TVA

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December 17, 1990

U.S. Nuclear Regulatory Commission
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Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE DPR-79 - LICENSEE EVENT REPORT (LER) 50-328/90016

The enclosed LER provides details concerning the nonconservative calibration of the nuclear instrumentation system intermediate range channels as a result of inappropriate personnel actions, management failure to properly plan and communicate expectations, procedural inadequacy, and insufficient management follow-up. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i) as an operation prohibited by technical specifications and 10 CFR 50.73(a)(2)(vii) as a single cause resulting in multiple inoperable channels.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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cc: See page 2

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah Nuclear Plant, Unit 2	0 5 0 0 0 3 2 7	1 OF 1 1

TITLE (4) Nonconservative calibration of nuclear instrumentation system intermediate range channels as a result of a lack of operability control for instrumentation affected by cycle-specific parameters.

EVENT DAY (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)
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1 1	1 7	9 0	9 0	0 1 6	0 0	1 2	1 7	9 0		0 5 0 0 0

OPERATING MODE (9): 3

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)

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)	XX 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	XX 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)	

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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)

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

EXPECTED SUBMISSION DATE (15): MONTH 0 3 DAY 0 1 YEAR 9 1

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

On November 17, 1990, at approximately 0700 Eastern standard time with Unit 2 in Mode 3, it was determined Unit 2 had operated in noncompliance with Technical Specification (TS) 2.2.1, "Limiting Safety System Settings," and Limiting Condition for Operation 3.3.1, "Reactor Trip System Instrumentation," because of nonconservative calibration of the nuclear instrumentation system (NIS) intermediate range (IR) channels. The nonconservative calibration was the result of procedural inadequacies, insufficient management follow-up, inappropriate personnel actions, and management failure to properly plan and communicate expectations. Although the nonconservative calibration resulted in IR setpoints being outside of their respective TS allowable values, the plant remained within the Updated Final Safety Analysis Report (UFSAR) accident analysis limits. Immediate corrective actions were completed before Unit 2 reentered Mode 2 to ensure that the NIS channels were correctly aligned, and that other setpoints affected by outage modifications were properly set. Long-term corrective actions focusing on personnel performance problems and operability controls are ongoing.

Description of Event

On November 17, 1990, at approximately 0700 Eastern standard time (EST) with Unit 2 in Mode 3 (0 percent reactor power, reactor coolant system [RCS] pressure at 1162 pounds per square inch gauge, and RCS temperature at 498 degrees Fahrenheit [F]), it was determined that Unit 2 had operated in noncompliance with Limiting Safety System Setting (LSSS) 2.2.1 and Limiting Condition for Operation (LCO) 3.3.1 because the nuclear instrumentation system (NIS) intermediate range (IR) channels (EIIS Code IG) had been nonconservatively calibrated. LCO 3.3.1 requires the NIS IR channels to be operable in Modes 1 and 2, and any time the reactor trip breakers are closed, the control rod drive system is capable of rod withdrawal, and there is fuel in the reactor vessel. LSSS 2.2.1 requires the NIS IR channels to have trip setpoints of less than or equal to 25 percent reactor power; and allowable values of less than or equal to 30 percent reactor power. Action provisions are provided in LCO 3.3.1 for inoperable NIS IR channels.

During the timeframe of this event, Unit 2 was restarting from its Cycle 4 refueling outage. The unit commenced rod withdrawal in preparation for criticality at 1730 EST on November 11, 1990. Mode 2 was administratively entered at 1945 EST on November 11, 1990. Initial criticality occurred at 1730 EST on November 12, 1990. At 0447 EST on November 13, 1990, a shutdown and cooldown of Unit 2 to Mode 5 was initiated to correct seal problems on the Loop 1 reactor coolant pump (RCP). Heatup of the unit was initiated at 0841 EST on November 16, 1990, with entry into Modes 4 and 3 occurring at 1630 EST and 2133 EST, respectively, on November 16, 1990.

During the Unit 2 Cycle 4 refueling outage, the source range (SR) and IR NIS channels for SQN Unit 2 were replaced with new Gamma-Metrics instrumentation. The workplan used to install the Gamma-Metrics instrumentation on Unit 2 included steps to calibrate the NIS IR channels after installation. During the modification process, at the time when each NIS IR channel calibration was to be performed, the data and procedure needed to calculate the cycle-specific fluence compensation were not available. Consequently, for initial IR channel calibration, the workplans used vendor-supplied data related to a reference neutron source rather than Unit 2 specific data. The workplan was annotated that the values used in the calibration were from the vendor. It was recognized that an alignment utilizing cycle-specific data was required. The postmodification testing (PMT) was completed on September 26, 1990, for Channel II (N36), and a PMT was completed on October 27, 1990, for Channel I (N35). The workplans were closed out October 31, 1990, and both channels were incorrectly declared operable.

On October 31, 1990, the Operations Group was verifying prerequisites for Surveillance Instruction (SI) 11, "Reactivity Control Systems Moveable Control Assemblies." This test verified free movement of the control rods. A reactor engineer was contacted for guidance regarding shutdown margin verification. The reactor engineer realized that NIS IR operability needed to be established before performance of SI-11. The reactor engineer completed procedure 2-PI-NXX-092-001.0, "Prestartup NIS Calibration Following Core Load," which calculated a voltage difference that would account for

Description of Event (Continued)

cycle-dependent fluence variations. The NIS IR channel calibration is based on calculating an expected full-power detector voltage for the upcoming cycle. The expected detector voltage is a function of the most recent actual NIS IR channel calibration voltage (Vold), and a bias term that accounts for cycle-dependent fluence variations. The bias term is a ratio of current (Pnew) to previous cycle (Pold) power fractions. This value is further reduced by 20 percent for additional conservatism. [Vnew = F(Vold x (0.8)Pnew/Pold)]. As described in LER 50-327/90011, Revision 1, the initial Unit 2 NIS IR calibration was to rely on Unit 1 Cycle 5 data for the "old" data, because no previous cycle Gamma-Metrics data existed for Unit 2.

The Unit 1 core closely models the Unit 2 core design and therefore provided the best available data for the voltage difference calculations for adjusting the Gamma-Metrics channels. This voltage difference was to be inserted in instrument calibration procedures 2-PI-ICC-092-N35.1, "Gamma-Metrics Channel I Full Power Alignment," and 2-PI-ICC-092-N36.2, "Gamma-Metrics Channel II Full Power Alignment," which are designed to align the Gamma-Metrics channels to true reactor power. At approximately 2215 EST on October 31, 1990, the reactor engineer (night shift test director) completed his procedure (i.e., calculation) and carried the appropriate data page to a senior instrument mechanic (IM) involved with NIS activities. The reactor engineer assumed the workman knew what was to be done with the data and little discussion of how to use the data occurred. However, the IM did not understand all the procedures required to adjust the NIS IR channels for startup, did not bring this to the attention of his supervision, and did not inform them that he had information from Reactor Engineering related to NIS IR calibrations. The following day the same reactor engineer delivered a copy of a page from the prestartup calibration procedure to an Instrument Maintenance General Foreman indicating which Instrument Maintenance calibration procedures had to be performed. This information was not acted upon and the Instrument Maintenance General Foreman did not remember receiving the information. Instrument Maintenance was subsequently provided setpoints associated with the NIS IR bistable trip, and this data was thought to be the same IR information previously provided. The reactor engineer incorrectly assumed that the NIS IR channels had been calibrated based on the calibration data being provided to Instrument Maintenance, though no procedural verification confirmed the calibrations. SI-11 was subsequently started on November 1, 1990, and completed on November 2, 1990. In addition, SI-11 was re-performed on November 11, 1990, as well as SI-43, "Rod Drop Time Measurement." The reactor was maintained at a cold shutdown boron concentration during this testing, with operable SR and power range (PR) instrumentation. During the performance of SI-11 and SI-43, the NIS IR channels are required to be operable as a result of the reactor trip breakers being closed and rods capable of withdrawal.

Description of Event (Continued)

Preparations for startup testing began on November 10, 1990. The startup test program is described by Restart Test Instruction (RTI)-1, "Restart Sequence." This instruction establishes the plant restart testing program and includes a tabulation of the major phases of the restart test program, a tabulated summary of the restart test sequence indicating applicable plant instructions to be performed, and acceptance and review criteria for each instruction. Phase 'A' of RTI-1 encompasses core reloading and initial testing required to support the Phase 'B' low power physics testing. Phase 'A' verifications are to be completed before initiating Phase 'B' testing.

The purpose of the restart test program conducted in Mode 2 is to determine if the operating characteristics of the core are consistent with the design predictions and to ensure that the core can be operated as designed. This is accomplished by comparing the measured value of selected key core parameters with their predicted design value and by obtaining data required for proper recalibration of core surveillance and protection instrumentation.

Documentation indicating that preliminary evaluations of test results have been performed on each test prior to proceeding to the next testing phase is also included.

Step 1 of Phase 'A' of RTI-1, includes verification of NIS IR adjustment by Instrument Maintenance to include values from 2-PI-NXX-092-001.0. This verification would ensure that the reactor would not be taken critical until both NIS IR channel calibrations were complete. The signoff for this step was not completed before Phase 'B' was started as a result of oversight by the assigned test directors.

On November 11, 1990, at approximately 0945 EST, Phase 'B' testing began with rod drop time measurement performance in accordance with SI-43. SI-43 prerequisites require that SR instrumentation is in operation, but does not require Operations to verify operability of the NIS IR channels. It is assumed by Operations that operability exists if all associated SIs are complete and within frequency, and there are no outstanding work requests or workplans on the equipment (indicated by a round orange sticker on the control board).

Between the hours of 0800 EST and 1000 EST on November 11, 1990, a prejob test briefing was conducted with the dayshift restart test group. During the meeting, the Test Director [illegible] based on the transfer of NIS IR calibration data from Reactor Engineeri[illegible]ument Maintenance, that the activities associated with Phase 'A' testing w[illegible]te and that the nightshift Test Director had verified performance of the pres[illegible] calibration procedure approximately 10 days earlier. RTI-1 testing Phase '[illegible] signed off by the nightshift Test Director. However, the dayshift Test Dire[illegible]ed the remaining blanks on November 12, 1990, excluding the NIS IR and PR calibration step intending for the nightshift Test Director to complete the signoffs, because he had been directly involved in the step.

Description of Event (Continued)

Rod drop testing was complete at approximately 1400 EST on November 11, 1990, and RTI-3.1, "Initial Criticality," commenced at approximately 1945 EST on November 11, 1990, when the unit administratively entered Mode 2. At this time, the control rods were withdrawn and the dilution to criticality began. Problems were experienced during the nightshift on RCP pump seal flow and this caused the dilution process to be very slow.

The Unit 2 reactor was taken critical at 1730 EST on November 12, 1990. Zero power physics testing was started and data was obtained at the point of adding nuclear heat (POAH). No anomalies in NIS IR indications were noted during this period. The reactor was taken subcritical at approximately 0450 EST on November 13, 1990, in preparation for reentry into Mode 5 for RCP seal maintenance.

A reactor engineer was reviewing the criticality data on the midnight shift of November 16, 1990, when he noted that the NIS IR channel outputs at the POAH were similar to the values previously exhibited at the POAH by the nonconservatively adjusted Unit 1 IR channels. A record search was initiated on November 17, 1990, to verify that procedures 2-PI-ICC-092-N35.1 and 2-PI-ICC-092-N36.2 had been performed. No records were found. RTI-1 was reviewed, and it was identified that the calibration verification step had not been signed. To confirm the condition, a work request was planned and executed to measure the "as found" voltage on one Unit 2 IR channel. The measured voltage confirmed that the calibrations to implement the calculated voltage difference had not been conducted. Subsequent analysis of data concluded that Unit 2 had closed the reactor trip breakers while capable of rod withdrawal with nonconservatively adjusted NIS IR channels.

Cause of Event

The cause of this event was a lack of operability control for instrument channels affected by cycle-specific parameters. The workplan for Gamma-Metrics was closed without the adjustments being made for startup on the NIS IR channels. The workplan used factory settings for voltages during the calibrations of the NIS IR channels as was noted in the workplan. However, it did not identify that additional adjustments were required to declare the NIS IR channels operable. Evaluation of operability controls for other instrumentation channels affected by cycle-specific parameters identified that a similar lack of coordination may exist between several instrument calibration and cycle-specific adjustment procedures. Instrument loops have previously been declared operable after the performance of a channel calibration, but before the cycle-specific adjustments are made.

Other procedural weaknesses also contributed to this event. The Reactor Engineering procedures that derived the Unit 2 calibration data did not include verification that required actions were taken. The only actions specified were to request the NIS IR calibration be performed, with no requirement to ensure this actually was performed.

Cause of Event (Continued)

Similarly, SI-11 does not specify that the NIS IR channels are required to be operable before rod motion is initiated (actually before the rods are capable of motion).

Another contributing cause was an inappropriate personnel action made in following RTI-1 at Step 1 of Table 3 for acceptance criteria. RTI-1 breaks the testing into five phases, and each phase is required to be complete before starting the next phase. RTI-1 Step 1 for Phase 'A' on Table 3 for acceptance criteria was to be signed as complete before proceeding with Phase 'B' tests. This step required the verification that IMs had implemented the NIS IR and PR alignments for startup. Table 2, "Restart Test Sequence," had all Phase 'A' requirements signed. The dayshift Test Director acknowledged that Table 2 was signed and that Table 3 had not been signed. He thought that this was a paper work oversight and signed the Phase 'A' blocks for those items associated with core reload, but did not sign Step 1 (prestartup calibration procedure) because he thought the nightshift Test Director should sign it because he was believed to have done the work.

A contributing cause was a lack of management follow-up to ensure RTI-1 was being completed properly before convening with Phase 'B' of startup testing. As part of the startup team, a manager was assigned to each shift (two 12 hour shifts) to provide oversight to startup testing. For preparation of Phase 'B' testing, management did not perform a follow-up verification that Phase 'A' testing was signed off as complete.

Insufficient planning and communication of expectations also contributed to this event. Numerous meetings, as well as focused training sessions, were conducted involving Instrument Maintenance, Reactor Engineering, and Operations' personnel in attempt to communicate the actions associated with the prestartup calibration of the NIS IR channels, as well as the conservative reductions of NIS setpoints. However, a clear assignment of responsibilities was not made for specific actions. This resulted in a lack of understanding by Instrument Maintenance as to what was to be done with the voltage data calculated by Reactor Engineering, and the declaration of operability for the NIS IR channels by Operations' without the channels being correctly calibrated.

Analysis of Event

This event is reportable in accordance with 10 CFR 50.73(a)(2)(i) as an operation prohibited by TSs and 10 CFR 50.73(a)(2)(vii) as a single cause resulting in multiple inoperable channels.

The reactor trip system automatically keeps the reactor operating within a safe region by shutting down the reactor whenever the limits of the region are approached.

Analysis of Event (Continued)

The following systems make up the reactor trip system:

1. Process Instrumentation and Control System
2. NIS
3. Solid State Logic Protection System
4. Reactor Trip Switchgear
5. Manual Actuation Circuit

The reactor trip system consists of up to four redundant sensors and associated analog process protection circuitry and two redundant digital logic trains. The analog process protection circuitry monitors various plant parameters and provides inputs to the digital logic trains. The digital logic trains develop the logic necessary to automatically open the reactor trip breakers.

Each of the two trains, A and B, is capable of opening a separate and independent reactor trip breaker.

The reactor trip system automatically initiates reactor trip:

1. Whenever necessary to prevent fuel damage for an anticipated transient (Condition II).
2. To limit core damage for infrequent faults (Condition III).
3. So that the energy generated in the core is compatible with the design provisions to protect the reactor coolant pressure boundary for limiting faults (Condition IV).

This event was associated with NIS reactor trips; the NIS SR high neutron flux trip, the NIS IR high neutron flux trip, and the NIS PR high neutron flux trip. The purpose of these trips is described below:

a. SR high neutron flux trip.

The SR high neutron flux trip circuit trips the reactor when one of the two SR channels exceeds the trip setpoint. This trip, which provides protection during reactor startup and plant shutdown, can be manually bypassed when one of the two IR channels reads above the P-6 setpoint value (SR cutoff power level) and is automatically reinstated when both IR channels decrease below the P-6 value. This trip is also automatically bypassed by two out of four logic from the PR permissive (P-10, approximately 10 percent power).

Analysis of Event (Continued)

b. IR range high neutron flux trip

The IR high neutron flux trip circuit trips the reactor when one out of the two IR channels exceed the trip setpoint. This trip, which provides protection during reactor startup, can be manually blocked if two out of four PR channels are above P-10.

c. PR high neutron flux trip

The PR high neutron flux trip circuit trips the reactor when two of the four PR channels exceed the trip setpoint. There are two independent bistables each with their own trip setting (a high and a low setting) per channel (four channels total). The high trip setting provides protection during normal power operation and is always active. The low trip setting, which provides protection during startup, can be manually bypassed when two out of the four power PR read above approximately 10 percent power (P-10).

During this event, the NIS SR channels were operable and would have initiated a reactor trip at approximately 10^5 counts per second until blocked at the P-6 permissive. At this point, the NIS IR channels should initiate a reactor trip at approximately 20 percent power (conservatively set) until blocked at the P-10 permissive. At the same time, the NIS PR channels would have initiated a reactor trip at the low power trip setpoint of approximately 20 percent power (conservatively set) while below the P-10 permissive. Above the P-10 permissive, only the high power trip setpoint is active (conservatively set at 50 percent power).

Section 15.2.1.1 of the SQN UFSAR states that the reactor trip for a postulated uncontrolled rod cluster control assembly bank withdrawal from a subcritical condition is assumed to be initiated from the power range monitor high neutron flux (low setting). A 10 percent increase is assumed for the NIS PR flux trip setpoint raising it from the nominal value of 25 percent to 35 percent. Previous results, however, show that the rise in the neutron flux is so rapid that the effects of errors in the trip setpoint on the actual time at which the rods are released is negligible.

Before entry into Mode 2, the NIS PR high neutron flux (low setting) was adjusted to 20 percent and the high setting was adjusted to 50 percent. The NIS IR high neutron flux trip was also adjusted to 20 percent. Including the 10 percent conservatism in the PR low setting, the trip setpoint would have been 30 percent (worst case) which is less than the 35 percent trip assumed in the SQN UFSAR. The plant safety analysis takes no credit for the NIS IR trips that would have tripped

Analysis of Event (Continued)

at approximately five times their required setpoint. Above 10 percent power, the PR low flux trip and IR trips are blocked (P-10) leaving the PR high flux trip for reactor protection. This trip was low red from 109 percent to 50 percent for additional conservatism during startup. However, the reactor was maintained at less than 1 percent power and permissive P-10 was never reached.

The SQN UFSAR describes a Condition III fault and a Condition IV fault, which rely on the NIS reactor trips. Condition III, "Single Rod Cluster Control Assembly Withdrawal at Full Power" occurs above P-10 and the Condition IV fault, "Rod Cluster Control Assembly Ejection" (worst case peak clad temperature) occurs at end of cycle, zero power. Since the reactor was being returned to service following a refueling outage and 10 percent power was never achieved, neither of these conditions were compromised.

In summary, although the NIS IR channels trip setpoints were outside the TS limits, the consequences were bounded by the SQN UFSAR accident analysis. Additionally, the NIS PR trip setpoints were adjusted conservatively; the high flux setpoint at 50 percent power, and the low flux setpoint at 20 percent power. Therefore, the health and safety of the plant personnel or the general public was not adversely affected by this event.

Corrective Actions

The corrective actions taken as a result of this were categorized as immediate actions required for the restart of Unit 2, and programmatic actions to prevent similar occurrences and recurrence. The immediate corrective actions included the proper calibration of the NIS IR channels by Instrument Maintenance, with verification by Reactor Engineering documented by the appropriate signoff in RTI-1. Operations also verified the calibration of the NIS IR channels before the reactor trip breakers were closed on November 20, 1990.

In addition to the above verifications, the calibration of the NIS PR channels was also checked by Instrument Maintenance and verified by Reactor Engineering. These reviews indicated that the NIS PR channels had been calibrated appropriately.

As another immediate corrective action, modification workplans implemented during the Unit 2 Cycle 4 refueling outage, which affected TS setpoints or critical plant parameters, were reviewed to ensure that the proper setpoints were utilized during final PMT calibration. Several discrepancies between design output documentation and plant parameters or procedures were identified and documented in Condition Adverse to Quality Report (CAQR) SQP901534. Evaluation of these discrepancies determined that operability of the associated equipment was not affected.

Corrective Actions (Continued)

To ensure closure of interfaces during startup, a review of startup and power ascension procedures was performed to identify "open-ended" actions. The necessary procedures have been revised to add signoffs for the verification of completed actions.

Another immediate action was the review of Administrative Instruction 19, "Modifications: Permanent Design Change Control Program," concerning workplan closure and determinations of operability. This review concluded that the process is adequate if implemented correctly. Changes may be made, however, as part of the ongoing Modification Simplification Task Force.

In addition to the above actions, the Instrument Maintenance and Reactor Engineering personnel involved in this event received disciplinary action.

SQN is continuing to evaluate the adequacy of controls for implementing changes resulting from core reloads on certain instrument channels. Methods to better control operability of instrument channels affected by cycle-specific parameters are also being evaluated. These evaluations will be completed by February 1, 1991.

Direction has been provided by the Vice President of Nuclear Operations for the development of action plans for conducting plant activities to assure accountability, responsibility, and follow-up. Emphasis is placed on plan adequacy, check points, clear assignments and responsibilities, clear communication channels, and verification that actions are completed.

Consistent with the above guidelines, an action plan to specifically address personnel errors at SQN is being developed. This action plan will include an analysis of the distribution of personnel errors, including an overall evaluation for common causes, organizations, disciplines, etc. The action plan also calls for an improvement in work practices, and reinforcement of performance and execution standards.

Reinforcement of performance and execution standards is included in line organization presentations currently being developed. The presentations will also include lessons learned from recent events, guidelines for action plan development and implementation, and discussions of SQN's Human Performance Enhancement System and Problem Evaluation Panel implementation. Emphasis will also be placed on self-checking and procedural compliance.

Also, as described in TVA's response to Notice of Violations 50-327, 328/90-29-01 and 50-327, 328/90-29-02, SQN will continue to supplement Reactor Engineering with additional experienced personnel, and increased management oversight.

Additional Information

This event is similar to that reported in LER 50-327/90011, Revision 1, which described the nonconservative calibration of the NIS PR and IR channels during restart of Unit 1 from its Cycle 4 refueling outage. The nonconservative calibrations were the result of technical inadequacies in the prestartup calibration procedures; corrective actions were focused on ensuring that procedures were technically correct. Extensive actions were taken which were intended to ensure appropriate calibration of NIS during the Unit 2 startup, e.g. changes and supplement of personnel, conduct of specialized training, evaluation of prediction methodology by Westinghouse Electric Corporation and the Institute of Nuclear Power Operations (INPO), revision of procedures to incorporate conservatism factors, review of Reactor Engineering procedures by Westinghouse and INPO, and conduct of extensive prejob briefings for affected personnel. These actions were not effective in preventing this event for the reasons previously described.

Commitments

SQN is continuing to evaluate the adequacy of controls for implementing changes resulting from core reloads on certain instrument channels. Methods to better control operability of instrument channels affected by cycle-specific parameters are also being evaluated. These evaluations will be completed by February 1, 1991.

Remaining corrective actions are consistent with commitments made in TVA's response to Notice of Violations 50-327, 328/90-29-01 and 50-327, 328/90-29-02, and in the November 27, 1990, TVA/NRC Enforcement Conference and Management Meeting.

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