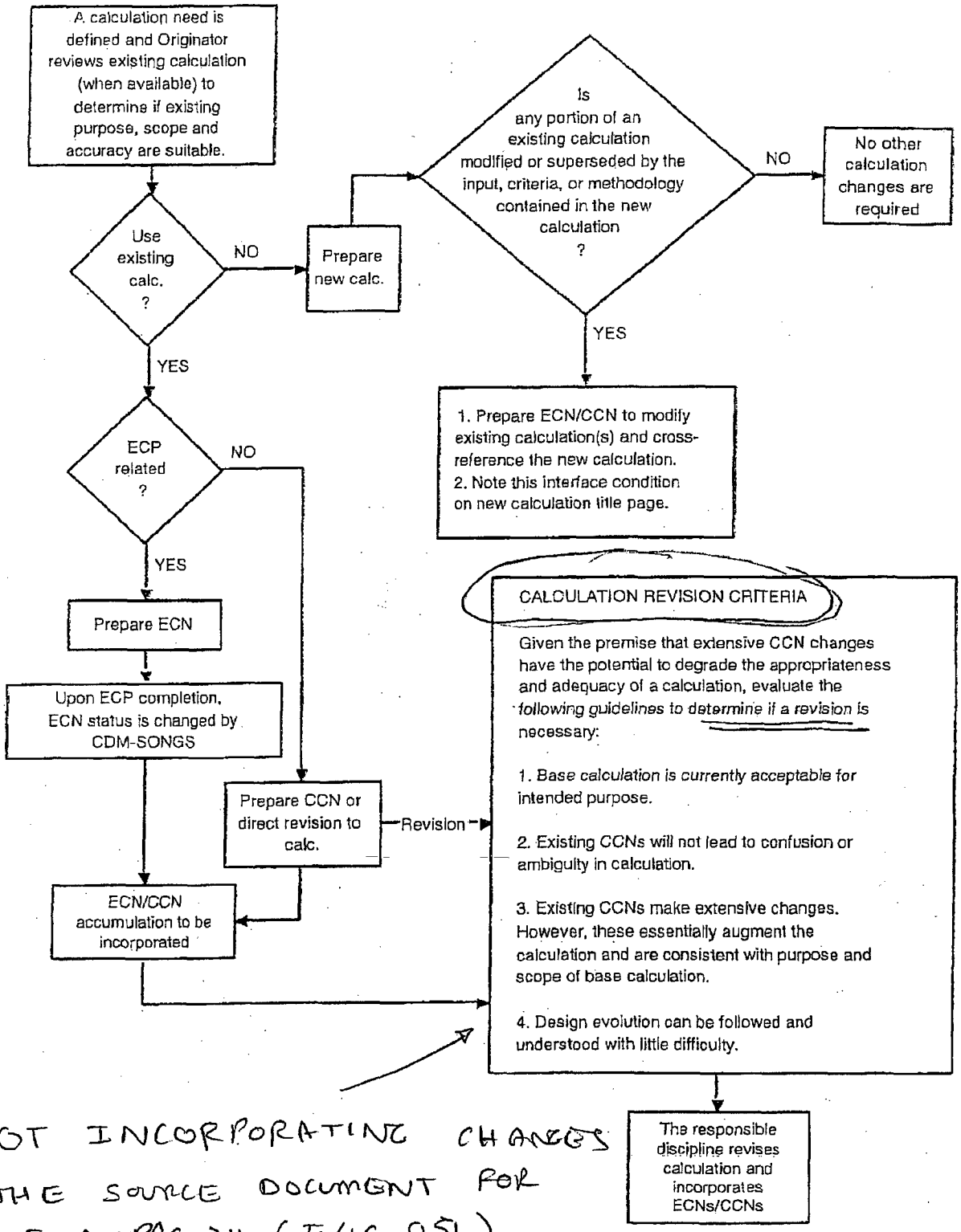
CALCULATION FORMAT DECISION TREE



NOT INCORPORATING CHANGES IN THE SOURCE DOCUMENT FOR CABLE AMPACITY (E4C-051) VIOLATES THE REVISION REQUIREMENT.

6.5.7 There is no limit for the total number of CCNs/ECNs accumulated against a calculation except electrical system level calculations.

.1 The responsible discipline shall incorporate CCNs/ECNs to ensure that the degree of accuracy, margin of safety, limits of applicability, intended use, and interdependencies with interfacing activities and documentation are adequate to facilitate future use of the calculation.

.2 All CCNs/ECNs against electrical system calculations shall be incorporated by revision within 120 days of close of breakers following Unit 3 refueling outages to prevent confusion or ambiguity and ensure degree of accuracy and margin of safety is maintained. Refer to Attachment 2 for CCN/ECN Incorporation Guidelines.

The electrical system calculations are:

E4C-017	125 Volt DC Battery
E4C-017.1	Class 1E 125 VDC System Data/Loading
E4C-019	Non-Class 1E 125 VDC & 250 VDC System Protection
E4C-043	Non-Class 1E 125 VDC Battery
E4C-082	Dynamic Voltage Evaluation
E4C-086	SONGS Data Development and Documentation
E4C-088	DG Loading
E4C-090	Auxiliary System Voltage Regulation
E4C-092	Short Circuit Studies
E4C-098	4kVolt Protection
E4C-102	MOV Voltages During Design Basis Accidents
E4C-109	125 Volt DC Protection

WHY E4C-099 480V POWER CIRCUIT BREAKER SETTINGS IS NOT CONSIDERED AS "SYSTEM CALCULATION"

TABLE 5 – Long Time Pick-Up and Delay

			.7				.8				.9				1.0				1.1			
Sensor Rating	AMP Tap	TEST Amps	LTPU Test Amps	Min	MAX	LT Delay Amps	LTPU Test Amps	Min	MAX	LT Delay Amps	LTPU Test Amps	Min	MAX	LT Delay Amps	LTPU Test Amps	Min	MAX	LT Delay Amps	LTPU Test Amps	Min	MAX	LT Delay Amps
225A Sensors	50	0.50	0.35	0.30	0.40	1.05	0.40	0.34	0.46	1.20	0.45	0.38	0.52	1.35	0.50	0.43	0.58	1.50	0.55	0.47	0.63	1.65
	70	0.70	0.49	0.42	0.56	1.47	0.56	0.48	0.64	1.68	0.63	0.54	0.72	1.89	0.70	0.60	0.81	2.10	0.77	0.65	0.89	2.31
	100	1.00	0.70	0.60	0.81	2.10	0.80	0.68	0.92	2.40	0.90	0.77	1.04	2.70	1.00	0.85	1.15	3.00	1.10	0.94	1.27	3.30
	150	1.50	1.05	0.89	1.21	3.15	1.20	1.02	1.38	3.60	1.35	1.15	1.55	4.05	1.50	1.28	1.73	4.50	1.65	1.40	1.90	4.95
	225	2.25	1.58	1.34	1.81	4.73	1.80	1.53	2.07	5.40	2.03	1.72	2.33	6.08	2.25	1.91	2.59	6.75	2.48	2.10	2.85	7.43
600A Sensors	250	1.00	0.70	0.60	0.81	2.10	0.80	0.68	0.92	2.40	0.90	0.77	1.04	2.70	1.00	0.85	1.15	3.00	1.10	0.94	1.27	3.30
	400	1.60	1.12	0.95	1.29	3.36	1.28	1.09	1.47	3.84	1.44	1.22	1.66	4.32	1.60	1.36	1.84	4.80	1.76	1.50	2.02	5.28
	600	2.40	1.68	1.43	1.93	5.04	1.92	1.63	2.21	5.76	2.16	1.84	2.48	6.48	2.40	2.04	2.76	7.20	2.64	2.24	3.04	7.92
1600A Sensors	600	0.75	0.53	0.45	0.60	1.58	0.60	0.51	0.69	1.80	0.68	0.57	0.78	2.03	0.75	0.64	0.86	2.25	0.83	0.70	0.95	2.48
	1000	1.25	0.88	0.74	1.01	2.63	1.00	0.85	1.15	3.00	1.13	0.96	1.29	3.38	1.25	1.06	1.44	3.75	1.38	1.17	1.58	4.13
	1600	2.00	1.40	1.19	1.61	4.20	1.60	1.36	1.84	4.80	1.80	1.53	2.07	5.40	2.00	1.70	2.30	6.00	2.20	1.87	2.53	6.60
2000A Sensors	800	1.00	0.70	0.60	0.81	2.10	0.80	0.68	0.92	2.40	0.90	0.77	1.04	2.70	1.00	0.85	1.15	3.00	1.10	0.94	1.27	3.30
	1200	1.50	1.05	0.89	1.21	3.15	1.20	1.02	1.38	3.60	1.35	1.15	1.55	4.05	1.50	1.28	1.73	4.50	1.65	1.40	1.90	4.95
	2000	2.50	1.75	1.49	2.01	5.25	2.00	1.70	2.30	6.00	2.25	1.91	2.59	6.75	2.50	2.13	2.88	7.50	2.75	2.34	3.16	8.25
3000A Sensors	2000	1.00	0.70	0.60	0.81	2.10	0.80	0.68	0.92	2.40	0.90	0.77	1.04	2.70	1.00	0.85	1.15	3.00	1.10	0.94	1.27	3.30
	3000	1.50	1.05	0.89	1.21	3.15	1.20	1.02	1.38	3.60	1.35	1.15	1.55	4.05	1.50	1.28	1.73	4.50	1.65	1.40	1.90	4.95

LONG TIME DELAY TIMING

SS3, SS4, SS5	SS13, SS14, SS15
MIN. 8 to 12 sec	MIN. 16 to 24 sec
INT. 20 to 30 sec	INT. 40 to 60 sec
MAX. 60 to 98 sec	MAX. 120 to 196 sec

LONG TIME PICK-UP TEST CURRENT ✘ .85 = MIN
LONG TIME PICK-UP TEST CURRENT ✘ 1.15 = MAX
LONG TIME PICK-UP TEST CURRENT ✘ 3 = LONG TIME DELAY CURRENT

TEST CURRENT ✘ LONG TIME PICK-UP = LONG TIME PICK-UP TEST CURRENT

Table 1
480V Load Center : Cable Protection

E4C-099								E4C-051	
Breaker	Load	FLA	(1) Tap	(2) LTPU	(1)*(2) Pick Amp	(3) Ampacity	(1)*(2)-(3) Margin %	(4) Ampacity	(1)*(2)-(4) Margin
Motors		sec.8.1.1.1				Sect. 4.1.6		Sec. 8.2	
2B0405	2P191	120	225	0.8	180	223	19.28%	101	-78.22%
2B0409	2A071	73.5	100	1.1	110	162	32.10%	90	-22.22%
2B0410	2E399	118	150	1.1	165	239	30.96%	122	-35.25%
2B0411	2E401	118	150	1.1	165	239	30.96%	122	-35.25%
2B0413	2P190	120	225	0.8	180	223	19.28%	101	-78.22%
2B0418	E418	170	250	1	250	328	23.78%	206	-21.36%
2B0419	2A074	73.5	100	1.1	110	162	32.10%	100	-10.00%
MCC		section 8.1.2.3							
2B0403	2BRA	37	250	1	250	384	34.90%	326	23.31%
2B0414	2BE	208	400	1	400	384	-4.17%	326	-22.70%
2B0415	2BY	362	600	1	600	598	-0.33%	508	-18.11%
2B0407	2BD *	260	400	1	400	310	-29.03%	269	-48.70%
2B0417	BQ	232	400	1	400	384	-4.17%	326	-22.70%
* Changed to			250	1.1	275	269	-2.23%		

* The above change was as result of myconcern.

Summary

1. In all cases the cable ampacity stated in calclation E4C-051, the source calc. is less than the ampacity stated in the Protection Calc. E4C-099, except for breaker 2B0403. In other words the protection settings are not revised per source document.

2. The breaker tolerence can increase differnece between pickup and ampacity in wrong direction. The as left breaker setting is not documented in the calcualtion. The LTPU settings are per procedure SO23-I-2.58-1

Table 2
480V Load Center : Motor Protection

E4C-099							
Breaker	Load	FLA	(1) MF	(2) Max. Acceptable LTPU Amp	(1)*(2) LTPU Amp	(3) Acceptable yes or no	(4) Margin
2B0405	2P191	120	1.4	168	180	No	-7.14%
2B0409	2A071	73.5	1.4	102.9	110	No	-6.90%
2B0410	2E399	118	1.4	165.2	165	Yes	0.12%
2B0411	2E401	118	1.4	165.2	165	Yes	0.12%
2B0413	2P190	120	1.4	168	180	No	-7.14%
2B0418	E418	170	1.4	238	250	No	-5.04%
2B0419	2A074	73.5	1.4	102.9	110	No	-6.90%

Table 2
480V Load Center : Motor Protection

E4C-099						E4C-051	
Breaker	Load	FLA	LTPU Amp as stated in Calc	Cable Ampacity Sec. 4.1.6	Acceptance LTPU < 100%Cable Ampacity	E4C-051 Ampacity Sec. 8.2	Margin
2B0403	2BRA	37	250	384	Yes	326	Yes
2B0414	2BE	208	400	384	No	326	No
2B0415	2BY	362	600	598	No	508	No
2B0407	2BD *	260	400	310	No	269	No
2B0417	BQ	232	400	384	No	326	No
* Changed to			275	269	No		