	100.0
6.901	2.51	0.02	0.02	80.99	44.9	98.28	-1.11	0.00	0.00	100.0	79.88	-5.74	0.00	0.00	100.0
7.001	2.50	0.02	0.02	81.09	44.9	98.29	-1.11	0.00	0.00	100.0	79.97	-5.76	0.00	0.00	100.0
7.101	2.50	0.02	0.02	81.19	44.9	98.29	-1.12	0.00	0.00	100.0	80.06	-5.79	0.00	0.00	100.0
7.201	2.49	0.02	0.02	81.29	44.8	98.30	-1.12	0.00	0.00	100.0	80.16	-5.82	0.00	0.00	100.0
7.301	2.48	0.02	0.02	81.40	44.8	98.31	-1.12	0.00	0.00	100.0	80.26	-5.85	0.00	0.00	100.0
7.401	2.47	0.02	0.02	81.52	44.7	98.32	-1.12	0.00	0.00	100.0	80.37	-5.88	0.00	0.00	100.0
7.501	2.47	0.02	0.02	81.64	44.7	98.33	-1.12	0.00	0.00	100.0	80.49	-5.92	0.00	0.00	100.0
7.601	2.46	0.02	0.02	81.78	44.6	98.34	-1.13	0.00	0.00	100.0	80.62	-5.97	0.00	0.00	100.0
7.701	2.45	0.02	0.02	81.93	44.6	98.35	-1.13	0.00	0.00	100.0	80.76	-6.03	0.00	0.00	100.0
7.801	2.44	0.02	0.02	82.11	44.5	98.36	-1.13	0.00	0.00	100.0	80.92	-6.08	0.00	0.00	100.0
7.901	2.42	0.02	0.02	82.30	44.4	98.38	-1.14	0.00	0.00	100.0	81.11	-6.16	0.00	0.00	100.0
8.001	2.41	0.02	0.02	82.54	44.4	98.39	-1.15	0.00	0.00	100.0	81.33	-6.24	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 43 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 264
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162				)	Bus (3A04				)	Bus (3B04				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
8.101	2.39	0.02	0.02	82.83	44.2	98.41	-1.15	0.00	0.00	100.0	81.61	-6.34	0.00	0.00	100.0
8.201	2.37	0.02	0.02	83.21	44.1	98.44	-1.16	0.00	0.00	100.0	81.97	-6.45	0.00	0.00	100.0
8.301	2.34	0.02	0.02	83.73	44.0	98.48	-1.17	0.00	0.00	100.0	82.46	-6.57	0.00	0.00	100.0
8.401	2.30	0.02	0.02	84.47	43.9	98.53	-1.18	0.00	0.00	100.0	83.16	-6.68	0.00	0.00	100.0
8.501	2.23	0.02	0.02	85.53	43.6	98.61	-1.16	0.00	0.00	100.0	84.18	-6.71	0.00	0.00	100.0
8.601	2.15	0.02	0.02	86.92	43.3	98.72	-1.17	0.00	0.00	100.0	85.50	-6.55	0.00	0.00	100.0
8.701	2.06	0.02	0.02	88.44	42.8	98.83	-1.15	0.00	0.00	100.0	86.94	-6.20	0.00	0.00	100.0
8.801	1.99	0.02	0.02	89.82	42.2	98.94	-1.12	0.00	0.00	100.0	88.25	-5.78	0.00	0.00	100.0
8.901	1.94	0.02	0.02	90.84	41.7	99.02	-1.10	0.00	0.00	100.0	89.20	-5.45	0.00	0.00	100.0
9.001	1.92	0.02	0.02	91.44	41.3	99.06	-1.09	0.00	0.00	100.0	89.76	-5.40	0.00	0.00	100.0
9.101	1.90	0.02	0.02	91.81	41.1	99.09	-1.09	0.00	0.00	100.0	90.12	-5.40	0.00	0.00	100.0
9.201	1.88	0.02	0.02	92.17	41.0	99.12	-1.09	0.00	0.00	100.0	90.46	-5.32	0.00	0.00	100.0
9.301	1.87	0.02	0.02	92.52	40.9	99.14	-1.08	0.00	0.00	100.0	90.78	-5.20	0.00	0.00	100.0
9.401	1.85	0.02	0.02	92.80	40.8	99.16	-1.07	0.00	0.00	100.0	91.05	-5.09	0.00	0.00	100.0
9.501	1.84	0.02	0.02	93.00	40.7	99.18	-1.07	0.00	0.00	100.0	91.24	-4.98	0.00	0.00	100.0
9.601	1.84	0.02	0.02	93.15	40.6	99.19	-1.06	0.00	0.00	100.0	91.38	-4.90	0.00	0.00	100.0
9.701	1.84	0.02	0.02	93.25	40.6	99.20	-1.05	0.00	0.00	100.0	91.47	-4.84	0.00	0.00	100.0
9.801	1.83	0.02	0.02	93.31	40.6	99.20	-1.05	0.00	0.00	100.0	91.52	-4.81	0.00	0.00	100.0
9.901	1.83	0.02	0.02	93.36	40.6	99.20	-1.05	0.00	0.00	100.0	91.56	-4.79	0.00	0.00	100.0
10.001	1.83	0.02	0.02	93.39	40.5	99.21	-1.05	0.00	0.00	100.0	91.59	-4.78	0.00	0.00	100.0
10.101	1.83	0.02	0.02	93.42	40.5	99.21	-1.05	0.00	0.00	100.0	91.61	-4.77	0.00	0.00	100.0
10.201	1.83	0.02	0.02	93.45	40.5	99.21	-1.05	0.00	0.00	100.0	91.63	-4.77	0.00	0.00	100.0
10.301	1.83	0.02	0.02	93.48	40.5	99.21	-1.05	0.00	0.00	100.0	91.66	-4.77	0.00	0.00	100.0
10.401	1.83	0.02	0.02	93.52	40.5	99.21	-1.05	0.00	0.00	100.0	91.68	-4.77	0.00	0.00	100.0
10.501	1.82	0.02	0.02	93.55	40.5	99.22	-1.05	0.00	0.00	100.0	91.70	-4.76	0.00	0.00	100.0
10.601	1.82	0.02	0.02	93.59	40.5	99.22	-1.05	0.00	0.00	100.0	91.72	-4.76	0.00	0.00	100.0
10.701	1.82	0.02	0.02	93.63	40.5	99.22	-1.05	0.00	0.00	100.0	91.75	-4.76	0.00	0.00	100.0
10.801	1.82	0.02	0.02	93.66	40.5	99.22	-1.05	0.00	0.00	100.0	91.76	-4.75	0.00	0.00	100.0
10.901	1.82	0.02	0.02	93.68	40.5	99.22	-1.05	0.00	0.00	100.0	91.78	-4.75	0.00	0.00	100.0
11.001	1.82	0.02	0.02	93.70	40.5	99.22	-1.05	0.00	0.00	100.0	91.79	-4.75	0.00	0.00	100.0
11.101	1.82	0.02	0.02	93.72	40.5	99.22	-1.05	0.00	0.00	100.0	91.81	-4.75	0.00	0.00	100.0
11.201	1.82	0.02	0.02	93.73	40.4	99.22	-1.05	0.00	0.00	100.0	91.82	-4.75	0.00	0.00	100.0
11.301	1.82	0.02	0.02	93.74	40.4	99.23	-1.05	0.00	0.00	100.0	91.83	-4.75	0.00	0.00	100.0
11.401	1.82	0.02	0.02	93.75	40.4	99.23	-1.05	0.00	0.00	100.0	91.83	-4.75	0.00	0.00	100.0
11.501	1.82	0.02	0.02	93.76	40.4	99.23	-1.05	0.00	0.00	100.0	91.84	-4.76	0.00	0.00	100.0
11.601	1.81	0.02	0.02	93.78	40.4	99.23	-1.05	0.00	0.00	100.0	91.85	-4.76	0.00	0.00	100.0
11.701	1.81	0.02	0.02	93.79	40.4	99.23	-1.05	0.00	0.00	100.0	91.86	-4.76	0.00	0.00	100.0
11.801	1.81	0.02	0.02	93.80	40.4	99.23	-1.05	0.00	0.00	100.0	91.88	-4.76	0.00	0.00	100.0
11.901	1.81	0.02	0.02	93.81	40.4	99.23	-1.05	0.00	0.00	100.0	91.89	-4.77	0.00	0.00	100.0
12.001	1.81	0.02	0.02	93.83	40.4	99.23	-1.05	0.00	0.00	100.0	91.90	-4.77	0.00	0.00	100.0
12.101	1.81	0.02	0.02	93.84	40.4	99.23	-1.05	0.00	0.00	100.0	91.91	-4.77	0.00	0.00	100.0

CCN No. _____

Project: E4C-DB2,R2-PCCN N-19 Sht 44 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 265
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
12.201	1.81	0.02	0.02	93.86	40.4	99.23	-1.05	0.00	0.00	100.0	91.93	-4.78	0.00	0.00	100.0
12.301	1.81	0.02	0.02	93.87	40.4	99.23	-1.05	0.00	0.00	100.0	91.94	-4.78	0.00	0.00	100.0
12.401	1.81	0.02	0.02	93.89	40.4	99.24	-1.05	0.00	0.00	100.0	91.96	-4.78	0.00	0.00	100.0
12.501	1.82	0.02	0.02	87.51	33.2	96.09	-0.88	0.00	0.00	100.0	85.60	-4.79	0.00	0.00	100.0
12.601	2.13	0.02	0.02	85.78	42.2	95.93	-1.21	0.00	0.00	100.0	84.25	-5.90	0.00	0.00	100.0
12.701	2.22	0.02	0.02	85.60	43.0	96.00	-1.21	0.00	0.00	100.0	84.10	-5.90	0.00	0.00	100.0
12.801	2.21	0.02	0.02	85.68	43.0	96.09	-1.21	0.00	0.00	100.0	84.18	-5.88	0.00	0.00	100.0
12.901	2.20	0.02	0.02	85.81	43.0	96.18	-1.23	0.00	0.00	100.0	84.30	-5.90	0.00	0.00	100.0
13.001	2.20	0.02	0.02	85.95	42.9	96.28	-1.25	0.00	0.00	100.0	84.44	-5.91	0.00	0.00	100.0
13.101	2.19	0.02	0.02	86.12	42.9	96.39	-1.28	0.00	0.00	100.0	84.60	-5.93	0.00	0.00	100.0
13.201	2.18	0.02	0.02	86.34	42.8	96.56	-1.35	0.00	0.00	100.0	84.81	-5.98	0.00	0.00	100.0
13.301	2.16	0.02	0.02	86.78	42.9	96.97	-1.45	0.00	0.00	100.0	85.22	-6.06	0.00	0.00	100.0
13.401	2.09	0.02	0.02	87.80	42.8	98.03	-1.33	0.00	0.00	100.0	86.20	-5.91	0.00	0.00	100.0
13.501	2.06	0.02	0.02	88.55	42.3	98.65	-1.20	0.00	0.00	100.0	86.91	-5.73	0.00	0.00	100.0
13.601	2.05	0.02	0.02	88.79	42.0	98.73	-1.21	0.00	0.00	100.0	87.12	-5.72	0.00	0.00	100.0
13.701	2.04	0.02	0.02	88.91	41.9	98.75	-1.20	0.00	0.00	100.0	87.24	-5.71	0.00	0.00	100.0
13.801	2.03	0.02	0.02	89.02	41.9	98.75	-1.20	0.00	0.00	100.0	87.34	-5.70	0.00	0.00	100.0
13.901	2.03	0.02	0.02	89.14	41.8	98.76	-1.20	0.00	0.00	100.0	87.45	-5.68	0.00	0.00	100.0
14.001	2.02	0.02	0.02	89.26	41.8	98.77	-1.20	0.00	0.00	100.0	87.56	-5.66	0.00	0.00	100.0
14.101	2.01	0.02	0.02	89.38	41.8	98.78	-1.20	0.00	0.00	100.0	87.68	-5.64	0.00	0.00	100.0
14.201	2.01	0.02	0.02	89.50	41.7	98.79	-1.20	0.00	0.00	100.0	87.79	-5.61	0.00	0.00	100.0
14.301	2.00	0.02	0.02	89.61	41.7	98.80	-1.20	0.00	0.00	100.0	87.90	-5.58	0.00	0.00	100.0
14.401	2.00	0.02	0.02	89.71	41.6	98.81	-1.20	0.00	0.00	100.0	87.99	-5.56	0.00	0.00	100.0
14.501	1.99	0.02	0.02	89.80	41.6	98.81	-1.19	0.00	0.00	100.0	88.07	-5.53	0.00	0.00	100.0
14.601	1.99	0.02	0.02	89.87	41.6	98.82	-1.19	0.00	0.00	100.0	88.14	-5.52	0.00	0.00	100.0
14.701	1.99	0.02	0.02	89.94	41.6	98.82	-1.19	0.00	0.00	100.0	88.20	-5.51	0.00	0.00	100.0
14.801	1.98	0.02	0.02	89.99	41.5	98.83	-1.19	0.00	0.00	100.0	88.25	-5.50	0.00	0.00	100.0
14.901	1.98	0.02	0.02	90.05	41.5	98.83	-1.19	0.00	0.00	100.0	88.30	-5.50	0.00	0.00	100.0
15.001	1.98	0.02	0.02	90.10	41.5	98.83	-1.19	0.00	0.00	100.0	88.35	-5.51	0.00	0.00	100.0
15.101	1.98	0.02	0.02	90.16	41.5	98.84	-1.19	0.00	0.00	100.0	88.41	-5.51	0.00	0.00	100.0
15.201	1.97	0.02	0.02	90.23	41.5	98.84	-1.19	0.00	0.00	100.0	88.47	-5.52	0.00	0.00	100.0
15.301	1.97	0.02	0.02	90.31	41.5	98.85	-1.20	0.00	0.00	100.0	88.55	-5.53	0.00	0.00	100.0
15.401	1.97	0.02	0.02	90.42	41.4	98.86	-1.20	0.00	0.00	100.0	88.65	-5.56	0.00	0.00	100.0
15.501	1.96	0.02	0.02	90.59	41.4	98.87	-1.20	0.00	0.00	100.0	88.81	-5.57	0.00	0.00	100.0
15.601	1.95	0.02	0.02	90.84	41.4	98.89	-1.20	0.00	0.00	100.0	89.05	-5.56	0.00	0.00	100.0
15.701	1.93	0.02	0.02	91.19	41.3	98.92	-1.19	0.00	0.00	100.0	89.38	-5.50	0.00	0.00	100.0
15.801	1.91	0.02	0.02	91.52	41.2	98.94	-1.19	0.00	0.00	100.0	89.69	-5.39	0.00	0.00	100.0
15.901	1.91	0.02	0.02	91.70	41.1	98.95	-1.18	0.00	0.00	100.0	89.86	-5.35	0.00	0.00	100.0
16.001	1.90	0.02	0.02	91.77	41.0	98.96	-1.18	0.00	0.00	100.0	89.92	-5.36	0.00	0.00	100.0
16.101	1.90	0.02	0.02	91.81	41.0	98.96	-1.18	0.00	0.00	100.0	89.95	-5.36	0.00	0.00	100.0
16.201	1.90	0.02	0.02	91.84	41.0	98.96	-1.18	0.00	0.00	100.0	89.98	-5.36	0.00	0.00	100.0

3A04 INITIAL COND FOR 3P012 VOLTAGE DROP IS NEGLIGIBL (0.992 P.U.

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 45 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI,B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162				)	Bus (3A04				)	Bus (3B04				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
16.301	1.90	0.02	0.02	91.86	41.0	98.97	-1.18	0.00	0.00	100.0	90.00	-5.36	0.00	0.00	100.0
16.401	1.90	0.02	0.02	91.89	41.0	98.97	-1.19	0.00	0.00	100.0	90.03	-5.37	0.00	0.00	100.0
16.501	1.90	0.02	0.02	91.92	41.0	98.97	-1.19	0.00	0.00	100.0	90.05	-5.37	0.00	0.00	100.0
16.601	1.89	0.02	0.02	91.95	40.9	98.97	-1.19	0.00	0.00	100.0	90.08	-5.38	0.00	0.00	100.0
16.701	1.89	0.02	0.02	91.99	40.9	98.97	-1.19	0.00	0.00	100.0	90.11	-5.39	0.00	0.00	100.0
16.801	1.89	0.02	0.02	92.03	40.9	98.98	-1.19	0.00	0.00	100.0	90.15	-5.40	0.00	0.00	100.0
16.901	1.89	0.02	0.02	92.08	40.9	98.98	-1.19	0.00	0.00	100.0	90.19	-5.41	0.00	0.00	100.0
17.001	1.89	0.02	0.02	92.13	40.9	98.98	-1.19	0.00	0.00	100.0	90.23	-5.43	0.00	0.00	100.0
17.101	1.88	0.02	0.02	92.19	40.9	98.99	-1.19	0.00	0.00	100.0	90.29	-5.44	0.00	0.00	100.0
17.201	1.88	0.02	0.02	92.27	40.9	98.99	-1.19	0.00	0.00	100.0	90.36	-5.46	0.00	0.00	100.0
17.301	1.88	0.02	0.02	92.38	40.9	99.00	-1.19	0.00	0.00	100.0	90.46	-5.48	0.00	0.00	100.0
17.401	1.87	0.02	0.02	92.53	40.8	99.01	-1.19	0.00	0.00	100.0	90.60	-5.51	0.00	0.00	100.0
17.501	1.86	0.02	0.02	90.94	39.5	97.99	-1.15	0.00	0.00	100.0	89.05	-5.12	0.00	0.00	100.0
17.601	1.95	0.02	0.02	90.53	41.1	97.98	-1.22	0.00	0.00	100.0	88.70	-5.44	0.00	0.00	100.0
17.701	1.96	0.02	0.02	90.50	41.4	98.02	-1.21	0.00	0.00	100.0	88.67	-5.44	0.00	0.00	100.0
17.801	1.96	0.02	0.02	90.54	41.4	98.08	-1.20	0.00	0.00	100.0	88.71	-5.44	0.00	0.00	100.0
17.901	1.95	0.02	0.02	90.61	41.4	98.13	-1.19	0.00	0.00	100.0	88.77	-5.42	0.00	0.00	100.0
18.001	1.95	0.02	0.02	90.68	41.3	98.17	-1.19	0.00	0.00	100.0	88.83	-5.41	0.00	0.00	100.0
18.101	1.95	0.02	0.02	90.74	41.3	98.21	-1.19	0.00	0.00	100.0	88.88	-5.40	0.00	0.00	100.0
18.201	1.95	0.02	0.02	90.80	41.3	98.24	-1.19	0.00	0.00	100.0	88.94	-5.39	0.00	0.00	100.0
18.301	1.94	0.02	0.02	90.86	41.3	98.28	-1.19	0.00	0.00	100.0	88.99	-5.39	0.00	0.00	100.0
18.401	1.94	0.02	0.02	90.91	41.3	98.31	-1.19	0.00	0.00	100.0	89.04	-5.39	0.00	0.00	100.0
18.501	1.94	0.02	0.02	90.97	41.2	98.34	-1.19	0.00	0.00	100.0	89.09	-5.38	0.00	0.00	100.0
18.601	1.94	0.02	0.02	91.03	41.2	98.38	-1.20	0.00	0.00	100.0	89.15	-5.39	0.00	0.00	100.0
18.701	1.93	0.02	0.02	91.12	41.2	98.45	-1.22	0.00	0.00	100.0	89.24	-5.39	0.00	0.00	100.0
18.801	1.93	0.02	0.02	91.29	41.2	98.61	-1.23	0.00	0.00	100.0	89.40	-5.40	0.00	0.00	100.0
18.901	1.91	0.02	0.02	91.55	41.1	98.86	-1.19	0.00	0.00	100.0	89.64	-5.33	0.00	0.00	100.0
19.001	1.91	0.02	0.02	91.66	41.0	98.93	-1.19	0.00	0.00	100.0	89.75	-5.32	0.00	0.00	100.0
19.101	1.91	0.02	0.02	91.70	41.0	98.94	-1.18	0.00	0.00	100.0	89.79	-5.32	0.00	0.00	100.0
19.201	1.90	0.02	0.02	91.73	41.0	98.95	-1.18	0.00	0.00	100.0	89.81	-5.31	0.00	0.00	100.0
19.301	1.90	0.02	0.02	91.75	41.0	98.95	-1.18	0.00	0.00	100.0	89.83	-5.31	0.00	0.00	100.0
19.401	1.90	0.02	0.02	91.77	41.0	98.95	-1.18	0.00	0.00	100.0	89.85	-5.31	0.00	0.00	100.0
19.501	1.90	0.02	0.02	91.79	41.0	98.95	-1.18	0.00	0.00	100.0	89.87	-5.31	0.00	0.00	100.0
19.601	1.90	0.02	0.02	91.81	41.0	98.95	-1.18	0.00	0.00	100.0	89.88	-5.31	0.00	0.00	100.0
19.701	1.90	0.02	0.02	91.83	41.0	98.95	-1.18	0.00	0.00	100.0	89.90	-5.31	0.00	0.00	100.0
19.801	1.90	0.02	0.02	91.85	41.0	98.96	-1.18	0.00	0.00	100.0	89.92	-5.31	0.00	0.00	100.0
19.901	1.90	0.02	0.02	91.86	41.0	98.96	-1.18	0.00	0.00	100.0	89.93	-5.31	0.00	0.00	100.0
20.001	1.90	0.02	0.02	91.88	41.0	98.96	-1.18	0.00	0.00	100.0	89.95	-5.31	0.00	0.00	100.0
20.101	1.90	0.02	0.02	91.90	41.0	98.96	-1.18	0.00	0.00	100.0	89.97	-5.31	0.00	0.00	100.0
20.201	1.90	0.02	0.02	91.92	40.9	98.96	-1.18	0.00	0.00	100.0	89.98	-5.31	0.00	0.00	100.0
20.301	1.89	0.02	0.02	91.94	40.9	98.96	-1.18	0.00	0.00	100.0	90.00	-5.31	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sbt 4-6 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 267
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR [P162]					Bus [3A04]					Bus [3B04]				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
20.401	1.89	0.02	0.02	91.95	40.9	98.96	-1.18	0.00	0.00	100.0	90.02	-5.32	0.00	0.00	100.0
20.501	1.89	0.02	0.02	91.97	40.9	98.97	-1.18	0.00	0.00	100.0	90.03	-5.32	0.00	0.00	100.0
20.601	1.89	0.02	0.02	91.99	40.9	98.97	-1.18	0.00	0.00	100.0	90.05	-5.32	0.00	0.00	100.0
20.701	1.89	0.02	0.02	92.01	40.9	98.97	-1.18	0.00	0.00	100.0	90.07	-5.33	0.00	0.00	100.0
20.801	1.89	0.02	0.02	92.03	40.9	98.97	-1.18	0.00	0.00	100.0	90.09	-5.33	0.00	0.00	100.0
20.901	1.89	0.02	0.02	92.05	40.9	98.97	-1.19	0.00	0.00	100.0	90.11	-5.34	0.00	0.00	100.0
21.001	1.89	0.02	0.02	92.08	40.9	98.97	-1.19	0.00	0.00	100.0	90.14	-5.35	0.00	0.00	100.0
21.101	1.89	0.02	0.02	92.11	40.9	98.98	-1.19	0.00	0.00	100.0	90.16	-5.35	0.00	0.00	100.0
21.201	1.89	0.02	0.02	92.14	40.9	98.98	-1.19	0.00	0.00	100.0	90.19	-5.36	0.00	0.00	100.0
21.301	1.89	0.02	0.02	92.17	40.9	98.98	-1.19	0.00	0.00	100.0	90.22	-5.37	0.00	0.00	100.0
21.401	1.88	0.02	0.02	92.21	40.9	98.98	-1.19	0.00	0.00	100.0	90.26	-5.39	0.00	0.00	100.0
21.501	1.88	0.02	0.02	92.26	40.9	98.99	-1.19	0.00	0.00	100.0	90.31	-5.40	0.00	0.00	100.0
21.601	1.88	0.02	0.02	92.32	40.9	98.99	-1.19	0.00	0.00	100.0	90.37	-5.42	0.00	0.00	100.0
21.701	1.88	0.02	0.02	92.41	40.8	99.00	-1.19	0.00	0.00	100.0	90.44	-5.44	0.00	0.00	100.0
21.801	1.87	0.02	0.02	92.52	40.8	99.01	-1.19	0.00	0.00	100.0	90.56	-5.47	0.00	0.00	100.0
21.901	1.86	0.02	0.02	92.70	40.8	99.02	-1.19	0.00	0.00	100.0	90.72	-5.49	0.00	0.00	100.0
22.001	1.85	0.02	0.02	92.96	40.8	99.04	-1.19	0.00	0.00	100.0	90.97	-5.49	0.00	0.00	100.0
22.101	1.83	0.02	0.02	93.32	40.7	99.07	-1.19	0.00	0.00	100.0	91.31	-5.44	0.00	0.00	100.0
22.201	1.81	0.02	0.02	93.71	40.6	99.10	-1.18	0.00	0.00	100.0	91.69	-5.31	0.00	0.00	100.0
22.301	1.80	0.02	0.02	94.00	40.5	99.12	-1.17	0.00	0.00	100.0	91.96	-5.19	0.00	0.00	100.0
22.401	1.80	0.02	0.02	94.14	40.4	99.13	-1.17	0.00	0.00	100.0	92.09	-5.14	0.00	0.00	100.0
22.501	1.80	0.02	0.02	92.26	38.3	98.99	-1.16	0.00	0.00	100.0	90.24	-4.98	0.00	0.00	100.0
22.601	1.89	0.02	0.02	91.63	40.7	98.94	-1.18	0.00	0.00	100.0	89.70	-5.33	0.00	0.00	100.0
22.701	1.91	0.02	0.02	91.50	41.0	98.93	-1.19	0.00	0.00	100.0	89.58	-5.35	0.00	0.00	100.0
22.801	1.92	0.02	0.02	91.47	41.1	98.93	-1.19	0.00	0.00	100.0	89.56	-5.35	0.00	0.00	100.0
22.901	1.91	0.02	0.02	91.48	41.1	98.93	-1.19	0.00	0.00	100.0	89.57	-5.35	0.00	0.00	100.0
23.001	1.91	0.02	0.02	91.50	41.1	98.93	-1.19	0.00	0.00	100.0	89.59	-5.35	0.00	0.00	100.0
23.101	1.91	0.02	0.02	91.52	41.1	98.93	-1.19	0.00	0.00	100.0	89.61	-5.35	0.00	0.00	100.0
23.201	1.91	0.02	0.02	91.54	41.0	98.93	-1.19	0.00	0.00	100.0	89.63	-5.34	0.00	0.00	100.0
23.301	1.91	0.02	0.02	91.56	41.0	98.93	-1.18	0.00	0.00	100.0	89.65	-5.33	0.00	0.00	100.0
23.401	1.91	0.02	0.02	91.59	41.0	98.94	-1.18	0.00	0.00	100.0	89.67	-5.33	0.00	0.00	100.0
23.501	1.91	0.02	0.02	91.61	41.0	98.94	-1.18	0.00	0.00	100.0	89.69	-5.33	0.00	0.00	100.0
23.601	1.91	0.02	0.02	91.63	41.0	98.94	-1.18	0.00	0.00	100.0	89.71	-5.32	0.00	0.00	100.0
23.701	1.91	0.02	0.02	91.65	41.0	98.94	-1.18	0.00	0.00	100.0	89.73	-5.32	0.00	0.00	100.0
23.801	1.91	0.02	0.02	91.67	41.0	98.94	-1.18	0.00	0.00	100.0	89.75	-5.32	0.00	0.00	100.0
23.901	1.91	0.02	0.02	91.69	41.0	98.94	-1.18	0.00	0.00	100.0	89.77	-5.32	0.00	0.00	100.0
24.001	1.90	0.02	0.02	91.71	41.0	98.95	-1.18	0.00	0.00	100.0	89.78	-5.31	0.00	0.00	100.0
24.101	1.90	0.02	0.02	91.73	41.0	98.95	-1.18	0.00	0.00	100.0	89.80	-5.31	0.00	0.00	100.0
24.201	1.90	0.02	0.02	91.75	41.0	98.95	-1.18	0.00	0.00	100.0	89.82	-5.31	0.00	0.00	100.0
24.301	1.90	0.02	0.02	91.76	41.0	98.95	-1.18	0.00	0.00	100.0	89.84	-5.31	0.00	0.00	100.0
24.401	1.90	0.02	0.02	91.78	41.0	98.95	-1.18	0.00	0.00	100.0	89.85	-5.31	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 47 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq. %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
24.501	1.90	0.02	0.02	91.80	41.0	98.95	-1.18	0.00	0.00	100.0	89.87	-5.31	0.00	0.00	100.0
24.601	1.90	0.02	0.02	91.82	41.0	98.95	-1.18	0.00	0.00	100.0	89.89	-5.31	0.00	0.00	100.0
24.701	1.90	0.02	0.02	91.84	41.0	98.96	-1.18	0.00	0.00	100.0	89.90	-5.31	0.00	0.00	100.0
24.801	1.90	0.02	0.02	91.85	41.0	98.96	-1.18	0.00	0.00	100.0	89.92	-5.31	0.00	0.00	100.0
24.901	1.90	0.02	0.02	91.87	41.0	98.96	-1.18	0.00	0.00	100.0	89.94	-5.31	0.00	0.00	100.0
25.001	1.90	0.02	0.02	91.89	41.0	98.96	-1.18	0.00	0.00	100.0	89.95	-5.31	0.00	0.00	100.0
25.101	1.90	0.02	0.02	91.91	41.0	98.96	-1.18	0.00	0.00	100.0	89.97	-5.31	0.00	0.00	100.0
25.201	1.90	0.02	0.02	91.92	40.9	98.96	-1.18	0.00	0.00	100.0	89.99	-5.31	0.00	0.00	100.0
25.301	1.89	0.02	0.02	91.94	40.9	98.96	-1.18	0.00	0.00	100.0	90.00	-5.31	0.00	0.00	100.0
25.401	1.89	0.02	0.02	91.96	40.9	98.96	-1.18	0.00	0.00	100.0	90.02	-5.32	0.00	0.00	100.0
25.501	1.89	0.02	0.02	91.98	40.9	98.97	-1.18	0.00	0.00	100.0	90.04	-5.32	0.00	0.00	100.0
25.601	1.89	0.02	0.02	92.00	40.9	98.97	-1.18	0.00	0.00	100.0	90.06	-5.32	0.00	0.00	100.0
25.701	1.89	0.02	0.02	92.02	40.9	98.97	-1.18	0.00	0.00	100.0	90.08	-5.33	0.00	0.00	100.0
25.801	1.89	0.02	0.02	92.04	40.9	98.97	-1.18	0.00	0.00	100.0	90.10	-5.33	0.00	0.00	100.0
25.901	1.89	0.02	0.02	92.06	40.9	98.97	-1.19	0.00	0.00	100.0	90.12	-5.34	0.00	0.00	100.0
26.001	1.89	0.02	0.02	92.08	40.9	98.97	-1.19	0.00	0.00	100.0	90.14	-5.35	0.00	0.00	100.0
26.101	1.89	0.02	0.02	92.11	40.9	98.98	-1.19	0.00	0.00	100.0	90.17	-5.36	0.00	0.00	100.0
26.201	1.89	0.02	0.02	92.14	40.9	98.98	-1.19	0.00	0.00	100.0	90.20	-5.36	0.00	0.00	100.0
26.301	1.88	0.02	0.02	92.18	40.9	98.98	-1.19	0.00	0.00	100.0	90.23	-5.37	0.00	0.00	100.0
26.401	1.88	0.02	0.02	92.22	40.9	98.98	-1.19	0.00	0.00	100.0	90.27	-5.39	0.00	0.00	100.0
26.501	1.88	0.02	0.02	92.27	40.9	98.99	-1.19	0.00	0.00	100.0	90.32	-5.41	0.00	0.00	100.0
26.601	1.88	0.02	0.02	92.34	40.9	98.99	-1.19	0.00	0.00	100.0	90.38	-5.43	0.00	0.00	100.0
26.701	1.87	0.02	0.02	92.43	40.8	99.00	-1.19	0.00	0.00	100.0	90.47	-5.45	0.00	0.00	100.0
26.801	1.87	0.02	0.02	92.56	40.8	99.01	-1.19	0.00	0.00	100.0	90.59	-5.48	0.00	0.00	100.0
26.901	1.86	0.02	0.02	92.75	40.8	99.02	-1.19	0.00	0.00	100.0	90.77	-5.49	0.00	0.00	100.0
27.001	1.85	0.02	0.02	93.04	40.8	99.04	-1.19	0.00	0.00	100.0	91.05	-5.48	0.00	0.00	100.0
27.101	1.83	0.02	0.02	93.42	40.7	99.07	-1.19	0.00	0.00	100.0	91.41	-5.41	0.00	0.00	100.0
27.201	1.81	0.02	0.02	93.80	40.6	99.10	-1.18	0.00	0.00	100.0	91.77	-5.28	0.00	0.00	100.0
27.301	1.80	0.02	0.02	94.05	40.5	99.12	-1.17	0.00	0.00	100.0	92.01	-5.17	0.00	0.00	100.0
27.401	1.80	0.02	0.02	94.16	40.4	99.13	-1.17	0.00	0.00	100.0	92.11	-5.14	0.00	0.00	100.0
27.501	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.13	-5.15	0.00	0.00	100.0
27.601	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.13	-5.15	0.00	0.00	100.0
27.701	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
27.801	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
27.901	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.001	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.101	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.201	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.301	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.401	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.501	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 48 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

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Date: 06-13-2005
SN: SCALEDISCN
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR [P162]					Bus [3A04]					Bus [3B04]				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
28.601	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.701	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.801	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
28.901	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.001	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.101	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.201	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.301	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.401	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.501	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.601	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.701	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.801	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
29.901	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.001	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.101	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.201	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.301	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.401	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.501	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.601	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.701	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.801	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
30.901	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.001	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.101	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.201	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.301	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.401	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.501	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.601	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.701	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.801	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
31.901	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.001	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.101	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.201	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.301	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.401	1.80	0.02	0.02	94.19	40.3	99.13	-1.17	0.00	0.00	100.0	92.14	-5.15	0.00	0.00	100.0
32.501	1.80	0.02	0.02	91.50	36.9	95.46	-1.11	0.00	0.00	100.0	89.45	-5.19	0.00	0.00	100.0
32.601	1.94	0.02	0.02	90.31	41.0	95.16	-1.07	0.00	0.00	100.0	88.45	-5.56	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 49 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 270
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162)					Bus (3A04)					Bus (3B04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
32.701	1.98	0.02	0.02	90.15	41.4	95.20	-1.48	0.00	0.00	100.0	88.30	-5.68	0.00	0.00	100.0
32.801	1.98	0.02	0.02	90.17	41.5	95.28	-1.50	0.00	0.00	100.0	88.33	-5.70	0.00	0.00	100.0
32.901	1.97	0.02	0.02	90.27	41.5	95.40	-1.54	0.00	0.00	100.0	88.42	-5.74	0.00	0.00	100.0
33.001	1.96	0.02	0.02	90.58	41.5	95.75	-1.59	0.00	0.00	100.0	88.72	-5.78	0.00	0.00	100.0
33.101	1.92	0.02	0.02	91.19	41.3	96.37	-1.44	0.00	0.00	100.0	89.29	-5.60	0.00	0.00	100.0
33.201	1.92	0.02	0.02	91.33	41.2	96.44	-1.46	0.00	0.00	100.0	89.43	-5.60	0.00	0.00	100.0
33.301	1.92	0.02	0.02	91.36	41.1	96.46	-1.46	0.00	0.00	100.0	89.47	-5.60	0.00	0.00	100.0
33.401	1.92	0.02	0.02	91.41	41.1	96.48	-1.46	0.00	0.00	100.0	89.50	-5.60	0.00	0.00	100.0
33.501	1.92	0.02	0.02	91.43	41.1	96.50	-1.46	0.00	0.00	100.0	89.52	-5.60	0.00	0.00	100.0
33.601	1.92	0.02	0.02	91.45	41.1	96.52	-1.46	0.00	0.00	100.0	89.54	-5.60	0.00	0.00	100.0
33.701	1.92	0.02	0.02	91.47	41.1	96.54	-1.46	0.00	0.00	100.0	89.56	-5.59	0.00	0.00	100.0
33.801	1.91	0.02	0.02	91.49	41.1	96.56	-1.46	0.00	0.00	100.0	89.58	-5.59	0.00	0.00	100.0
33.901	1.91	0.02	0.02	91.51	41.1	96.57	-1.46	0.00	0.00	100.0	89.59	-5.59	0.00	0.00	100.0
34.001	1.91	0.02	0.02	91.53	41.1	96.59	-1.46	0.00	0.00	100.0	89.61	-5.59	0.00	0.00	100.0
34.101	1.91	0.02	0.02	91.54	41.0	96.61	-1.46	0.00	0.00	100.0	89.63	-5.59	0.00	0.00	100.0
34.201	1.91	0.02	0.02	91.56	41.0	96.62	-1.46	0.00	0.00	100.0	89.64	-5.59	0.00	0.00	100.0
34.301	1.91	0.02	0.02	91.58	41.0	96.64	-1.47	0.00	0.00	100.0	89.66	-5.59	0.00	0.00	100.0
34.401	1.91	0.02	0.02	91.59	41.0	96.65	-1.47	0.00	0.00	100.0	89.67	-5.59	0.00	0.00	100.0
34.501	1.91	0.02	0.02	91.61	41.0	96.67	-1.47	0.00	0.00	100.0	89.69	-5.60	0.00	0.00	100.0
34.601	1.91	0.02	0.02	91.62	41.0	96.68	-1.47	0.00	0.00	100.0	89.70	-5.60	0.00	0.00	100.0
34.701	1.91	0.02	0.02	91.64	41.0	96.70	-1.47	0.00	0.00	100.0	89.72	-5.60	0.00	0.00	100.0
34.801	1.91	0.02	0.02	91.65	41.0	96.71	-1.48	0.00	0.00	100.0	89.73	-5.60	0.00	0.00	100.0
34.901	1.91	0.02	0.02	91.67	41.0	96.73	-1.48	0.00	0.00	100.0	89.75	-5.60	0.00	0.00	100.0
35.001	1.91	0.02	0.02	91.68	41.0	96.74	-1.49	0.00	0.00	100.0	89.76	-5.61	0.00	0.00	100.0
35.101	1.91	0.02	0.02	91.70	41.0	96.76	-1.50	0.00	0.00	100.0	89.78	-5.61	0.00	0.00	100.0
35.201	1.90	0.02	0.02	91.72	41.0	96.77	-1.50	0.00	0.00	100.0	89.79	-5.62	0.00	0.00	100.0
35.301	1.90	0.02	0.02	91.73	41.0	96.79	-1.51	0.00	0.00	100.0	89.81	-5.63	0.00	0.00	100.0
35.401	1.90	0.02	0.02	91.75	41.0	96.81	-1.51	0.00	0.00	100.0	89.83	-5.63	0.00	0.00	100.0
35.501	1.90	0.02	0.02	91.77	41.0	96.83	-1.52	0.00	0.00	100.0	89.85	-5.64	0.00	0.00	100.0
35.601	1.90	0.02	0.02	91.80	41.0	96.85	-1.54	0.00	0.00	100.0	89.87	-5.66	0.00	0.00	100.0
35.701	1.90	0.02	0.02	91.83	41.0	96.88	-1.55	0.00	0.00	100.0	89.90	-5.67	0.00	0.00	100.0
35.801	1.90	0.02	0.02	91.86	41.0	96.92	-1.58	0.00	0.00	100.0	89.93	-5.69	0.00	0.00	100.0
35.901	1.90	0.02	0.02	91.92	41.0	96.97	-1.61	0.00	0.00	100.0	89.99	-5.72	0.00	0.00	100.0
36.001	1.89	0.02	0.02	92.02	41.0	97.08	-1.66	0.00	0.00	100.0	90.08	-5.76	0.00	0.00	100.0
36.101	1.89	0.02	0.02	92.25	41.0	97.32	-1.71	0.00	0.00	100.0	90.30	-5.80	0.00	0.00	100.0
36.201	1.86	0.02	0.02	92.75	41.0	97.86	-1.69	0.00	0.00	100.0	90.78	-5.76	0.00	0.00	100.0
36.301	1.82	0.02	0.02	93.37	40.8	98.46	-1.48	0.00	0.00	100.0	91.37	-5.52	0.00	0.00	100.0
36.401	1.83	0.02	0.02	93.64	40.5	98.65	-1.52	0.00	0.00	100.0	91.62	-5.52	0.00	0.00	100.0
36.501	1.82	0.02	0.02	93.70	40.5	98.68	-1.53	0.00	0.00	100.0	91.68	-5.55	0.00	0.00	100.0
36.601	1.82	0.02	0.02	93.75	40.4	98.72	-1.51	0.00	0.00	100.0	91.72	-5.52	0.00	0.00	100.0
36.701	1.82	0.02	0.02	93.76	40.4	98.72	-1.52	0.00	0.00	100.0	91.72	-5.53	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 50 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

DYNAMIC STABILITY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 271
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

	IndMTR (P162				)	Bus (3A04				)	Bus (3B04				)
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %	Voltage %Mag.	Voltage Deg.	Load MW	Load Mvar	Freq %
36.801	1.81	0.02	0.02	93.76	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
36.901	1.82	0.02	0.02	93.76	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.001	1.81	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.101	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.201	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.301	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.401	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.501	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.601	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.701	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.801	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
37.901	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.001	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.101	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.201	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.301	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.401	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.501	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.601	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.701	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.801	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
38.901	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.001	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.101	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.201	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.301	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.401	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.501	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.601	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.701	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.801	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
39.901	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0
40.000	1.82	0.02	0.02	93.77	40.4	98.72	-1.52	0.00	0.00	100.0	91.73	-5.52	0.00	0.00	100.0

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 51 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

TS ACTION SUMMARY
PowerStation 4.0.4N
Study Case: CASE1,B-A-OR

Page: 292
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Device	Action	Time
3A0404	Open	0.000
3A0412	Open	0.000
3B0402	Open	0.000
3BD06	Open	0.000
3BD07	Open	0.000
3BD08	Open	0.000
3BD18-A	Open	0.000
3BD18-B	Open	0.000
3BY40-D	Open	0.000
3BY40-G	Open	0.000
3BY19	Open	0.000
3BY23	Open	0.000
3BY33	Open	0.000
BQ11	Open	0.000
3BY39-F	Open	0.000
BQ09	Close	0.000
BQ15	Close	0.000
BQ20	Close	0.000
BQ22	Close	0.000
BQ23	Close	0.000
BQ24	Close	0.000
BQM	Close	0.000
3A0408	Close	0.000
3B0413	Close	0.000
3BRAM	Close	0.000
3BD23	Close	0.000
3BD24	Close	0.000
3BDM	Close	0.000
3BE06	Close	0.000
3BE09	Close	0.000
3BE14	Close	0.000
3BE15	Close	0.000
3BE18	Close	0.000
3BE19	Close	0.000
3BE21	Close	0.000
3BE22	Close	0.000
3BE23	Close	0.000
3BE26	Close	0.000
3BE27	Close	0.000
3BE29	Close	0.000
3BE30	Close	0.000
3BE31	Close	0.000

CCN No. _____

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Device	Action	Time
3BE36	Close	0.000
3BE45	Close	0.000
3BE48	Close	0.000
3BEM	Close	0.000
3BE46	Close	0.000
3BY07	Close	0.000
3BY08	Close	0.000
3BY11	Close	0.000
3BY12	Close	0.000
3BY15	Close	0.000
3BY16	Close	0.000
3BY20	Close	0.000
3BY21	Close	0.000
3BY22	Close	0.000
3BY24	Close	0.000
3BY25	Close	0.000
3BY30	Close	0.000
3BY31	Close	0.000
3BY35	Close	0.000
3BY36	Close	0.000
3BYM	Close	0.000
BQ14	Close	0.000
3BY37	Close	0.000
3BY38	Close	0.000
3B0409	Open	2.500
3B0419	Open	2.500
3BY39-A	Open	2.500
3BY40-B	Open	2.500
3BY40-F	Open	2.500
3A0407	Close	2.500
3B0418	Close	2.500
3B0419-1	Close	2.500
3B0409-1	Close	2.500
3B0410	Close	2.500
3B0411	Close	2.500
3A0405	Open	12.500
3BD18-C	Open	12.500
3BD18-D	Open	12.500
3BY40-A	Open	12.500
3BD12	Close	12.500
3BD13	Close	12.500
3A0405-1	Close	12.500

CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 53 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

TS ACTION SUMMARY
PowerStation 4.0.4N
Study Case: CASEI.B-A-OR

Page: 294
Date: 06-13-2005
SN: SCALEDISON
File: Songs23

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Device	Action	Time
3A0403	Close	12.500
3BD21	Close	12.500
3BD22	Close	12.500
3A0411	Open	17.500
3BD12	Open	17.500
3BD13	Open	17.500
3A0411-1	Close	17.500
3BD12-1	Close	17.500
3BD13-1	Close	17.500
3BD12-1	Open	22.500
3BD13-1	Open	22.500
3BD12-2	Close	22.500
3BD13-2	Close	22.500
3BY39-H	Open	32.500
3A0402	Close	32.500
3A0404	Close	32.500

CCN NO. _____

Project: E4C-082,R2-PCCN N-19 Sht 54 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

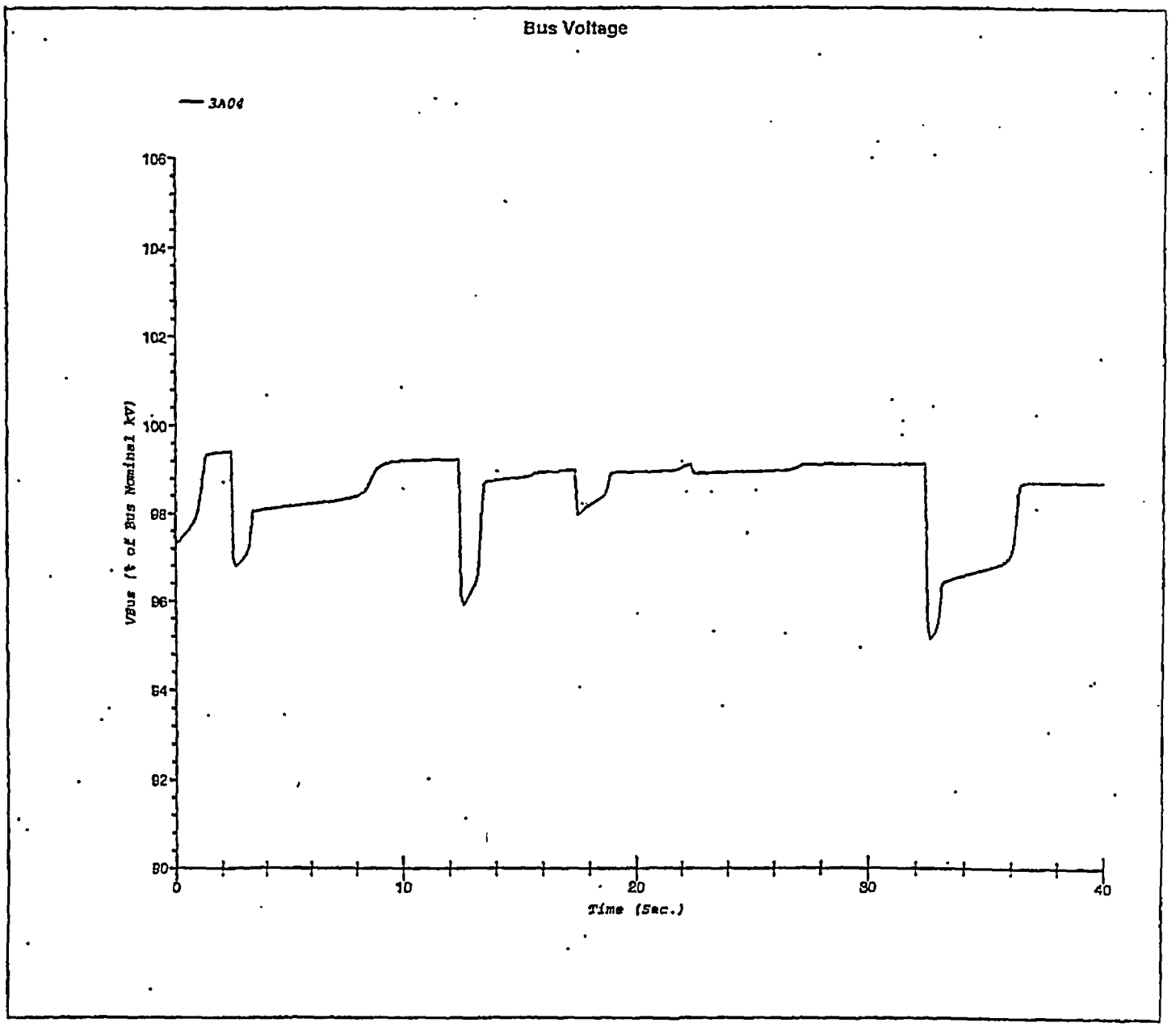
Study Case: CASE1.B-A-OR

Date: 05-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.3A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

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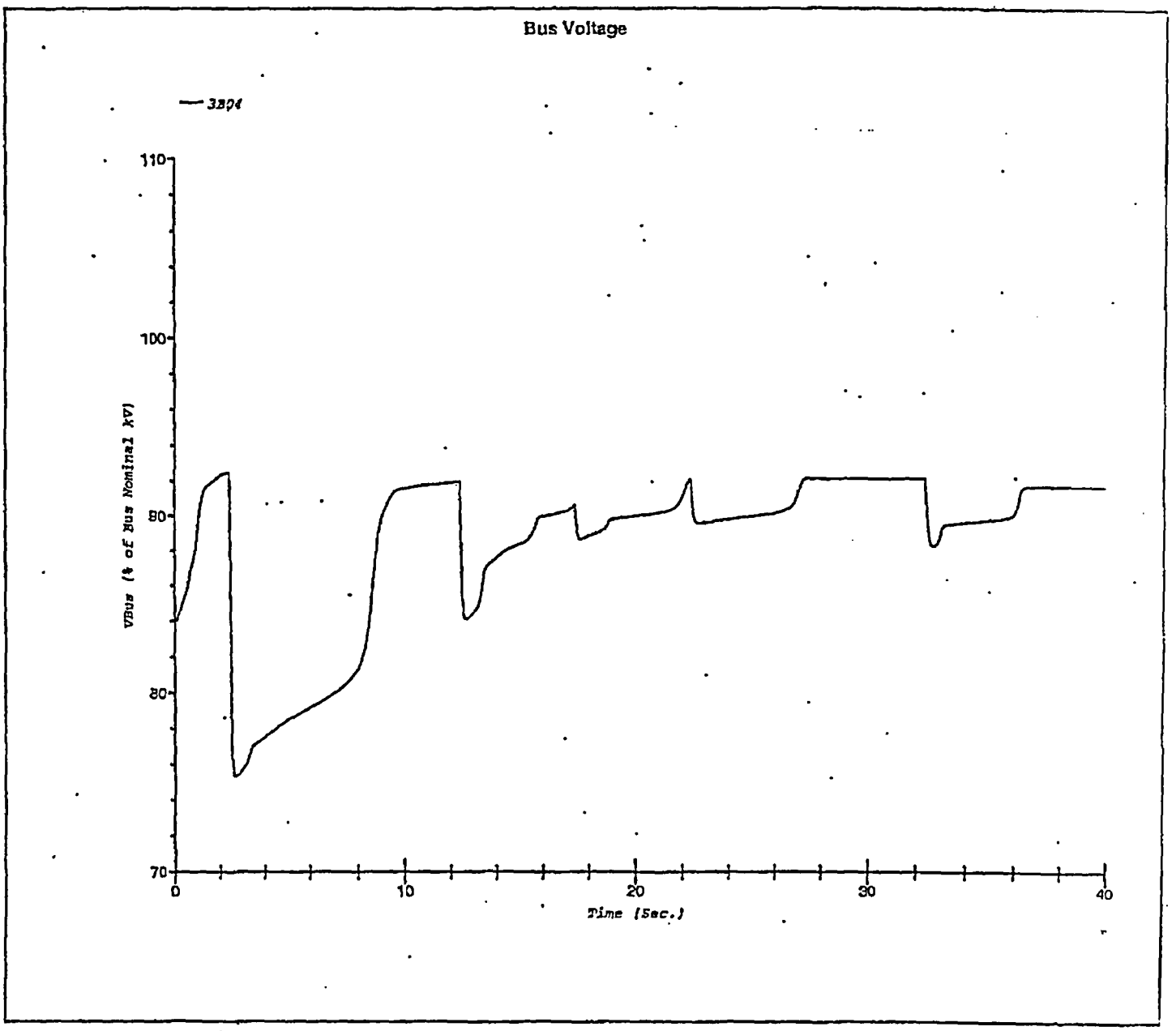
Project:	E4C-082,R2-PCCN N-29 Sht	PowerStation 4.0.4N		Date:	06-13-2005
Location:	SONGS 2&3			SN:	SCALEDISON
Contract:				Revision:	Base
Engineer:	Ric Cabiling		Study Case: CASEI.B-A-OR	Config.:	I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

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Project: E4C-082,R2-PCCW N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

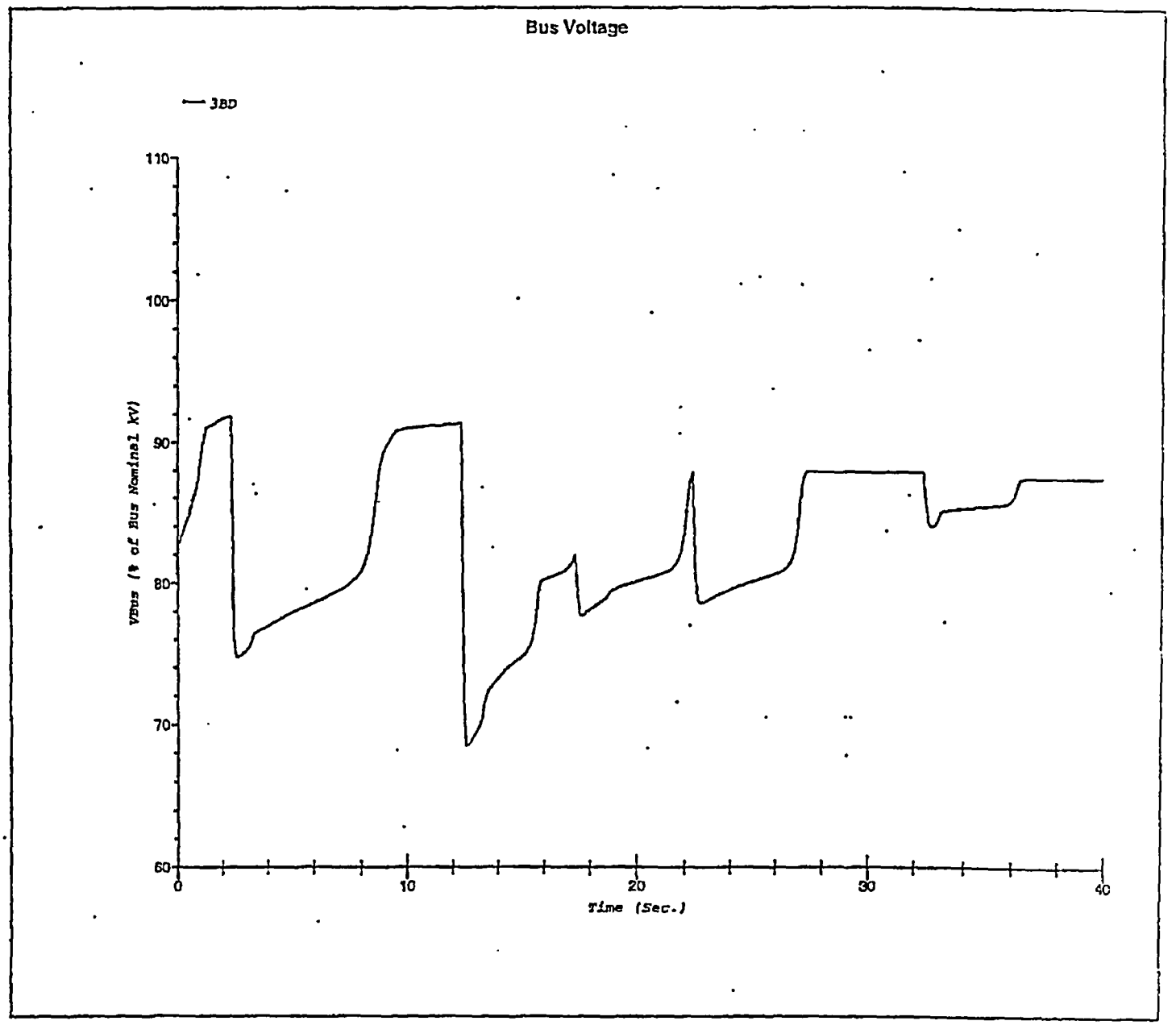
Study Case: CASEI.B-A-CR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-CR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: 3B-A-CR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

Project: E4C-082,R2-PCCN N-19 Sht 57 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

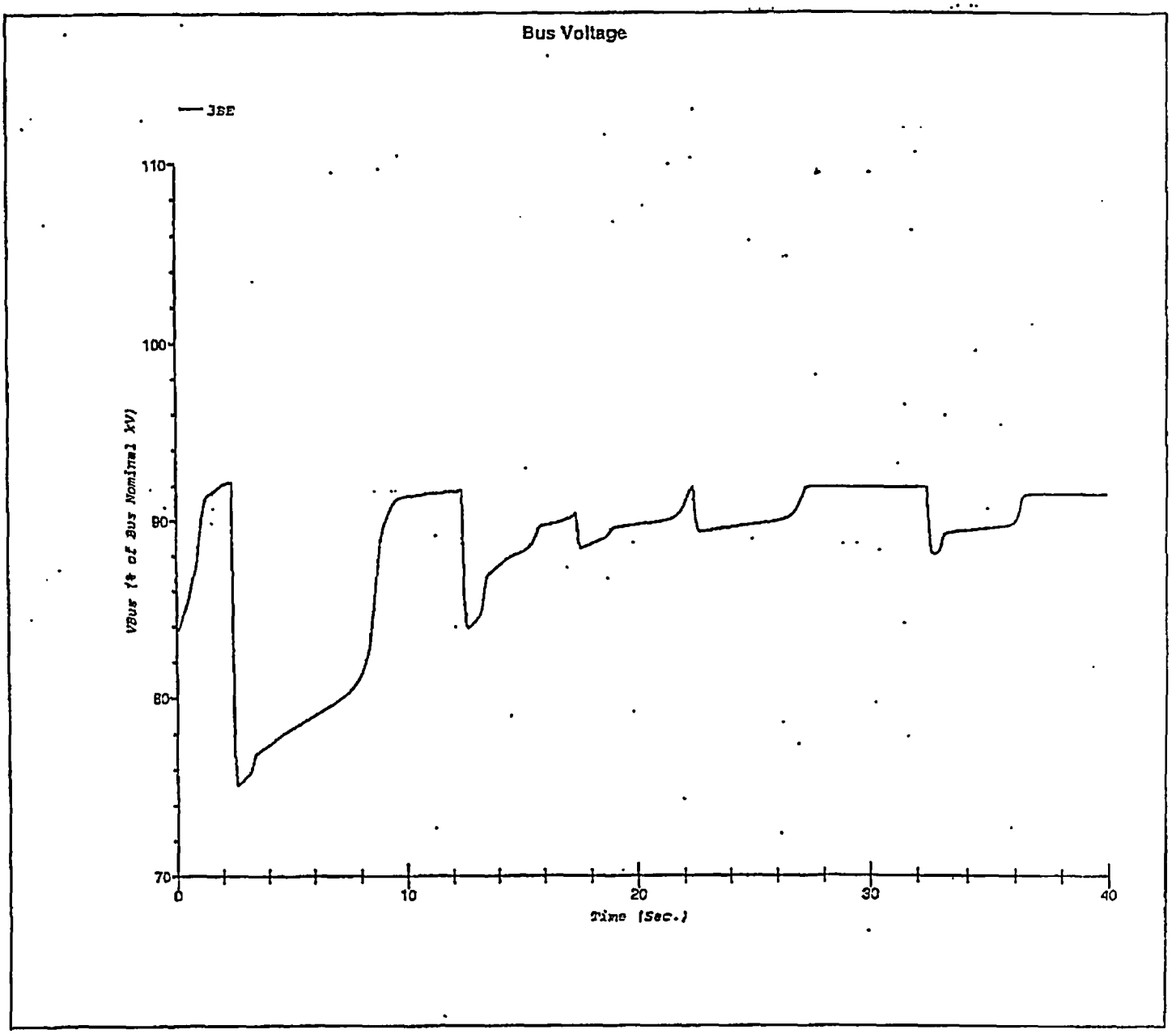
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR.

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN M-15 Sht 58 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

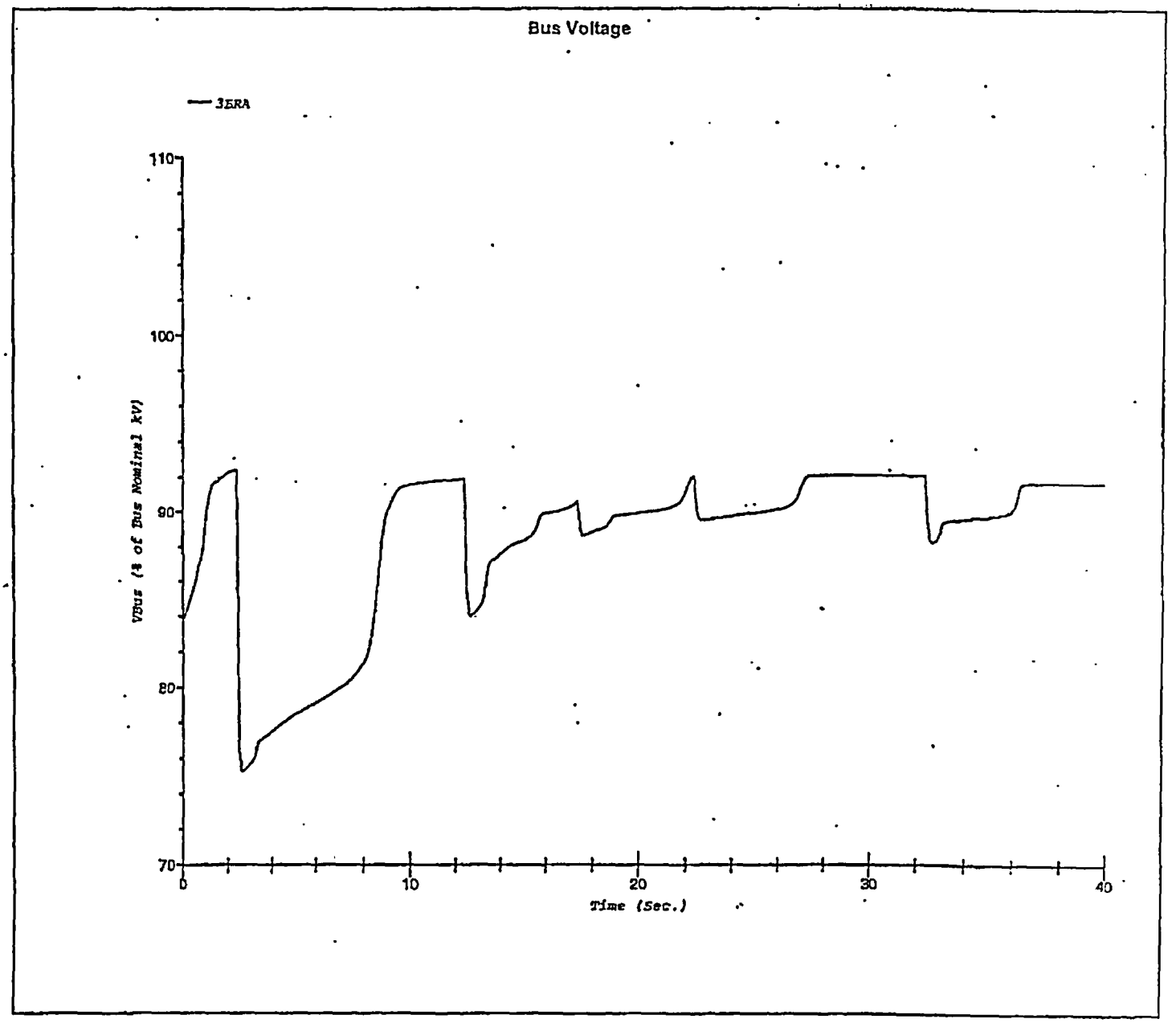
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

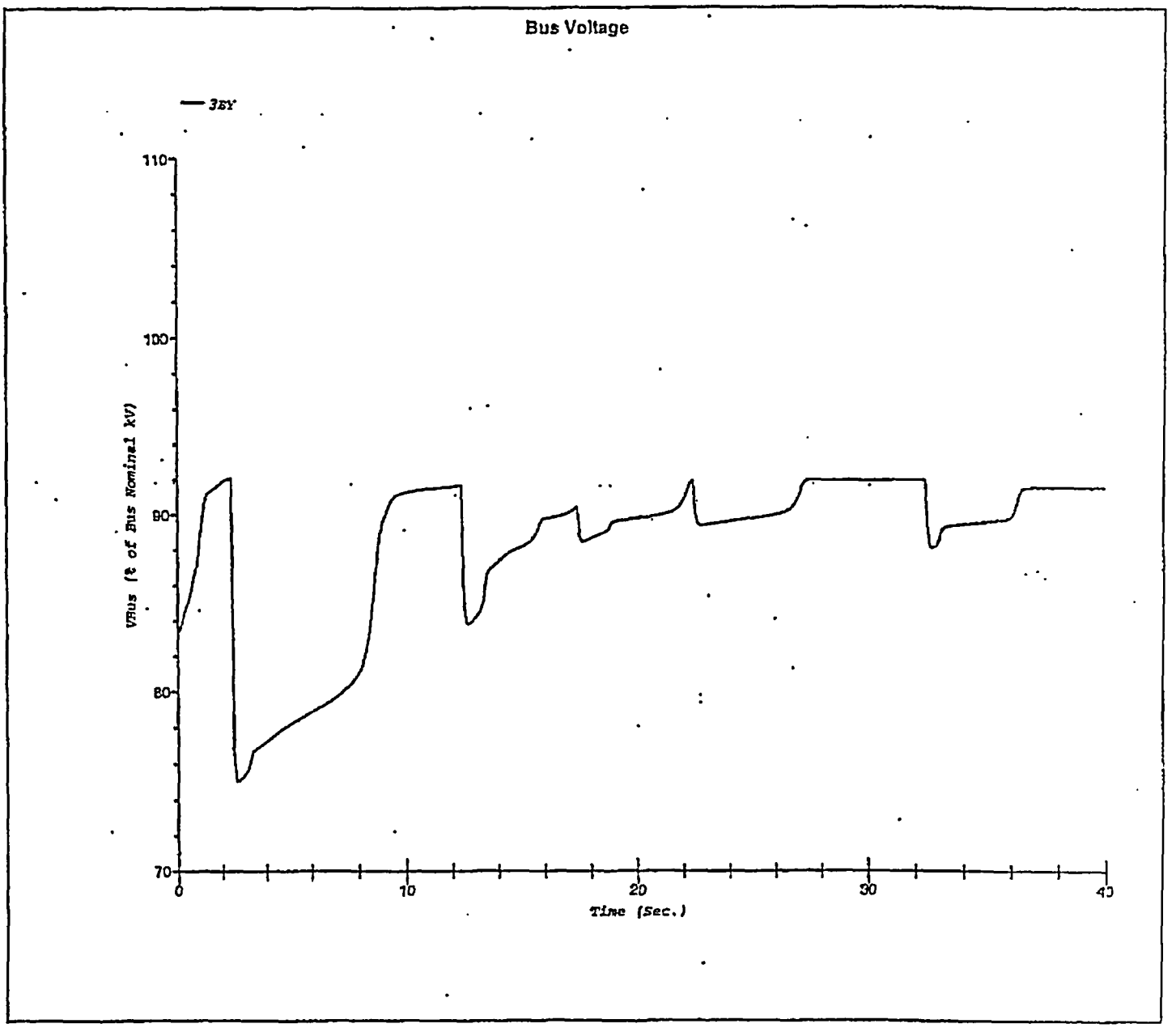
59 of 75

Project:	E4C-082,R2-PCCN X-19 Sht	PowerStation 4.0.4N		Date:	06-11-2005
Location:	SONGS 2&3			SN:	SCALEDISON
Contract:				Revision:	Base
Engineer:	Ric Cabiling	Study Case: CASEI.B-A-OR		Config.:	I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WP\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

Project: E4C-082,R2-PCCN N-19 Sht 60 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

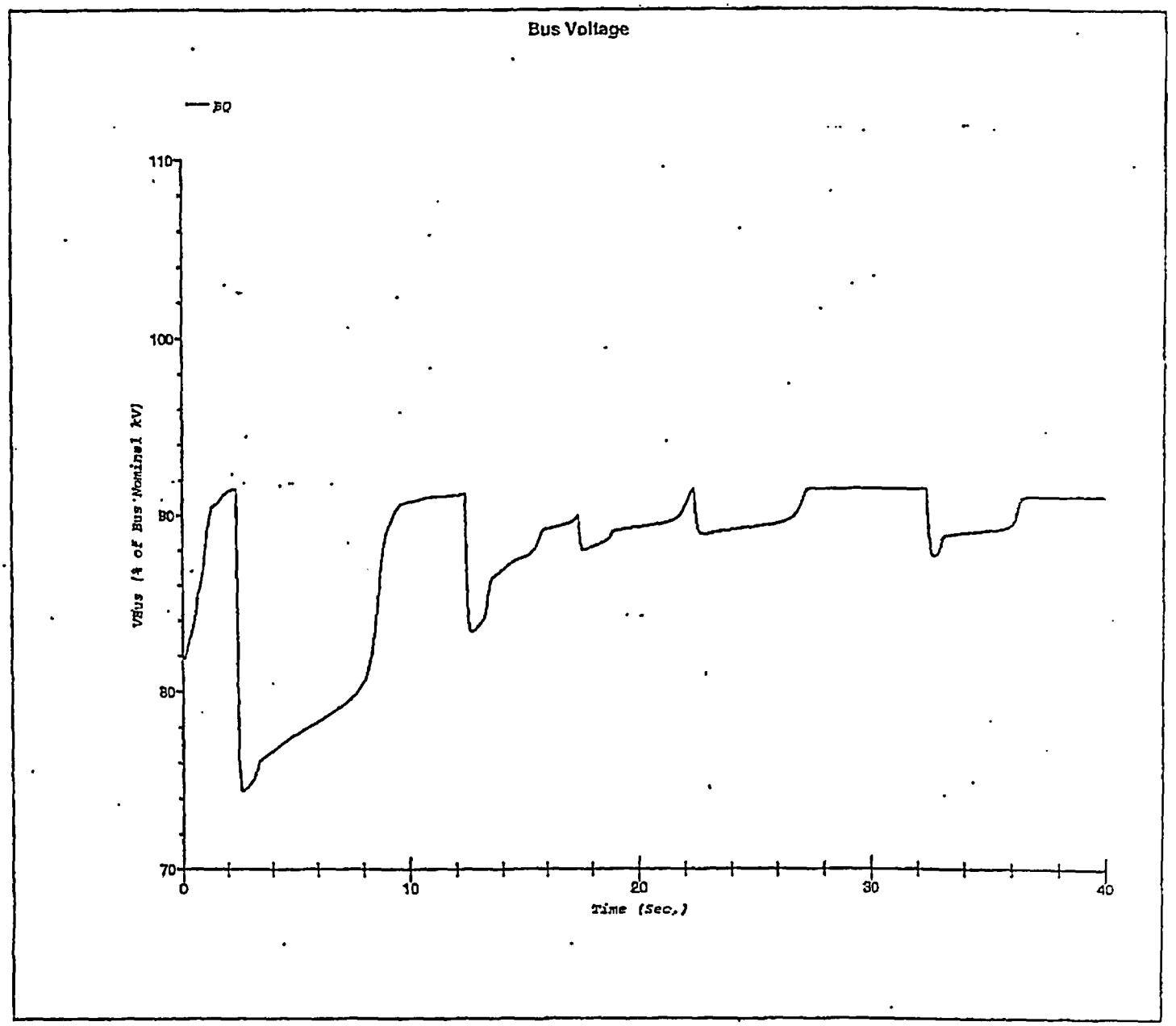
Study Case: CASE1.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: 1.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: 1B-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

Project: E4C-082,R2-PCCN N-19 Eht 61 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

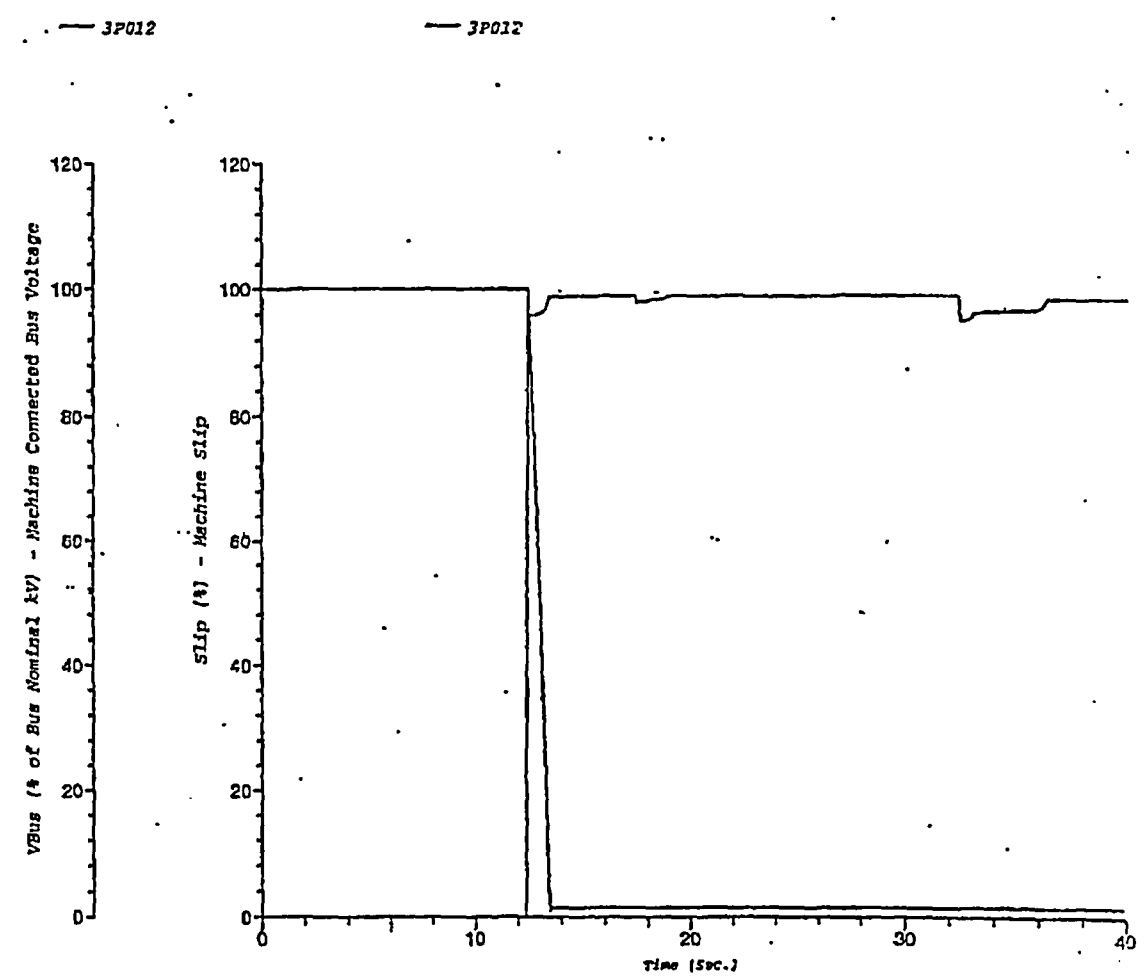
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISCN
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No.

62 of 75

Project: E4C-082,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

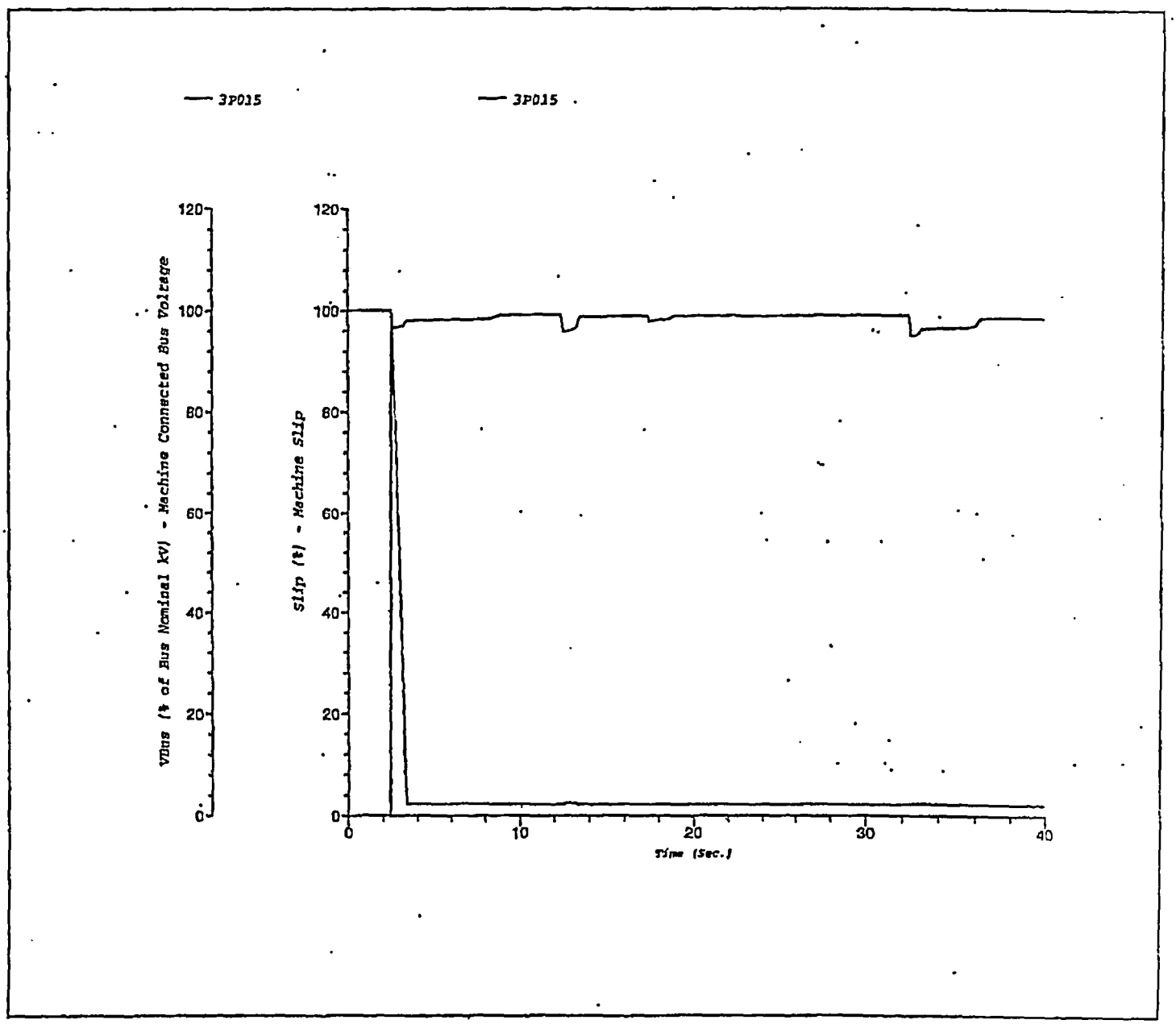
Study Case: CASE1.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WP\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

63 of 75

Project: E4C-082,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

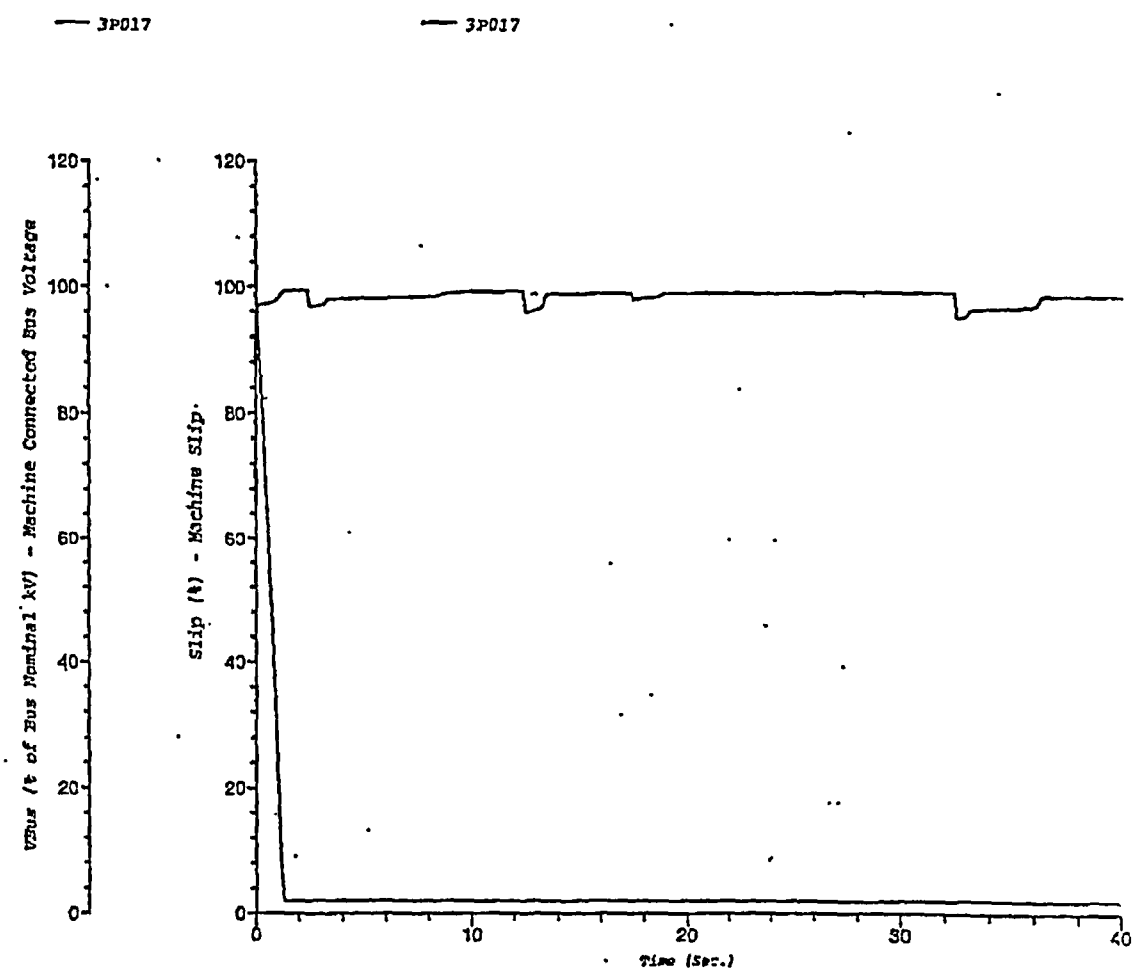
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11,9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DSA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 64 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

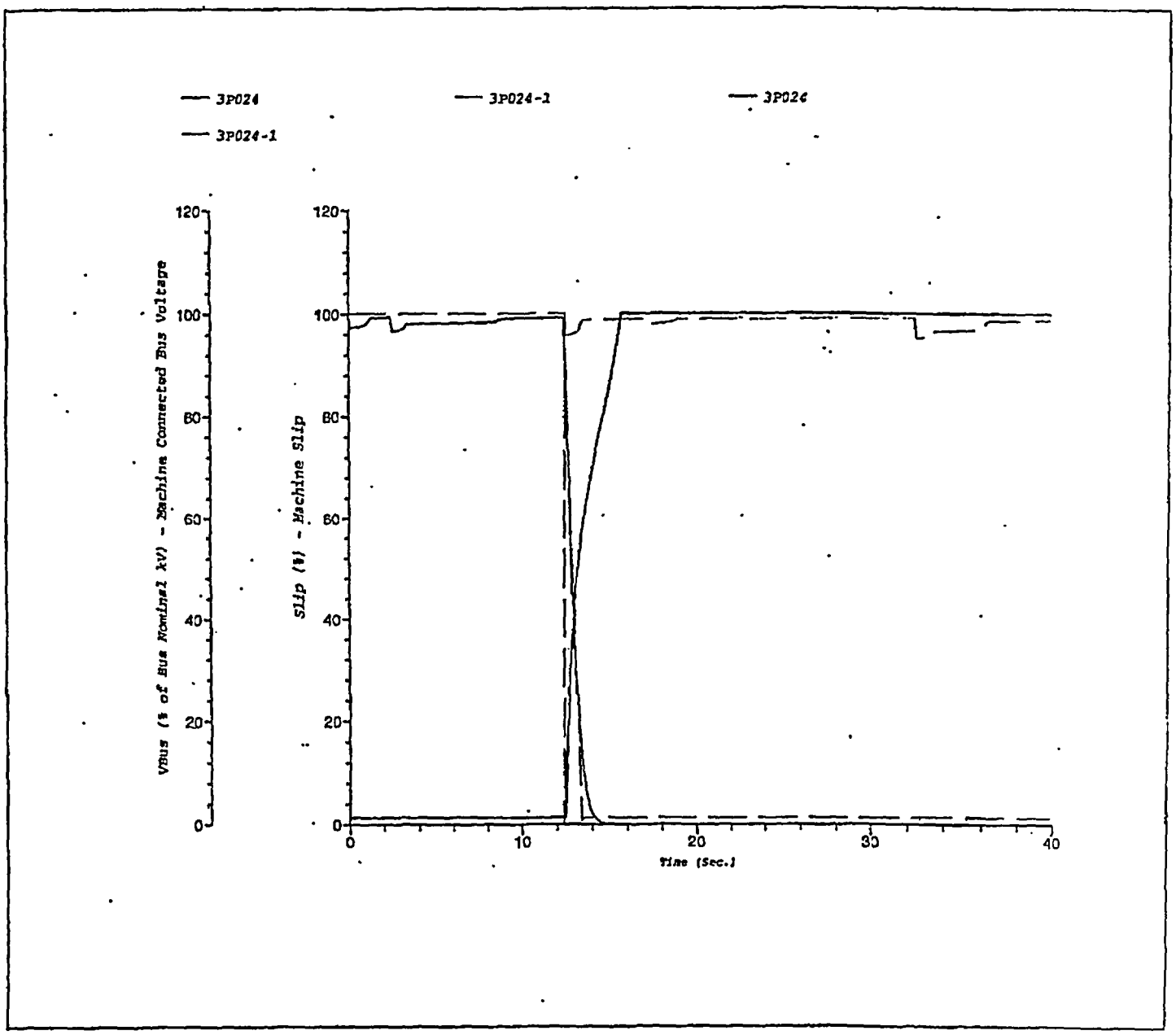
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.3A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

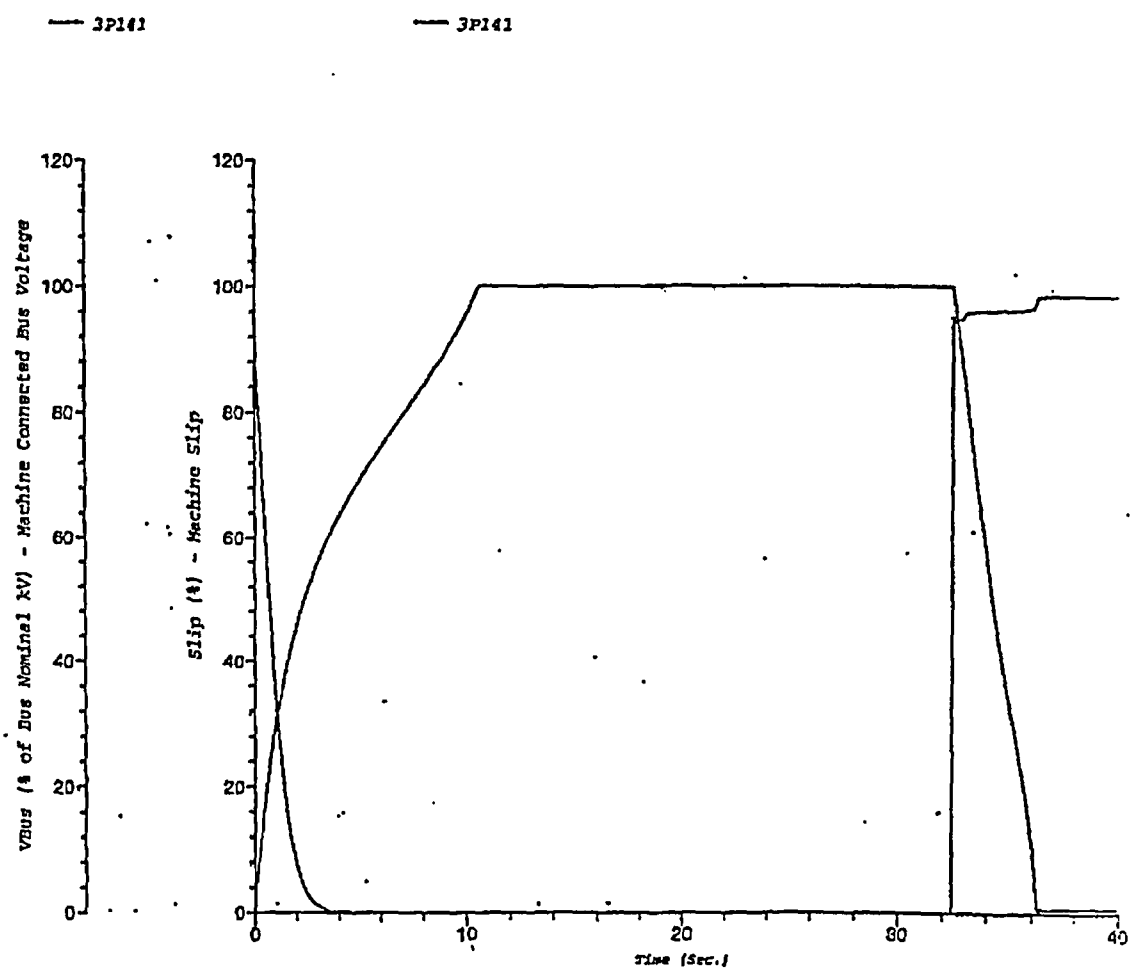
Study Case: CASEI,B-A-OR

Date: 06-23-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WT\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 660 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

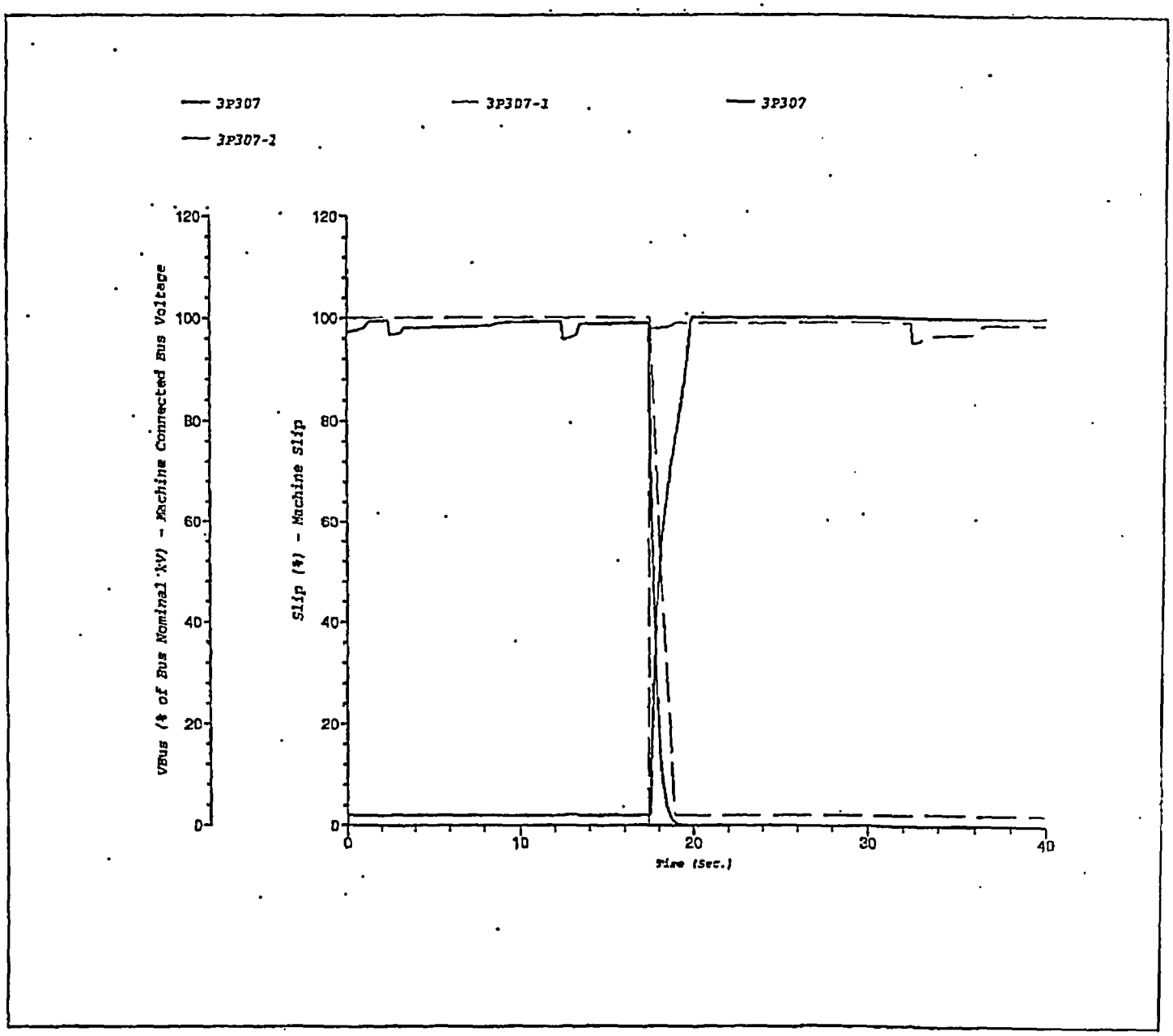
Study Case: CASE1.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 67 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

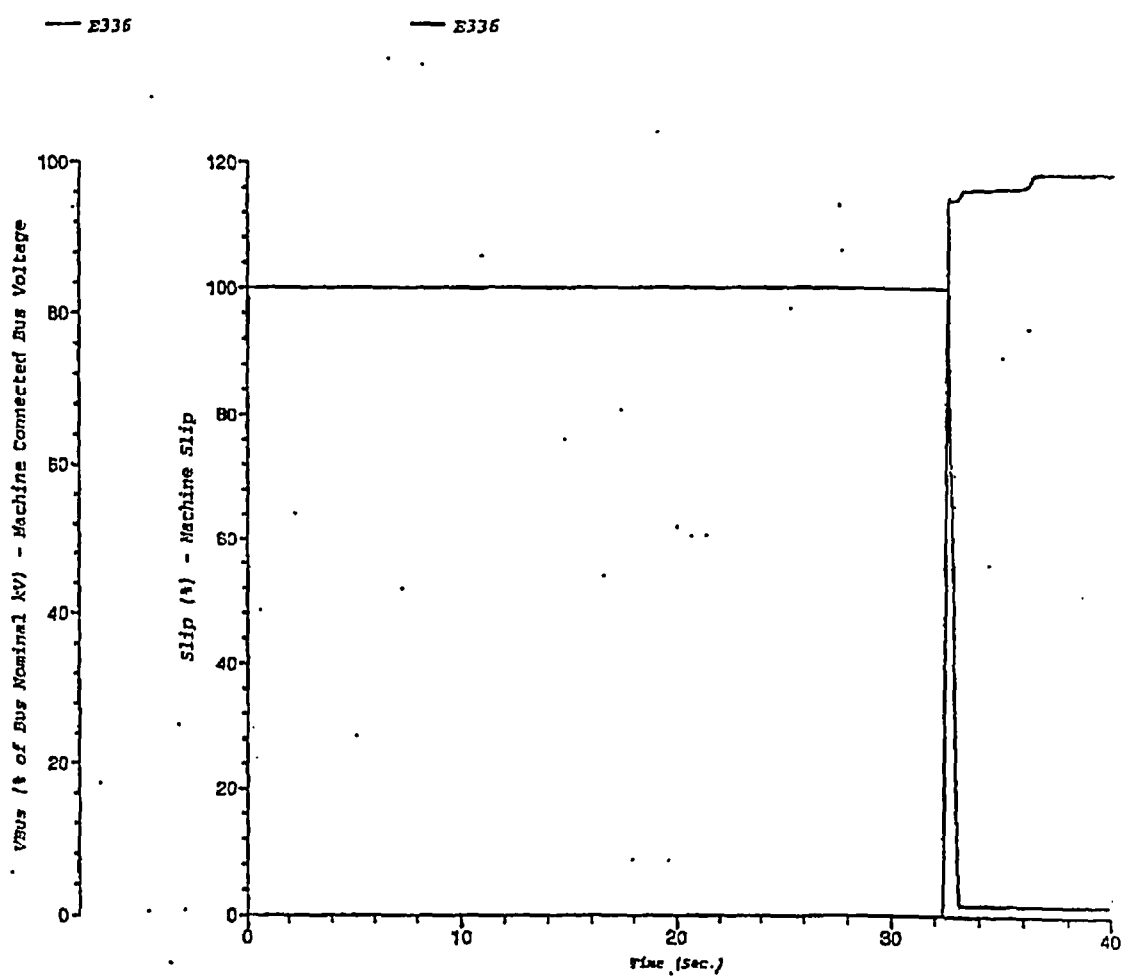
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: 1B-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 68 of 75.
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

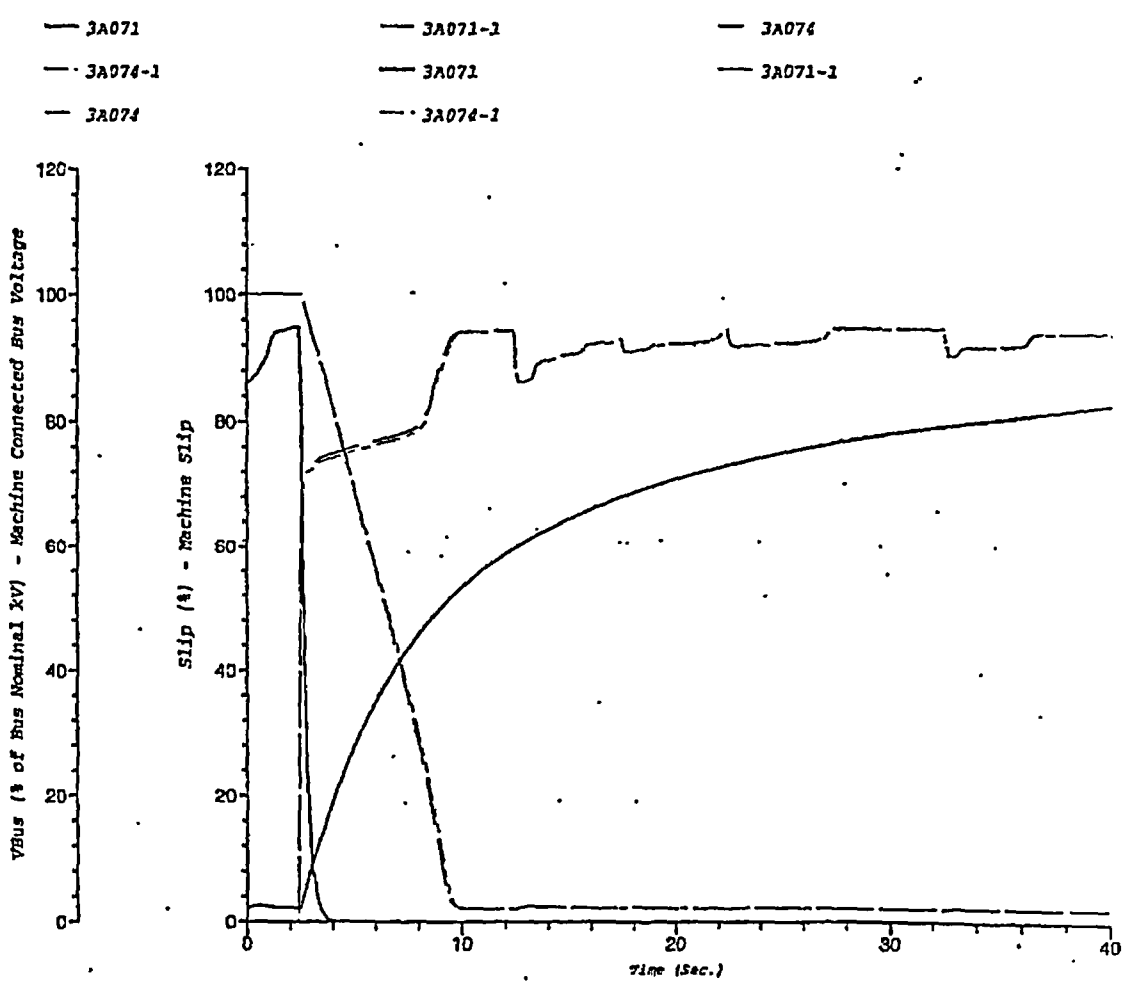
Study Case: CASE1.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: 1B-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 69 of 75
Location: SONGS 2&3
Contract:
Engineer: Nic Cabiling

PowerStation
4.0.4N

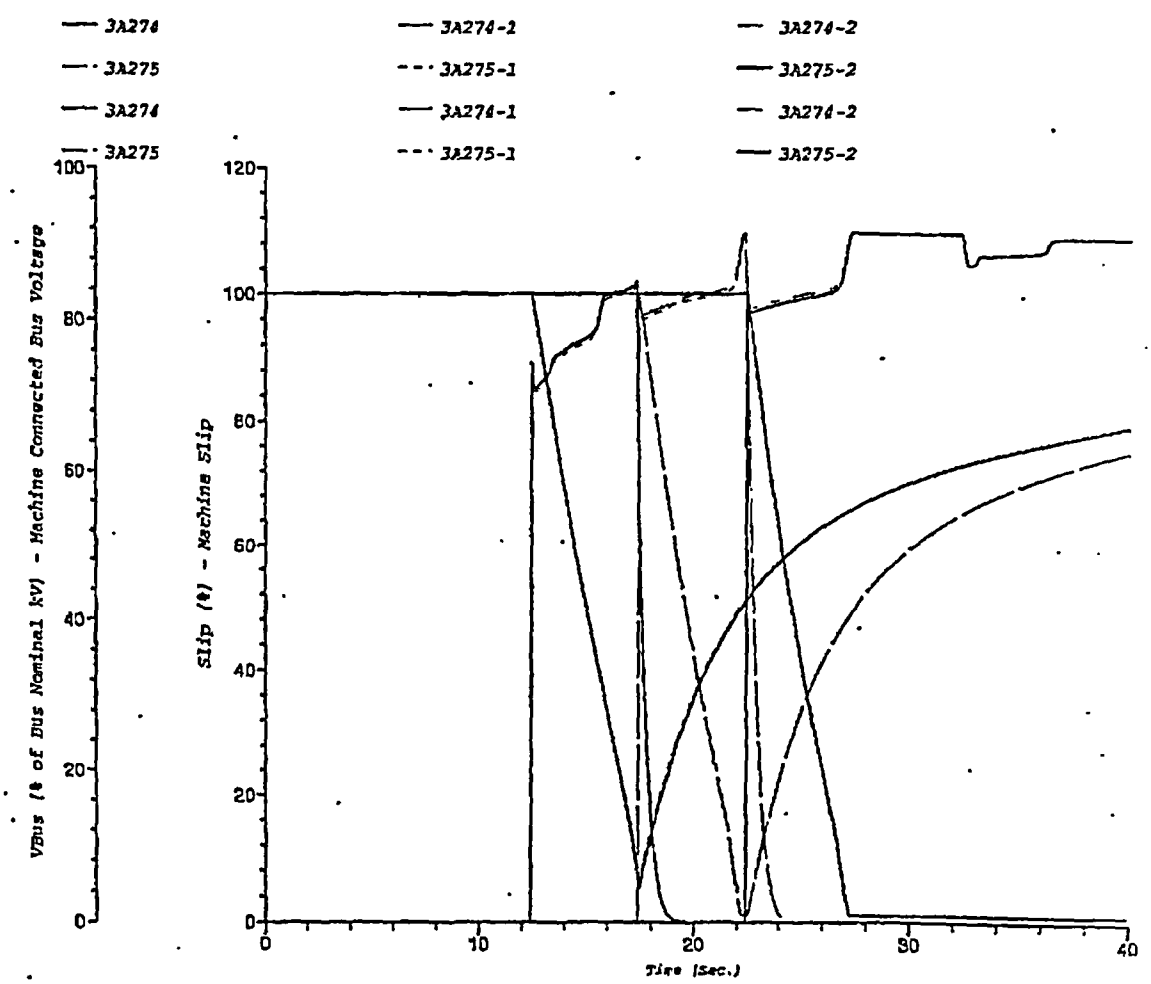
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

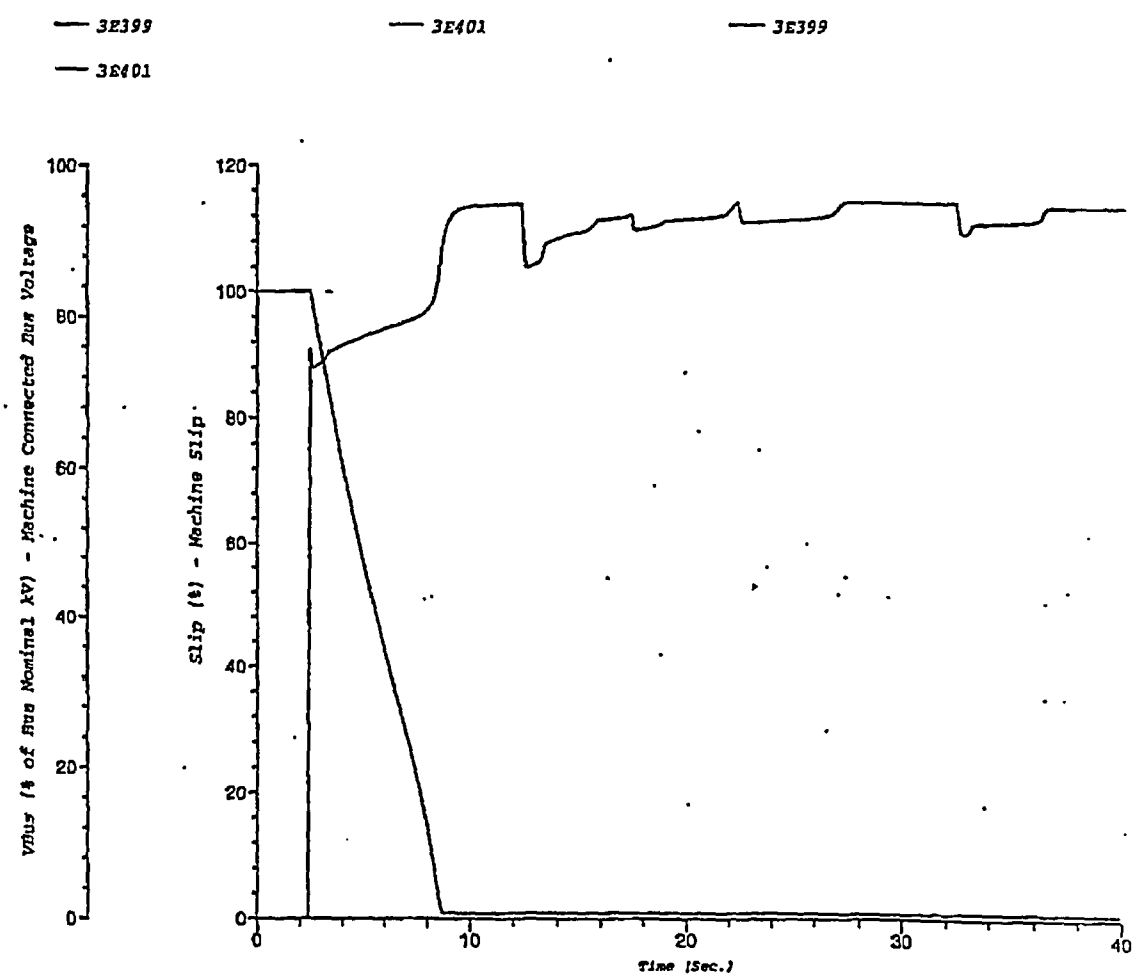
Study Case: CASBI.B-A-CR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

Project: E4C-082,R2-PCCN N-19 Sht 71 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

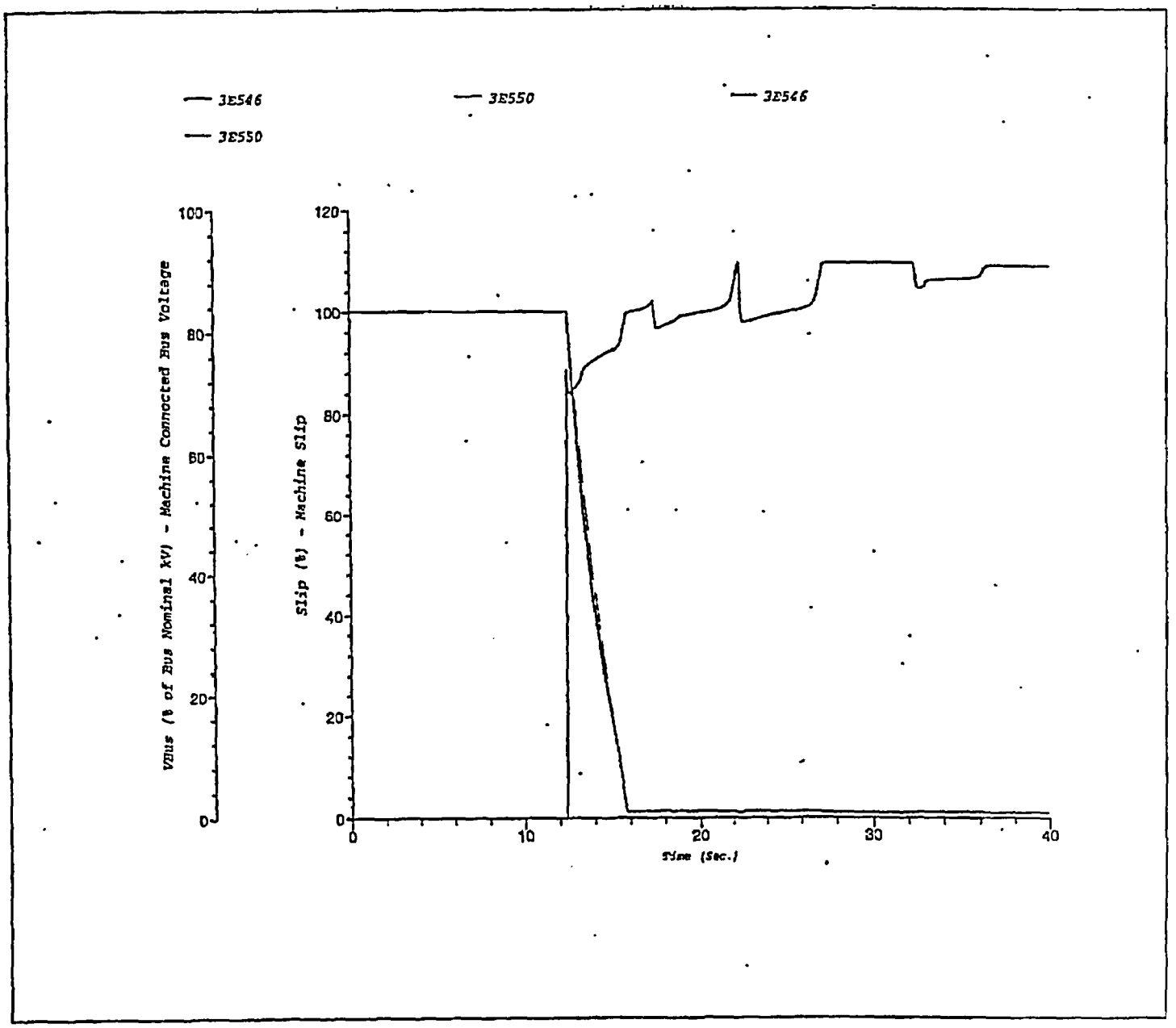
Study Case: CASEI,B-A-OR

Date: 06-13-2005
SN: SCALEDISCN
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DEA with overlapping relay timer.

Project File: C:\E4C-082, R3WP\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN No. _____

Project: E4C-082,R2-PCCN N-19 Sht 72 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

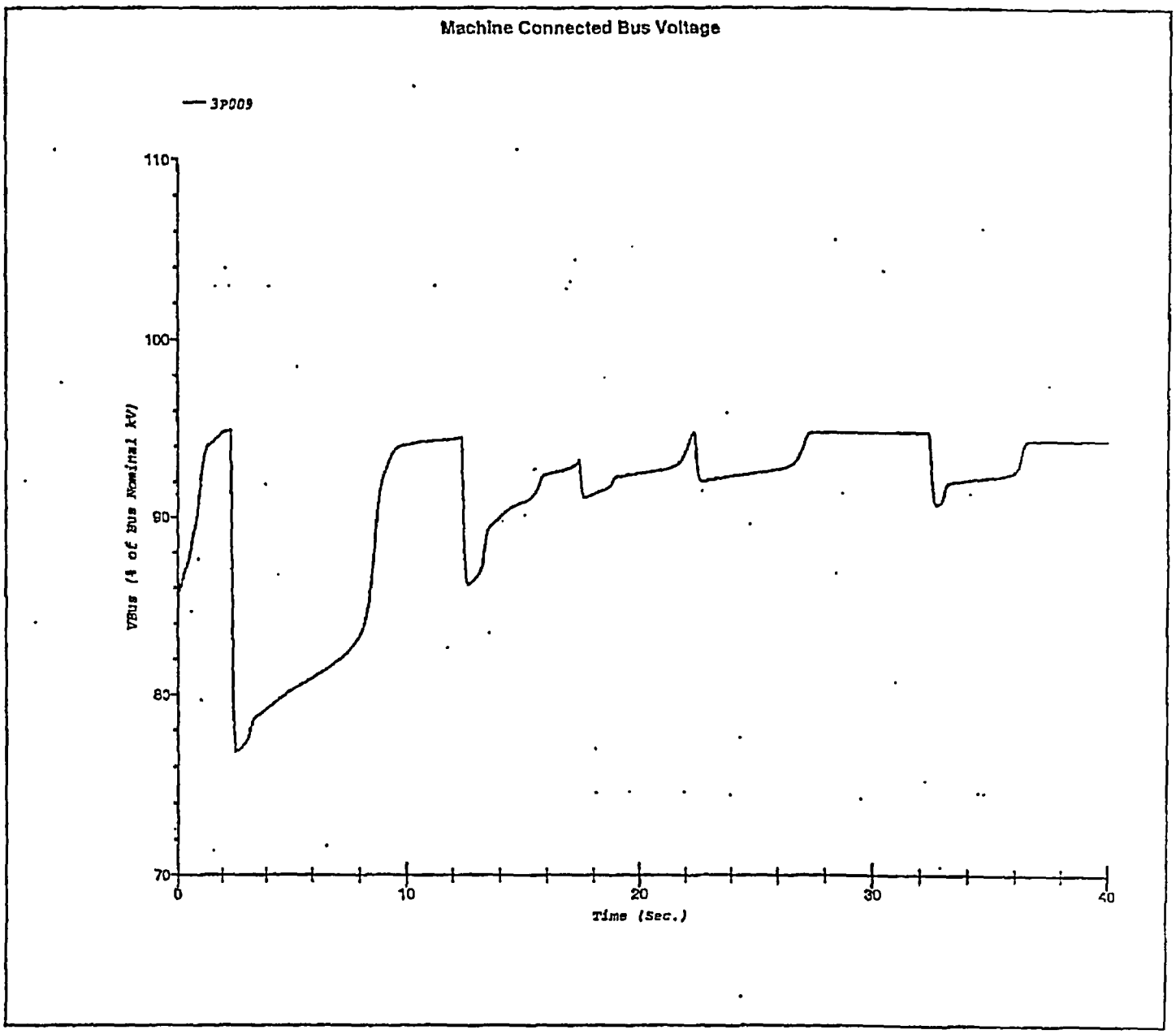
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISCN
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO.

Project: E4C-082,R2-PCCN N-19 Sht 73 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

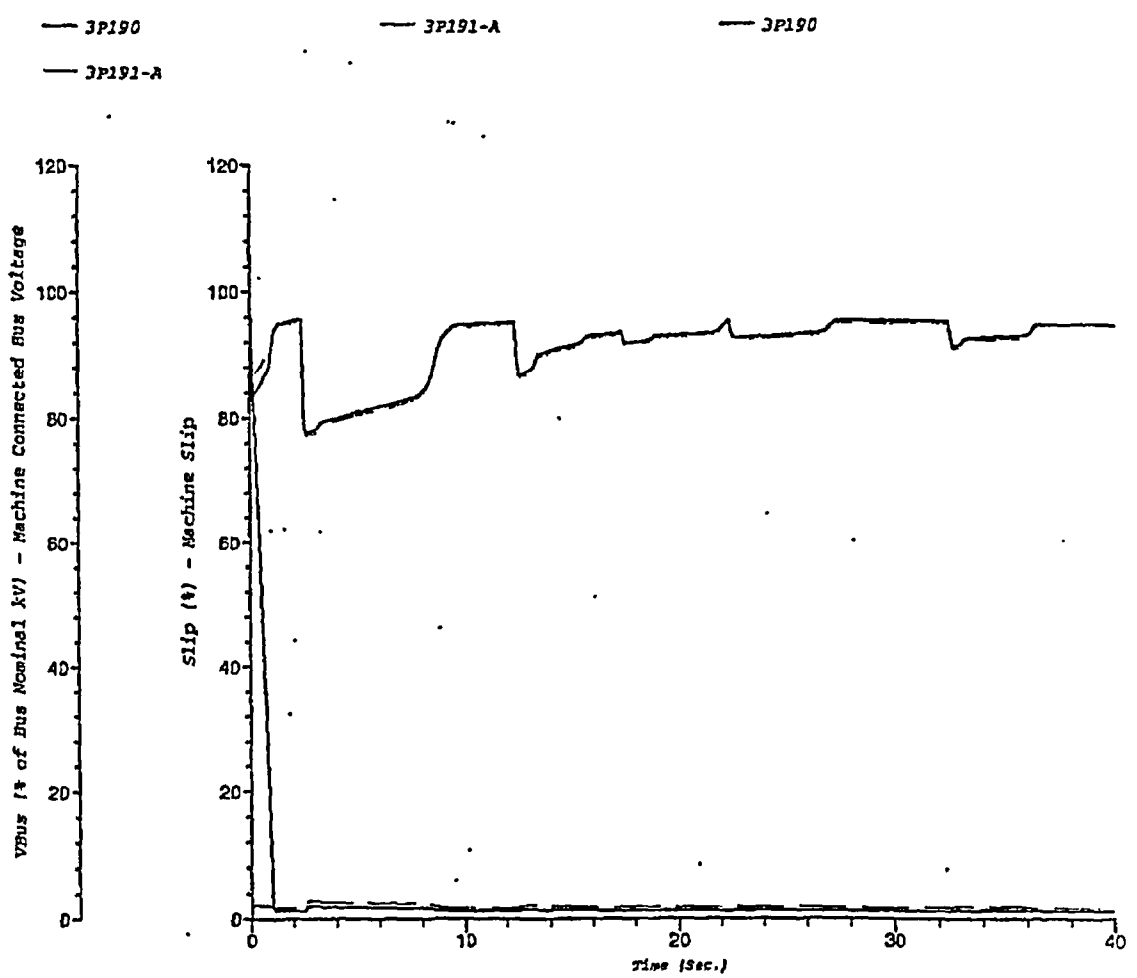
Study Case: CASEI.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: I3-A-OR

TRANSIENT STABILITY ANALYSIS



CCN. No. _____

Project: E4C-082,R2-PCCN N-19 Sht 74 of 75
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

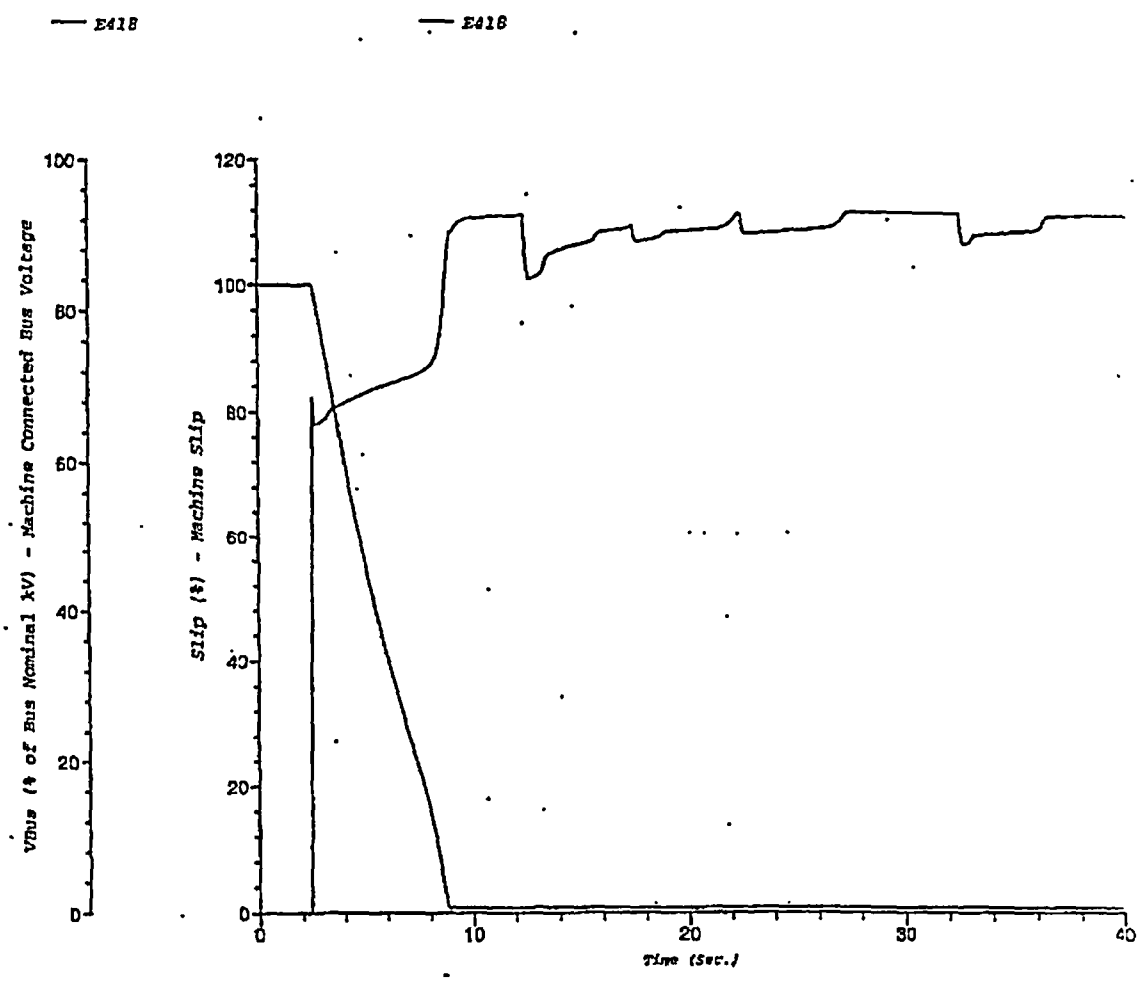
Study Case: CASEI.B-A-OR

Date: 05-23-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



CCN NO. _____

Project: E4C-082,R3-PCCN N-19 Sht
Location: SONGS 2&3
Contract:
Engineer: Ric Cabiling

PowerStation
4.0.4N

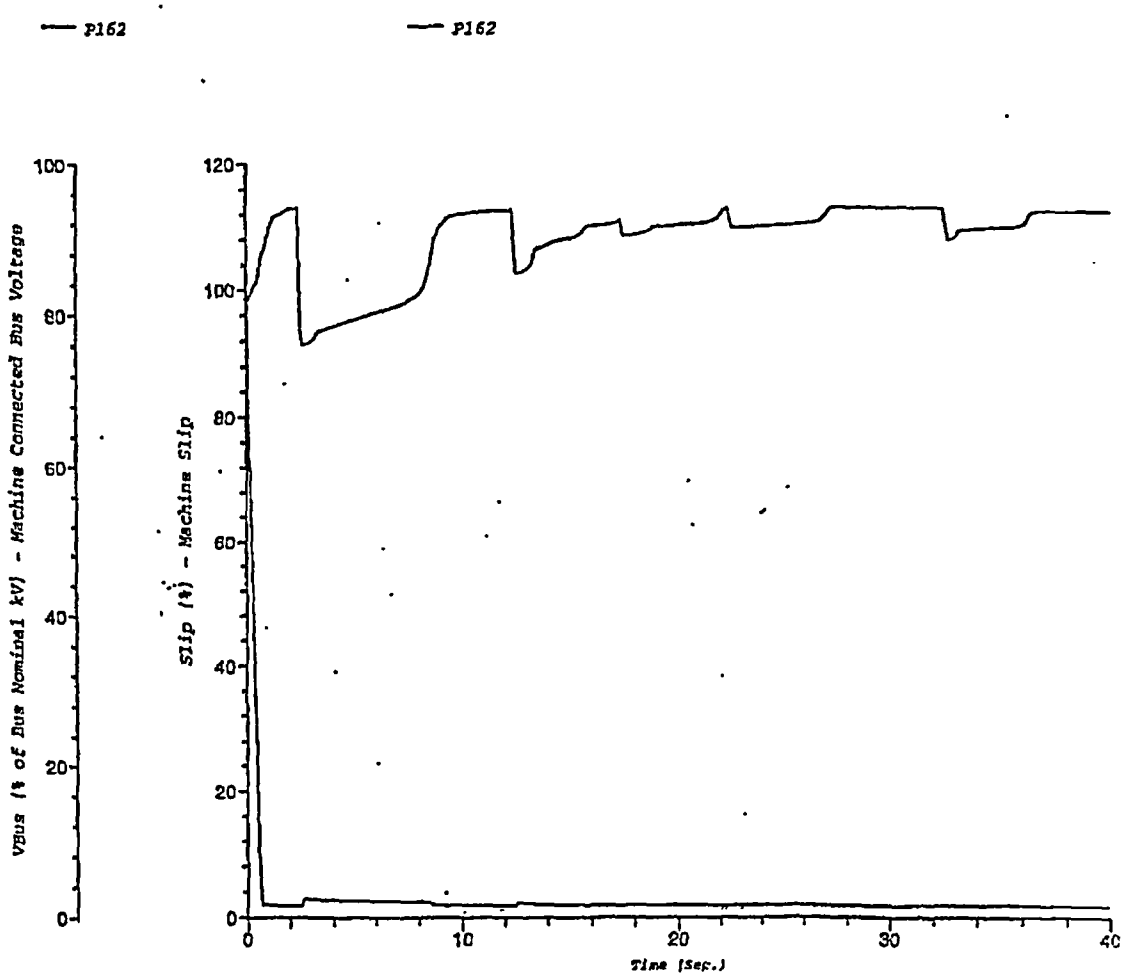
Study Case: CASE1.B-A-OR

Date: 06-13-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A-OR

Sec.11.9A-Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA with overlapping relay timer.

Project File: C:\E4C-082, R3WF\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-OR

TRANSIENT STABILITY ANALYSIS



Attachment 5

Calculation E4C-082, "System Dynamic Voltages During DBA"

Section 3.0, "Assumptions"

3.0 ASSUMPTIONS

3.1 In Mode 1 (Cases I and II), the total load in on each Reserve Auxiliary Transformer (RAT) secondary Y-wiring, which supplies the Non-ESF buses 2A03, 2A07, 2A08, 2A09, 3A03, 3A07, 3A08, and 3A09 are assumed equal to the full MVA (OA) rating of the winding of RAT secondary Y-winding at power factor of 85%, i.e., 20MVA at 0.85 power factor (17+j10.536)MVA. This is acceptable since 20MVA is a conservative estimate of the actual loading and any change in the loading of the Y-winding does not significantly affect the voltage of the X-winding in a three winding transformer. Accordingly, any change in the loading of non-ESF buses connected to the Y-winding of these RAT has negligible effect on the voltage of ESF busses connected to the X-winding of these transformers.

3.2 Assumptions and methods used in the development of equipment parameters for the Unit 2 & 3 data calculation E4C-086 (Ref. 6.3) are applicable to this calculation.

3.3 Any ESF load which could start coincident with the initiation of an accident signal and is not prevented from being started by an automatic control, operating instructions, or administrative limitations, is assumed to start. Likewise, any ESF load which could be running prior to the initiation of an accident signal and which is not automatically tripped by the signal is assumed to continue running.

3.4 For Case III & U2EDG, maintained voltage at the diesel generator is assumed to be at (4.38 KV). Per reference 6.61, the motor operated potentiometer (MOP) indicates a voltage setpoint for the EDG regulator of 4460±80 volts, or a minimum of 4380 volts. With the majority of EDG loads being induction motors (constant KVA devices), assuming a regulated voltage of 4380 volts for this analysis is conservative since system losses (based on current flow) will be higher. See section 4.10 of calculation E4C-090 (Ref. 6.2).

3.5 The analysis consider a design basis accident that would result in the initiation of a SIAS or SIAS with concurrent EFAS and LOVS. One of the HPSI is on test and remain connected to the 4-kV bus upon initiation of theses accident signals. Accordingly, two HPSI Pumps are started during the initial load group sequencing operation.

3.6 The analysis considers a Safety Injection Actuation Signal (SIAS) concurrent with an Emergency Feedwater Actuation Signal (EFAS). In Cases III-A and III-B a loss of Voltage Signal Voltage is also considered. The Auxiliary Feedwater Pumps are trip at t = 0 seconds on SIAS. After all the required ESF loads are sequenced (except the Auxiliary Building Emergency Chillers), the Auxiliary Feedwater Pumps re-start at t=30 seconds and the Auxiliary Building Emergency Chillers start at t = 35 seconds. This results in the worst case sequencing configuration for a dynamic voltage analysis.

3.7 5KVA Lumped Static Load and 5 HP Lumped Motor Load are added to each ESF MCC to allow for future load growth.

Attachment 6

Calculation E4C-090, "Auxiliary System Voltage Regulation,"

Section 3.0, "Assumptions"

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
3										

3.0 ASSUMPTIONS

The assumptions described in this section are considered conservative for the purposes of this calculation. Some are an integral part of the methodology used, while others are based on engineering judgment. A basis or a thought process for the assumption is provided where appropriate, or a reference to a source of further information is indicated.

3.1 For the purpose of obtaining cable resistance values, cable conductors are assumed to be at an operating temperature of 75° C for all study cases. Operating temperatures higher than 75° C may be experienced for short cable runs associated with loads or tray sections located in high ambient temperature locations. However, when evaluating the entire cable run, a temperature of 75° C is considered a conservative value.

3.2 Intermittent loads such as cranes, hoists, utility power, and MOVs are not considered in the analysis. For example, large cranes and hoists will be operated for short periods and are most likely to occur during conditions of reduced system loading, such as during plant outages. MOVs are typically small loads, which operate for a relatively short duration. Hence, these types of loads do not represent steady-state conditions for the auxiliary electrical system.

3.3 Voltage criteria specified in Section 1 are based on rated frequency. For the purposes of this calculation, it is assumed that steady-state system frequency is 60Hz for all study cases. Frequencies other than 60Hz are not addressed in this calculation, as these are transient conditions. For additional information on frequency considerations at SONGS, see Reference 6.301, Sections 3.11.6.2 and 8.2.2.1.2.

3.4 Subsequent to a Safety Injection Actuation Signal (SIAS), all non-Class 1E loads that are supplied from a Class 1E bus are automatically disconnected (References 6.301 and 6.302). However, these loads are capable of being reconnected during the post-accident period (see Reference 6.304, Attachment 12). For the purposes of this calculation and its applicable cases, these loads are assumed to be steady-state loads during the post-accident period. This assumption ensures that the bus loading in the included analysis is bounding for all possible post-accident loading conditions. See also Section 5.3.1.

3.5 For the purposes of this calculation, non-Class 1E MCCs are modeled as lumped motor and lumped static loads as described in Reference 6.102. The individual MCC motor feeders are assumed a voltage drop allowance of 3% (see Section 5.12). This is in agreement with the methodology described in calculation E4C-120 (Reference 6.105) that includes voltage drop analyses for non-Class 1E MCC loads.

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
3										

3.6 In general, MCC bus loading is assumed as follows:

Minimum Voltage Cases

Non-Class 1E MCCs are assumed loaded at 75% of connected load unless otherwise noted. The MCCs are represented as lumped loads based on the load tables in Section 8 of calculation E4C-086 (Reference 6.102).

Class 1E MCCs are assumed loaded at 75% of connected load for non-accident scenarios, and 100% of connected emergency load for accident scenarios unless otherwise noted. See also Section 5.3.1.

All MCC loading, unless otherwise noted, includes motor (5 HP) and static (5 kVA) margin loads.

Maximum Voltage Cases

Non-Class 1E MCCs are assumed loaded at 25% of connected load unless otherwise noted.

Class 1E MCCs are assumed loaded at 25% of connected load unless otherwise noted.

Load margin values are not included.

These general loading conditions are judged conservative for this analysis. See also Section 3.2.

3.7 Assumptions described in calculation E4C-086 (Reference 6.102) are applicable to this calculation unless otherwise noted.

3.8 For motor starting cases (A8, A9, A10, A10a, A11, 3A8, 3A9, 3A10, 3A10a and 3A11), the starting motor is assumed to be a constant impedance (static) load. This load derives its running current and running power factor from the respective motor's starting current and starting power factor. See Section 5.10.

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
3										

3.9 In general, conservative assumptions are applied to the bus loading alignments described in Section 5.3. Under normal plant conditions, some loads are cycled, while others may be chosen to run at the discretion of the plant operators. Loading scenarios in this calculation were selected in an effort to envelope a wide range of operating needs, but cannot include all possible plant alignments. Section 5.3 describes specific loading conditions that are assumed for the plant operating in Modes 1 – 4 and in Modes 5 & 6.

The following are also assumed for the Class 1E buses:

a) For long term bus loading (cases A13a, A13b, 3A13a, 3A13b only), no HPSI, LPSI or AFW Pump is assumed operating in Modes 1 – 4 (See Section 5.5 and Reference 6.502).

b) For short term bus loading, one AFW pump on each train is assumed operating in Modes 1 – 4. This loading envelopes a postulated HPSI, LPSI, or AFW pump operating on the bus.

c) Salt Water Cooling Pumps are assumed operating one per train in all modes.

d) Two CCW pumps are assumed operating on a single Class 1E bus in Modes 1 – 4 for cases A8, A9, 3A8, and 3A9. For other cases, one CCW pump is assumed operating on each train.

e) For accident scenarios, all three HPSI pumps are assumed to be operating.

3.10 For the Class 1E battery chargers 2(3)B001 through 2(3)B004, it is assumed that the chargers are not operating at full load (at current limit level). Per battery testing maintenance orders (Reference 6.608), the charger will typically deliver over 200 amperes of current for 3 hours or less on a post-service test recharge cycle. Hence, a fully loaded charger is not considered as a long term steady-state load in this calculation. However, a conservative load of 200 amperes DC is assumed based on emergency loading. It is further assumed that the battery charger has an efficiency valued of 0.85. See also Section 5.6.

3.11 Specific study cases are analyzed for Unit 2 only. For these cases, Unit 3 is assumed similar due to its similar design features. See Tables 5-1 through 5-5 for details.

3.12 To obtain initial acceptance criteria for 480V MCC maximum voltage study cases (Table 1-7), it is assumed that the maximum allowable bus voltage is equivalent to the maximum motor terminal voltage. This is a conservative assumption, and neglects any voltage drop from the 480V bus to the motor. See Section 5.12.

3.13 For motor starting cases A10a, A11, 3A10a and 3A11, it is assumed that Reactor Coolant Pump 2(3)P002 is started. This replacement motor has a higher inrush current than the original motors. It is chosen because it represents the limiting condition for starting any one of the four RCPs.

3.14 For minimum voltage study cases where the main generator is connected and its voltage is adjusted to 95% rated, the switchyard voltage is assumed to be 226kV (Section 4.1). For maximum voltage study cases where the switchyard voltage is adjusted to 232kV with the main generator connected, the generator is assumed to operate at its nominal reactive power output of 250MVAR (Reference 6.609).

3.15 For cases related to the DGVS setpoint, once a switchyard voltage is established which causes any one of the Class 1E buses being analyzed to be at the specified DGVS setpoint (Section 4.3), that switchyard voltage is considered valid for all Class 1E 4.16kV buses that are included in that analysis. Analyses are not included for the redundant train with its bus at the respective setpoint. This is acceptable since there is only a small voltage difference between any of the Class 1E 4.16kV buses for a given switchyard voltage. See also Section 5.4.

3.16 For all non-motor loads, acceptable voltage variation is assumed to be ± 10% of rated voltage. This is judged to be conservative for non-motor loads, and is consistent with the allowed variation for motor loads based on published standards. Rated voltage for all non-motor loads is assumed to be 480V. See also Sections 1.3.1.5 and 5.11.2.

3.17 For certain cases, a Unit postulated to be in safe shutdown mode is assumed to be operating its accident mitigating loads caused by a spurious accident signal. This conservative approach will be bounding for all loading requirements for safe shutdown as required in the UFSAR. See Section 4.6.

3.18 For the Class 1E loadcenter transformer long term loading study (cases A13a, A13b, 3A13a, and 3A13b), it is assumed that the plant life will terminate concurrent with its license in the year 2022. See Section 5.5.