

CATEGORY

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9706260137 DOC.DATE: 97/06/20 NOTARIZED: NO DOCKET #
 FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
 AUTH.NAME AUTHOR AFFILIATION
 CHERNOFF,H.K. Carolina Power & Light Co.
 MOYER,J.W. Carolina Power & Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-006-00:on 970521,results of field verification confirmed cable routing concern existed in field.Caused by original plant design installation error.Review of other SI pump cables performed.W/970620 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 6
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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NRR/DE/EELB	1 1	NRR/DE/EMEB	1 1
NRR/DRCH/HHFB	1 1	NRR/DRCH/HICB	1 1
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Carolina Power & Light Company

Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File No: 13510C
Serial: RNP-RA/97-01132

JUN 20 1997

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
LICENSEE EVENT REPORT NO. 97-06-00

Gentlemen:

The attached Licensee Event Report is submitted in accordance with 10 CFR 50.73. Should you have any questions regarding this matter, please contact Mr. H. K. Chernoff at (803) 857-1437.

Very truly yours,

A handwritten signature in dark ink, appearing to read "J. W. Moyer".

J. W. Moyer
Plant General Manager

9706260137 970620
PDR ADDCK 05000261
S PDR



Attachment

- c: Mr. L. A. Reyes, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. B. B. Desai, USNRC Senior Resident Inspector, HBRSEP

060002

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (4-95)					APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.					
LICENSEE EVENT REPORT (LER)										
FACILITY NAME (1) H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2					DOCKET NUMBER (2) 50-261		PAGE (3) 1 OF 5			
TITLE (4) CONDITION OUTSIDE DESIGN BASIS DUE TO DESIGN INSTALLATION ERROR: SAFETY INJECTION PUMP CONTROL POWER CABELING										
EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NI IMRFR	REVISION NI IMRFR	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	21	97	97	--	06 -- 00	06	20	97	FACILITY NAME	DOCKET NUMBER
OPERATING		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)			20.2203(a)(2)(v)		X	50.73(a)(2)(i)	
POWER		100	20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)	
			20.2203(a)(2)(i)			20.2203(a)(3)(iii)			50.73(a)(2)(iii)	
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	
									OTHER <small>Specify in Abstract below or in NRC Form 368A</small>	
LICENSEE CONTACT FOR THIS LER (12)										
NAME H. K. Chernoff, Supervisor, Licensing/Regulatory Programs								TELEPHONE NUMBER (Include Area Code) (803) 857-1437		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED		MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).						<input type="checkbox"/> NO		7/15/97		
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)										
<p>On May 21, 1997, with H. B. Robinson Steam Electric Plant, Unit No. 2 operating at 100% power, engineering personnel discovered that auto-start and manual start cables for Safety Injection (SI) Pump C were routed in the same cable tray stack as the auto-start cables for SI Pumps A, and B (when aligned in the safety Train A configuration), a condition outside of the design basis of the plant. A modification was implemented on May 25, 1997, that replaced the cables in new routes that achieved normal design basis separation. This condition was caused by an original plant design installation error. There have been no significant adverse safety consequences associated with this condition. The results of a review concluded that the cable routing error did not introduce a condition that had significant adverse safety consequences. A review of other SI pump cables was performed, and additional deviations to the redundant cable separation criteria that were identified were dispositioned. Current electrical installation practices provide conservative separation criteria that is based on the concepts of safety train separation. Additional emphasis will be placed on incorporating the review of electrical separation during appropriate engineering self-assessments.</p> <p>This report is submitted in accordance with 10 CFR 50.73(a)(2)(i) as a condition that was outside the design basis of the plant.</p>										

NRC FORM 366A (4-95)		U.S. NUCLEAR REGULATORY COMMISSION			
LICENSEE EVENT REPORT (LER)					
FACILITY NAME (1)		DOCKET	LER NUMBER (6)		
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2		50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
			97	-- 06	-- 00
			PAGE (3) 2 OF 5		

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

I. DESCRIPTION OF EVENT

On May 20, 1997, H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 was operating at 100 percent power. Site engineering personnel reviewing the Safety Injection (SI) Pump (EHS System Code: BQ; Component: P) control and power cable (EHS Code: CBL) configuration discovered evidence that the auto-start cable (i.e., cable no. C2239D) and the manual start cable (i.e., cable no. C2239C) for the SI Pump C may have been routed in the same cable tray stack as the auto-start cable for SI Pump A (i.e., cable no. C2237D) and the auto-start cable for SI Pump B (i.e., cable no. C2891C) when the system is aligned in the Train A pump (i.e., the injection train) configuration. The SI system design requires that safety related functionally redundant cables be separated by minimum distance of four feet vertically or 18 inches horizontally; therefore the cable routing for cables C2239C and C2239D appeared to be outside of the design basis of the plant. HBRSEP, Unit No. 2 Technical Specifications (TS) section 3.3.1.1 requires that the reactor shall not be made critical unless two SI pumps are operable, each capable of automatic initiation from a separate emergency bus. TS section 3.3.1.2 provides a Limiting Condition for Operation (LCO) of 24 hours for inoperability of one SI pump during normal reactor operation. Although this condition had not been confirmed to exist in the field, at 1147 hours on May 20, 1997, plant operators declared SI Pump C inoperable, placed SI Pump B in service, and exited the LCO.

On May 21, 1997, at 1650 hours Eastern Daylight Time, the results of field verification confirmed the cable routing concern existed in the field. The NRC Operations Center was notified via the Federal Telephone System (FTS) of this condition at 1746 hours. A modification was developed to replace cables C2239C and C2239D in new routes that achieved normal design basis separation. Implementation of the modification was completed on May 25, 1997.

II. CAUSE OF EVENT

This condition was caused by an original plant design installation error. During plant construction, the cable was field verified on November 28, 1969, and the verified cable route was noted on the inspection sheet. A cable separation review performed by engineering personnel for the HBRSEP, Unit No. 2 Architect Engineer (i.e., Ebasco) determined that cable C2239D was pulled in an incorrect route. Documentation for that review indicates that this cable was "re-pulled per design." However, the cable field verification performed by HBRSEP, Unit No. 2 engineering personnel on May 21, 1997, verified that the cable was in the same route as the field verification of November 28, 1969. Therefore, it appears that the cable was either not re-pulled, or was re-pulled into the same route as previously verified.

A factor that may have led to the design installation error creating this separation deviation is that the design basis for the SI pump was changing from an installed spare to a required swing pump during the period of time that HBRSEP, Unit No. 2 was being designed and constructed.

NRC FORM 366A
(4-95)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)	
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 5	
		97	-- 06	-- 00		

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

II. CAUSE OF EVENT (Continued)

HBRSEP was originally designed to require only one of two SI pumps to be in service to satisfy the minimum safeguards flow requirements. Three pumps were incorporated into the plant design with the concept that two pumps were available and the third pump was an installed spare. During construction of HBRSEP it was determined that additional safeguards flow beyond that delivered by a single SI pump was required for the mitigation of the steam line break accident. During 1968 - 1969, the HBRSEP design was changed to automatically start the spare pump. The concept of a "swing pump" was developed that would allow the B SI Pump to automatically start upon receiving a SI signal. The power supply for this pump would also be automatically transferred from either of the two emergency buses (i.e., emergency buses E1 and E2) (EIS Component Code: BU) upon the loss of one of the buses. This transfer scheme utilized a tie bus duct between the safety related emergency buses, E1 tie breaker (EIS Component Code: BKR) 52/22B, E2 tie breaker 52/29B, and the SI Pump B main breaker 52/29C in the E2 bus. The automatic transfer of the power supply was performed when the under voltage and safeguards logic sensed a loss of voltage on the applicable emergency bus. The power supply for the SI Pump B would be transferred by opening/closing the emergency bus tie breakers. The original plant cable tray layout only provided two possible cable routes between the auxiliary relay racks and the safeguards racks.

In January 1988, the NRC raised questions regarding the automatic transfer scheme for SI Pump B. Resolution of these questions resulted in modifications to the plant and reanalysis. During May 1988, a small break LOCA analysis was performed which concluded that HBRSEP only required one SI pump to mitigate the full spectrum of accidents. In June 1988, a license amendment was issued to allow the plant to operate with only two operable SI pumps.

During 1989, the HBRSEP, Unit No. 2 design basis, including the cable separation criteria used during construction, was reconstituted and documented as Design Basis Document (DBD)/R87038/SD62, "Cable and Raceway System." This review relied, in part, on the engineering review performed during construction. This review did not identify the discrepancy identified on May 21, 1997.

NRC FORM 366A (4-95)		U.S. NUCLEAR REGULATORY COMMISSION				
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION						
FACILITY NAME (1)		DOCKET	LER NUMBER (6)			PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2		50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
			97	-- 06	-- 00	

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

II. CAUSE OF EVENT (Continued)

During the period of November 1988 and January of 1989, a modification was installed that reconfigured SI Pump B to allow it to start automatically on an SI signal, but without the automatic bus transfer feature. As a result, SI Pump B can be used as a maintenance pump that could replace the A or C pump. When the SI Pump B is not in service, the two tie breakers remained racked out. The SI Pump B main feed breaker remains racked in and closed, but it does not have the auto close/open feature connected. When the SI Pump B is placed into service to replace either the A or C SI Pump, the applicable tie breaker is racked in and the other tie breaker remains racked out. The auto-start or the manual start features for the pump will open or close the tie breaker to start or stop the pump. This was accomplished using the original control cables for the tie breakers. Individually, the tie breakers changed from being functionally redundant to each other, to being functionally redundant to the opposite train SI pump breaker when the SI Pump B is in service (i.e.: the E1 tie breaker would be redundant to SI Pump C breaker).

In summary, this event was caused by failure to ensure adequate design and configuration control during original plant construction. The subject cable routing error resulted in a condition outside the design basis of the plant.

III. ANALYSIS OF EVENT

There have been no significant adverse safety consequences associated with this condition. To ensure that the cable route for cable C2239D did not constitute a safety concern, a review of the potential failure modes for the potentially affected cables was performed. The potential failure modes considered included internal cable faults (i.e., open circuits, short to ground, short to power) and external events (i.e., fire, missiles, seismic, damage from falling objects or equipment). The results of the review concluded that the cable routing error did not introduce a condition that had significant adverse safety consequences.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(i) as a condition that was outside the design basis of the plant.

IV. CORRECTIVE ACTIONS

On May 20, 1997, plant operators declared SI Pump C inoperable, and SI Pump B was placed in service. This action eliminated the potential failure of SI Pump A as a result of the identification of this potential issue.

On May 21, 1997, following confirmation that the cable routing concern existed in the field, the NRC Operations Center was notified via the Federal Telephone System (FTS).

NRC FORM 366A (4-95)		U.S. NUCLEAR REGULATORY COMMISSION				
LICENSEE EVENT REPORT (LER)						
TEXT CONTINUATION						
FACILITY NAME (1)		DOCKET	LER NUMBER (6)			PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2		50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 5
			97	-- 06	-- 00	

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

IV. CORRECTIVE ACTIONS (Continued)

On May 25, 1997, a modification was installed that replaced cables C2239C and C2239D in new routes that achieved normal design basis functional separation.

A review of other SI pump cables was performed, and two additional deviations to the redundant cable separation criteria were identified. This review concluded that these cables had been abandoned during previous modifications.

Current electrical installation practices provide conservative separation criteria that is based on the concepts of safety train separation.

Additional emphasis will be placed on incorporating the review of electrical separation during appropriate engineering self-assessments.

V. ADDITIONAL INFORMATION

A. Failed Component Identification

None

B. Previous Similar Events

None

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9706260137 DOC. DATE: 97/06/20 NOTARIZED: NO DOCKET #
 FACIL: 50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
 AUTH. NAME AUTHOR AFFILIATION
 CHERNOFF, H.K. Carolina Power & Light Co.
 MOYER, J.W. Carolina Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-006-00: on 970521, results of field verification confirmed cable routing concern existed in field. Caused by original plant design installation error. Review of other SI pump cables performed. W/970620 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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	FILE CENTER		1	1		NRR/DE/ECGB	1	1	
	NRR/DE/EELB		1	1		NRR/DE/EMEB	1	1	
	NRR/DRCH/HHFB		1	1		NRR/DRCH/HICB	1	1	
	NRR/DRCH/HOLB		1	1		NRR/DRCH/HQMB	1	1	
	NRR/DRPM/PECB		1	1		NRR/DSSA/SPLB	1	1	
	NRR/DSSA/SRXB		1	1		RES/DET/EIB	1	1	
	<u>RGN2 FILE 01</u>		1	1					
EXTERNAL:	L ST LOBBY WARD		1	1		LITCO BRYCE, J H	1	1	
	NOAC POORE, W.		1	1		NOAC QUEENER, DS	1	1	
	NRC PDR		1	1		NUDOCS FULL TXT	1	1	

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CP&L**Carolina Power & Light Company**

Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File No: 13510C
Serial: RNP-RA/97-01132

JUN 20 1997

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Attn: Document Control Desk
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
LICENSEE EVENT REPORT NO. 97-06-00

Gentlemen:

The attached Licensee Event Report is submitted in accordance with 10 CFR 50.73. Should you have any questions regarding this matter, please contact Mr. H. K. Chernoff at (803) 857-1437.

Very truly yours,



J. W. Moyer
Plant General Manager

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Lev

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PDR ADOCK 05000261
S PDR



Attachment

c: Mr. L. A. Reyes, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. B. B. Desai, USNRC Senior Resident Inspector, HBRSEP

260002

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(4-95)

APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NUMBER (2)

50-261

PAGE (3)

1 OF 5

TITLE (4)

CONDITION OUTSIDE DESIGN BASIS DUE TO DESIGN INSTALLATION ERROR: SAFETY INJECTION PUMP CONTROL POWER CABELING

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NI IMRFR	REVISION NI IMRFR	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	21	97	97	--	06 -- 00	06	20	97	FACILITY NAME	DOCKET NUMBER
OPERATING		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
			20.2201(b)			20.2203(a)(2)(v)		X	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER		100	20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71 Appx. G(l)(b)
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME H. K. Chernoff, Supervisor, Licensing/Regulatory Programs	TELEPHONE NUMBER (Include Area Code) (803) 857-1437
---	--

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

X YES (If yes, complete EXPECTED SUBMISSION DATE).	NO	EXPECTED 7/15/97	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 21, 1997, with H. B. Robinson Steam Electric Plant, Unit No. 2 operating at 100% power, engineering personnel discovered that auto-start and manual start cables for Safety Injection (SI) Pump C were routed in the same cable tray stack as the auto-start cables for SI Pumps A, and B (when aligned in the safety Train A configuration), a condition outside of the design basis of the plant. A modification was implemented on May 25, 1997, that replaced the cables in new routes that achieved normal design basis separation. This condition was caused by an original plant design installation error. There have been no significant adverse safety consequences associated with this condition. The results of a review concluded that the cable routing error did not introduce a condition that had significant adverse safety consequences. A review of other SI pump cables was performed, and additional deviations to the redundant cable separation criteria that were identified were dispositioned. Current electrical installation practices provide conservative separation criteria that is based on the concepts of safety train separation. Additional emphasis will be placed on incorporating the review of electrical separation during appropriate engineering self-assessments.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(i) as a condition that was outside the design basis of the plant.

NRC FORM 366A
(4-95)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		97	-- 06	-- 00	

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

I. DESCRIPTION OF EVENT

On May 20, 1997, H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 was operating at 100 percent power. Site engineering personnel reviewing the Safety Injection (SI) Pump (EIS System Code: BQ; Component: P) control and power cable (EIS Code: CBL) configuration discovered evidence that the auto-start cable (i.e., cable no. C2239D) and the manual start cable (i.e., cable no. C2239C) for the SI Pump C may have been routed in the same cable tray stack as the auto-start cable for SI Pump A (i.e., cable no. C2237D) and the auto-start cable for SI Pump B (i.e., cable no. C2891C) when the system is aligned in the Train A pump (i.e., the injection train) configuration. The SI system design requires that safety related functionally redundant cables be separated by minimum distance of four feet vertically or 18 inches horizontally; therefore the cable routing for cables C2239C and C2239D appeared to be outside of the design basis of the plant. HBRSEP, Unit No. 2 Technical Specifications (TS) section 3.3.1.1 requires that the reactor shall not be made critical unless two SI pumps are operable, each capable of automatic initiation from a separate emergency bus. TS section 3.3.1.2 provides a Limiting Condition for Operation (LCO) of 24 hours for inoperability of one SI pump during normal reactor operation. Although this condition had not been confirmed to exist in the field, at 1147 hours on May 20, 1997, plant operators declared SI Pump C inoperable, placed SI Pump B in service, and exited the LCO.

On May 21, 1997, at 1650 hours Eastern Daylight Time, the results of field verification confirmed the cable routing concern existed in the field. The NRC Operations Center was notified via the Federal Telephone System (FTS) of this condition at 1746 hours. A modification was developed to replace cables C2239C and C2239D in new routes that achieved normal design basis separation. Implementation of the modification was completed on May 25, 1997.

II. CAUSE OF EVENT

This condition was caused by an original plant design installation error. During plant construction, the cable was field verified on November 28, 1969, and the verified cable route was noted on the inspection sheet. A cable separation review performed by engineering personnel for the HBRSEP, Unit No. 2 Architect Engineer (i.e., Ebasco) determined that cable C2239D was pulled in an incorrect route. Documentation for that review indicates that this cable was "re-pulled per design." However, the cable field verification performed by HBRSEP, Unit No. 2 engineering personnel on May 21, 1997, verified that the cable was in the same route as the field verification of November 28, 1969. Therefore, it appears that the cable was either not re-pulled, or was re-pulled into the same route as previously verified.

A factor that may have led to the design installation error creating this separation deviation is that the design basis for the SI pump was changing from an installed spare to a required swing pump during the period of time that HBRSEP, Unit No. 2 was being designed and constructed.

NRC FORM 366A
(4-95)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)	
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	50-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3	OF 5
		97	-- 06	-- 00		

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

II. CAUSE OF EVENT (Continued)

HBRSEP was originally designed to require only one of two SI pumps to be in service to satisfy the minimum safeguards flow requirements. Three pumps were incorporated into the plant design with the concept that two pumps were available and the third pump was an installed spare. During construction of HBRSEP it was determined that additional safeguards flow beyond that delivered by a single SI pump was required for the mitigation of the steam line break accident. During 1968 - 1969, the HBRSEP design was changed to automatically start the spare pump. The concept of a "swing pump" was developed that would allow the B SI Pump to automatically start upon receiving a SI signal. The power supply for this pump would also be automatically transferred from either of the two emergency buses (i.e., emergency buses E1 and E2) (EIS Component Code: BU) upon the loss of one of the buses. This transfer scheme utilized a tie bus duct between the safety related emergency buses, E1 tie breaker (EIS Component Code: BKR) 52/22B, E2 tie breaker 52/29B, and the SI Pump B main breaker 52/29C in the E2 bus. The automatic transfer of the power supply was performed when the under voltage and safeguards logic sensed a loss of voltage on the applicable emergency bus. The power supply for the SI Pump B would be transferred by opening/closing the emergency bus tie breakers. The original plant cable tray layout only provided two possible cable routes between the auxiliary relay racks and the safeguards racks.

In January 1988, the NRC raised questions regarding the automatic transfer scheme for SI Pump B. Resolution of these questions resulted in modifications to the plant and reanalysis. During May 1988, a small break LOCA analysis was performed which concluded that HBRSEP only required one SI pump to mitigate the full spectrum of accidents. In June 1988, a license amendment was issued to allow the plant to operate with only two operable SI pumps.

During 1989, the HBRSEP, Unit No. 2 design basis, including the cable separation criteria used during construction, was reconstituted and documented as Design Basis Document (DBD)/R87038/SD62, "Cable and Raceway System." This review relied, in part, on the engineering review performed during construction. This review did not identify the discrepancy identified on May 21, 1997.

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II. CAUSE OF EVENT (Continued)

During the period of November 1988 and January of 1989, a modification was installed that reconfigured SI Pump B to allow it to start automatically on an SI signal, but without the automatic bus transfer feature. As a result, SI Pump B can be used as a maintenance pump that could replace the A or C pump. When the SI Pump B is not in service, the two tie breakers remained racked out. The SI Pump B main feed breaker remains racked in and closed, but it does not have the auto close/open feature connected. When the SI Pump B is placed into service to replace either the A or C SI Pump, the applicable tie breaker is racked in and the other tie breaker remains racked out. The auto-start or the manual start features for the pump will open or close the tie breaker to start or stop the pump. This was accomplished using the original control cables for the tie breakers. Individually, the tie breakers changed from being functionally redundant to each other, to being functionally redundant to the opposite train SI pump breaker when the SI Pump B is in service (i.e.: the E1 tie breaker would be redundant to SI Pump C breaker).

In summary, this event was caused by failure to ensure adequate design and configuration control during original plant construction. The subject cable routing error resulted in a condition outside the design basis of the plant.

III. ANALYSIS OF EVENT

There have been no significant adverse safety consequences associated with this condition. To ensure that the cable route for cable C2239D did not constitute a safety concern, a review of the potential failure modes for the potentially affected cables was performed. The potential failure modes considered included internal cable faults (i.e., open circuits, short to ground, short to power) and external events (i.e., fire, missiles, seismic, damage from falling objects or equipment). The results of the review concluded that the cable routing error did not introduce a condition that had significant adverse safety consequences.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(i) as a condition that was outside the design basis of the plant.

IV. CORRECTIVE ACTIONS

On May 20, 1997, plant operators declared SI Pump C inoperable, and SI Pump B was placed in service. This action eliminated the potential failure of SI Pump A as a result of the identification of this potential issue.

On May 21, 1997, following confirmation that the cable routing concern existed in the field, the NRC Operations Center was notified via the Federal Telephone System (FTS).

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IV. CORRECTIVE ACTIONS (Continued)

On May 25, 1997, a modification was installed that replaced cables C2239C and C2239D in new routes that achieved normal design basis functional separation.

A review of other SI pump cables was performed, and two additional deviations to the redundant cable separation criteria were identified. This review concluded that these cables had been abandoned during previous modifications.

Current electrical installation practices provide conservative separation criteria that is based on the concepts of safety train separation.

Additional emphasis will be placed on incorporating the review of electrical separation during appropriate engineering self-assessments.

V. ADDITIONAL INFORMATION

A. Failed Component Identification

None

B. Previous Similar Events

None