Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

August 17, 1994
3F0894-10

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

Subject: Licensee Event Report (LER) 94-004-00

Dear Sir:

Attached is Licensee Event Report (LER) 94-004-00 which is submitted in accordance with 10 CFR 50.73.

Sincerely,

Gary Boldt

G. L. Boldt
Vice President
Nuclear Production

GLB/JAF:ab

Attachment

xc: Regional Administrator, Region II
Project Manager, NRR
Senior Resident Inspector

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NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Crystal River Unit 3 (CR-3)	0 5 0 0 0 3 0 2	1 OF 0 6

TITLE (4) Failure to Revise Procedure Causes Non-Conservative Setpoint Adjustment Resulting in Degraded Operation of ATWS-AMSAC System

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
0 7	0 1	9 4	9 4	- 0 0 4	- 0 0	0 8	1 7	9 4		0 5 0 0 0

OPERATING MODE (9)	1	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)	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)	X 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
	AREA CODE
K. R. Wilson, Nuclear Licensing Manager	9 0 4 5 6 3 - 4 5 4 9

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 fifteen single-space typewritten lines) (16)

On July 1, 1994, Crystal River Unit-3 was at 100% power, preparing to reduce reactor power to perform maintenance. Instrument and Control technicians had recently performed an ATWS-AMSAC (Anticipated Transient Without Scram-Mitigation System Actuation Circuitry) surveillance. The procedure they used was not revised after the installation of a modification, and setpoints were nonconservatively adjusted.

As power descent was progressing, operators noticed the ATWS "TURB AMSAC LOW FLUX BYPASS" annunciator began to alarm every few seconds. The plant was at approximately 89% reactor power. Plant operators realized the trip capability of ATWS-AMSAC was bypassed; plant conditions were substantially above the ATWS-AMSAC arming setpoint of 45% reactor power; and the discrepancies were probably caused by the recently completed surveillance. On July 5, 1994, the plant was returned to greater than 89% reactor power, arming ATWS-AMSAC.

On July 7, 1994, the appropriate ATWS-AMSAC setpoints were reset to correct values and a revised procedure performed to assure proper operation of all system modules. The cause of this event was personnel error in failing to assure revision of a procedure following a modification, compounded by further technical problems. This event did not compromise the health and safety of the general public. This report is submitted in accordance with 10CFR50.73(a)(2)(ii)(B)

EVENT DESCRIPTION:

On July 22, 1994, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE 1 (POWER OPERATION), operating at 100% reactor power and generating 866 megawatts. FPC Licensing personnel determined that between July 1, 1994 and July 5, 1994, CR-3 had inadvertently operated outside its design basis in that certain Anticipated Transient Without Scram-Mitigation System Actuation Circuitry (ATWS-AMSAC)[IO] setpoints were non-conservative. This report is submitted in accordance with 10CFR50.73(a)(2)(ii)(B).

The ATWS-AMSAC system is designed to trip the main steam turbine [TA] on loss of feedwater and to actuate Emergency Feedwater (EFW) through the Emergency Feedwater Initiation and Control System (EFIC)[JB] when both startup and main feedwater flows are less than 17% and reactor power is greater than a preset value.

The neutron flux module (reactor power) [IG] setpoints provide a "permissive" signal for EFIC initiation and turbine trip. A modification installed during the recent refueling outage raised the ATWS-AMSAC arming setpoints from 25% reactor power to 45%. As part of the modification, the signal source was also changed to a more accurate signal source.

During the design and planning of this modification two of the surveillance procedures which would be effected by this change were inadvertently omitted from the procedure revision process by FPC engineering personnel. One of the procedures was eventually identified and revised. The other procedure was not revised and, thus, did not reflect the modified system.

On July 1, 1994, CR-3 was operating at 100% power and operators were preparing to reduce reactor power to replace a condensate pump motor [SD,P] and coupling [SD,CPLG]. Instrument and Control (I&C) technicians were performing an ATWS-AMSAC surveillance, using the procedure which had not been revised to reflect the new neutron flux voltage signal used to input reactor power. Since the "as-found" voltage setpoint of the bistable module was so much lower (post-modification value) than expected and listed in the procedure (pre-modification value), the I&C technicians erroneously concluded that the bistable module setpoint potentiometer [IMOD,RHE] was a part of the test circuit used to simulate voltages to test system functionality. Failing to question the anomalous system behavior, the I&C technicians proceeded with system adjustments until the "as-left" system status cleared the alarm at the power level of the plant at that time (100%).

At 1450, as the power descent was progressing, the operators noticed that the ATWS-AMSAC "TURB AMSAC LOW FLUX BYPASS" annunciator [IB] began to alarm every two or three seconds. At that time, the plant was at approximately 89% reactor power. It was recognized by operations personnel that ATWS-AMSAC surveillance testing had recently been performed, and they correctly concluded that there were discrepancies

with the ATWS-AMSAC "arming" setpoint which were probably caused by the recently completed surveillance. They further realized that the trip capability of ATWS-AMSAC was "unarmed" (bypassed) and that the plant conditions were substantially above the "arming" setpoint of 45% reactor power. Due to steady state fluctuations in reactor power, the alarm was continuously coming in and rapidly clearing.

Since the alarm was becoming a nuisance and operator distraction, at 1454, the operators opened the annunciator link silencing the alarm, but failed to initiate a work request, as required by procedure. They incorrectly assumed that the I&C technicians would restore the system to operable status with the correct setpoints using the surveillance procedure. The I&C technicians thought that operations personnel would initiate a work request. Control room operators continued to maintain an awareness of the discrepancies although there was no visible alarm. The situation was discussed at several shift turnover sessions, and Technical Specifications were reviewed in an effort to determine ATWS-AMSAC operability requirements and time frames for system restoration.

On July 4, 1994, an operator was reviewing the annunciator/link log, which is normal weekend policy. It was noted that the "TURB AMSAC LOW FLUX BYPASS" alarm link was open as a nuisance alarm with no associated work request. The operator realized that it should not be in alarm and closed the link. The alarm came in even though the reactor power level was 70%. Realizing that the system was malfunctioning and not simply a nuisance alarm, he immediately wrote a work request to restore ATWS-AMSAC to normal conditions.

On July 5, 1994 while returning to full power, operators noticed that the "TURB AMSAC LOW FLUX BYPASS" alarm did not clear until the plant reached approximately 89% power. Power ascension to 100% reactor power continued with the alarm "clear". With reactor power greater than 89%, the ATWS-AMSAC system was fully armed and capable of all trip initiation functions.

On July 7-8, 1994, the appropriate ATWS-AMSAC setpoints were restored to new values developed by the modification. The revised surveillance procedure was also performed to assure proper operation of all associated modules.

EVENT EVALUATION

The purpose of the ATWS-AMSAC system is to provide a diverse means to initiate emergency feedwater through EFIC and trip the main turbine on a loss of main feedwater, at reactor power levels greater than 45% and feedwater flows less than 17%. ATWS-AMSAC is a two channel system with a two-out-of-two trip logic. Both channels must trip in order to actuate EFW. The trip logic is established by the method in which the ATWS-AMSAC system output signals are combined within EFIC. The two-out-of-two coincidence logic is satisfied in that if only one channel of ATWS-AMSAC trips the result will be a half-trip of EFIC.

The ATWS-AMSAC setpoints were correct between the turnover of the modification following startup from Refuel 9 and performance of the ATWS-AMSAC surveillance on July 1, 1994. During this period, ATWS-AMSAC was armed to initiate EFIC and trip the main turbine if reactor power was greater than 45% and feedwater flow was reduced to less than 17%.

A review of the as-found values of the neutron flux module setpoints on the July 5, 1994, work request was conducted. The review revealed that the setpoints had been incorrectly adjusted during the surveillance procedure performed on July 1, 1994. During the period between July 1, 1994 at 1330 and July 5, 1994 at 0927 Channel "A" of ATWS-AMSAC was set to arm for EFIC actuation and turbine trip at power levels greater than 89%. During the same period channel "B" of ATWS-AMSAC was set to arm at 19% power. During this period, the plant was in its least protected position relative to ATWS-AMSAC. If a loss of feedwater flow had occurred during the period that reactor power was less than 89%, ATWS-AMSAC channel "B" (permissive for EFIC channel D) would have tripped EFIC cabinet D, establishing a single EFIC channel trip (half trip) and tripped one of the two channels required for a turbine trip (turbine half trip). Thus, loss of main feedwater would have resulted in no ATWS-AMSAC response. However, in this hypothetical worst case scenario, a reactor trip would have been effected by one of the following means: the Reactor Protection system would provide an anticipatory trip on loss of two out of two main feedwater pumps or an auto trip at high reactor coolant system pressure; the independent Diverse Scram System would trip the reactor on high pressure and an operator intervention trip by operation of the manual reactor trip pushbutton. A main turbine trip occurs automatically on a reactor trip, and can also be accomplished manually from the control board, or locally at the main turbine. Immediate actions of the appropriate Emergency Operating Procedures (EOP) require manual depression of the reactor trip and turbine trip pushbuttons following an auto reactor trip signal.

During the period between July 5, 1994 and July 7, 1994, when the reactor power level was greater than the channel "A" arming setpoint of 89%, ATWS-AMSAC would have functioned as designed, on loss of feedwater, although the setpoints were nonconservatively adjusted.

EFIC was fully operable during the entire period, and would have properly actuated on an initiation signal. The Final Safety Analysis Report (FSAR) for CR-3 takes no credit for ATWS-AMSAC in the evaluation of loss of main feedwater accidents and thus the Technical Specifications do not establish any operability requirements for ATWS-AMSAC. This event did not compromise the health and safety of the general public.

CAUSE

The root cause of this event was personnel error on the part of FPC Systems Engineering personnel for failure to properly identify all procedures requiring revision coincident with the installation of a plant modification.

A contributing cause of this event was personnel error on the part of FPC I&C technicians for the failure to question inconsistencies and unexpected results of procedure steps.

The cause of the delay in writing the work request was personnel error on the part of FPC Operations personnel for failure to follow procedure is attributed to the fact that Operations personnel assumed that the I&C technicians would complete system restoration using the surveillance procedure, while the I&C technicians awaited a work request.

CORRECTIVE ACTION

Corrective actions for this event include the following:

1. Setpoints for ATWS-AMSAC arming were reset and a complete surveillance performed to assure proper operation of all modules.

2. A standardized MAR (Modification Approval Record) and FCN (Field Change Notice) review program will be included in the Systems Engineering Manual. An evaluation will be performed on the use of computer based aids in the performance of the MAR/FCN review program.

3. A review and evaluation will be performed by Quality Programs personnel to determine the process each department uses when reviewing MAR/FCN impact on procedures for which they are responsible.

4. Retraining will be provided for the I&C technicians involved in this event. This training may consist of formal I&C course work at the FPC Nuclear Training Center, or informal training conducted by experienced plant personnel.

5. The procedure addressing the Annunciator/Event Point Alarm Defeat Log will be reviewed to determine if clarification of the actions to be initiated with each log entry is required.

5. Human Performance Evaluation System (HPES) studies will be conducted as appropriate to determine if additional corrective actions are required.

6. Additional guidance will be provided to operations personnel addressing ATWS-AMSAC operability.

PREVIOUS SIMILAR EVENTS

There have been no previous reportable events involving the ATWS-AMSAC system.