NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 3	1 OF 0 5

TITLE (4)
Nuclear Instrumentation System Power Range Reactor Trip

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 6	1 6	8 5	8 5	—	0 4 2	—	0 0	0 7	1 6	8 5		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
	1	20.402(b)		20.405(c)	X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0 5 0	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)	X 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)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)	50.72(b)(2)(ii)
		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
Roger W. Ouellette, Associate Engineer - Licensing	7 0 4 — 3 7 3 1 - 7 5 3 0

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 June 16, 1985, at 1616:18:969 hours, a Nuclear Instrumentation System High Flux Rate Power Range Reactor Trip occurred. While calibrating an NIS channel after placing it in a tripped condition, at least one other channel tripped. The unexpected tripping of the other channel(s), satisfying the 2-out-of-4 logic, resulted in a Reactor Trip. The cause of the trip of the other channel(s) could not be determined. Unit 1 was in Mode 1 at 50% Reactor Power at the time of the incident. To recover from the incident, the power range channels were reset, and Reactor start-up commenced after other equipment affected by the Reactor Trip was placed in normal alignment.

This incident is reportable pursuant to 10 CFR 50.73, Section (a)(2)(iv), and 10 CFR 50.72, Section (b)(2)(ii).

IE 22
1/1

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 3	8 5	— 0 4 2	— 0 0	0 2 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

The Nuclear Instrumentation System (NIS) Power Range Circuits consist of four independently operating channels designated as Power Range Channels N-41 through N-44. These circuits trip the reactor when a sudden abnormal increase or decrease of 2.5% in nuclear power for two seconds occurs as detected by 2-out-of-4 power range channels. The high positive neutron flux rate trip is available for rod ejection accidents. The high negative neutron flux rate trip provides protection against two or more dropped rods.

Technical Specification Table 4.3-1 Note 2 requires a comparison of calorimetric to excore power indication above 15% of Rated Thermal Power. If the absolute difference is greater than 2%, adjustment of excore channel gains consistent with calorimetric power must be made. This adjustment is performed per procedure IP/0/A/3240/11 (Excore NIS Power Range Calibration at Power). For the channel to be calibrated, the procedure requires that control functions be bypassed and protective functions be tripped after verifying the absence of alarms on other NIS power range channels. The control functions are bypassed by manipulating the appropriate controls. Protective functions for Steam Generator Low-Low Level and OTDT (Overtemperature/Change In Temperature) are manually tripped in the 7300 Process Cabinets. Protective functions for High Flux Rate and High Flux Hi/Low setpoints are tripped by removing the channel's control power fuses. The removal of these fuses will simulate the tripped condition on the channel that is being calibrated. Nuclear thermal power is determined from the Operator Aid Computer, and then test voltages are determined. The channel is adjusted via the GAIN ADJUST knob to obtain the test voltage. The channel is returned to service when the channel reading agrees with thermal power measurement.

On June 16, 1985, Reactor Power was being increased per procedure OP/1/A/6100/03 (Controlling Procedure for Unit Operation). At 1430 hours, power escalation was secured at 50% to allow adjustment of the NIS power range circuits since they were not with ± 2% of thermal power. From 1540 to 1555 hours, and from 1556 to 1613 hours, NIS power range channels N-41 and N-42 were calibrated. The calibration of channel N-43 was begun at 1613 hours. The control power fuse of channel N-43 was pulled, giving a tripped signal on that channel. However, at 1616:18:969 hours, a NIS High Flux Rate Power Range Reactor Trip Signal was generated, caused by the tripping of at least one other channel while channel N-43 was tripped. The Reactor subsequently tripped. The Reactor Trip thus caused a trip of the Main Turbine, the Generator Breakers, and the Main Feedwater Pumps (CFPT). Feedwater Isolation also occurred, and the Motor Driven Auxiliary Feedwater (CA) Pumps auto-started.

Operators responded to the incident by entering the following procedures: EP/1/A/5000/01 (Reactor Trip or Safety Injection), EP/1/A/5000/1A (Reactor Trip Response), and AP/1/A/5500/02 (Turbine-Generator Trip). The Unit was brought to stable conditions without manual intervention by the NCO's.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 3	8 5	— 0 4 2	— 0 0	0 3 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

To recover from the incident, all NIS power range channels were reset at 1621:50:831 hours. Feedwater isolation was reset. CFPT 1B was reset and returned to service. CA Pumps 1A and 1B were secured. Reactor start-up commenced at 2100 hours, and the Unit reached Mode 1 at 0257 hours on June 17, 1985.

The cause of this incident is unknown. Prior to tripping channel N-43, it was verified that no other channels were tripped via the absence of NIS alarms on the Main Control boards and the NIS console. The annunciators were tested after the incident to verify that no bulbs for the NIS alarms were burned out. All lights functioned properly. Therefore, the signal originated while channel N-43 was tripped.

The other channel(s) that tripped could not be determined because the Sequence of Events recorder only monitors the Reactor Trip, not the trip inputs. However, the trip that occurred was determined to be on a negative flux rate signal. On a Reactor Trip, the control rods fall into the core, initiating a negative rate trip on each channel. Immediately after the trip, all four channels indicated a negative rate trip. No positive rate bistables, with the exception of N-43, were tripped when control room personnel reset the channels. There were no indications that two or more dropped control rods caused the negative rate trip. From the alarm typer printout, control rods were detected out of position only after the Reactor Trip signal occurred.

The other channel that possibly could have caused the trip was N-44. Noise had been previously detected on channel N-44, thus making calibration difficult. A Temporary Modification was installed to filter the noise. The noise is induced by a ground between the detector and the detector well. Four to six hours prior to the Reactor Trip, the NCO reported seeing the "Loss of Detector Voltage" alarm on the NIS console flickering, which had been a characteristic of excessive noise on the channel. If a sufficient amount of noise existed, some of the noise could have gone unfiltered by the Temporary Modification and could have tripped channel N-44's negative rate bistable at the same time channel N-43 was tripped. The negative rate circuit is more susceptible to noise than the positive rate circuit. The detector cable will be replaced during the first refueling outage. To help minimize the effects of the problem prior to the outage, the low detector voltage setpoint was lowered from 700 to 400 VDC. Per the Westinghouse NIS instruction manual, the voltage can be set anywhere between 300 and 1500 VDC.

As a result of the Reactor Trip, other items requiring corrective action were identified. The decision to trip the protective functions of the NIS channels was made due to Technical Specification Table 3.3-1 Action 2, which required a channel to be tripped within one hour if it was inoperable. However, from experience, the channel adjustment can be made in less than one hour. Therefore, the tripping of the channel was removed from procedure IP/0/A/3240/11 so that a spurious signal on one channel would not cause a Reactor Trip while the channel to be adjusted was tripped.

Another problem identified was that it was not possible to determine which channel(s) gave the Reactor Trip. The Sequence of Events Recorder monitors only the Reactor Trip, and not the trip inputs. To remedy this problem, a Station Problem Report was initiated on June 25, 1985, to provide bistable indications to the Sequence of Events Recorder for all channels which input into the Reactor Protection System/Solid State Protection System trip functions. When this is completed, the channels causing the trips can be identified, and thus the recurrence of inadvertent trips can be minimized.

During this Reactor Trip, no post trip data was saved by the Operator Aid Computer Transient Monitor. The monitor will automatically freeze on Reactor Trips, Turbine Trips, Generator Breaker Trips, Main Feedwater Pump Trips, Pressurizer or Steam Generator Power Operated Relief Valve Openings, or a Load Rejection Valve opening. On June 15, 1985, the Main Turbine and Main Feedwater Pumps were trip tested per procedure.

However, no one reset the Transient Monitor. Therefore, on the day the trip occurred, no trip data was saved. Also, the proper response of the Safety Parameter Display System could not be verified as a result of the Transient Monitor data not being saved. To help prevent recurrence of this problem, a program change request has been submitted to allow Area 2 Transient Monitor to freeze only on a Reactor Trip or Turbine Trip. Operations Document Development added computer points D4492 and D4493 to the Computer Response Manual. This will reinforce the need to immediately notify the appropriate personnel when those alarms are received.

Per Technical Specification Table 4.3-1, Note 2, Power Range Instrumentation Neutron Flux High Setpoint is required to have a comparison with excore power indication above 15% RATED THERMAL POWER. This adjustment is required if the absolute difference is greater than 2%. To prevent having to perform procedure IP/0/A/3240/11 several times during power ascension, a Technical Specification Interpretation will be issued so that if the Power Range NIS is reading conservatively high, power ascension will not have to cease to adjust the Power Range NIS to within 2% of excore power indication. This adjustment can take place when Unit steady state conditions are established.

CORRECTIVE ACTION

1. NIS power range channels were reset.
2. Systems affected by the Reactor Trip were returned to normal alignment.
3. Unit 1 Reactor was returned to Mode 1 per OP/1/A/6100/05 (Unit Fast Recovery).
4. A procedure change was made to IP/0/A/3240/11 to allow channel calibration without first tripping the channel.
5. All NIS power range channels were recalibrated.
6. A Station Problem Report was initiated so that all Reactor Trip inputs will receive an indication on the Sequence of Events Recorder.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 3	8 5	— 0 4 2	— 0 0	0 5 OF 0 5

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

7. A change request to the Transient Monitor Area 2 program was originated. This will prevent a freeze except on Reactor and Turbine Trips.
8. Computer points D4492 and D4493 were added to Operations Computer Response Manual.
9. The detector cable for power range NIS channel N-44 is to be replaced during the first refueling outage.

SAFETY ANALYSIS

After the Reactor Trip, the Unit responded as designed without manual intervention by the NCO. Pre-trip pressurizer pressure was approximately 2235 psig and decreased to a low of approximately 2125 psig after the trip. The pressure then stabilized to no load conditions. Pressurizer level stabilized to a no load level of approximately 25% after the trip. NC System temperature stabilized at approximately 530 degrees F due to various steam drains remaining open, and Steam Generator (S/G) CA nozzle reverse purge. Steam Generator narrow range levels stabilized at approximately 30%. CF and SM flow isolated as expected following the trip.

The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

July 16, 1985

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Licensee Event Report 413/85-42 concerning a Nuclear Instrumentation System high flux rate power range Reactor trip. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

RWO:slb

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Palmetto Alliance
2135½ Devine Street
Columbia, South Carolina 29205

Mr. Jesse L. Riley
Carolina Environmental Study Group
854 Henley Place
Charlotte, North Carolina 28207

Robert Guild, Esq.
P. O. Box 12097
Charleston, South Carolina 29412

American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange, Suite 245
270 Farmington Avenue
Farmington, CT 06032

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, New York 10020

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

NRC Resident Inspector
Catawba Nuclear Station

IE22
1/1