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ERRORS IN EFFECTIVE REACTOR TRIP SETTINGS OR MONITORING ASSOCIATED WITH EXCORE INSTRUMENTATION

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1. SUMMARY

Errors in effective reactor trip settings or reactor monitoring associated with excore monitors were examined in 26 licensee event reports covering power ascension as well as full power operation. A wide range of human errors contributed to the observed mistakes in the effective reactor trip settings. These errors included miscommunication with the vendor, procedure errors, administrative oversights in maintaining the monitors, as well as technician errors. Industry generic communications have addressed most of these causal factors which generally reflect site specific deficiencies. On several occasions, random supervisory observations in the control room detected mismatches in power indications and subsequently, stimulated corrective actions. The safety analyses in the LERs generally did not indicate a significant safety issue.

2. INTRODUCTION

The excore nuclear instrumentation system (NIS) in many plants triggers several of the reactor trips or alarms associated with power level, axial power shape, and flux rate. This instrumentation is also monitored by the operators to maintain reactor power and axial power distribution during power operation within license and technical specification requirements. Source range (SR), intermediate range (IR), and power range (PR) monitors generally make up the NIS. Variations exist in the utilizations of these functions among vendors as well as among plants from a single vendor.

At startup, initial monitor or trip input settings are estimated for reactor power, axial flux offset and flux rate. During power operation, calorimetric calculations and incore flux measurements are made to adjust these parameters associated with the NIS as control rods are withdrawn. During power ascension at some plants, the power level trip set point is increased incrementally until the excores are calibrated against the plant heat balance at a fairly high power level. At this point a reactor trip is set to the design overpower setpoint. The calorimetric calculations and incore measurements are performed at regular intervals to calibrate the NIS as specified in the plant's technical specifications (TS).

If the plant goes through a power transient, a mismatch may occur between the calorimetric power indication and that indicated by the excores. Interpretation of the plant's technical specifications determines when the calorimetric and excore indications are compared during a transient.

Relevant licensee event reports (LERs) were obtained from a search of the NUDOCS database. The preponderance of Westinghouse reactors in the selected group of LERs suggests that there may be subtle differences in the interpretation of an inoperable excore system among the vendors since the processes are similar for all plants. This aspect was not explored in this study.

3. DESCRIPTION OF EVENTS

Summaries of 26 LERs related to miscalibration of excore detectors and their reactor trip settings are presented in the Appendix. Several of the more illustrative events are described below:

Catawba, Unit 1

In late June 1991, the licensee discovered that one channel of the overtemperature delta temperature (OTDT) reactor trip was incorrectly calibrated because of an error in calibrating one pair of excore detectors (Ref. 1). Test leads used in the detector calibration were defective and produced an erroneous result. A subsequent hand calculation to determine channel operability was performed incorrectly, which resulted in missing the erroneous excore calibration. The test leads are used to obtain a digital reading across the excore output resistor, rather than using the analog indicator on the electronics panel. The error in the hand calculation was a sign error for the axial offset measurement. Normally these calculations are reviewed by a second person, however, there was no place in the procedure to retain the hand calculations or to indicate a second review of the analysis. The licensee modified the procedure to retain the hand calculations and require an independent check.

Robinson

In November 1990, the licensee discovered that a small region of the allowable axial offset in the technical specifications was in error during the previous four operating cycles (Ref. 2). The misinterpretation was nonconservative. This problem arose subsequent to introducing a low leakage fuel loading pattern into the reactor in response to pressurized thermal shock concerns. This type of pattern was more restrictive compared to previous cycles because of increased peaking factors. In order to improve operating flexibility, the licensee developed a new methodology for determining allowable axial power shapes and implemented this procedure four operating cycles earlier in 1985. The error in the methodology was discovered during the introduction of a new axial distribution analysis program in 1990.

Sequoyah, Unit 1

In June 1990, the licensee discovered that the effective power range trip settings were 20 to 31 percent higher than expected (Ref. 3) because of the deficient initial calibration of the PR channels. This fuel cycle included a lower leakage core and installation of new excore monitors. The specific cause of the deviation was attributed to misinterpretation of the vendor information regarding the new core and the subsequent deficient initial calibration of the IRs and PRs.

Sequoyah, Unit 2

In November 1990, the licensee discovered that the intermediate range nuclear channels were incorrectly calibrated during plant startup (Ref. 4). This occurred during the installation of new instrumentation which included calibration steps. The instrumentation was knowingly calibrated initially using vendor data rather than cycle specific data as required by the procedures. This deficiency was not corrected prior to power operation. This situation was not rectified and the instrument incorrectly declared operable. A similar problem occurred with the initial calibration of the NIS during the startup of Unit 1 (Ref. 3) several months earlier. In awareness of the prior experience, the licensee noted:

> "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 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."

Shearon Harris

During power ascension in 1989, a calorimetric heat balance calculation showed actual power to be 42 percent while the indicated power was 28 percent on the power range detectors (Ref. 5). The mismatch was attributed in part to the installation of a low leakage core and the absence of any formal program to account for cycle specific attributes in the initial NIS settings. One of the licensee's corrective actions was to require comparison of PR monitors to other diverse indications of reactor power during power ascension (a form of continuous monitoring as opposed to waiting for some arbitrary surveillance point) and resolution of any gross discrepancies observed.

Not all LERs captured in the database search were summarized in the Appendix. In 1985, eight LERs described problems with setting the flux rate trip points in Westinghouse reactors. A Westinghouse bulletin to their licensees discussing rod drop analyses and appropriate flux rate trip settings stimulated most of these LERs. This appeared to be a small issue based on miscommunication that was quickly resolved.

Another group of LERs in the 1988 to 1990, time frame described mismatches between calorimetric calculations of power and NIS indications of power while plant transients were occurring. These LERs were from the McGuire and Catawba plants. One of the corrective actions has the control room operators making adjustments to maintain mismatches less than 5 percent during plant transients rather than waiting for I&C personnel to perform the adjustment. This issue appeared to be limited to these two plants.

4. ANALYSIS

The 26 events summarized in the Appendix may not be an accurate reflection of the frequency of disagreement between the calorimetric calculations and excore indication of core power in the last seven years; however, they do provide a sense of the range of situations encountered and the causative factors. In an industry generic communication on this subject, two of six events that were referenced were not reported as LERs.

4.1 Initial Settings at Startup

Incorrect initial settings of the nuclear instrumentation during startup following a refueling occurred in 12 of the events (numbers 12 to 23) in the Appendix. This topic received a comprehensive review in six industry generic communications in 1988 through 1990, time period. The industry documents catalogue observed defects in the process and suggested corrections. Yet, as noted in the Appendix, these types of events continue to occur. The two Sequoyah events and the Shearon Harris event discussed above involve incorrect initial nuclear instrument settings.

The first Sequoyah event, in June 1990 (at Unit 1), was attributed to misinterpreted vendor data (Ref. 3) which resulted in an effective IR trip setpoint at 38 percent instead of the expected 12 percent of full power, an effective low PR trip at 33 percent, and an effective high PR trip of 135 percent based on the incore-excore detector calibration at 24 percent actual power. The IRs were adjusted at about 4 percent power. The PRs did not need adjusting at that time. The IR and low range PR reactor trips are blocked at 10 percent power during ascension so the high PR reactor trip was the only over power trip in use. At the time of this event, Sequoyah did not use a reduced high PR reactor trip setpoint during power ascension as is done at other plants.

In November 1990, similar IR miscalibrations occurred at Unit 2 (Ref. 4), despite concerted efforts by the licensee to correct the mistakes observed at Unit 1 five months earlier (see above quote from the LER). The following summaries of some of the errors identified in the LER are illustrative of various types of personnel lapses that occur:

> 1. New IR monitors were installed, but plant/cycle specific data were not available when the time for calibration arrived. Technicians used generic information and annotated the workplan accordingly. Workplans were closed out October 31, after post maintenance tests. Both channels were declared operable incorrectly since the appropriate initial settings were not applied to the instruments. Consequently, there was no orange sticker on control-board indicating an open action against these instruments.
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> 2. Subsequently, an operations group was preparing for control rod testing. Engineer "A" realized that the IRs had to be calibrated with cycle specific data. Late in the evening on October 31, Engineer "A" (night test director) provided Technician "B"

with the appropriate calibration information. Engineer "A" incorrectly assumed Technician "B" knew how to use the data. Technician "B" did not understand the procedures for the calibration, did not tell his supervisor he didn't understand, and did not inform anyone that he had the calibration data. The following day, Engineer "A" provided the same data to Foreman "C" indicating that the calibration had to be performed. Foreman "C" did not act on this information. Engineer "A" assumed that the calibration had been performed and the control rod tests were performed on November 1, 2, and 11 with improperly calibrated IRs.

3. Restart test instructions were implemented on November 10. Phase A required sign-off of IR calibration by maintenance. Phase B was initiated without signoff of this step. Engineer "D" (dayshift test director) assumed that Engineer "A" had verified IR calibration 10 days earlier and signed off remaining blanks except for the IR calibration verification. The reactor went critical on November 12 and subsequently tripped for unrelated reasons. The improper initial setting of the IRs was discovered accidently on November 17.

These personnel lapses are not unique to nuclear instrument calibration; these types of problems can probably be found in all types of maintenance work. It is particularly troubling though, that these human lapses occurred in a situation that had heightened, near term organizational attention because of the problems on Unit 1 five months earlier.

Based on a review of the safety analyses in the reports, none of the LERs indicated that the discrepancies in the initial NIS settings would result in exceeding the consequences reported in the FSAR safety analyses.

4.2 Mismatches During Power Operation

Typically, the excore instrumentation is calibrated against a plant heat balance on a daily basis and the axial distribution is calibrated against the incore monitors on a longer time interval. These calibrations are subject to all the various errors encountered in any calibration evolution as indicated by the Catawba and Robinson events described above and events 1 through 12 in the Appendix.

The Catawba event illustrates an equipment weakness that is compensated by human intervention. The instrument rack has an analog dial, on the face of the rack, which the instrument technicians do not rely on. Instead, they go into the rack to attach alligator clips across an output resistor so they can get a readout on a digital meter. In this instance, it introduced an error; under other circumstances, similar actions could produce inadvertent reactor trips. In discussions with Catawba personnel, there is a potentiometer on the front of the rack that the control room operators use to match the PR settings to the calorimetric during a plant transient to stay within the operability limit interpreted from the technical specifications. If this potentiometer runs out of adjustment, an instrument technician is needed to go inside of the rack to adjust another potentiometer. Here again, the imperfect instrument rack design induces unnecessary activities inside the rack that introduce the potential for human errors.

The Robinson event shows that the "calibration" process can contain imbedded errors that go undetected for long periods of time because of the absence of independent, diverse verification/testing.

The calorimetric calculations used to calibrate the excore detectors depend on feedwater flow measurements. It is well known that the flow instrumentation degrades over time and consequently impacts the NIS. Events 3 and 4 in the Appendix were events involving flow instrument degradation. According to Event 4, Callaway increased the frequency of flow meter calibration from 18 to 3 months. Event 12 had a different twist - the equalizing valves on the instruments were leaking sufficiently to cause a 7 percent nonconservative error.

There were several LERs from McGuire and Catawba plants related to declaring the PR monitors inoperable during a power reduction transient because the PR monitors were more than 3.4 to 5 percent below the calorimetric power indication. This involved interpretation of what constitutes an inoperable PR monitor in the technical specifications. The plants have started using plant operators to reset the PR monitors during transients to eliminate the time delay associated with using I&C technicians.

The deviations between the power range monitors and the actual core power were generally small for the events examined. The largest was 7 percent caused by a calorimetric calculation deficiency associated with the feedwater flow instrumentation.

4.3 Other Situations

Events 24 through 26 in the Appendix depict other situations where the monitoring instrumentation was incorrect. Two of these involved boron dilution mitigation and the other involved monitor calibrations during plant coastdown. Each event had a unique cause, two of which were associated with process errors and the third with an operator error.

4.4 Causes

Examination of the 26 events in the Appendix indicates that process errors, administrative oversights, and technician errors were the dominant contributors to the deficiencies noted in these LERs. Process errors included incorrect constants or arithmetic errors in the calorimetric calculations or other procedural errors. In Event 5 (Appendix), an inexperienced technician followed the incorrect procedure exactly and miscalibrated one channel, while perversely, an experienced technician apparently didn't follow the procedure and correctly calibrated the other three channels. Administrative oversights were associated with incorrect initial NIS settings because of unrecognized impact of modifications during refueling, for example, introduction of a low leakage core or excore monitor movement. The technician errors were generally associated with not following procedures. These types of problems can probably be found in all types of maintenance work. Industry generic communications have addressed these types of calibration problems.

On the positive side, supervisory personnel in Events 11, 12, and 14 caught incorrect calibrations because they detected something was wrong with a calibration based on other power indications or prior experience. Along these lines, in Event 4, the plant computer was modified so that the plant would be operated in accordance with the calorimetric as well as the NIS indicated power. In Event 12, the procedures were revised to inhibit further power escalations until disagreements among power indicators are resolved. The use of alternate power indicators such as core delta T or plant electric power output to verify NIS power calibration is analogous to post-maintenance testing of safety related components that was addressed in Generic Letter 83-28.

4.5 Safety Impact

The analyses presented in the LERs generally do not indicate that the consequences calculated in the safety analyses of the FSAR were exceeded. Many of these LER analyses refer to alternate reactor trip functions that provide backup protection. These alternate trip functions are required by IEEE-279. In addition, the differences between indicated and actual power after the initial startup calibrations do not appear to be extreme in the LERs reviewed.

5.0 CONCLUSIONS

A review of LERs associated with errors in effective reactor trip settings related to excore monitors does not indicate a significant, unreviewed generic problem. The errors are attributable to various human errors related to defective communication with the vendor, incorrect procedures, administrative oversights, and technician errors. Most of these observed problems are plant specific and need specific management attention when discovered. Industry generic communications have discussed most of these issues in the past. Also, the analyses in the LERs did not indicate a significant generic safety problem. Several of the LERs indicated the benefits of monitoring alternate indications of core power to verify that the NIS power indications are reasonable.

6.0 REFERENCES

1. Duke Power Company, Licensee Event Report 413/91-14, Catawba Unit 1, July 29, 1991.

2. Carolina Power & Light Company, Licensee Event Report 261/90-14, H.B. Robinson, November 26, 1990.

3. Tennessee Valley Authority, Licensee Event Report 327/90-11, Sequoyah Unit 1, July 1990.

4. Tennessee Valley Authority, Licensee Event Report 328/90-16, Sequoyah Unit 2, December 17, 1990.

5. Carolina Power & Light Company, Licensee Event Report 400/89-23, Shearon Harris, February 5, 1990.

APPENDIX 1

SUMMARIES OF EVENTS

1. **Diablo Canyon LER 275/89-05** The licensee had a computer program for developing flux maps from monthly incore readings. If fewer than six monitors were available in a string, the calibration factors were not used to replace the values stored in memory for the quarterly NIS calibrations. The licensee determined that the impact of not updating the axial distribution factors was negligible in this instance. This was reported as a failure of the NIS quarterly surveillance requirement in the TS. The calibration procedures were subsequently modified to flag the potential problem.

2. **So. Texas LER 499/89-25** An inexperienced technician made an error during quarterly calibration of one NIS channel. This was reported as a failure to declare the channel inoperable within six hours of event (TS). The licensee determined that this had no adverse impact because the other channels were operable. Only qualified people will perform this calibration in the future and a verification step was added to the procedures.

3. **Vogtle LER 424/87-69** The operators were controlling the plant to 100 percent power using the nuclear instrumentation. They subsequently determined that the calorimetric determinations (both computer and hand calculations) indicated higher power levels by up to 2 percent compared to the power indicated by the nuclear instrumentation. The nuclear instrumentation was being used to verify that the plant was not exceeding 100 percent power. A recalibration of the feedwater flow transmitter indicated that it was overestimating by 1 percent. The situation was reported as a violation of the maximum allowed power level (TS). The licensee changed the excore calibration tolerance to +2 percent, -0 percent (performed daily) to insure that the detectors would not read less than the calorimetric calculations.

4. **Callaway LER 483/86-25** The licensee discovered that the plant operated above 100 percent power on two occasions. The cause of the first was an unknown calorimetric error and the cause of the second was attributed to drift in the feedwater flow instrument. The overpower did not exceed 2 percent. The calorimetric is used to calibrate the NIS which is used in turn to verify that 100 percent power is not exceeded. The calibration frequency of the feedwater flow meters was increased from 18 to 3 months. The calorimetric was computerized so the plant will be operated in accordance with the calorimetric and the NIS indicated power. The event was reported as a violation of a license condition on operation at 100 percent power.

5. **Ft. Calhoun LER 285/90-18** One channel of NIS was incorrectly calibrated because of a sign error in a new calibration procedure. An inexperienced technician performed calibration on this channel by following the new procedures exactly. An experienced technician calibrated the other three channels without noticing the error in the new procedure. This was reported because all the channels could have been miscalibrated by the incorrect procedure. The procedure was corrected.

6. **Catawba LER 413/85-16** During reactor power escalation, three of the four overpower channels were incorrectly set to trip at 109 percent power instead of 50 percent power. This error was caused by three different technicians not following the procedure and an inadequate review of the completed work order by a supervisor. This was reported as a voluntary LER. The settings were corrected and the procedure rewritten to make it clearer.

7. **Catawba LER 413/91-14** Through a series of mishaps, one channel of NIS was incorrectly calibrated because of defective test leads and incorrect hand calculations. The limiting conditions for operation were not met for the faulted channel, a technical specification violation. The channel was recalibrated using functional test leads and the procedure was modified to enhance review of the calculations.

8. **Robinson LER 261/90-14** The licensee discovered that he had operated for five years with an incorrect allowable axial flux shape limit in the technical specifications. The error was attributed to the misinterpretation of a revised methodology for determining the allowable axial flux shape (1985). This revision was aimed at improving the plant operating margin after the introduction of a low leakage core. The most recent revision (1990) to the axial operating limit methodology was reviewed to ensure it was not defective in a similar fashion to that implemented in 1985.

9. **Callaway LER 483/87-12** The licensee discovered that scaling instructions for axial offset in the over temperature-delta temperature trip were deleted incorrectly from the surveillance procedure three years earlier. The error was attributed to miscommunication. The procedures were revised after the deficiency was discovered. This event was reported as a technical specification violation.

10. **Haddam Neck LER 213/86-38** An axial offset alarm occurred when the plant was at 94 percent power after recently being down for steam generator repair. During the outage, some work was performed on the excore detectors which shifted their location. Therefore, the calibration of the offset monitors was invalid. The axial offset was not recalibrated following the outage because the NIS movements were not considered major. The deficiency could have persisted undetected until the next incore calibration. This event was reported as a technical specification violation. The licensee revised his procedures to require that engineering to evaluate the situation after any work when the excore monitors are moved.

11. **D.C. Cook LER 315/88-04** During a review of test data, a supervisor noted that an incore flux trace appeared different than he expected. The problem was that the test was incorrectly performed with an input filter in place. This impacted the recorder output graph and resulted in incorrectly adjusting the high flux rate time constant. Only one channel was affected. This event was reported as a technical specification violation. Equipment and procedures were modified to reduce the likelihood of recurrence of this error.

12. **Farley LER 364/89-09** During startup, operations management noted that there appeared to be differences in indications of reactor power. Subsequent investigation indicated that leaking equalizing valves on feedwater flow instruments caused a 7 percent error in the calorimetric calculations. Since the NIS was calibrated by the calorimetric calculations, the reactor trip settings that use NIS were also in error. This was reported because the reactor trip settings were in error by 7 percent. The licensee fixed the leaking valves and procedures were revised to inhibit further power escalation until any disagreement among power indicators are resolved.

13. **Wolf Creek LER 482/92-01** The licensee discovered that the incorrect initial setpoints were used in the intermediate range channels prior to start-up following a refueling outage. The problem was attributed to deficiencies in temporary changes to the procedures for this surveillance during the start-up evolutions. This was a reported as a voluntary LER. The procedures have been revised to require engineering personnel to verify the adequacy of the IR trip setpoints within twelve hours of physics testing.

14. **Comanche Peak LER 445/91-32** The initial calibration of the power range channels prior to plant start-up was incorrect because the omission of a step in the procedure. The shift supervisor sensed that the observed reactor power was inconsistent with his expectations and directed that a calorimetric analysis be performed. The results indicated that the NIS indication was low by 8 percent. The licensee modified relevant procedures to minimize recurrence of this problem.

15. **Salem LER 311/90-28** Evaluation of data taken at 10 percent power during start-up following a refueling indicated that the IRMs were miscalibrated and would cause a reactor trip at 44 percent and 38 percent power instead of the expected 25 percent power. The LER was issued because this large discrepancy violated the technical specifications. The cause of this discrepancy was attributed to details in the process used by engineering to make an estimate of the initial NIS settings.

16. **Sequoyah LER 328/90-16** The initial calibration of IR monitors was incorrect because it was performed without a proper procedure and cycle specific data. The newly installed instruments were incorrectly declared operable. Subsequent interaction between engineering and the instrumentation maintenance department highlighted inadequate communication and supervision. The event was reported because of technical specification violation. Similar mistakes were made earlier on unit 1 start-up. The licensee enacted several changes to improve administrative control of these situations and accountability.

17. **Sequoyah LER 327/90-11** Calorimetric calculations indicated that initial settings on IRs and PRs were off by 20 to 30 percent in a nonconservative direction. The event was reported as a technical specification violation. Misinterpretation of the vendor's instructions was cited as the cause of the problem. The procedures for initial NIS settings were modified.

18. **Sequoyah LER 328/89-06** An operations supervisor noted that the IR 25 percent trip lights were not lit when the plant was at 73 percent power. A Westinghouse representative had been called in earlier to resolve noises in source range detectors. Among other things he recommended that the SR and IR monitors be retracted in their wells. Because of inadequate administrative control, the initial setting on the IRs did not reflect the reduced flux at the monitors resulting from the relocation and the deficiency went unnoticed until the plant was almost at 100 percent power. The IR trip was blocked when the reactor power was 10 percent. The LER was reported as a technical specification violation. The procedures were modified to require additional IR checking at low power levels.

19. **Shearon Harris LER 400/89-23** Following a refueling outage, a calorimetric calculation indicated a power of 42 percent while the NIS indicated 28 percent. This event was caused by inadequate administrative control of the NIS following installation of a low leakage core. Procedures were revised to minimize the likelihood of this problem recurring. This event was reported because a single cause resulted in multiple inoperable channels in the reactor protection system.

20. **Calvert Cliffs LER 88-07** A calorimetric calculation indicated that reactor power was 44 percent while the indicated power was 30 percent. The discrepancy was attributed to inadequate communications and improper procedure implementation. The power ascension procedure was modified to minimize recurrence of this event.

21. **Millstone LER 423/88-10** The initial settings for negative and positive rate reactor trips were incorrect. The error was attributed to engineering personnel failing to adequately account for the low leakage core. Potential problems with low leakage cores were previously flagged by NRC and industry notifications to the licensees in 1983. The refueling calibration procedure for NIS was revised. The event was reported because a single cause resulted in multiple inoperable channels in the reactor protection system.

22. **Prairie Island LER 282/87-14** A calorimetric calculation indicated core power was 46 percent compared to the NIS indication of 35 percent. The problem was attributed to a change in leakage caused by a new core pattern. The licensee planned a license amendment to increase the required setpoint of the low range PR trip setting and also to check the PR indications at lower powers. The LER was reported as a technical specification violation.

23. **Salem LER 311/91-15** A daily calorimetric check (at about 30 percent power) indicated that two channels of power range monitors were slightly low and needed to be reset. This was reported as a technical specification violation. The licensee attributed the reportability of this situation to an overly conservative technical specification operability criteria for potential events initiated from low powers. The licensee was examining the definition of operability for these instruments based on the updated FSAR.

24. **Comanche Peak LER 445/92-03** The Westinghouse generic curve for inverse count rate ratio used in setting the boron dilution mitigation system actuation versus boron concentration did not bound Comanche Peak. Consequently, the boron dilution mitigation system actuation from the source range monitors was incorrect. This was reported because this error defeated the safety system. The licensee requested that the instrumentation be removed from the technical specifications based on NRC Generic Letter 85-05.

25. **Callaway LER 483/86-31** Erroneous test voltages were discovered in the procedures for verifying the boron dilution setpoint of the source range monitors. This attributed to incorrect vendor information. This was reported as a technical specification violation. The calibration procedures were revised.

26. **Yankee Rowe LER 29/88-09** During plant coastdown at less than 15 percent power, the operator zeroed the fine gain on the nuclear channels. This dropped the indicated power below the actual power so that the plant trip settings (on power level) potentially could be exceeded in the event of a reactor power excursion event. The event was reported as a technical specification violation. The licensee attributed the event to insufficient guidance in the procedures which were subsequently changed.