

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-295/85027(DRS); 50-304/85028(DRS)

Docket Nos. 50-295; 50-304

License Nos. DPR-39; DPR-48

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Facility Name: Zion Nuclear Power Station, Units 1 and 2

Inspection At: Zion, Illinois

Inspection Conducted: July 22 through August 30, 1985

Inspector: *M. L. McCormick-Barger*
M. L. McCormick-Barger

9-20-85
Date

J. Haman
Approved By: M. A. Ring, Chief
Test Programs Section

9/20/85
Date

Inspection Summary

Inspection on July 22 through August 30, 1985 (Report No. 50-295/85027(DRS); 50-304/85028(DRS))

Areas Inspected: Routine, announced inspection of licensee actions on previous inspection findings, general program requirements for Unit 1 Cycle 9 Startup Testing, reactor thermocouple/RTD cross calibration, isothermal temperature coefficient measurement, doppler coefficient measurement, control rod drive and rod position indication checks, and incore/excore calibration. The inspection involved 94 inspector-hours onsite.

Results: No violations or deviations were identified.

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DETAILS

1. Persons Contacted

- *K. Graesser, Station Manager
- *T. Rieck, Station Superintendent, Services
- *W. Kurth, Assistant Superintendent, Services
- *C. Schultz, Assistant Technical Staff Supervisor
- *R. Chin, Nuclear Group Leader
- *W. Stone, Quality Assurance Supervisor
- *J. Ballard, Quality Control Supervisor

Additional station technical and administrative personnel were contacted by the inspector during the course of the inspection.

*Denotes those personnel present at the exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Open Item (295/82-21-01): This item involved two concerns - the lack of acceptance criteria for the wide range Resistance Temperature Detectors (RTD) in surveillance procedure TSS 15.6.72, "RTD Cross Calibration," dated November 10, 1981 and that 15 of the 65 incore thermocouples for Unit 1 Cycle 7 were inoperable.

The inspector reviewed TSS 15.6.72, "RTD Cross Calibration," dated September 20, 1984, and noted that it contained the following acceptance criterion for the wide range RTDs: "Step 6.13. Evaluate the wide range RTDs using the following acceptance criterion: $-6^{\circ}\text{F} \leq (\text{predicted wide range RTD temperature} - \text{average temperature of all the good narrow range RTDs}) \leq 0.5^{\circ}\text{F}.$ " A review of the incore thermocouples for operability based on the results of TSS 15.6.72, dated September 20, 1984, and performed for Unit 1 Cycle 9 on September 7-13, 1985, indicated that only 5 of 65 incore thermocouples were inoperable which the inspector considers acceptable.

3. General Program Requirements for Unit 1 Cycle 9 Startup Testing

The inspector utilized the following documents during a review of general program requirements for Unit 1 Cycle 9 Startup Testing:

- Reload Safety Evaluation Zion Nuclear Plant, Unit 1 Cycle 9, July 1984.
- NRC letter J. Norris to D. L. Farrar, NRC transmittal of Technical Specification Amendments No. 89 to DPR-39 and No. 79 to DPR-48 and the associated safety evaluation report, dated May 24, 1985.

- Commonwealth Edison (CECo) Internal Memorandum, H. E. Bliss, Nuclear Fuel Services Manager, to K. L. Graesser, Zion Station Manager, "Zion 1 Cycle 9 CAOC Analysis Based on Actual EOC8 Burnup," Z1C9/043, dated June 7, 1985.
- Safety Parameter Interaction List for Zion, Unit 1 Cycle 9, approved January 4, 1984.
- Zion 1, Cycle 9, Nuclear Design Report, NFSR-0035, Revision 0.
- CECO memo, H. E. Bliss to K. L. Graesser, "Revision to Table 7.2 of Zion, Unit 1 Cycle 9 Nuclear Design Report," dated August 2, 1985.
- CECO memo, H. E. Bliss to K. L. Graesser, "Zion 1 Cycle 9 Rod Exchange Data," Z1C9/040, dated May 9, 1985.
- Technical Staff Surveillance (TSS) Procedure 15.6.51, "Zero Power Physics Measurements Following Refueling," dated June 3, 1985 and performed for Unit 1 Cycle 9 on June 14-16, 1985.
- TSS Procedure 15.6.61, "At Power Physics Measurements Following Refueling," dated January 10, 1984, and performed for Unit 1 Cycle 9 on June 21, 1985 to July 27, 1985.

With regard to TSS 15.6.51, "Zero Power Physics Measurements Following Refueling," the results evaluation discussed inconsistencies in boron sample measurements taken during startup physics testing. Boron sample measurement inconsistencies were also identified in the results evaluation for TSS 15.6.51, dated July 2, 1984, and performed for Unit 2, Cycle 8 on July 4-7, 1984. For Unit 1 Cycle 9, differences between two measurements of the same boron sample were as much as 67 ppm and, for Unit 2 Cycle 8, were as much as 45 ppm. The corrective actions discussed in the Unit 2 Cycle 8 test evaluation recommended that a meeting be held between the Nuclear Group and the station chemists to discuss the importance of boron sampling measurements. Although no meeting minutes were kept, the Station Nuclear Engineer stated that this meeting had taken place prior to the Unit 1 Cycle 9 startup. To calibrate the boron measurement instrumentation, a standard with known boron concentration is used. In an attempt to improve boron sample measurements, the Unit 1 Cycle 9 test evaluation indicated that the licensee intends to investigate the possibility of using a standard with a boron concentration nearer to the boron concentration of the samples being measured. Review of the licensee's corrective actions in a subsequent NRC inspection will be tracked as an open item (295/85027-01).

TSS 15.6.51 and TSS 15.6.61 both contained steps requiring that the manufacturer, model and serial number of all instruments used in the reactivity computer system be recorded. In both cases, the inspector was unable to locate this information in the completed test packages. In discussions of this matter with the licensee, the licensee explained that, since Zion has only one reactivity computer system, a standard type-written sheet had been developed which provided all of this information. This sheet was inadvertently omitted from the completed test packages. The licensee stated their intent to take the necessary actions to ensure that future test packages include reactivity computer system data as required.

Paragraph 5.a of this report contains comments regarding the Zion 1 Cycle 9 Nuclear Design Report and CECO memo, "Revision to Table 7.2 of Zion, Unit 1 Cycle 9 Nuclear Design Report," dated August 2, 1985.

No violations or deviations were identified. However, a portion of this area requires further review and evaluation and is considered to be an open item.

4. Reactor Thermocouple/RTD Cross Calibration

The inspector reviewed surveillance procedure TSS 15.6.72, "RTD Cross Calibration," dated September 20, 1984, and performed for Unit 1 Cycle 9 on June 7-13, 1985, to determine that results obtained were within prescribed limits and that any discrepancies were properly evaluated. During this review the inspector noted that the results for one of the wide range RTDs did not meet the acceptance criterion for wide range RTDs of: $-6^{\circ}\text{F} \leq (\text{predicted wide range RTD temperature minus the average temperature of all the good narrow range RTDs}) \leq 0.5^{\circ}\text{F}$. The licensee stated that an evaluation of this condition took place prior to proceeding with the Unit 1 Cycle 9 initial startup. The inspector had no evidence that would contradict that statement. However, the documented evaluation was not signed until June 27, 1985. (The test which was required to be performed prior to initial criticality was performed on June 12-13, 1985, initial criticality occurred on June 14, 1985, and Unit 1 was at 88% power on June 25, 1985.) In discussions with the licensee concerning this matter, the licensee agreed that, in the future, the evaluation of a startup test acceptance criterion that was not satisfied would be documented prior to proceeding with the startup testing. This is an open item pending NRC review during the next core physics startup testing inspection (295/85027-02).

No violations or deviations were identified. However, a portion of this area requires further review and evaluation and is considered to be an open item.

5. Isothermal Temperature Coefficient and Doppler Coefficient

The inspector reviewed licensee procedures and results to verify that prerequisites, precautions and plant conditions were met, that results

were within acceptance criteria and consistent with Technical Specifications and that any discrepancies were properly evaluated. The inspector utilized the following procedures during the review:

- TSS 15.6.54, "Isothermal Moderator Temperature Coefficient Measurements," dated May 27, 1982, and performed for Unit 1 Cycle 9 on June 15, 1985.
- TSS 15.6.62, "Moderator Temperature Coefficient Measurement," dated July 9, 1980, (with Station Procedure Change Request A85-613 approved June 27, 1985, attached) and performed for Unit 1 Cycle 9 on July 9, 1985.
- TSS 15.6.62, "Moderator Temperature Coefficient Measurement," dated July 9, 1980, (with Station Procedure Change Request A85-613 approved June 27, 1985, attached) and performed for Unit 1 Cycle 9 on July 27, 1985.
- TSS 15.6.63, "Doppler Coefficient Measurement," dated February 8, 1985, (with Station Procedure Change Request A85-612 approved June 27, 1985, attached) and performed for Unit 1 Cycle 9 on July 9, 1985.
- TSS 15.6.63, "Doppler Coefficient Measurement," dated February 8, 1985, (with Station Procedure Change Request A85-612 approved June 27, 1985, attached) and performed for Unit 1 Cycle 9 on July 22, 1985.

The inspector also utilized the following document during the review:

- "Nuclear Design Report for Zion, Unit 1 Cycle 9," NFSR 0035, Revision 0, Nuclear Fuel Services - Commonwealth Edison Company, dated April 1985.
- a. During the test evaluation for TSS 15.6.54, "Isothermal Moderator Temperature Coefficient Measurements," performed on June 15, 1985, a member of the Technical Staff discovered an apparent error in Table 7.2 of the Nuclear Design Report. In discussions between the Technical Staff and the Nuclear Fuel Services Section, it was confirmed that an error existed in the method used to generate the moderator temperature coefficient component of the isothermal temperature coefficient reported in Table 7.2. Table 7.2 was subsequently corrected via a memo from H. E. Bliss, Nuclear Fuel Services Manager, to K. L. Graesser, Zion Station Manager, "Revision to Table 7.2 of Zion, Unit 1 Cycle 9 Nuclear Design Report," Z1C9/045, dated August 2, 1985. Other than this memo, members of the Technical Staff were not cognizant of corrective actions taken by the Nuclear Fuel Services section. Therefore, pending an NRC inspection of the CECO Nuclear Fuel Services section to review the licensee's corrective actions to prevent recurrence of errors in nuclear design reports, this is considered an unresolved item (295/85027-03).

- b. The test evaluation for TSS 15.6.63, "Doppler Coefficient Measurement," performed on July 9, 1985, stated that all design and safety criteria were met. However, the measured doppler coefficient was $-7.59 \text{ pcm/\% power}$ which was outside of the design acceptance criterion band of $-8.95 \pm 1.34 \text{ pcm/\% power}$ (i.e., -7.61 to $-10.29 \text{ pcm/\% power}$). At the time that the inspector reviewed the test evaluation, the Technical Staff Supervisor had not signed the procedure yet. Additionally, a subsequent doppler coefficient measurement had been performed on July 22, 1985, which resulted in a doppler coefficient value that did meet the design acceptance criterion. Following discussion of this matter with the licensee, the licensee rewrote the test evaluation to reflect the fact that the design acceptance criterion for the doppler coefficient had not been met in the July 9 instance.

No violations or deviations were identified. However, a portion of this area requires further review and evaluation and is considered to be an unresolved item.

6. Control Rod Drive and Rod Position Indication Checks

The inspector reviewed licensee procedures and results to verify that prerequisites, precautions and plant conditions were met, that results were within acceptance criteria and consistent with Technical Specifications and that any discrepancies were properly evaluated. The inspector utilized the following procedures during the review:

- TSS 15.6.26, "Control Rod System Checkout," dated January 1, 1985, and performed for Unit 1 Cycle 9 on June 10-12, 1985.
 - TSS 15.6.57, "Checkcut of the Bank Overlap Unit," dated March 12, 1984, and performed for Unit 1 Cycle 9 on June 11, 1985.
- a. With regard to TSS 15.6.26, "Control Rod System Checkout," the inspector noted the following:
- (1) All rod drop times satisfied the acceptance criterion of 2.4 seconds or less required by the Technical Specifications.
 - (2) The inspector reviewed the slave cycler strip chart traces for power cabinets 1BD and 1AC and the rod drop timing traces for rods in Shutdown Banks A, C, and D, and Control Bank A. The inspector had no concerns as a result of the review of these strip charts.
 - (3) Surveillance test TSS 15.6.26 was required to be completed prior to initial criticality per Technical Specification 3/4.2.3.C. However, the signatures in the last section of the procedure (the test results evaluation section) were as follows:

Initial Criticality, June 14, 1985

Test Engineer's Signature, June 21, 1985
(Reactor at approximately 49% power)

Station Nuclear Engineer's Signature, July 10, 1985
(Reactor at approximately 100% power)

Technical Staff Supervisor's Signature, July 19, 1985

The licensee stated that the startup test surveillances are considered to be complete when the last step is complete which is prior to the test evaluation section writeup, but these surveillances were not signed and dated until after the test evaluation was complete.

During discussions with the licensee, the licensee stated their intent to review the startup test procedures and revise them as necessary to provide for signatures and dates that would signify completion of the tests to the extent necessary to satisfy surveillance requirements prior to proceeding with a reactor startup. This is an open item (295/85027-04) pending procedure revisions and subsequent NRC review.

- b. With regard to TSS 15.6.57, "Checkout of the Bank Overlap Unit," the inspector noted the following:

- (1) Step 7.5.2 stated, "All rod positioning indicators are reading zero steps." When this step was signed, however, some of the Rod Positioning Indicators (RPI) were not reading zero as documented in the Data Sheet Section. For example, for Shutdown Bank A the following values were recorded:

Rod Designation (Group)	RPI Recorded Steps
M2(2)	5
D2(1)	-5
P4(1)	5
B4(2)	0
P12(2)	0
B12(1)	0
M14(1)	5
D14(2)	7

During discussions between the inspector and the licensee, the licensee indicated that:

- (a) This test was performed prior to the RPIs being calibrated (that is, prior to TSS 15.6.26 being performed) and, therefore, a precaution statement should have been included in the procedure to state that the RPI signals are not valid prior to

TSS 15.6.26 being completed. (The procedure contained precaution 5.6 which stated, "If this test is performed in cold shutdown, the RPI signals are not valid since they are calibrated for hot shutdown conditions." This precaution did not apply to TSS 15.6.57 as performed on June 11, 1985, because it was performed at hot shutdown conditions.)

- (b) The intent of Step 7.5.2 was for the RPIs to read within a tolerance band of zero steps.

The licensee initiated a procedure change request on August 15, 1985, to include the precaution and tolerance band discussed above.

- (2) The test evaluation section stated, "Several of the rod bottom lights did not clear at 20 steps which is acceptable since the RPI calibration had not yet been performed." The Precautions, Limitations and Setpoint document establishes 20 steps as the setpoint for the rod bottom bistables. Upon the inspector's request to review the documentation that showed that the rod bottom lights had cleared at 20 steps (following the RPI calibration), the licensee responded that the check was made but was not documented. In discussions with the licensee, the Station Nuclear Engineer stated that the station procedures would be modified to include a check that the rod bottom lights go out at 20 steps during the initial startup following a refueling. This is an open item (295/85027-05) pending the procedure revision and subsequent NRC review.

No violations or deviations were identified. However, portions of this area require further review and evaluation and are considered to be open items.

7. Incore/Excore Detector Calibration

For Unit 1 Cycle 9, the inspector reviewed licensee procedures to verify that prerequisites, precautions and plant conditions were met, that results were within acceptance criteria and consistent with Technical Specifications and that any discrepancies were properly evaluated. The inspector utilized the following procedures during the review:

- TSS 15.6.2, "NIS Calibration," dated March 1, 1985, and performed for Unit 1 Cycle 9 on July 3, 1985.
- TSS 15.6.0, "Flux Map Data Acquisition, Power Distribution and Incore/Excore Axial Imbalance Checks," dated January 12, 1984, and performed for Unit 1 Cycle 9 on:

July 2, 1985 (associated with Flux Map 1-9-06)

July 3, 1985 (associated with Flux Map 1-9-07)

July 3, 1985 (associated with Flux Map 1-9-08)

During the review, the inspector noted that surveillance test TSS 15.6.2, "NIS Calibration," was required to be completed prior to exceeding 90% power per Technical Specification 3.2.2.C.1. However, the signatures in the last section of the procedure (the test results evaluation section) were as follows:

Unit 1 exceeded 90% power, July 5, 1985

Test Engineer's Signature, July 8, 1985

Station Nuclear Engineer's Signature, July 10, 1985

Technical Staff Supervisor's Signature, July 19, 1985

This is another example of the situation discussed in Paragraph 6.a.(3) of this inspection report. Refer to Paragraph 6.a(3) for additional discussion.

The inspector reviewed the following procedures performed during Unit 1 Cycle 8 to verify that Technical Specification 3.2.2.C.1, concerning periodic checks and recalibrations of the excore nuclear detectors, was being met.

- TSS 15.6.2, "NIS Calibration," performed for Unit 1 Cycle 8 on the following dates:
 - February 18, 1984
 - May 15, 1984
 - September 10, 1984
 - December 15, 1984
- TSS 15.6.0, "Flux Map Data Acquisition Power Distribution and Incore/Excore Imbalance Checks," performed 29 times for Unit 1 Cycle 8 between February 11, 1984 and December 28, 1984, inclusive.

No violations or deviations were identified.

8. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 3, 4, 6.a.(3), and 6.b.(2).

9. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 5.

10. Exit Interview

The inspector met with licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on August 30, 1985. The inspector summarized the scope of the inspection and the findings. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents/processes as proprietary.