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

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station Unit 1 and Unit 2	05000413	1 of 7

TITLE (4)
Inoperable Refueling Water Storage Tank Level Channels results in Operation Outside of the Design Basis

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)
02	15	1999	1999	- 001	- 00	03	17	1999	Catawba Unit 2	05000414

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)	100	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)	x 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)	50.73(a)(2)(iv)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		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)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	AREA CODE	
M.S. Purser, Regulatory Compliance Specialist	(803)	831-4015

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	
				N/A							

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 February 15, 1999, at approximately 0850, during the implementation of a Unit 1 modification of the Refueling Water Storage Tank (FWST) instrumentation, the Unit 1 FWST Channel 3 level transmitter was not placed in the bypass position as required by Technical Specifications. Instead, the channel was in a tripped condition. The oncoming Operations crew questioned the Control Room annunciator and status light indication and the error was noted. The channel was put in bypass at 2147 (approximately 13 hours later). The unit remained at 100 percent power during the event. A review of previous work orders related to this modification identified 2 additional instances where a FWST channel was not placed in bypass as required by Technical Specifications.

Inadequate Program design was determined to be the root cause for each incident, leading to vagueness in procedures and the design process; with a contributing cause of inadequate communications between Operations, Engineering and Maintenance groups. Corrective actions include procedure reviews and communication improvements between groups.

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Background

On February 15, 1999, during the performance of a Unit 1 modification to minimize lightning vulnerability to the Refueling Water Storage Tank [EIIS: TK](FWST) level transmitters [EIIS: LIT], it was noted that Unit 1 FWST Channel 3 was in the trip condition instead of bypass, and had exceeded the allowable conditions in Technical Specifications (TS) 3.3.2. Subsequent review determined that the channel had been inoperable greater than 12 hours. The channel was immediately placed in bypass upon discovery. This is a condition prohibited by the plant's Technical Specifications (TS) and outside the design basis, and is being reported pursuant to 10 CFR 50.73 (a)(2)(ii). A review of other channels affected by the Unit 1 modification indicated that FWST Channel 2 was also in trip instead of bypass on December 14, 1998 for greater that 12 hours. A review of the corresponding Unit 2 modification indicated that Unit 2 FWST Channel 1 was in trip instead of bypass on December 1, 1998 for greater than 12 hours. These additional instances will be included in this LER as similar events.

Catawba Nuclear Station, Units 1 and 2 are four loop Westinghouse pressurized water reactors. FWST level measurement is used by the Emergency Core Cooling System (ECCS) to initiate automatic swapover from ECCS injection to ECCS re-circulation modes. There are four independent channels of safety-related level measurement. The FWST level signals are processed by the 7300 Process Control System (PCS) cabinets I through IV. FWST level indication is used by the plant operators to determine when to manually swap over Containment Spray pump suction from the FWST to the Containment Recirculation Sump. Safety-related indicators for display of each channel of level measurement are located in the Control Room. Non-safety related annunciator alarms are provided to alert the operator of a 2/4 low level, which is coincident with automatic swapover of the Residual Heat Removal (ND) pump suction. The low-level alarm also alerts the operator to initiate the manual actions required to swapover to cold leg recirculation.

Catawba Technical Specifications Engineering Safeguard Feature Actuation System Instrumentation Table 3.3.2-1, Functional unit 7.b., requires a total of 4 channels of FWST level instrumentation to be operable. Condition N specifies:

"One channel inoperable.

Place channel in bypass within 6 hours.

OR

Be in Mode 3 in 12 hours. AND, Be in Mode 5 in 42 hours."

Channel 3 was inoperable and in the trip condition for greater than 12 hours. Having the channel in trip changes the coincident logic to one out of three of the remaining operable channels. Therefore, a spurious failure of one additional channel in conjunction with a Safety Injection Signal could swap the ECCS pumps to the containment sump before an adequate amount of water is available for pump suction.

Event Description

June 23, 1998
A Problem Investigation Process (PIP) item was written to document that Unit 1 FWST level channel 1 was indicating ~85 percent with all other channels indicating ~97 percent. The difference was due to lightning strike effects on June 22, 1998. This was the second time the instrument had been affected by lightning strikes. Modifications had been approved earlier in the year to replace the FWST level transmitters. The decision was made to initiate a corrective minor modification to handle the immediate issue for Channel 1. A minor modification (MM) CNCE-9668 was generated to replace the channel 1 transmitter. FWST Channel 1 was placed in bypass and properly returned to service after the modification.

July 31, 1998
Unit 1 FWST Channel 4 transmitter was replaced per MM CNCE-9668. Channel 4 was placed in bypass. The I&E Tech recognized the need to put the channel in bypass and performed the appropriate steps.

October 23, 1998
A minor modification, CNCE-61391, was written to replace the unit 2 FWST level transmitters.

December 1, 1998
Unit 2 FWST Channel 1 transmitter was replaced per MM CNCE-61391. Channel 1 was in a trip condition instead of bypass for greater than 12 hours.

December 14, 1998

Unit 1 FWST Channel 2 transmitter was replaced per MM CNCE-9668. Channel 2 was in a trip condition instead of bypass for greater than 12 hours.

February 15, 1999
Approximately 0850 hours - Unit 1 FWST channel 3 was declared inoperable and logged into the Technical Specification Action Item Log (TSAIL) to perform a modification, MM CNCE-9668. There was no detailed discussion between the I&E Tech and the WCC SRO at this time. The I&E Tech called the System Engineer from the WCC to question whether the channel should be in bypass since the procedure steps would lead to a tripped condition. He was told that pulling the logic card was all that was necessary. The I&E Tech informed the Control Room (CR) SRO that the work was starting but did not discuss the TS implications. Operations incorrectly assumed that the Engineering modification review and the I&E Tech experience would assure the work complied with TS.

Approximately 0920 hours - The channel was placed in the trip condition not in the bypass position as required by TS. The unit was at 100% power and in Mode 1 during the event.

Approximately 1200 hours - the WCC SRO called the I&E Tech in the field to determine the time the FWST Channel was placed in bypass. The I&E Tech understood the WCC SRO to ask what time the channel was made inoperable and replied about 0920 hours.

Approximately 2030 hours - the oncoming operations crew questioned the status light indication in the control room for Unit 1 FWST Channel 3 that was supposed to be in bypass.

Approximately 2145 hours - A Maintenance Single Point of Contact (SPOC) crew was dispatched to verify the Unit 1 FWST Channel 3 status in Protection Cabinet 3. It was determined the channel was in a trip condition versus bypass.

Approximately 2147 hours - Unit 1 FWST Channel 3 was placed in the bypass position per TS 3.3.2 condition N. A 1-hour Emergency Notification System report was made under 10CFR50.72(b)(1)(ii).

Conclusion

A formal root cause analysis was conducted for this event. The Root Cause Failure Analysis Report concluded that the root cause of this event was

inadequate program design leading to vagueness in procedures and design process. This root cause is bounding for all three incidences. The Modification Manual is not as clear as it should be with regards to having engineering ensure that all steps of implementing a modification are reviewed for TS requirements. The procedures for working on the FWST level channels do not specifically caution the user about the TS implications and the need to place the channels in bypass to satisfy TS action items. The wording needs to be stronger and specifically note the impact to the TS. The work to be performed was similar to Analog Channel Operational Tests (ACOT)s which are performed successfully on a regular basis. The assumption was that the same procedures would successfully implement the transmitter change-out. Therefore, no one involved felt the need for additional discussion or caution.

A contributing cause was a lack of effective communication between Operations, Engineering and the I&E Tech. The work order was brought into the WCC, signed on and placed in TSAIL without a detailed discussion between the WCC SRO and the I&E Tech. The I&E Tech called the System Engineer from the WCC and asked if the channel should be in bypass instead of trip. He was told that pulling the logic card was all that was necessary. The I&E Tech then discussed the job with the CR SRO but there was no discussion concerning TS. The WCC SRO called the I&E Tech around 1200 hours to get a time for placing the channel in bypass. The I&E Tech understood him to ask when the channel was taken out of service. The discussions were ineffective based on the differences in what they thought was said. Another factor was that the SROs assumed that since the work was a modification, the engineering review would follow the guidelines used in more routine procedures and the I&E Techs would be familiar with the TS requirements based on their experience. Each group assumed that routine processes would take care of the details needed to successfully complete the work.

There has been one similar occurrence for inadequate program design leading to operation outside of TS. This event was reported in LER 414/98-007. Corrective actions in LER 414/98-007 would not have prevented this event.

There are no EPIX reportable equipment failures associated with this report.

Corrective Actions

Immediate

1. Unit 1 FWST Channel 3 was placed in bypass.
2. The work orders for the 3 remaining Unit 2 FWST level transmitters, modification CNCE-61391, were revised to ensure TS requirements were addressed.

Subsequent

1. Engineering has been informed that TS requirements must be included in the modification implementation plan.
2. The existing expectation that any work received in the Work Control Center requiring TS Actions be reviewed with the craft to ensure the TS action will be satisfied has been reinforced with Operations.

Planned

1. The Modification Manual will be revised to specifically address the need to ensure TS requirements are included in the modification implementation plans and clearly communicated to OPS. Training will be provided on the revised documents.
2. Implementation procedures will be reviewed for "FWST Level"(IP/1((2)/A/3222/001/A,B,C,D) for both units to see if it is appropriate to add wording or steps explaining the need to take these channels to bypass within the 6 hour action statement from when the channel was taken out of service and clearly address TS requirements.
3. Implementation procedures will be reviewed for "Containment Pressure Loop"(IP/1(2)/A/3222/047A,B,C,D) for both units to see if it is appropriate to add wording or steps explaining the need to take these channels to bypass within the 6 hour action statement from when the channel was taken out of service and clearly address TS requirements.
4. Operations will reinforce expectations for communication standards between SRO and workers when signing on tasks that will make TS equipment inoperable.
5. All modifications waiting implementation will be reviewed to insure any TS requirements have been addressed.

Safety Analysis

The FWST level channels, together with the Safety Injection (SI) signal, initiate the automatic switchover of the ECCS pumps from the FWST to the containment sump when the FWST inventory is depleted. With one of the channels in trip, the level sensing logic is configured in a one-out-of-

three arrangement, but remains able to perform its safety function. However, if a spurious failure were to occur on one of the remaining three transmitters (with an estimated failure probability of 3 x 4.6E-7/hr) while a SI signal is present, the ECCS pumps could fail if the switchover occurs before an adequate supply of water has been transferred to the containment sump.

Two PRA scenarios that involve a SI signal are a LOCA (3.8E-7/hr) and a spurious SI signal (9.3E-6/hr). However, for a spurious SI signal to lead to core damage, additional equipment failures must occur (e.g., failure of secondary side heat removal). Considering the LOCA and spurious SI signal frequencies, the estimated failure rate of the FWST level transmitters, and the amount of time that FWST Level Channel 3 was in trip, the estimated impact on core damage frequency associated with this event is well below the accident sequence precursor threshold of 1E-6/yr. This analysis is also valid for the two additional incidents discussed in this LER.

Additional Information

During the time period covered in this Licensee Event Report, Catawba Unit 1 was operating in Mode 1, Power Operation, at approximately 100 percent rated thermal power.