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June 5, 1997

U. S. Nuclear Regulatory Commission
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Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458/97-001-00
File Nos. G9.5, G9.25.1.3

RBG-43983
RBF1-97-0207

Ladies and Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject report.

Sincerely,

RJK/JPO
enclosure

IE22

cc: U. S. Nuclear Regulatory Commission
Region IV
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Arlington, TX 76011

NRC Sr. Resident Inspector
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INPO Records Center
700 Galleria Parkway
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Public Utility Commission of Texas
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Louisiana Department of Environmental Quality
Radiation Protection Division
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Baton Rouge, LA 70884-2135
ATTN.: Administrator

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

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)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
River Bend Station	05000-458	1 of 5

TITLE (4) Manual Reactor Scram on Lowering Vessel Level due to Cut Cable

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 NAME	DOCKET NUMBER
									N/A	05000
05	06	97	97	-- 001 --	00	06	05	97	FACILITY NAME	DOCKET NUMBER
									N/A	05000

OPERATING MODE (9)	1
POWER LEVEL (10)	99

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

20.2201(5)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
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
20.2203(a)(2)(ii)	20.2203(a)(4)	X 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	TELEPHONE NUMBER (Include Area Code)
D. N. Lorfing, Supervisor - Licensing	504-381-4157

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

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

On May 6, 1997, at 9:01 AM, with the plant in mode 1 (power operation) and the reactor at 99% power, contract insulators severed and shorted two wires inside a cable (*CBL*) while removing low density silicon elastomer (LDSE) from a floor penetration in the turbine building. This resulted in a trip of three electrical breakers de-energizing the 4.16kV safety-related bus "B", and the 4.16 kV and 13.8kV non-safety-related bus "B", resulting in a loss of two of three reactor feedwater pumps. The reactor operator initiated a manual scram at 9:02 AM on lowering water level in anticipation of an automatic scram at reactor vessel level 3. The loss of electrical busses also resulted in the loss of reactor protection system "B" and subsequent containment isolations. In addition, the inboard main steam isolation valves (MSIV) isolated on high temperatures in the turbine building and main steam tunnel.

The primary causes of the cut cable event were determined to be: site standards, procedures, and formal guidance for breaching penetrations was less than adequate, and tools and techniques used for the work need improvement. The cause of the MSIV isolation was determined to be human engineering. Corrective actions include repairing the cut cable, developing expectations for breaching penetration seals, and evaluating measures to reduce vulnerability to isolations caused by ambient area temperatures. The reactor safely shut down and the main turbine trip occurred in accordance with plant design. Engineered safety feature (ESF) systems performed their safety function per design. These events are reportable pursuant 10CFR50.73 (a)(2)(iv) as a manual reactor protection system actuation and automatic ESF actuations.

Reported Condition

On May 6, 1997, at 9:01 AM, with the plant in mode 1 (power operation) and the reactor at 99% power, contract insulators working in the turbine building at River Bend Station (RBS) severed and shorted two wires inside a cable (*CBL*) while removing low density silicon elastomer (LDSE) from a floor penetration in the turbine building. This resulted in a trip of three electrical breakers de-energizing the 4.16kV safety-related bus "B", and the 4.16 kV and 13.8kV non-safety-related bus "B". The loss of the 13.8kV non-safety related bus resulted in a loss of two of three reactor feedwater pumps. The reactor operator initiated a manual scram on lowering water level in anticipation of an automatic scram at reactor vessel level 3. The loss of electrical busses also resulted in the loss of reactor protection system (RPS) "B" and subsequent containment isolations. In addition, the inboard main steam isolation valves isolated on high temperatures in the turbine building and main steam tunnel. The reactor safely shut down and the main turbine trip occurred in accordance with plant design. Engineered safety feature (ESF) systems performed their safety function per design. These events are reportable pursuant 10CFR50.73(a)(2)(iv) as a manual reactor protection system actuation and automatic ESF actuations.

Investigation

On May 6, 1997, two contractor insulators were performing work in the turbine building as part of a planned plant modification. This work included the breach of an electrical penetration sealed with LDSE. The floor penetration contained three cable trays running vertically along a wall. The work package was initiated and planned, with a field walk down by a field engineer and insulating supervisor performed on April 18, 1997. The package was delivered to the insulators on April 22, 1997.

RBS has breached several thousand penetrations since 1990, and several hundred so far in 1997. The insulators performing the breach had at least 5 years experience in breaching penetrations.

The insulators received a pre-job brief from their supervisor along with the package. The pre-job brief indicated that this penetration would be hand dug (not drilled) using a screwdriver and a ballpeen hammer based on previous work experience, and an electrician would check the work site. The work management center signed in the package at 7:45 AM on May 6, 1997.

The manual method being used necessitated a hole big enough to work with the hammer and screwdriver. The hole approached within 2 inches of the cable tray boundary. While digging the penetration the insulators unknowingly cut through a cable in the penetration. Responding to the turbine building lights going out in the work area, the insulators found a cut cable end in the hole and notified the main control room.

Cutting the cable with the screwdriver shorted two conductors and resulted in bypassing normally open contacts. This actuated lockout relays which caused breakers for the 4.16kV safety-related bus "B" and

the 4.16 kV and 13.8kV non-safety related bus "B" to open, with a subsequent loss of feedwater pumps 1B and 1C, condensate pump 1B, reactor recirculation pump 1B, circulating water pumps 1B and 1D, and normal and alternate power supply to "B" RPS and other loads.

Since the loss of the 13.8kV non-safety related bus resulted in a loss of two of three reactor feedwater pumps, the reactor operator initiated a manual scram on lowering water level in anticipation of an automatic scram at reactor vessel level 3. The reactor safely shut down and the main turbine trip occurred in accordance with plant design. The division II and III emergency diesel generators started automatically due to bus under-voltage and re-energized their buses. Various plant systems isolated, as designed, including cooling water to the reactor recirculation pumps. The "B" recirculation pump tripped on loss of power and the operators secured reactor recirculation pump "A" due to the loss of pump and seal cooling which was isolated by the loss of RPS "B". The operators maintained reactor level with one operating reactor feedwater pump. Reactor pressure was maintained with the turbine bypass system until the outboard main steam isolation valves were closed by the reactor operator at 9:24 AM to conserve heat and reduce the cooldown rate. Pressure control was then maintained using the safety relief valves and steam drains.

Per plant design, the loss of RPS "B" initiated various division II actuations and isolations. The alternate power supply to the division II bus was restored, re-energizing the power line conditioner that feeds the "B" RPS bus. One of the breakers that supplies the "B" RPS bus would not reset because the under-voltage relay reset setpoint was above the normal supplied voltage. Consequently, restoration of power to the "B" RPS bus was delayed.

The loss and subsequent difficulty restoring RPS "B" resulted in several operator challenges. Cooling water to reactor recirculation pumps isolated preventing operation of either pump. Since reactor water clean-up also isolated, no forced circulation was available. A supply breaker to main turbine lift pumps and other turbine auxiliaries tripped during the main turbine coast-down. Containment floor drain isolation valves isolated preventing containment and drywell sump operation. Isolation of chilled water to the containment unit coolers complicated containment pressure control. The reactor coolant sampling valve could not be opened until RPS "B" was restored. This delayed sampling reactor coolant. Containment purge isolation dampers were closed, thus preventing venting of containment. A steam line equalizing valve that could have been used for pressure control was isolated.

Upon the loss of power to the non-safety related B bus, the operating turbine building chill water pump tripped followed by a trip of the operating chillers. Power remained available to one chilled water pump and one chiller. Additionally, two unit coolers that cool the moisture separator area were lost. Temperatures in the moisture separator reheater areas and the south end of the steam line tunnel rose. At 11:41 AM an inboard main steam isolation valve (MSIV) closure was activated by leak detection system temperature monitoring instruments exceeding trip points in the moisture separator reheater area of the turbine building and the steam line tunnel.

Power was restored to the safety related and non safety related "B" busses at 12:06 PM. At 12:08 PM the scram initiation signal was reset. RBS exited the emergency operating procedures at 13:59 PM.

ESF systems actuated properly and performed their safety function per design. Offsite 230kV power was not lost or degraded during this event. An RBS significant event response team was assigned to investigate the root cause of the plant scram. A review of recent LERs did not identify any similar events.

Root Cause

The primary causes of the cut cable event were determined to be: site standards, procedures, and formal guidance for breaching penetrations was less than adequate, and tools and techniques used for the work need improvement.

The site standards, procedures, and formal guidance documents for breaching penetrations were less than adequate. Most items, including: which tools to use, methods of digging, placement of holes, size of holes, and how close to come to the cable tray were either communicated informally or left to the "skill of the craft". The lack of adequate standards, procedures, and resulting work package contributed to the failure of barriers which are in place to control work.

The tools and techniques used for the work need improvement. The method used to breach this penetration was "chiseling" a hole approximately 5 inches in diameter and 18 inches deep to allow cable insertion. A ballpeen hammer and a 16 inch screwdriver were used in the excavation of this penetration. These tools had been successfully used by the craft on numerous occasions to perform this task and were considered "tools of the trade".

The cause of the MSIV isolation was determined to be human engineering in that indications need improvement. There was a lack of indication or warning of the impending MSIV isolation due to turbine area and main steam tunnel area temperatures. Operators did not recognize the impending isolation and therefore did not prioritize restoration of cooling systems above other bus restoration and emergency and abnormal operating procedure activities. The attention of the operators was appropriately focused on manual reactor vessel level and pressure control and the restoration of power to the safety and non-safety related busses.

Corrective Actions

Cut Cable

- The cut cable was repaired and immediate administrative controls to limit the breaching of penetrations were instituted until permanent corrective actions are put in place.
- Guidance was provided to engineers concerning modifications that contain penetration breaches.
- A method of removing LDSE using tools that are not as likely to damage cables will be developed.

- Appropriate Maintenance procedures will be revised to ensure that the risk associated with breaching a sealed penetration is assessed in the process.
- Procedures and expectations for conducting penetration seal breaches will be developed provided and communicated to appropriate personnel .

MSIV Isolation

- Operator training will be conducted on lessons learned from this event.
- Measures to reduce vulnerability to isolations caused by ambient area temperatures will be evaluated.

Safety Significance

Following the manual initiation of the scram by the reactor operator the reactor was safely shut down and the main turbine trip occurred in accordance with plant design. Engineered safety features (ESF) systems performed their safety function per plant design.

The River Bend Safety Analysis Report section 15.2.6 evaluates the loss of all normal and preferred station service transformers. This is a more severe transient and bounds the event that occurred on May 6, 1997.

Core thermal limit performance for this event is bounded by generator load rejection, turbine trip, feedwater controller failure, and pressure regulator failure downscale. The consequences of this event did not result in any significant temperature or pressure transient. The automatic isolation of the inboard MSIVs on high temperature was not safety significant because the outboard MSIVs had already been manually closed.

Note: Energy Industry Identification codes are identified in the text as (*XX*)