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October 29, 1998

Docket No. 50-366

HL-5703

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant - Unit 2
Licensee Event Report
Personal Error Results in Condition Prohibited by Technical Specifications

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i) and (v), Southern Nuclear Operating Company is submitting the enclosed Licensee Event Report (LER) concerning a personnel error which resulted in a condition prohibited by Technical Specifications.

Respectfully submitted,

Lewis Sumner

H. L. Sumner, Jr.

eb/OCV

Enclosure: LER 50-366/1998-004

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
SNC Document Management (R-Type A02.001)

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. J. T. Munday, Senior Resident Inspector - Hatch

NRC FORM 366 (06-1998) U.S. NUCLEAR REGULATORY COMMISSION

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 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. If a document used to impose 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.

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

Personnel Error Results in Condition Prohibited by Technical Specifications

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(S) 05000
10	05	1998	1998	004	00	10	29	1998		DOCKET NUMBER(S) 05000

OPERATING MODE (9)	5
POWER LEVEL (10)	000

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)		50.73(a)(2)(vii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(ix)
	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)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	X	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)
Steven B. Tipps, Nuclear Safety and Compliance Manager, Hatch	(912) 367-7851

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On 10/05/1998 at 1000 EDT, Unit 2 was in the Refuel mode with the core fully reloaded, the reactor vessel head removed, and water level raised to accommodate refueling operations. Licensed personnel in the main control room were performing timing on control rod drives (CRDs) per procedure 34SV-C11-004-2S, "CRD Timing." This procedure involves withdrawing one control rod fully out, measuring the time required for the stroke, then inserting the control rod fully in again, measuring the time required for the stroke. When control rod 38-15 was withdrawn, the licensed operator noted that the full-in position indicating light did not extinguish as expected. Technicians who investigated found a jumper had been left in place in a circuit card in the rod position indication system (RPIS). The effect of this jumper on the logic was to simulate the full-in condition for rod 38-15. This had the further effect of defeating the interlock for this particular control rod such that, had rod 38-15 been withdrawn first, another control rod could have been withdrawn also. Therefore, limiting conditions for operation 3.9.2 and 3.9.4 were not met. This event resulted from personnel error. Technicians should have removed the jumper but inadvertently left it in place. Corrective actions for this event included coaching the involved personnel and briefing other technicians on the event. Also, an improved method of performing the RPIS rod block bypass will be developed as well as a functional test to be used after jumpers have been removed from the RPIS. Improved methods and functional testing will be used during the next refueling outage, currently scheduled for Spring, 1999.

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

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System codes appear in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 10/05/1998 at 1000 EDT, Unit 2 was in the Refuel mode with the core fully reloaded, the reactor vessel head removed, and water level raised to accommodate refueling operations. At that time, licensed personnel in the main control room were performing timing tests on control rod drives (CRDs, EIIS Code AA) per procedure 34SV-C11-004-2S, "CRD Timing." This test involves fully withdrawing a rod, measuring the elapsed time, then stroking the control rod fully in and again measuring the elapsed time. When control rod 38-15 was withdrawn, the licensed operator noticed that the rod still showed an indication that it was fully inserted. He then inserted the control rod fully in and initiated a deficiency card per plant procedures. In addition, no in-vessel fuel movement was performed and no control rod was withdrawn until the condition was repaired. This complied with Unit 2 Technical Specifications (TS) 3.9.2, required actions A.1 and A.2, and Unit 2 TS 3.9.4, required actions A.1.1, A.1.2, and A.1.3.

When the condition was investigated, technicians discovered that a jumper had been left in place in the rod position indication system (RPIS, EIIS Code AA) circuit card for this particular control rod. When the plant is in the Refuel mode, the reactor manual control system (RMCS, EIIS Code JD) logic normally allows only one control rod to be withdrawn at a time. This is accomplished by means of the full-in indication. When the RPIS senses a full-in indication for all the control rod drives, then the RMCS will permit one and only one control rod to be withdrawn. If any control rod is withdrawn while the plant mode switch is in the refuel position, then the RMCS senses one rod out and will permit no further control rod withdrawal.

The original purpose of this jumper was to simulate a full-in signal to the CRD control logic to allow multiple CRDs to be simultaneously removed for maintenance. A total of 32 jumpers were installed, one for each RPIS circuit card associated with each CRD to be removed. While these CRDs were removed for maintenance, there was no fuel in the cell surrounding each removed rod, complying with Unit 2 TS limiting condition for operation (LCO) 3.10.6. When maintenance was completed on the CRDs, all the jumpers should have been removed prior to loading any fuel in the evacuated regions. However, the jumper for control rod 38-15 was inadvertently left in place at that time. This jumper was removed on 10/5/1998, the day the condition was discovered, terminating the event.

Further investigation revealed that the jumpers had been installed on 9/13/1998, and licensed personnel entered the appropriate conditions and required actions for an inoperable control rod at that time. All the jumpers were believed to have been removed on 9/25/1998. Fuel loading began on 9/25/1998 and the core was fully loaded by 9/27/1998, including the cell surrounding the affected control rod. Believing the CRDs to be fully operable, however, licensed personnel exited the conditions and required actions for the inoperable full-in position indication on affected CRDs on 9/25/1998. Hence, the duration of the event was from 9/25/1998 until 10/5/1998.

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CAUSE OF EVENT

This event was caused by personnel error. On 9/13/1998, technicians had been performing procedure 57GM-MEL-003-0S, "Rod Block Bypasses, Selective RPIS and Total System." This procedure provides instructions for installing and removing jumpers to defeat the full-in position indication input to the one-rod-out interlock logic system. When the plant is in the refuel condition, RMCS normally permits only one control rod to be withdrawn at a time. When any one control rod is not fully inserted into the core, RMCS senses this condition and generates a rod withdraw block which prevents any other rod from being withdrawn.

Thirty-two control rods were removed for routine maintenance during the ongoing refueling outage. To remove a CRD, fuel must be removed from the cell associated with the control rod to be removed, and the withdraw block associated with that control rod must be defeated by means of installing a jumper. With the rod withdraw block defeated for each rod, it can be withdrawn and removed without preventing other rods from being removed simultaneously. Each jumper is attached by soldering it onto a circuit card in the RPIS, and the altered card is then inserted into a card "file." These actions were performed on 9/13/1998.

After the CRDs were re-installed, the jumpers should have been removed from the circuits on 9/25/1998 prior to loading fuel in the empty cells. The procedure requires that jumpers be removed and verified prior to the re-installation of the cards. Technicians unplugged groups of circuit cards simultaneously, removed the jumpers, signed off the procedure steps, and then reinstalled the cards in the file. In so doing, a circuit card was overlooked, and the jumper was not removed, even though the procedure step had been signed and verified. Upon completing the evolution, technicians attempted to perform an additional check that all the jumpers were removed by confirming that no jumper tags had been left on any of the circuit cards. In this case, however, the tag was turned so that it was very difficult to see between the circuit cards. Hence, it was missed. The effect of the jumper was to simulate a full-in signal for the affected control rod regardless of its actual position. Hence, if this control rod were withdrawn, the RMCS would not initiate a rod withdraw block as expected, and this would permit another control rod to be withdrawn.

Between 9/25/1998 when the jumper was left in place and 10/5/1998 when CRD timing tests were initiated as described above, no control rods were moved except to verify the operability of the one-rod-out interlock per Unit 2 TS surveillance requirement 3.9.2.2. In those instances, rods were withdrawn only one notch and then re-inserted per procedure. Rod 38-15 was never selected because it is not a peripheral rod, and the procedure requires the test to be performed only on a peripheral rod. The event was discovered when licensed personnel performed the timing surveillance to measure the insert and withdraw times of the control rods.

One of the steps in this surveillance procedure requires that the full-in indication be checked for each withdrawn control rod per Technical Specifications Surveillance Requirement 3.9.4.1. This was performed for each rod stroked during the timing test. When rod 38-15 was stroked, the full-in indication light did not extinguish as expected.

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REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This event must be reported per 10 CFR 50.73(a)(2)(i) because the plant entered a condition which was prohibited by the Technical Specifications (TS). Namely, control rods were withdrawn while the one-rod-out interlock was defeated for at least one rod. This is contrary to the provisions of TS 3.0.4 which forbids entry into a condition of applicability unless the associated required action statements allow unlimited completion time. Unit 2 TS 3.9.2, required actions A.1 and A.2, and TS 3.9.4, required actions A.1.1, A.1.2, and A.1.3, have a completion time of "immediately." Therefore, it constituted a condition prohibited by the Technical Specifications to load fuel or withdraw a control rod with an inoperable rod withdraw block.

This event must be reported per 10 CFR 50.73(a)(2)(v) because a single condition occurred which potentially could have prevented the fulfillment of the safety function of a system needed to maintain the plant in a shutdown condition. The design function of the refuel position one-rod-out interlock is to prevent more than one control rod from being withdrawn at the same time. With the jumper in place, it was physically possible to withdraw a control rod with rod 38-15 also withdrawn.

There are multiple controls applied to reactivity, some of which are physical and others which are administrative. In this event, only one physical barrier existed to prevent simultaneous withdrawal of more than one rod, and this was the refuel position one-rod-out interlock. The other barriers were the procedure in use at the time as well as the training of the licensed personnel. The procedure in use at the time was 34SV-C11-004-2S, "CRD Timing." The work flow of this procedure requires that each control rod be fully withdrawn and then fully reinserted. The purpose of this procedure is to measure the time required to fully stroke each CRD in each direction. Hence, the job in progress would have prevented an operator from fully withdrawing a second control rod after withdrawing rod 38-15. Furthermore, licensed personnel are aware of the potential consequences of having two control rods withdrawn simultaneously and thus simply would not have done so. In addition, control rod manipulations of this kind are overseen by a second, licensed operator, providing assurance that no control manipulation could result in two control rods being withdrawn simultaneously while in this plant condition. It should be noted that the administrative controls for control rod manipulation were followed and successfully identified this event.

Based on the training of licensed operators, the work flow of the procedure in use at the time, the normal administrative controls which apply to control rod movement, and the presence of a second, licensed operator during control rod movement, it is considered incredible that operators would have withdrawn two control rods at a time in the existing plant condition.

However, for the purpose of this analysis, the worst-case event has been evaluated, namely, with rod 38-15 fully withdrawn along with the highest worth adjacent rod. In such an extremely improbable case, the worst possible resultant criticality would be self-limiting due to the combination of the fuel temperature and moderator temperature coefficients. Evaluations performed by the Company's fuels group with

confirmation by General Electric showed that the resulting increase in radiological dose on the refueling floor was essentially zero owing to the fact that the reactor cavity was flooded at the time and the water above the core provides significant shielding.

There is somewhat less shielding between the core and the accessible areas inside the drywell. Thus, it is expected that the radiation field inside the drywell would be slightly above the normal dose resulting from spent fuel decay alone. To address this, personnel from the Health Physics department researched plant history to characterize the fields that exist in the drywell when the reactor is at low power. This research has shown that dose rates in the drywell do increase when the reactor is operating at a power level comparable to the power level expected from a worst case criticality in this event, which would be a power level of less than 1.0 percent of rated thermal power. However, these elevated dose rates occur only at certain, specific locations. Dose calculations have been performed assuming the worst-case equilibrium conditions that could result from the worst possible rod withdrawal error, and these show that the potential for significant overexposure is not credible. An analysis of the potential dose rates resulting from the transient conditions will be performed. This analysis is expected to show that no significant increase in exposure would have occurred for persons working inside the drywell. Should the analysis show otherwise, this Licensee Event Report will be revised.

Based on this analysis, it is concluded that this event had no adverse impact on nuclear safety. No credible potential for overexposure of personnel in the drywell or on the refueling floor existed at any time during this event. The analysis of potential reactivity effects and resulting radiation dose levels applies to the core and plant conditions which existed at the time of the event. Other portions of the analysis involving administrative controls and operator training apply to all operating conditions.

CORRECTIVE ACTIONS

The jumper was removed from the RPIS circuit card for rod 38-15.

After the removal the jumper, Operations personnel tested every CRD in the Unit 2 core to ensure the full-in indications and rod blocks were working properly. All were found to be working correctly.

The involved technicians have been coached regarding their error.

The involved technicians have briefed other surveillance technicians on the event and its causes and consequences, including a discussion of independent verification.

Technicians are developing an improved method for performing the RPIS rod block bypass activity. The improved method will be used during the next refueling outage, currently scheduled for Spring, 1999.

A functional test will be developed to confirm operability of the RPIS rod block following jumper installation and removal. This functional test will be used during the next refueling outage, currently scheduled for Spring, 1999.

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In addition, management and supervisory practices used within the maintenance organization are being reviewed to prevent recurrence.

ADDITIONAL INFORMATION

1. Other Systems Affected: No systems were affected by this event other than those which have already been mentioned in this report.

2. Failed Components Information: No failed components either contributed to or resulted from this event.

3. Commitments Information: This report does not create any permanent licensing commitments.

4. Previous Similar Events: One event has been reported in the past two years involving the use of jumpers or lifted leads. This event is described in Licensee Event Report 50-366/1997-002, dated 04/22/1997. In this event, a jumper was inadvertently grounded by an electrician while working in an electrical panel. This resulted in a blown fuse and subsequent actuations of engineered safety features. The corrective actions for this event included counseling involved personnel and clarifying management policy on the use of temporary jumpers. These actions would not have prevented this event because the jumper was left soldered to a circuit card as a result of personnel failing to follow procedure and then overlooking its presence during a post-evolution check.