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March 2, 1990

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

Subject: Catawba Nuclear Station
Docket No. 50-413
LER 413/90-~~07~~012

Gentlemen:

Attached is Licensee Event Report 413/90-~~07~~012, concerning TECHNICAL SPECIFICATION VIOLATIONS FOR IMPROPER CALIBRATION OF UNDERVOLTAGE RELAYS DUE TO MANAGEMENT AND DESIGN DEFICIENCIES.

This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony B. Owen
Station Manager

keb\LER-NRC.TBO

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

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TITLE (4) Technical Specification Violations For Improper Calibration Of Undervoltage Relays Due To Management And Design Deficiencies

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)
1 1	0 8	8 9	9 0	0 1 2	0 0	0 3	0 2	9 0	CNS, Unit 2	0 5 0 0 0 4 1 4
										0 5 0 0 0

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	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)	X 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)	
		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
R.M. Glover, Compliance Manager	8 0 3 8 3 1 1 - 1 3 2 3 6

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 November 8, 1989, with Units 1 and 2 in Mode 1, Power Operation, a Quality Assurance (QA) staff member observed Transmission Personnel performing monthly 4160 V essential bus undervoltage (UV) relay tests. A subsequent QA review of the Transmission procedures used to perform these tests revealed that test acceptance criteria did noi agree with Technical Specifications and that these relays were not being adjusted to the Trip Setpoint as required. Following notification of these discrepancies, Transmission personnel recalibrated all affected 4160 V essential bus UV relays to comply with Technical Specifications. While reviewing other procedures to ensure compliance, Transmission personnel discovered on February 16, 1990, at 1500 hours, with Unit 1 in Mode 0, Defueled, and Unit 2 in Mode 1, that Reactor Coolant (NC) Pump UV relay settings were also not being adjusted to the Trip Setpoint. Transmission personnel subsequently recalibrated all affected NC Pump UV relays. This incident is attributed to a management deficiency for lack of procedure control in both preparation and review of Transmission procedures, and to a Design deficiency not changing Technical Specifications to reflect setpoint changes. Transmission procedures have been revised, and a Technical Specification change will be initiated.

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

BACKGROUND

Technical Specification 3/4.3.2, Engineered Safety Features Actuation System (ESFAS) Instrumentation, specifies that when an ESFAS Instrumentation or Interlock Trip Setpoint is less conservative than the Trip Setpoint, but more conservative than the Allowable Value, as shown on Table 3.3-4 (ESFAS Instrumentation Trip Setpoints), the setpoint is to be adjusted to the Trip Setpoint. Table 3.3-4 Item 10.a, 4 KV Bus Undervoltage - Loss of Voltage, specifies a Trip Setpoint of $\geq$ 3500 V and an Allowable Value of $\geq$ 3200 V. A set of three undervoltage relays [EIIS:RLY] is provided for each 4160 V essential bus, which is calibrated to drop out if voltage drops below 84.1% (3500 V) of normal bus voltage. Actuation of 2/3 of these relays will actuate the sequencer, close in the Diesel Generator [EIIS:GEN] associated with the bus, and trip the incoming breaker [EIIS:BRK] if the undervoltage condition is sustained. Twelve relays are used in this application at Catawba (3 per bus, 2 trains per Unit). The relays are manufactured by Brown-Boveri, Type ITE-27D. A monthly Trip Activating Device Operational Test is performed on these relays by Transmission personnel under Standing Work Requests (SWRs) 3226 SWR, 4036 SWR, 4356 SWR, and 4355 SWR using PT/0/A/4971/10/R, Routine Test Procedure: Brown-Boveri Type ITE 27D Relay.

Technical Specification Table 3.3-4 Item 10.b, 4KV Bus Undervoltage - Grid Degraded Voltage, specifies a Trip Setpoint of $\geq$ 3685 V and Allowable Value of $\geq$ 3611 V. A set of three undervoltage relays is provided for each 4160 essential bus, which is calibrated to drop out if voltage drops below 92% of normal bus voltage. These relays are provided to prevent operation of equipment, with a degraded bus condition. Actuation of 2/3 of these relays will trip the incoming breaker if this undervoltage condition is sustained longer than 10 minutes. Twelve relays are used in this application at Catawba (3 per bus, 2 trains per Unit). The relays are manufactured by Brown-Boveri, Type ITE-27H. A monthly Trip Activating Device Operational Test is performed on these relays by Transmission personnel under SWRs 3226 SWR, 4036 SWR, 4356 SWR, and 4355 SWR using PT/0/A/4971/06/R, Routine Test Procedure: Brown-Boveri Type ITE 27H Relay.

Technical Specification 2.2.1, Reactor Trip System Instrumentation Setpoints, specifies that when a Reactor Trip System Instrumentation or Interlock Setpoint is less conservative than the Trip Setpoint, but more conservative than the Allowable Valve, as shown on Table 2.2-1 (Reactor Trip System Instrumentation Trip Setpoints), the setpoint is to be adjusted to the Trip Setpoint. Table 2.2-1 Item 14, undervoltage-Reactor Coolant [EIIS:AB] (NC) Pumps [EIIS:P], specifies a Trip Setpoint of $\geq$ 77% (5082 V) of bus voltage, and an Allowable Value of $\geq$ 76% (5016 V). When a significant loss of NC flow is imminent due to a sustained reduction in voltage on the power cables to 2/4 NC Pump motors [EIIS:MO], a Reactor Trip signal is generated, as long as Reactor power level is $\geq$ 10%. Eight relays are used in this application at Catawba (one per NC Pump, 4 NC Pumps per Unit). The relays are manufactured by Rochester, RIS Type 90634-100. A monthly test is performed on these relays by Transmission personnel under SWRs 3228 SWR and 4113 SWR using PT/0/A/4971/12/R, Routing Test Procedure: RIS Type 90634-100 Undervoltage Sensor With C-H M300 Auxiliary Relay.

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EVENT DESCRIPTION

During the design phase of Catawba, the Brown-Boveri Type 27H relay was chosen to detect degraded grid voltage because vendor pre-manufacturing promotional data indicated that it would have a relatively small operating band (between the trip value at the low end, and the energize value at the high end). This relatively small band was desired by Design Engineering (DE) because unnecessary Diesel Generator starts would be minimized if, following a degraded grid voltage relay trip, the relay could quickly reenergize once bus voltage began to recover.

The vendor discovered, after the relays were manufactured, that the actual operating band was larger than the promotional data had indicated. When DE reviewed the vendor data, the decision was made to continue using the relays, and to revise the Relay Setting Sheets.

On November 19, 1984, the revised Relay Setting Sheets were issued, prior to the Commercial Operation of Catawba. Subsequently, the Transmission procedure used to calibrate the Brown-Boveri Type ITE 27H relay, PT/0/A/4971/06/R, was revised to reflect the change. Technical Specification Table 3.3-4 Item 10.b, however, was never revised to reflect the change in Trip Setpoint from $\geq$ 3685V to 3657-3833V.

On November 8, 1989, with Units 1 and 2 in Mode 1, Power Operation. Quality Assurance (QA) personnel watched Transmission personnel, as part of a Departmental Audit, perform monthly Trip Activating Device Operational Tests under PT/0/A/4971/06/R and PT/0/A/4971/10/R. A subsequent review of these procedures by QA showed that the Acceptance Criteria did not agree with Technical Specification Table 3.3-4 Items 10.a and 10.b.

Between November 9 and 21, 1989, a QA staff member discussed the discrepancies with Transmission personnel. Transmission indicated during these discussions that the Acceptance Criteria for these procedures were obtained from DE Relay Setting Sheets. The discrepancy between the Technical Specification values and the Acceptance Criteria was documented by the QA staff member on an Audit Item Sheet, which was given to Transmission personnel on November 21, 1989. The QA staff member subsequently spent a week on a different phase of the Departmental Audit.

On December 7, 1989, the QA staff member discussed the discrepancies with DE. According to DE, the ranges supplied on the Relay Setting Sheets (and Transmission procedures) were satisfactory to ensure that adequate voltage would be supplied to components. On January 25, 1990, the QA staff member met with Transmission personnel in an exit meeting. Transmission indicated that coordination would be required between DE and the Nuclear Production Department

(NPD) to resolve these discrepancies. During the period from November 9 to January 25, while it was recognized that a discrepancy existed between the Acceptance Criteria and Technical Specifications, the need to take immediate action to comply with Technical Specifications was not realized.

On January 26, 1990, the QA staff member initiated Problem Investigation Report O-C90-0036. This PIR stated that the relays' voltages were not being adjusted to the Trip Setpoint value, as required by Technical Specifications, when the as-found voltage readings were between the Allowable Value and the Trip Setpoint value. It also stated that the current practice was to leave the relay setting as found if it was greater than the Technical Specification Allowable Value. During the period between January 26 and February 9, the PIR was typed and mailed to Catawba.

On February 9, 1990, Transmission personnel were notified of PIR O-C90-0036. By 2100 hours, all relays addressed by Technical Specification Table 3.3-4, Items 10.a and 10.b were recalibrated, under Work Requests 0158 TRD, 0159 TRD, 0160 TRD, and 0161 TRD. All relays were set to comply with Technical Specifications. Also, on February 9, an operability evaluation was performed by Compliance, Transmission, and DE. This evaluation verified the fact that the values in the Transmission procedure were supported by DE calculations, but that these values were in violation of the existing Technical specification because it was not changed when necessary. The most recent test data for all affected relays was reviewed and it was found that 6 of 12 Type ITE 27H relays (Table 3.3-4, Item 10.a) and 10 of 12 Type ITE 27D relays (Table 3.3-4, Item 10.b) had been found and left at trip values less than the Technical Specification Trip Setpoint but greater than the Allowable Value. All of the trip values were found to be significantly above the Technical Specification Allowable Values, which are the minimum values required for successful operation during an event.

On February 15 and 16, 1990, Transmission personnel reviewed all Transmission procedures involving Technical Specifications to ensure compliance, including PT/0/A/4973/05/R, Routine Test Procedure:Agastat Type SSC12 Relays, PT/0/A/4971/06/R and PT/0/A/4971/10/R, PT/0/A/4971/12/R, Routine Test Procedure:RIS Type 90634-100 Undervoltage Sensor With C-H M300 Auxiliary Relay, and PT/0/A/4971/13/R, Routine Test Procedure:RIS Type 90634-100A Underfrequency Sensor With C-H M300 Auxiliary Relay. During this review, on February 16, 1990, at 1500 hours, with Unit 1 in Mode 0, Defueled, and Unit 2 in Mode 1, Transmission personnel discovered that NC Pump undervoltage relay settings were not being adjusted to the Trip Setpoint value listed in Technical Specification Table 2.2-1, Item 14. Reviewing the most recent relay settings, it was found that trip setpoints for undervoltage relays in Power Monitor Panels for NC Pumps 1A, 1B, 1D, 2A, 2B, and 2D were less than the Technical Specification Trip Setpoint value in Table 2.2-1, but greater than the Allowable Value. PIR O-C90-0055 was initiated by Transmission, and all affected Unit 2 relays were calibrated to comply with Technical Specifications under SWR 4113 SWR, using PT/0/A/4971/12/R, on February 16, 1990.

By February 20, 1990, changes to procedures affecting Technical Specifications were completed by Catawba Transmission personnel and given to the off-site Transmission group responsible for writing procedures. In each of these procedures, a step has been added to recalibrate the relay to operate at the setpoint value, if the relay is found to operate between the lower limit and the Allowable Value. In addition, the required action to be taken if a relay is found to operate below the Allowable Value has been added. All data sheets have been revised to reflect Technical Specification setpoints.

CONCLUSION

This incident is attributed to a Management Deficiency, due to a lack of procedure control in the areas of procedure preparation and procedure review. Technical Specifications were considered when preparing the Transmission procedures, and it was noted that the Relay Setting Sheet values differed from the Technical Specification Trip setpoints. These values were considered to be acceptable, however, since all of these values were greater than the Allowable Value. The Technical Specification required action of recalibration relays to the Trip Setpoint when between the Allowable Value and the Trip Setpoint was not realized in either procedure preparation or review. Corrective actions included the prompt recalibrating of affected relays upon discoveries of these deficiencies, and the revisions of these procedures. Procedure preparation now requires a 10CFR 50.59 Evaluation, which ensures that neither the Final Safety Analysis Report nor Technical Specifications are compromised.

This incident is assigned a contributing cause of Design Deficiency, due to the incomplete documentation of the trip setpoint change for the Type ITE 27H relay. This change was not documented on a Technical Specification update, resulting in Table 3.3-4 Item 10.b not being changed to the new value. It should be noted that prior to Commercial Operation, a mechanism did not exist to review Technical Specifications and the Safety Analysis Report when a setpoint change was made, other than routing Technical Specifications for updates. If such a change was initiated now, a 10CFR 50.59 Evaluation would be required, which would ensure that neither the Final Safety Analysis Report nor Technical Specifications would be compromised as a result of the change.

Corrective actions will include a change to Technical Specifications to reflect the desired setpoints for the relays addressed in Table 3.3-4, Items 10.a and 10.b, and in Table 2.2-1, Item 14, and to reflect the desired action to be taken when a setpoint value is found to be between the Allowable Value and the Trip Setpoint Value. All new or rewritten safety-related Transmission procedures will receive a cross-disciplinary review, by Nuclear Production Department personnel, to ensure that Technical Specifications are being complied with. During future QA Audits, the Audit team will promptly initiate a PIR when audit items are identified that potentially affect compliance with Technical Specification and/or FSAR requirements. Station Compliance evaluates all PIRs for reportability and operability issues.

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A review of the Operating Experience Program Database showed other Technical Specification violations resulting from Design And Management deficiencies. However, only one of there incidents, LER 413/89-009, involved both an inadequate Technical Specification and a defective procedure. LER 413/89-009 describes an event in which Operations personnel discovered an error in both the Technical Specifications and the Boric Acid Tank (BAT) volume curves in both Units' Data Book Procedures (the calculation of usable volume was in error). This incident differs from the previous event in that the Acceptance Criteria for UV relays in the Transmission procedures were based on DE supplied calculations which were not in error. This is therefore not considered to be a recurring problem.

CORRECTIVE ACTION

SUBSEQUENT

1) Transmission personnel promptly recalibrated all affected Brown-Boveri, Type ITE-27D and Type ITE-27H relays to comply with Technical Specifications.

2) Transmissions personnel promptly recalibrated the NC Pump undervoltage relays for NC Pumps 2A, 2B and 2D.

3) The following Transmission procedures were revised to comply with Technical Specifications: PT/0/A/4971/06/R, PT/0/A/4971/10/R, PT/0/A/4971/12/R, PT/0/A/4971/13/R, and PT/0/A/4973/05/R.

4) Transmission personnel recalibrated the NC Pump undervoltage relays for NC Pumps 1A, 1B and 1D as part of the normal monthly surveillance.

PLANNED

1) A change to Technical Specifications will be initiated, to reflect the desired setpoints for the relays addressed in Table 3.3-4, Items 10.a and 10.b, and in Table 2.2-1, Item 14, and to reflect the desired action to be taken when a setpoint value is found to be between the Allowable Value and the Trip Setpoint Value.

2) All new or rewritten safety-related Transmission procedures will receive a cross-disciplinary review, by Nuclear Production Department personnel, to ensure that Technical Specifications are being complied with.

3) During the period from November 9 to January 25, it was recognized that a discrepancy existed between procedure Acceptance Criteria and Technical Specifications, but the need to take immediate action to comply with Technical Specifications was not realized. The following corrective action will ensure that this realization occurs quickly.

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During future QA Audits, the Audit team will promptly initiate a PIR when audit items are identified that potentially affect compliance with Technical Specification and/or FSAR requirements.

SAFETY ANALYSIS

The present and past operability of the relays addressed in Technical Specification Table 3.3-4, Items 10.a and 10.b was referenced in the Operability Evaluation for PIR 0-C90-0036. None of the relay setpoints was found to be at less than the Allowable Value setpoint. In the past, the Transmission procedures required that when the as-found setpoint was lower than the Allowable Value, the Shift supervisor be notified, and that the setpoint be adjusted. At no point in the past have setpoint values been left at settings lower that the Technical Specification Allowable Values. The Allowable Values for these relays are the minimum operating conditions required to ensure Engineered Safety Feature operation. The values which existed in the Transmission procedures for relays addressed in Table 3.3-4, Items 10.a and 10.b as well as those addressed in Table 2.2-1, Item 14 were based on DE calculations. These values presented a violation of the existing Technical Specifications because revision was not performed when necessary. These relays are and have been fully operable. Their ability to provide 4160 V essential bus undervoltage protection, or NC Pump undervoltage protection, was not compromised. The health and safety of the public were unaffected by this incident.

*U.S. GPO: 1988-520-589/00070