

Attachment M

(Calculation E4C-082, ICCN C-47)

Proposed Interim Change (219.5 kV)

SONGS Units 2 and 3

Southern California Edison Company INTERIM CALCULATION CHANGE NOTICE (ICCN)/ CALCULATION CHANGE NOTICE (CCN) COVER PAGE SUMMARY CHANGE <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES	CALC NO. E4C-082		ICCN NO./ PRELIM. CCN NO. C-47	PAGE 1	TOTAL NO. OF PAGES 19
	BASE CALC. REV. 2	UNIT 3	CCN CONVERSION: CCN NO. CCN-		CALC. REV.
	CALCULATION SUBJECT: SYSTEM DYNAMIC VOLTAGES DURING DBA				
CALCULATION CROSS-INDEX <input checked="" type="checkbox"/> New/Updated Index Included <input type="checkbox"/> Existing Index Is Complete	ENGINEERING SYSTEM NUMBER/PRIMARY STATION SYSTEM DESIGNATOR 1804 & 1805 / PBA-PHJ			Q-CLASS II	
Site Programs / Procedure Impact? <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES, AR No.	CONTROLLED PROGRAM OR DATABASE ACCORDING TO SO123-XXIV-5.1 <input checked="" type="checkbox"/> PROGRAM <input type="checkbox"/> DATABASE		PROGRAM/DATABASE NAME(S) ETAP		VERSION/RELEASE NO.(S) 4.04N
10CFR50.59/72.48 Review: AR No. N/A (PCN 561)	<input checked="" type="checkbox"/> PROGRAM <input type="checkbox"/> DATABASE		<input type="checkbox"/> ALSO, LISTED BELOW		

1. BRIEF DESCRIPTION OF ICCN/CCN:

Purpose:

This ICCN supports PCN 561 and ECP 050500255-34. The ECP revises the setting for the 4-undervoltage relays 3A0420-127D-1, 3A0420-127D-2, 3A0420-127D-3, and 3A0420-127D-4.

This ICCN is to analyze for the expected 4 kV voltage at the early DGVSS window of 4.11 seconds after the 1st loading sequence on a postulated switchyard voltage of 219.5 kV.

Acceptance Criteria:

The calculated 4 kV voltage at the early DGVSS window of 4.11 seconds should be above the maximum design limit value of 4190 V (reference E4C-090, ICCN C-130). This will ensure that the 4 kV bus remains connected to the normal preferred (offsite) source during the load sequencing when the unit experience a DBA.

Results and Conclusions:

The resultant 3A04 bus voltage derived from this ICCN is 101.43% x 4160 = 4219.5 V at 4.11 seconds. This is above the acceptance criterion of 4190 V as described above, and is therefore acceptable.

INITIATING DOCUMENT (ECP, OTHER) **ECP 050500255-34** Rev. **0**

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 / <i>R. Cabiling</i> 5/26/05 ORIGINATOR (Print name/sign/date) Approval requires PQS T3EN64 Qualification Verified: <i>RC</i> Initial	DISCIPLINE / ESC: <u>Electrical / DEO</u> <i>Kim Mel</i> 5/26/05 FLS (Signature/date) Approval requires PQS T3EN64 Qualification Verified: <i>km</i> Initial
J. Kim / <i>J. Kim</i> 5/26/05 IRE (Print name/sign/date) Approval requires PQS T3EN64 Qualification Verified: <i>JCK</i> Initial	

4. CONVERSION TO CCN DATE _____ **SCE CDM-SONGS**

CALCULATION CROSS-INDEX

Calculation No. E4C-082

Sheet _____ of _____

Calc. rev. number and responsible FLS Initials and date	INPUTS <small>These Interfacing calculations and/or documents provide input to the subject calculation, and if revised may require revision of the subject calculation.</small>		OUTPUTS <small>Results and conclusion of the subject calculation are used in these Interfacing calculations and/or documents.</small>		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.		
2 <i>FW</i> 5/26/05	E4C-130, ICCN C-3 E4C-090, ICCN C-130	1 3	NONE			

E&TS DEPARTMENT
CALCULATION SHEET

ICCN NO./ PRELIM. CCN NO. C-47	PAGE <u>3</u> OF <u>19</u>
CCN CONVERSION: CCN NO. CCN	

Project or ECP 050500255-34 Calc No. E4C-082
 Subject SYSTEM DYNAMIC VOLTAGES DURING DBA

Sheet _____ of _____

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

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 and E4C-090, degraded bus voltage relays 127D-1, 127D-2, 127D-3, and 127D-4 setting and maximum design limit are as follows:

Maximum Design Limit	4190 V
Maximum Relay Pickup	4183.9 V

5.0 METHODOLOGY:

5.11.1 These degraded bus voltage relays in conjunction with timing relays will initiate a degraded grid voltage signal with SIAS (DGVSS), which will transfer the 4.16 kV Class 1E buses to the standby power source, during the first automatic load sequencing cycle only. If no degraded voltage is detected during the first automatic load sequencing cycle, timing relays will ensure that during subsequent load sequencing cycles no DGVSS will be generated. If the voltage is above the 27N maximum pickup voltage (4183.9 V) at 4.11 seconds, all the ESF loads will be sequenced onto the bus irrespective of the bus voltage during the subsequent cycles thus assuring no interruption in the middle of load sequencing. (reference DBD-SO23-120 Figure D-18 and E/D 32220 sht.2)

5.12 CASE I

b.4 CASE I.B-A219 - This case considers a Unit 3 ESF bus alignment for Trains A, ESF bus is connected to the X-winding of their dedicated Reserve Auxiliary Transformer. A lumped load of 20 MVA is considered in the Y-winding per Section 3.1. A Design Basis Accident is postulated for Unit 3.

This case was established to verify the capability of the electrical auxiliary system of Unit 3 to start, based on a predetermined sequence, and operate all ESF loads that are required to mitigate the consequences of a Design Basis Accident (DBA) when served from the normal preferred power source. Loading sequence is based on Table 10.1, Case I.B-A-1.

The switchyard voltage used in this analysis is 219.5 kV. This ICCN is to verify that the 4 kV bus voltage is above the maximum design limit voltage (4190 V) at 4.11 seconds.

E&TS DEPARTMENT
CALCULATION SHEET

ICCN NO./ PRELIM. CCN NO. C-47	PAGE <u>4</u> OF <u>19</u>
CCN CONVERSION: CCN NO. CCN	

Project or ECP 050500255-34 Calc No. E4C-082
 Subject SYSTEM DYNAMIC VOLTAGES DURING DBA

Sheet _____ of _____

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATO R

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

1. Table 10.1 – CASE LB-A-1, this load schedule shows the loading sequences.
2. Section 11.2B – Case LB-A219
 - a. ETAP Initial Load Flow Report which shows the switchyard voltage.
 - b. ETAP Dynamic Stability Report which shows the Bus 3A04 voltage @ 4.11 seconds.
 - c. ETAP TS Action Summary Report which shows breaker action in the first loading sequence.
 - d. ETAP Transient Stability Analysis Graph which shows voltages versus time for bus 3A04.

Table 10.1 CONT

CASE I.B-A-1, Unit 3 ESF Load Schedule for Unit 3 Design Basis Accident with Normal Bus Alignment ⁽¹⁾

Tag No.	Equipment	Breaker	Initial Condition	Loading Sequence								Post Accident	
				Sequence/Seconds									
				1/ 0.0	2/ 5.0	3/ 10.0	4/ 15.0	5/ 20.0	6/ 25.0	7/ 30.0	8/ 35.0		
3HV9300	RWST East Outlet	3BY41	Off	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	On
3BYSM	Margin for Static Load	3BYS	On	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	On
BQ	480 V MCC												
E297	CB Rmg Vent Elect Htr. E297	BQ04	On	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	On
3L270	Cntnm Spray Chem HT Pnl	BQ06	On	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	On
2E255	ESF Swgr Rm Emrg ACU	BQ08	On	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	On
L437	HP Comp HVAC Panel	BQ11	On	Off	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	On
3A173	Battery Rm Emrg Exh Fan	BQ14	Off	Start	On	On	On	On	On	On	On	On	On
3E255	ESF Swgr Rm Emrg ACU	BQ15	Off	Start	On	On	On	On	On	On	On	On	On
P445	Chiller E336 Oil Pump	BQ20	Off	Start	On	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	On
A056	CB Chiller Rm Exhaust Fan	BQ23	Off	Start	On	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	On
W310	Chiller E336 Pumpout	BQ25	Off	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	On
Q033	480-208/120 Panel	BQ27	On	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	On
BQMM	Margin for Motor Load	BQM	Off	Start	On	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.

Project: EAC-082,R2-ICCN C-47 Sht 9 of 19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

INITIAL LOAD FLOW
 =====
 PowerStation 4.0.4N
 Study Case: CASEI.B-A219

Page: 78
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

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	101.74	-3.0	0.00	0.00	0.00	0.00	0.00	0.00	BQ 2A173	0.00 0.00	0.00 0.00	4 4	66.5 66.5	
2E255B	Load	0.46	101.74	-3.1	0.00	0.00	0.00	0.00	0.00	0.00	BQ 2E255	-0.01 0.01	-0.01 0.01	10 10	79.0 79.0	
*2G002	BUS	Swng	4.36	100.46	-0.1	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	2G003	0.00	0.00	0	0.0	
2L270B	Load	0.48	96.99	-3.0	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	5	85.0	
3A04	Load	4.16	101.60	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3P141B 3P024B 3P307B 3B04XHS 3T014, NORME 3XR1-X	0.69 0.47 0.33 0.71 0.13 -2.33	0.34 0.23 0.24 0.35 0.08 -1.25	104 71 56 108 21 360	89.8 89.4 80.9 89.6 85.0 88.2	
3A071-3BLP03	Load	0.48	98.17	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3B04 3BP09-3A071	-0.05 0.05	-0.03 0.03	68 68	80.4 80.4	
3A071B	Load	0.46	101.40	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BP09-3A071 3A071	-0.04 0.04	-0.03 0.03	68 68	80.2 80.2	
3A074-3BLP03	Load	0.48	98.18	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3B04 3BP11-3A074	-0.05 0.05	-0.03 0.03	69 69	80.5 80.5	
3A074B	Load	0.46	101.22	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BP11-3A074 3A074	-0.04 0.04	-0.03 0.03	69 69	80.3 80.3	
3B001B	Load	0.48	98.18	-3.4	0.00	0.00	0.00	0.00	0.04	0.03	3BY	-0.04	-0.03	66	80.0	
3B003B	Load	0.48	98.21	-3.4	0.00	0.00	0.00	0.00	0.04	0.03	3BE	-0.04	-0.03	66	80.0	
3B04	Load	0.48	98.68	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BRA 3P191-3DB041 3ED 3A071-3BLP03 3BE 3BY BQ 3A074-3BLP03	0.01 0.06 0.04 0.05 0.10 0.14 0.06 0.05	0.01 0.05 0.01 0.03 0.05 0.09 0.04 0.03	19 89 51 68 136 198 87 69	85.5 77.9 96.0 80.5 88.4 85.2 85.0 80.6	

* Regulated (constant voltage) buses.

Project: E4C-082,R2-ICCN C-47 Sht 10 of 19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

INITIAL LOAD FLOW
 =====
 PowerStation 4.0.4N
 Study Case: CASEI.B-A219

Page: 79
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kv.

Bus/Machine Information			Voltage		Generation		Motor-Load		Static-Load		Load Flow				XPRM	
ID	Type	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	To Bus ID	MW	Mvar	Amp	%PF	& Tap
											3E126(3BHP04	0.20	0.00	246	100.0	
											3B04XHS	-0.70	-0.31	938	91.5	
3B04XHS	Load	4.16	101.58	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04	-0.71	-0.35	108	89.6	
											3B04	0.71	0.35	108	89.6	
3BD	Load	0.48	97.86	-3.7	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.04	-0.01	51	96.2	
											3P996/3P1015	0.00	0.00	3	69.4	
											3P997/3P1014	0.00	0.00	3	69.3	
											3BDSMB	0.00	0.00	4	85.3	
											3T020B	0.01	0.01	13	85.0	
											3E654(X)B	0.01	0.00	13	100.0	
											3E655(X)B	0.01	0.00	13	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	97.86	-3.7	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	2	100.0	
3BDSMB	Load	0.48	97.05	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BD	0.00	0.00	4	85.0	
3BE	Load	0.48	98.58	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.10	-0.05	136	88.4	
											3RU7822-1B	0.00	0.00	1	85.2	
											3E464B	0.02	0.00	25	100.0	
											3B003B	0.04	0.03	66	80.1	
											3Q063B	0.02	0.01	22	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	97.76	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	4	86.0	
3BP09-3A071	Load	0.48	97.97	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3A071-3BLP03	-0.05	-0.03	68	80.4	
											3A071B	0.05	0.03	68	80.4	
3BP11-3A074	Load	0.48	97.98	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3A074-3BLP03	-0.05	-0.03	69	80.5	
											3A074B	0.05	0.03	69	80.5	
3BRA	Load	0.48	98.66	-3.4	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.

Project: E4C-082,R2-ICCN C-47 Sht 11 of 19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

INITIAL LOAD FLOW
 =====
 PowerStation 4.0.4N
 Study Case: CASEI.B-A219

Page: 80
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

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	97.84	-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	98.57	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	3B04	-0.14	-0.09	198	85.2	
											3B001B	0.04	0.03	66	80.1	
											3P174B	0.02	0.01	31	84.9	
											3P009B	0.02	0.01	33	86.0	
											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	0.02	0.01	21	85.3	
											3BY39 HTRS	0.01	0.00	8	100.0	
											3BY40 HTRS	0.00	0.00	3	100.0	
3BY39 HTRS	Load	0.48	98.57	-3.5	0.00	0.00	0.00	0.00	0.01	0.00	3BY	-0.01	0.00	8	100.0	
3BY40 HTRS	Load	0.48	98.57	-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	97.76	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	4	85.0	
3E128 (3BHP04	Load	0.48	97.57	-4.1	0.00	0.00	0.00	0.00	0.20	0.00	3B04	-0.20	0.00	246	100.0	
3E464B	Load	0.48	97.75	-3.5	0.00	0.00	0.00	0.00	0.02	0.00	3BE	-0.02	0.00	25	100.0	
3E652B	Load	0.48	97.40	-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	97.30	-3.7	0.00	0.00	0.00	0.00	0.01	0.00	3ED	-0.01	0.00	13	100.0	
3E655(X)B	Load	0.48	96.87	-3.7	0.00	0.00	0.00	0.00	0.01	0.00	3ED	-0.01	0.00	13	100.0	
3EG002(X)B	Load	0.48	97.76	-3.7	0.00	0.00	0.00	0.00	0.00	0.00	3ED	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	
3L266B	Load	0.48	97.68	-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	96.23	-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	98.53	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	0	0.0	

* Regulated (constant voltage) buses.

Project: E4C-D82,R2-ICCN C-47 Sht 12 of 19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

INITIAL LOAD FLOW
 =====
 PowerStation 4.0.4N
 Study Case: CASE1.B-A219

Page: 81
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWVD voltage is 219.5 kV.

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	98.56	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BRA 3L707X-3L707	0.00	0.00	1	90.0	
3L707X-3L707	Load	0.48	98.56	-3.4	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	101.76	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	3BY 3P009	-0.02	-0.01	33	85.8	
3P024B	Load	4.16	101.54	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04 3P024	-0.47	-0.23	71	89.4	
3P141B	Load	4.16	101.45	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04 3P141	-0.68	-0.34	104	89.8	
3P174B	Load	0.46	101.13	-3.0	0.00	0.00	0.00	0.00	0.00	0.00	3BY 3P174	-0.02	-0.01	31	84.4	
3P191-3DB041	Load	0.46	101.88	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3B04 3P191A-B	-0.06	-0.05	89	77.8	
3P191A-B	Load	0.46	101.77	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3P191-3DB041 3P191-A	-0.06	-0.05	89	77.8	
3P307B	Load	4.16	101.54	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04 3P307	-0.33	-0.24	56	80.9	
3P996/3P1015	Load	0.46	101.93	-3.6	0.00	0.00	0.00	0.00	0.00	0.00	3BD 3P996/3P1015	0.00	0.00	3	69.3	
3P997/3P1014	Load	0.46	102.01	-3.6	0.00	0.00	0.00	0.00	0.00	0.00	3BD 3P997/3P1014	0.00	0.00	3	69.2	
3Q063B	Load	0.48	98.57	-3.5	0.00	0.00	0.00	0.00	0.02	0.01	3BE	-0.02	-0.01	22	85.0	
3RU7804-1B	Load	0.46	102.53	-3.3	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	98.01	-3.3	0.00	0.00	0.00	0.00	0.00	0.00	3BE	0.00	0.00	1	85.0	
3T014, NONIE	Load	4.16	101.58	-0.9	0.00	0.00	0.00	0.00	0.13	0.08	3A04	-0.13	-0.08	21	85.0	
3T020B	Load	0.48	97.86	-3.7	0.00	0.00	0.00	0.00	0.01	0.01	3BD	-0.01	-0.01	13	85.0	

* Regulated (constant voltage) buses.

Project: E4C-082,R2-ICCN C-47 Sht 13 of 19 INITIAL LOAD FLOW
 Location: SONGS 2&3 PowerStation 4.0.4N
 Contract: Study Case: CASEI.B-A219
 Engineer: Ric Cabiling

Page: 82
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

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	98.57	-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	98.65	-3.4	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	97.08	-3.2	0.00	0.00	0.00	0.00	0.02	0.01	3BY	-0.02	-0.01	21	85.0	
3XR1-X	Load	4.16	101.71	-0.9	0.00	0.00	0.00	0.00	0.00	0.00	3A04 3XR1-Y & SWYRD U3	2.33	1.25	360	88.2	
3XR1-Y	Load	4.16	97.69	-3.9	0.00	0.00	13.60	8.43	3.24	2.01	SWYRD U3 & 3XR1-X	-16.84	-10.44	2815	85.0	
BQ	Load	0.48	98.32	-3.5	0.00	0.00	0.00	0.00	0.00	0.00	E297B 2L270B 3L270B 2A173B 2E255B L211-1B L211-4B BQSMB T033B L437(X)B 3B04	0.00 0.00 0.00 0.00 0.01 0.01 0.01 0.00 0.01 0.00 0.00 -0.06	0.00 0.00 0.00 0.00 0.01 0.01 0.00 0.01 0.00 0.00 -0.04	4 5 5 4 10 16 16 4 13 6 87	100.0 85.4 85.6 67.2 79.4 85.1 85.1 85.3 85.0 85.2 85.1	
BQSMB	Load	0.48	97.50	-3.2	0.00	0.00	0.00	0.00	0.00	0.00	BQ	0.00	0.00	4	85.0	
E297B	Load	0.48	96.77	-3.5	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	98.07	-3.4	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	97.99	-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	97.52	-3.2	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	98.34	-3.4	0.00	0.00	0.00	0.00	0.00	0.00	3BY	0.00	0.00	4	85.0	
*SWYRD	Swng	230.00	95.43	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	SWYRD U3 U2 or U3 ON	19.25 -19.25	13.41 -13.41	61 61	82.0 82.0	
SWYRD U3	Load	230.00	95.43	-0.1	0.00	0.00	0.00	0.00	0.00	0.00	SWYRD	-19.25	-13.41	61	82.0	

* Regulated (constant voltage) buses.

Project: E4C-082,R2-ICCN C-47 Sht 140119
 Location: SCNGS 2&3
 Contract:
 Engineer: Ric Cabiling

INITIAL LOAD FLOW
 =====
 PowerStation 4.0.4N
 Study Case: CASE1.B-A219

Page: 83
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

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	19.25	13.41	61	82.0	-2.500
T033B	Load	0.48	98.31	-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	100.45	-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 ON	Utly	230.00	95.54	0.0	19.25	13.45	0.00	0.00	0.00	0.00	SWYRD	19.25	13.45	61	82.0	
3P024	IndM	4.16	93.36	-11.8	0.00	0.00	0.46	0.13	0.00	0.00	3P024B	-0.46	-0.13	71	96.2	
3P141	IndM	4.16	93.79	-11.6	0.00	0.00	0.68	0.19	0.00	0.00	3P141B	-0.68	-0.19	104	96.4	
3P307	IndM	4.16	83.63	-16.5	0.00	0.00	0.32	0.12	0.00	0.00	3P307B	-0.32	-0.12	55	93.7	
2A173	IndM	0.46	90.77	-9.5	0.00	0.00	0.00	0.00	0.00	0.00	2A173B	0.00	0.00	4	74.5	
2E255	IndM	0.46	88.71	-15.6	0.00	0.00	0.01	0.00	0.00	0.00	2E255B	-0.01	0.00	10	90.3	
3A071	IndM	0.46	91.16	-11.1	0.00	0.00	0.04	0.02	0.00	0.00	3A071B	-0.04	-0.02	68	87.7	
3A074	IndM	0.46	90.99	-11.1	0.00	0.00	0.04	0.02	0.00	0.00	3A074B	-0.04	-0.02	69	87.7	
3P009	IndM	0.46	91.31	-14.4	0.00	0.00	0.02	0.01	0.00	0.00	3P009B	-0.02	-0.01	33	94.2	
3P174	IndM	0.46	86.55	-17.6	0.00	0.00	0.02	0.01	0.00	0.00	3P174B	-0.02	-0.01	31	95.2	
3P191-A	IndM	0.46	90.06	-12.5	0.00	0.00	0.06	0.03	0.00	0.00	3P191A-B	-0.06	-0.03	89	86.8	
3P996/3P1015	IndM	0.46	83.51	-13.3	0.00	0.00	0.00	0.00	0.00	0.00	3P996/3P1015	0.00	0.00	3	80.5	
3P997/3P1014	IndM	0.46	83.58	-13.4	0.00	0.00	0.00	0.00	0.00	0.00	3P997/3P1014	0.00	0.00	3	80.4	

* Regulated (constant voltage) buses.

Project: E4C-082.R2-ICCN C-47 Sht 150119
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

DYNAMIC STABILITY
 =====
 PowerStation 4.0.4N

Study Case: CASE1.B-A219

Page: 115
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

IndMTR (E418)						IndMTR (P162)					Bus (3A04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Deg.	Load MW	Load Mvar	Freq %
0.000	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.00	0.00	0.0	101.60	-0.93	0.00	0.00	100.0
0.001	100.00	0.00	0.00	0.00	0.0	100.00	0.00	0.01	84.87	243.8	99.30	-0.69	0.00	0.00	100.0
0.101	100.00	0.00	0.00	0.00	0.0	82.53	0.00	0.04	83.58	222.1	99.28	-1.00	0.00	0.00	100.0
0.201	100.00	0.00	0.00	0.00	0.0	65.46	0.00	0.04	84.44	204.8	99.33	-0.99	0.00	0.00	100.0
0.301	100.00	0.00	0.00	0.00	0.0	49.30	0.01	0.04	85.16	189.7	99.39	-0.99	0.00	0.00	100.0
0.401	100.00	0.00	0.00	0.00	0.0	33.88	0.01	0.04	85.66	174.2	99.45	-1.00	0.00	0.00	100.0
0.501	100.00	0.00	0.00	0.00	0.0	18.26	0.02	0.05	86.18	150.6	99.51	-1.01	0.00	0.00	100.0
0.601	100.00	0.00	0.00	0.00	0.0	3.61	0.02	0.04	88.13	84.2	99.60	-1.02	0.00	0.00	100.0
0.701	100.00	0.00	0.00	0.00	0.0	2.17	0.02	0.02	89.96	42.1	99.69	-1.04	0.00	0.00	100.0
0.801	100.00	0.00	0.00	0.00	0.0	1.95	0.02	0.02	90.56	41.5	99.79	-1.07	0.00	0.00	100.0
0.901	100.00	0.00	0.00	0.00	0.0	1.91	0.02	0.02	91.70	41.7	99.96	-1.09	0.00	0.00	100.0
1.001	100.00	0.00	0.00	0.00	0.0	1.83	0.02	0.02	93.18	41.1	100.24	-1.11	0.00	0.00	100.0
1.101	100.00	0.00	0.00	0.00	0.0	1.81	0.02	0.02	94.02	40.8	100.63	-1.12	0.00	0.00	100.0
1.201	100.00	0.00	0.00	0.00	0.0	1.77	0.02	0.02	94.77	40.5	101.13	-0.98	0.00	0.00	100.0
1.301	100.00	0.00	0.00	0.00	0.0	1.76	0.02	0.02	95.08	40.2	101.32	-0.87	0.00	0.00	100.0
1.401	100.00	0.00	0.00	0.00	0.0	1.76	0.02	0.02	95.19	40.1	101.34	-0.86	0.00	0.00	100.0
1.501	100.00	0.00	0.00	0.00	0.0	1.75	0.02	0.02	95.32	40.1	101.35	-0.86	0.00	0.00	100.0
1.601	100.00	0.00	0.00	0.00	0.0	1.75	0.02	0.02	95.52	40.1	101.36	-0.86	0.00	0.00	100.0
1.701	100.00	0.00	0.00	0.00	0.0	1.74	0.02	0.02	95.69	40.0	101.37	-0.86	0.00	0.00	100.0
1.801	100.00	0.00	0.00	0.00	0.0	1.73	0.02	0.02	95.83	40.0	101.37	-0.86	0.00	0.00	100.0
1.901	100.00	0.00	0.00	0.00	0.0	1.73	0.02	0.02	95.97	39.9	101.38	-0.85	0.00	0.00	100.0
2.001	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.07	39.9	101.39	-0.85	0.00	0.00	100.0
2.101	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.14	39.9	101.39	-0.85	0.00	0.00	100.0
2.201	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.17	39.8	101.40	-0.85	0.00	0.00	100.0
2.301	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.21	39.8	101.40	-0.85	0.00	0.00	100.0
2.401	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.24	39.8	101.40	-0.85	0.00	0.00	100.0
2.501	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.27	39.8	101.40	-0.85	0.00	0.00	100.0
2.601	100.00	0.00	0.00	0.00	0.0	1.72	0.02	0.02	96.32	39.8	101.41	-0.85	0.00	0.00	100.0
2.701	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.38	39.8	101.41	-0.85	0.00	0.00	100.0
2.801	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.42	39.8	101.41	-0.85	0.00	0.00	100.0
2.901	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.45	39.8	101.41	-0.85	0.00	0.00	100.0
3.001	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.47	39.8	101.42	-0.85	0.00	0.00	100.0
3.101	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.49	39.8	101.42	-0.85	0.00	0.00	100.0
3.201	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.52	39.8	101.42	-0.85	0.00	0.00	100.0
3.301	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.54	39.8	101.42	-0.85	0.00	0.00	100.0
3.401	100.00	0.00	0.00	0.00	0.0	1.71	0.02	0.02	96.58	39.7	101.42	-0.85	0.00	0.00	100.0
3.501	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.62	39.7	101.43	-0.85	0.00	0.00	100.0
3.601	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.66	39.7	101.43	-0.85	0.00	0.00	100.0
3.701	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.69	39.7	101.43	-0.85	0.00	0.00	100.0
3.801	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.70	39.7	101.43	-0.85	0.00	0.00	100.0
3.901	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.72	39.7	101.43	-0.85	0.00	0.00	100.0

Project: E4C-082,R2-ICCN C-47 Sht 16 of 19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

DYNAMIC STABILITY
 =====
 PowerStation 4.0.4N
 Study Case: CASEI.B-A219

Page: 116
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESP bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kv.

IndMTR (E418)						IndMTR (P162)					Bus (3A04)				
Time (Sec.)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Slip (%)	Mech. (MW)	Elec. (MW)	Term. V (%)	Term. I (A)	Voltage %Mag.	Deg.	Load MW	Load Mvar	Freq %
4.001	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.73	39.7	101.43	-0.85	0.00	0.00	100.0
4.101	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.74	39.7	101.43	-0.85	0.00	0.00	100.0
4.201	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.75	39.7	101.44	-0.85	0.00	0.00	100.0
4.301	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.76	39.7	101.44	-0.85	0.00	0.00	100.0
4.401	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.77	39.7	101.44	-0.85	0.00	0.00	100.0
4.501	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.78	39.7	101.44	-0.85	0.00	0.00	100.0
4.601	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.79	39.7	101.44	-0.85	0.00	0.00	100.0
4.701	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.80	39.7	101.44	-0.85	0.00	0.00	100.0
4.801	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.81	39.7	101.44	-0.85	0.00	0.00	100.0
4.901	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.81	39.7	101.44	-0.85	0.00	0.00	100.0
5.000	100.00	0.00	0.00	0.00	0.0	1.70	0.02	0.02	96.83	39.7	101.44	-0.85	0.00	0.00	100.0

Project: E4C-082,R2-ICCN C-47 Sht 170+19
 Location: SONGS 243
 Contract:
 Engineer: Ric Cabling

TS ACTION SUMMARY
 =====
 PowerStation 4.D.4N
 Study Case: CASEI.B-A219

Page: 123
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWYD voltage is 219.5 kV.

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
3BED6	Close	0.000
3BED9	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

Project: E4C-082,R2-ICCN C-47 Sht 180+19
 Location: SONGS 2&3
 Contract:
 Engineer: Ric Cabiling

TS ACTION SUMMARY
 =====
 PowerStation 4.0.4N
 Study Case: CASE1.B-A219

Page: 124
 Date: 05-24-2005
 SN: SCALEDISON
 File: Songs23

Section 11.2B - Unit 3 Train A ESF bus is connected to its dedicated RAT and experiences a DBA.SWVD voltage is 219.5 kv.

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

Project: E4C-082.R2-ICCN C-47 Sht 19 of 19
Location: SONGS 243
Contract:
Engineer: Ric Cabiling

PowerStation
4.D.4N
Study Case: CASE1.B-A219

Date: 05-24-2005
SN: SCALEDISON
Revision: Base
Config.: I.B-A219.5KV

Section 11.2B - Unit 3 Train A ESP bus is connected to its dedicated RAT and experiences a DBA.SWVD voltage is 219.5 kV.

Project File: C:\E4C-082, R3W7\E4C-082, R3\E4C-082, R3\ETAP Files\Songs23
Output Report: IB-A-219

TRANSIENT STABILITY ANALYSIS

