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SUBJECT: LER 88-023-00:on 881010,potential for overcurrent conditions on two motor control ctrs.

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NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	0 5 0 0 0 2 6 1	1 OF 0 8

TITLE (4)
POTENTIAL FOR OVERCURRENT CONDITIONS ON TWO MOTOR CONTROL CENTERS

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
										0 5 0 0 0
1 0	1 0	8 8	8 8	0 2 3	0 0	1 1	0 9	8 8		0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Don Sayre, Senior Specialist - Regulatory Compliance	AREA CODE 8 0 3 3 8 3 - 1 2 4 2

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SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On October 10, 1988, the licensee made a 10CFR50.72(b)(2)(iii) nonemergency notification after confirmatory calculations that a potential electrical overcurrent could exist for two Motor Control Centers (MCC-5 and 6) under certain conditions. The potential for this condition was determined on October 5 and 6 and the licensee had informed NRC Region II and NRR of the potential by a conference call on October 7. Compensatory measures had been implemented on October 7. On October 11, in its continuing review, the licensee discovered that the calculated ampacity of the feeder cable to MCC-6 could be less than the expected current during design basis conditions and, on October 12, the licensee advised NRC Region II and NRR in a follow-up conference call. By October 13, the licensee completed a thermal calculation indicating the as-built capacity of the cable was sufficient. Verification conducted by a consultant, however, resulted in initially contradictory values and the licensee initiated a Limiting Condition for Operation. On October 14, the plant started decreasing unit load to hot shutdown and an Unusual Event was declared since one of the loads on the MCC declared inoperable was required for Containment integrity. The Event was terminated on October 15 after the reactor was in cold shutdown. Additional compensatory actions were taken through October 17, followed by a conference call with NRC Region II and NRR. The reactor was returned to power operation on October 18. The cause of the potential overcurrent condition was original design. Additional corrective actions have been planned. This LER is submitted in accordance with 10CFR50.73(b)(2)(vii).

NRC Form 366 (9-83)

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
H. B. ROBINSON S.E. PLANT, UNIT 2	0 5 0 0 0 2 6 1	8 8	— 0 2 3	— 0 0	0 2 OF 0 8

TEXT (If more space is required, use additional NRC Form 366A's) (17)

I. Description of Event

On October 10, at 1717 hours, the licensee notified the NRC Operations Center of a reportable condition in accordance with 10CFR50.72(b)(2)(iii).[1] The following chronology provides details on the event in a sequential order.

On October 5, 1988, the licensee's Nuclear Engineering Department (NED) had advised Plant management of the results of preliminary calculations which indicated that excessive electrical currents could exist under certain conditions and distribution system alignments for two Motor Control Centers (MCCs).[2,3] The licensee had initiated preliminary calculations related to load flow for the mitigation of a Loss of Coolant Accident (LOCA) without loss of offsite power concurrent with a single failure that will disable one safety-related electrical train (single buss LOCA) as part of an ongoing design basis reconstitution program committed to in response to an NRC inspection.[4]

On October 6, Plant management initiated compensatory measures while the calculation input verification was conducted. The recommended measures included balancing the running Heating, Ventilating and Air Conditioning (HVAC) loads between MCC-5 and MCC-6 and preventing an automatic start of the standby HVAC loads. In addition, breakers on other nonessential loads were opened to prevent starting. This alignment allowed the Plant to maintain full HVAC capability while precluding automatic start of nonessential loads.

On October 7, a telephone conference with NED, the NRC Region II Office, and the NRR Office was conducted to provide an update on the conditions and the plan of action. The licensee also provided a status on the checking of the calculations and discussions underway with equipment vendors to evaluate catalog ratings. It was expected that these actions would be complete by October 11. The NRC requested a follow-up conference call.

From October 7 through October 10 the following compensatory measures were effected:

1. The preliminary load factors were reviewed by Plant engineering, the originator (Architect-Engineer), and NED.[5] Minor adjustments resulted.
2. The base load flow calculations were rerun using the adjusted load factors.
3. The load flow calculations based on the compensatory measures taken (above) were rerun using the adjusted load factors.

1/ H. B. Robinson Steam Electric Plant, Unit No. 2 is a Westinghouse Pressurized Water Reactor nuclear power plant, in commercial operation since March 1971.
2/ MCC-5 and MCC-6..
3/ EIIS Codes: System - ED; Component - MCC; Manufacturer - W120.
4/ NRC IE Inspection Report No. 87-06.
5/ The Architect-Engineer is Ebasco.

4. A Plant Special Procedure, SP-820, was developed to implement the necessary compensatory actions.[6]
5. NED and equipment vendors completed an assessment of acceptable emergency ratings above the published catalog ratings.

On October 10, the potential overcurrent condition was confirmed based on verification of calculation input information reported. The licensee then notified the NRC Operations Center of a reportable condition in accordance with 10CFR50.72.

On October 11, while continuing evaluation of the issue, the feeder cable to MCC-6 was determined to be potentially the most limiting component because of calculated ampacity below the expected maximum current in response to a design basis condition.

On October 12, the licensee initiated a follow-up conference call with the NRC Region II Office and the NRR Office. The licensee discussed the feeder cable development and its limited ampacity. The licensee advised the NRC that a best-estimate thermal calculation was being prepared to determine the as-built capacity of the cable, followed by independent verification by a consultant.

By the morning of October 13, the licensee had completed the thermal calculation and had determined that the as-built capacity of the cable was considerably higher than indicated by design standards.[7,8] That evening, the independent consultant provided results of the verification. The verification results were substantially lower than the thermal calculation results obtained by the licensee. Plant management then declared MCC-6 inoperable, pending validation of the consultant's calculation results.

The Plant initiated a 24-hour Limiting Condition for Operation (LCO) at 2100 hours, October 13, due to the inoperability of MCC-6. The following morning, after a more detailed review of Plant Technical Specifications, it was determined that a 4-hour LCO was applicable since one of the components supplied by MCC-6 was required for Containment integrity. At 1041 hours, October 14, the Plant started decreasing Unit load to Hot Shutdown. At 1106 hours, an Unusual Event was declared due to the Containment integrity issue. The reactor was in Hot Shutdown by 1300 hours.

The Unusual Event was terminated at 0945 hours, October 15, after the reactor was in Cold Shutdown and the Containment integrity Technical Specification was no longer applicable.

6/ SP-820, OPERATIONS TO PREVENT OVERLOAD ON MCC-5 AND MCC-6.
7/ The feeder cable was determined to be capable of continuous performance up to 750 amps without accelerated degradation as compared to a design standard of approximately 460 amps conservatively calculated using derating factors for tray loading and flame retardant coating.
8/ Design Standards: IPCEA P-46-426 and P-54-440.

From October 14 through October 17, the following compensatory measures were effected to resolve the MCC-6 operability concerns:

1. The feeder cable from Emergency Switchgear E2 to MCC-6 was replaced and rerouted via electrical conduit, providing greater ampacity.
2. Other safety-related power cables were evaluated for potential overload.
3. The independent consultant re-evaluated the parameters input to the computer model originally utilized and made necessary adjustments for realistic and as-built conditions resulting in a conclusion which validated the licensee's thermal calculation.
4. Equipment inspections were performed.

On October 17, the licensee initiated a conference call with the NRC Region II Office and the NRR Office as requested. The purpose of the call was to provide information on the methodology used to resolve the overload issues and the plans for Plant restart.

At 1555 hours, October 17, Plant heatup was begun and, at 1543 hours, October 18, the reactor was returned to power operation.

NED and the Plant Technical Support group documented the event and compensatory measures under an Engineering Evaluation and presented the information to the Plant Nuclear Safety Committee for review on October 20, 1988.[9,10]

II. Cause of Event

The reason for the potential overcurrent conditions apparently originated in original Plant design. The Architect-Engineer was responsible for the design of the distribution system configuration and had apparently undersized the distribution equipment for MCC-5 and MCC-6.

See Section V.B.

III. Analysis of Event

A postulated LOCA without loss of offsite power, concurrent with a single failure disabling one safety-related electrical train could jeopardize the operability of the remaining safety-related electrical train's 480 volt MCC (MCC-5 or 6). Any postulated accident which generates a Safety Injection signal could result in the conditions discussed below.

9/ Engineering Evaluation No. 88-134.
10/ Justification for Continued Operation No. 88-010.

Currents in excess of 800 amps could be present at MCC-5 (or MCC-6) if offsite power is maintained and all anticipated loads, including the standby HVAC and Turbine auxiliaries, were running. Certain loads on the MCCs would be removed by undervoltage devices if offsite power was lost. No credit is given for Operator action in the scenario. Currents in excess of 800 amps would exceed the continuous catalog ratings for the MCCs (600 amps) and also fall within the long delay pickup tolerance band of the feeder breakers for the two MCCs (800 amps +/- 10 percent).

The single failure of either MCC would result in the automatic transfer of some of its loads or the starting loads of standby equipment on the remaining MCC. The combined loading (potentially as much as 800 amps) could therefore cause the feeder breaker for the MCC to trip. This loading could also cause the eventual failure of the feeder cable for MCC-6 by exceeding the cable's calculated continuous rating.

Since effecting the compensatory measures recommended by NED the new alignment of nonessential loads results in the calculated loading being less than the equipment emergency ratings at the two MCCs. The present calculated maximum expected currents under design basis conditions are 614 amps at MCC-5 and 672 amps at MCC-6. In addition, Plant Operations personnel have been trained in the instructions of SP-820 to ensure the compensatory measures are maintained, although no Operator action is required to mitigate the consequences of postulated accidents within the first six hours following the starting of the Turbine auxiliaries.

Manufacturer published data has been assessed as well as Plant specific data to demonstrate that the MCC-5 and MCC-6 feeder breakers' long delay pickups have, by test, reliably tripped at or near 800 amps, well above the predicted existing currents with the compensatory measures implemented. Since the feeder cable to MCC-6 was the limiting factor, licensee engineering personnel performed a best-estimate thermal calculation based on the as-built configuration of the cable.[11] The calculation indicated that the cable could be loaded continuously up to 750 amps without accelerated degradation, well above the predicted current with the compensatory measures implemented.

This LER describes a reportable condition pursuant to 10CFR50.73(a)(2)(vii)(D).

IV. Corrective Action

Following Plant shutdown, the following actions were accomplished to ensure the overcurrent concerns were adequately resolved:

a) MCC-5 and MCC-6 were inspected to ensure no accelerated degradation of the equipment has occurred and found acceptable using standard inspection techniques.

11/ The feeder cable for MCC-5 has sufficient ampacity since it's replacement several years ago for unrelated reasons.

b) The supply transfer switch to MCC-5 was inspected for indication of prior overcurrent conditions and found acceptable using standard inspection techniques.

c) The feeder cable to MCC-6 was replaced to ensure the ampacity as calculated by original design standards is adequate based on the calculated loading.

d) Preventive maintenance records were reviewed for evidence of abnormalities with regard to the feeder breakers for the two MCCs and none was found.

e) The Diesel Generator bus duct ampacity ratings were reviewed to ensure no concerns existed at the current levels predicted for the postulated accident and were found acceptable.

f) The remaining safety-related power cables were evaluated to ensure no ampacity concerns exist and were found acceptable for continued operation with two exceptions: (1) the circuits to the Diesel Generator auxiliaries, and, (2) the duct heater for the fuel handling exhaust unit, HVE-15A.

The Diesel Generator auxiliaries feeder cables have a calculated ampacity of 20 amps while the calculated current for the loads is approximately 35 amps (each circuit). These circuits provide power to auxiliaries to keep the lube oil and water jacket systems warm. Should a circuit fail, alarms would alert the Operator of the abnormal condition (low temperature). Failure of a circuit would place the affected Diesel Generator under a 7-day LCO which would allow sufficient time for correcting the problem without consequence to Plant safety. The circuit is not required for diesel operation and would not affect diesel generator operability during the postulated accident.

The HVE-15A duct heater feeder cable has a calculated ampacity of 59 amps while the calculated current for the load is approximately 99 amps. At present, the duct heaters are under caution tags in accordance with SP-820 to prevent unnecessary loading of MCC-6. This duct heater provides humidity control for the charcoal filters associated with the exhaust unit and is not required to remain operable on emergency power following a postulated LOCA. However, should the circuit fail, fuel movement in the Spent Fuel Pit could be restricted.

The evaluation also revealed that certain feeder cables could have experienced accelerated aging due to calculated currents being above the calculated ampacity. The concerns have been satisfactorily justified as having no significant impact on circuit operability.

In summary, the compensatory measures and actions taken have removed the safety concerns related to the potential overload conditions at MCC-5 and MCC-6. Specifically, the following issues have been resolved:

1) The trip setting (including manufacturer tolerance) of the feeder breakers for the two MCCs is not exceeded due to compensatory actions provided under SP-820.

2) Equipment emergency ratings are sufficient to accommodate the calculated currents during the postulated accident with the compensatory actions provided under SP-820.

3) Potentially affected equipment has not been jeopardized by past current loadings.

4) Other safety-related power cables have not experienced accelerated aging to an extent that would jeopardize current safe Plant operation.[10]

Further actions have been planned, to further ensure continuous operability of the MCCs:

1) SP-820 will continue to be followed, to provide Plant Operations personnel with guidance on controlling nonessential loads.

2) Licensee engineering personnel will continue to verify the calculations and analyses associated with this event.[12]

3) A project will be initiated and implemented to alleviate the overload condition at the two MCCs prior to the expiration of SP-820 and before Plant restart following Refueling Outage No. 12.[12,13] Additionally, the feeder cable for the Diesel Generator auxiliaries and the HVE-15A duct heater will be replaced in the same window.

4) A project will be initiated to provide for additional cable replacement based on operating conditions.[12]

5) The ongoing Design Basis Reconstitution program will continue to ensure that the load flow calculations using the revised load factors do not invalidate previous evaluations, such as degraded voltage, breaker coordination and interrupt capacity, and vital bus loading studies. This action will assure systematic identification and resolution of any future concerns.

V. Additional Information

12/ Project Change Notice No. 88/192-00.
13/ Refueling Outage No. 12 is scheduled to begin on November 12, 1988.

A. Failed Component Identification

None.

B. Previous Similar Events

On May 2, 1975, the MCC-6 main breaker tripped on overcurrent due to failure of Reactor Coolant Pump "C". The MCC was re-energized and, shortly afterwards, the MCC-5 main breaker tripped on overcurrent. On August 11, 1974, similar overcurrent trips occurred on the main breakers of MCC-5 and MCC-6.[14,15]

The licensee will continue to investigate any similarities between this event and those of 1975 and 1974 concerning the two MCCs.

14/ Letter, E. E. Utley, CP&L, to N. C. Moseley, NRC, Serial: NG-75-826, dated June 4, 1975.
15/ Plant Operating Experience Report, dated January 13, 1975.

Form 244

CP&L

Carolina Power & Light Company

Company Correspondence

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NOV 09 1988

Robinson File No: 13510C

Serial: RNPD/88-5462
(10 CFR 50.73)

United States Nuclear Regulatory Commission
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT 88-023-00

Gentlemen:

The enclosed Licensee Event Report (LER) is submitted in accordance with 10 CFR 50.73 and NUREG-1022 including Supplements No. 1 and 2.

Very truly yours,

R. E. Morgan
General Manager
H. B. Robinson S. E. Plant

DAS/jch

Enclosure

cc: Mr. M. L. Ernst
Mr. L. W. Garner
INPO

IE22
1/1