Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

Ashok S. Bhatnagar
Vice President, Browns Ferry Nuclear Plant

June 4, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D. C. 20555-0001

10 CFR 50.73

Dear Sir:

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - DOCKET 50-296 - FACILITY OPERATING LICENSE DPR - 68 - LICENSEE EVENT REPORT (LER) 50-296/2002-003-00

The enclosed report provides details of an event which involved a valid initiation of the reactor protection system while shutdown. TVA is reporting this event pursuant to the requirements of 10 CFR 50.73(a)(2)(iv)(A).

There are no commitments contained in this letter.

Sincerely,

Ashok S. Bhatnagar

cc: See page 2

IE22

Enclosure
cc (Enclosure):
(Via NRC Electronic Distribution)
Mr. Kahtan N. Jabbour, Senior Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Mr. Paul E. Fredrickson, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Resident Inspector
Browns Ferry Nuclear Plant
P. O. Box 149
Athens, Alabama 35611

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Browns Ferry Nuclear Plant	05000296	1 of 6

TITLE (4)

Actuation of RPS while shutdown due to inadvertent depressurization of scram pilot air header

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
									NA	
04	06	2002	2002	-- 003	-- 00	06	04	2002	NA	DOCKET NUMBER

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	000		20.2201(b)		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)
Paul S. Heck, Nuclear Engineer, Industry Affairs	256.729.3624

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
X	JC	CNTR	G080	Y						

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 April 6, 2002, Unit 3 was in day 12 of its cycle 10 refueling outage. Electrical Maintenance personnel were performing preventive maintenance work on the reactor protection system (RPS) manual scram contactors. At approximately 1314 hours CST, a full reactor scram was received due to low pressure in the RPS scram pilot air header.

A loose plunger arm screw on an RPS scram contactor was discovered. This loose plunger arm prevented proper operation of the associated auxiliary contacts. These contacts are designed to open when the main contactor is energized. With the plunger arm in a loose condition, these contacts were remaining closed when the main contactor was energized. Faulty auxiliary contact operation on this RPS contactor caused the RPS 3A portion of the energization circuitry for one backup scram valve to be partially completed when it should not have been. During subsequent work on the RPS 3B contactors, the backup scram valve energization circuit was unknowingly completed, resulting in the valve's actuation. The purpose of the backup scram valve is to vent and depressurize the scram pilot air header upon a full scram condition; the inadvertent operation of this valve directly caused the actual scram pilot air header low pressure and the resulting full actuation of the RPS logic.

As corrective actions the loose plunger arm screw was tightened, the screws on the remaining Unit 3 and Unit 2 contactors were inspected and tightened as necessary, and Electrical Maintenance instructions are being revised to ensure the scram contactor auxiliary contacts are inspected during preventive or corrective maintenance activities.

I. PLANT CONDITION(S)

At the time of the event, Unit 3 was shutdown and in Mode 5. Unit 2 was in Mode 1 at 100 percent reactor power (approximately 3458 megawatts thermal). Unit 1 was shutdown and defueled.

II. DESCRIPTION OF EVENT

A. Event:

On April 6, 2002, Unit 3 was in day 12 of its cycle 10 refueling outage. Electrical Maintenance personnel were performing a preventive maintenance (PM) work order on the reactor protection system (RPS) [JC] manual scram contactors. Additionally, at this time on Unit 3, Operations and engineering personnel were performing control rod drive system [AA] testing via Technical Instruction 0-TI-20. At approximately 1314 hours CST, a full reactor scram was received due to low pressure in the RPS scram pilot air header. At the time of the scram, all control rods were already fully inserted into the core with the exception of rod 06-39. This rod was in the process of being withdrawn in accordance with the TI and was at position 26 when the scram occurred. The control rod fully inserted upon receipt of the scram signal. The 0-TI-20 testing and scram contactor PM activities were stopped, and personnel were dispatched to investigate the cause of the scram.

A loose plunger arm screw on RPS scram contactor 3-CONT-099-05AK15C [CONT] was discovered. This loose plunger arm prevented proper operation of the associated auxiliary contacts. These contacts are designed to open when the main contactor is energized, however, with the plunger arm in a loose condition, these contacts were remaining closed when the main contactor was energized. It was determined that faulty operation of the auxiliary contacts on this RPS contactor had allowed the RPS 3A portion of the energization circuitry for backup scram valve 3-FSV-085-0035B to be partially completed when it should not have been. During subsequent work on the RPS 3B contactors, the backup scram valve energization circuit was unknowingly completed, resulting in the valve's actuation. The purpose of the backup scram valve is to vent and depressurize the scram pilot air header upon a full scram condition; the inadvertent operation of this valve directly caused the actual scram pilot air header low pressure and the resulting full actuation of the RPS logic.

Because the scram pilot air header depressurization resulted in a valid, automatic actuation of the RPS, and because the scram was not part of a pre-planned sequence, this event is reportable in accordance with 10 CFR 50.73 (a) (2) (iv) (A).

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None

C. Dates and Approximate Times of Major Occurrences:

April 6, 2002, dayshift	Electrical Maintenance personnel began Unit 3 RPS contactor PM activity under Work Order 01-007824-000. Operations and Engineering personnel were performing 0-TI-20 to verify control rod drive performance.

April 6, 2002, at 1314 hours CST	Unexpected full reactor scram received from low scram pilot air header pressure condition. RPS PM and 0-TI-20 activities suspended.
April 6, 2002, at 1326 hours CST	RPS scram signal reset.

D. Other Systems or Secondary Functions Affected

None

E. Method of Discovery

Operations personnel received control room annunciation of the automatic reactor scram.

F. Operator Actions

Operator action in this event was appropriate. Since Unit 3 was shutdown and in Mode 5 at the time of the event, the occurrence of the scram did not result in a plant transient. The control room crew verified the single control rod inserted, suspended 0-TI-20 testing and the RPS contactor PM activities, and took the necessary actions to verify the source of the scram.

G. Safety System Responses

The only safety systems and/or components required to respond to the event were the RPS and portions of the control rod drive system. The proper response of the RPS logic to the actual scram pilot air header low pressure condition initiated the event. The control rod drive system hydraulic control units and scram discharge volume vent and drain valves operated per their design during this event.

III. CAUSE OF THE EVENT

A. Immediate Cause

Logic circuitry sufficient to energize a backup scram valve was inadvertently completed due a combination of the RPS scram contactor PM work and the faulty operation of the auxiliary contact sets which had not been previously identified.

B. Root Cause

The cause of this event was loosening of the contactor plunger arm screw. The loosening of this screw prevented the proper operation of the RPS contactor auxiliary contacts. The faulty operation of these auxiliary contacts in conjunction with the continuing PM work on other RPS contactors led to the unexpected full scram condition.

C. Contributing Factors

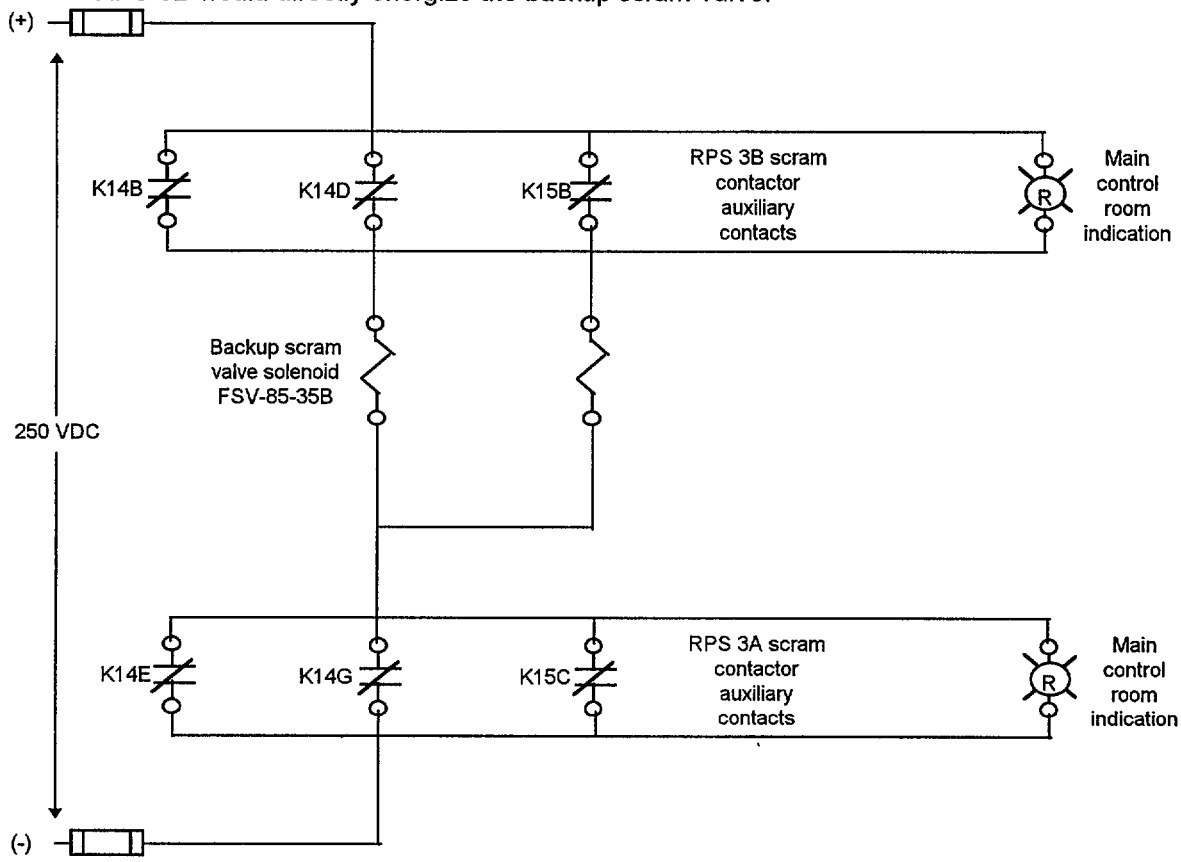
None

IV. ANALYSIS OF THE EVENT

The function of the RPS is to monitor plant conditions and initiate rapid control rod insertion whenever the sensed plant conditions indicate a possible problem exists. The RPS is arranged in a one-out-of-two-twice logic arrangement, meaning that the tripping of either of two redundant channels (A and C) in trip system A, in conjunction with the tripping of either of another set of redundant channels (B and D in trip system B, is required for a full actuation of the RPS (i.e. a full scram). Actuation of one or both channels in a single trip system alone (e.g., channels A and/or C in trip system A) will result in a half-scram condition for that trip system only. The RPS logic circuitry is designed to energize two backup scram valves when a full scram occurs. Any control rod having a stuck scram pilot solenoid valve which prevented the venting of control air from the rod's scram inlet and outlet valves will then be scrammed as the entire scram pilot air header is vented. Scram contactor auxiliary contacts are used in the backup scram valve circuitry.

The design purpose for initiating a reactor scram upon scram air header low pressure is to ensure that all control rods are fully inserted prior to the hypothetical filling of the scram discharge volume due to scram outlet valve leakage from low control air pressure. This scram serves as a diverse, redundant scram to the scram discharge instrument volume high level scram.

The simplified schematic below depicts the electrical circuit containing backup scram valve 3-FSV-085-0035B. It can be seen that with the K15C contacts from RPS 3A closed (having failed to open when the contactor itself was energized), the closure of the contacts from any of contactors K14B, K14D, or K15B in RPS 3B would directly energize the backup scram valve.



Over time, the plunger arm hold screw loosened such that the auxiliary contacts of scram contactor BFN-3-CONT-099-05AK15C did not open.

The logic for backup scram valve operation was partially completed without the knowledge of the Maintenance nor Operations personnel. When the PM work proceeded to the opposite RPS trip system, the backup scram circuit was completed, the backup scram valve opened, and the full scram resulted from scram pilot air header low pressure.

V. ASSESSMENT OF SAFETY CONSEQUENCES

At the time of this event Unit 3 was shutdown in Mode 5. All control rods with the exception of rod 06-39 were already fully inserted into the core.

The faulty operation of the scram contactor auxiliary contacts did not affect the operation of the contactors themselves, therefore the condition of these contacts would not have prevented a reactor scram had the reactor been at power at the time of this event. The RPS scram contactor auxiliary contacts are all normally closed, i.e., they are closed when the contactor is de-energized. The loose plunger arm had the effect of potentially leaving these contacts in the closed position even with the main contactor energized. As evidenced by the event itself, the faulty operation in this manner of the contactor auxiliary contacts also does not prevent operation of the backup scram aspect of RPS .

Based on the above discussion, there was no adverse safety impact of this event. There was no adverse effect on the health and safety of the public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

Work order 01-007824-001 was planned and worked to identify and repair faulty scram contactor auxiliary contacts. The plunger arm screw on BFN-3-CONT-099-05AK15C was tightened two full turns. The remaining Unit 3 scram contactors were inspected and six different screws were found loose. These screws were tightened from one-half to one full turn. Unit 3 has twelve total RPS scram contactors.

B. Corrective Actions to Prevent Recurrence [1]

The Unit 2 RPS scram contactors were inspected during a mid-cycle outage in late April 2002. Of the ten type CR105X contactors on Unit 2 (two had been previously replaced with newer models with different auxiliary contact arrangements), three were found to have plunger arm screws which required tightening.

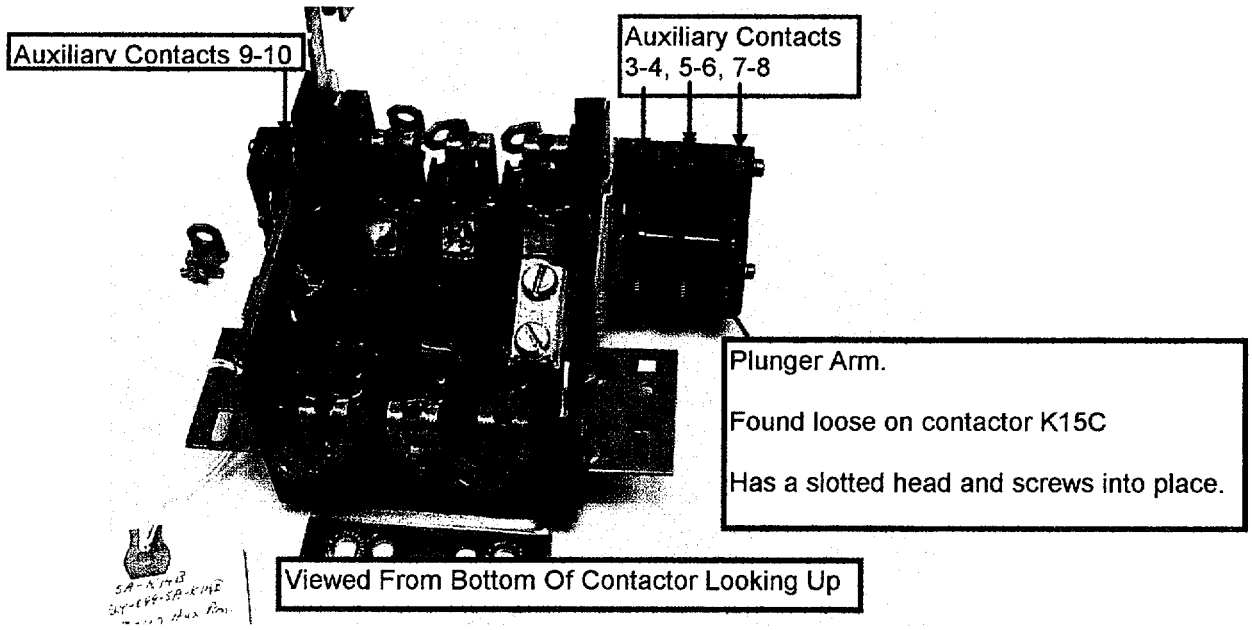
Electrical Maintenance instructions are being revised to ensure the scram contactor auxiliary contacts are inspected during preventive or corrective maintenance activities. Note that subsequent to this event General Electric published 10 CFR 21 notification SC02-05 on scram contactor auxiliary contact operation. The Electrical Maintenance instructions will use the inspection criteria as defined in the notification.

[1] TVA does not consider these corrective actions as regulatory commitments. The completion of these actions will be tracked in TVA's Corrective Action Program.

VII. ADDITIONAL INFORMATION

A. Failed Components

RPS contactor - General Electric type CR105X auxiliary contact operating arm. The picture below shows part of this component, including the auxiliary contacts and the auxiliary operating rod.



B. Previous LERs on Similar Events

None

C. Additional Information

None

D. Safety System Functional Failure Consideration:

This event is not considered a safety system functional failure in accordance with NEI 99-02 in that the RPS was always capable of carrying out its design function. The functional capability of the overall system was not jeopardized.

E. Loss of Normal Heat Removal Consideration:

This event is not considered a scram with loss of normal heat removal for Performance Indicator reporting purposes.

VIII. COMMITMENTS

None