U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-347/83-10(DE)

Docket No. 50-237 License No. DPR-19

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

Facility Name: Dresden Station, Unit 2

Inspection At: Dresden Site, Morris, IL

Inspection Conducted: March 1, 9-10, 24-25, April 4, 20, 22, 23, 26-27, May 5, June 30, and July 1 and 7, 1983.

Inspector: for I. T. Yin 8/11/83

Approved By: D. H. Danielson, Chief 8/11/83
Materials & Processes Section

Inspection Summary

Inspection on March 1, 9-10, 24-25, April 4, 20, 22, 23, 26-27, May 5, June 30, and July 1 and 7, 1983 (Report No. 50-237/83-10(DE))
Areas Inspected: Review of the evaluation and testing to determine the cause of snubber failures in the Main Steam System. The inspection involved a total of 68 inspector-hours onsite, at the Wyle Laboratories, and at the Region III Office by one NRC inspector.
Results: No items of noncompliance or deviations were identified.

## DETAILS

### Persons Contacted

Inspections Conducted at the Site on March 1, 9-10, 24-25, April 4, 20, 23, June 30, and July 1, 1983.

Commonwealth Edison Company (CECo)

D. J. Scott, Station Superintendent
J. W. Wujciga, Assistant Superintendent - Administration
J. D. Brunner, Technical Staff Supervisor
J. Dunbar, Maintenance Staff Assistant
R. Mirochua, Engineer, SNED
G. Frizzell, Engineer, SNED
M. C. Strait, Engineer, SNED
L. Williams, QA Supervisor
S. Harris, Engineering Associate, Technical Staff
R. Zentner, Lead Engineer, Station Construction Department
M. Leahy, Group Engineer, Technical Staff
R. Zentner, Lead Engineer
B. Rybak, Nuclear Licensing
K. Davenport, Technical Staff Group Leader
R. Coen, Technical Staff Assistant Group Leader

Sargent and Lundy Engineers (S&L)

S. Azzazy, Supervisor, EMD

Wyle Laboratories (Wyle)

B. Smith, Project Engineer

Meeting Held at the Region III Office on April 22, 1983

CECo

B. Rybak, Nuclear Licensing
J. S. Abel, Station Nuclear Engineering
R. H. Mirochua, Station Nuclear Engineering
D. Farrar, Nuclear Licensing
J. Wujciga, Assistant Superintendent - Administration

S&L

A. Walser, Structural Project Engineer
R. H. Jason, Project Manager
S. E. Azzazy, Supervisor - EMD

Wyle

B. Smith, Project Engineer

NRC - Region III (RIII)

J. G. Keppler, Regional Administrator
R. L. Spessard, Director, Division of Engineering
W. D. Shafer, Chief, Branch No. 2
W. S. Little, Chief, Engineering - Branch II
M. J. Jordan, Acting Section Chief, DPRP - 2C
D. H. Danielson, Chief, Materials and Processes Section
S. Stasek, Dresden, Resident Inspector
I. T. Yin, Senior Mechanical Engineer

Inspection Conducted at Wyle Laboratories on April 26-27, 1983

Wyle

L. E. Frazier, Director, Test Operations
V. F. Kearns, Senior Snubber Engineer
A. Kuykendall, Project Engineer
D. F. Dougherty, Program Development
D. M. Hooper, Engineer

Meeting Held at the Region III Office on May 5, 1983

CECo

J. S. Abel, Station Nuclear Engineering Department (SNED)
D. L. Farrar, Licensing
R. Mirochua, SNED
B. Rybak, Licensing
J. Wujcica, Dresden, Assistant Superintendent
J. Brunner, Dresden, Technical Staff Supervisor

S&L

R. H. Jason, Project Manager
S. E. Azzazy, Supervisor
D. E. Olson, Project Engineer

Wyle

B. Smith, Project Engineer

Nutech Engineers (Nutech)

J. W. Muffett, Engineering Manager
R. H. Buchholz, Project Director
T. A. Pickens, Project Manager

RIII

A. B. Davis, Deputy Regional Administrator
R. L. Spessard, Director, Division of Engineering
C. E. Norelius, Director, Division of Project and Resident Program
W. S. Little, Chief, Engineering - Branch II
D. H. Danielson, Chief, Materials and Processes Section
M. J. Jordan, Action Chief, DPRP - 2C
I. T. Yin, Senior Mechanical Engineer

Inspection Conducted at Region III on July 7, 1983

CECo

*J. W. Wujciga, Assistant Superintendent - Administration
*K. Davenport, Technical Staff Group Leader

*Denotes those attending the management exit interview on July 7, 1983.

Functional or Program Areas Inspected

During the Dresden Unit 2 refueling outage, on Feburary 10, 1983, five safety related mechanical snubbers installed on the Main Steam System (MS) lines were found to be damaged and inoperable. The snubbers had been installed during the previous refueling outage. The incident was reported to Region III on February 26, 1983 (resident office) and February 28, 1983 (regional office). This inspection was conducted to evaluate the licensee's action/program for inspection of system damage, to determine the cause of the problem, and to prevent recurrence.

The damage appeared to be that type which could have resulted from the snubbers being overloaded. These failures were not found on other Commonwealth Edison units utilizing the same type of snubbers. The licensee instituted a program to determine the cause for the failures including: a search of the operating history to determine what operational transients had occurred, an analytical evaluation of the forces exerted on the snubbers by operational transients, an evaluation of how potential installation deficiencies or improper materials of construction could affect snubber performance, and a test program to verify loads exerted on the snubbers by the worst operational transients (lifting of relief valves). Region III discussed the licensee's program with the NRR licensing project manager for Dresden and with NRR Mechanical Engineering Branch personnel who were in general agreement with the actions taken and the conclusions drawn.

The inspection report is divided into the following sections to document RIII and the licensee efforts in a chronological manner and to provide a record of events and data obtained through site inspections, testing, and management meetings.

## Section I

This section documents the events that took place from March 1 to April 27, 1983, including RIII site inspection efforts, the licensee's preparation prior to conducting MS thermal and dynamic tests, and a meeting at the RIII office on April 22, 1983.

- RIII observed snubber failure conditions.
- CECo shutdown Dresden 3 to conduct inspection of MS snubbers for similiar problems. No snubber damage was found.
- CECo inspected Quad-Cities Units 1 and 2 MS snubbers for similar problems. No snubber damage was found.
- S&L evaluated the Dresden 2 MS failed snubber cold spring effects, and determined that the stresses were within code allowables.
- RIII issued a Confirmatory Action Letter (CAL) on March 17, 1983 to delineate required inspection and testing action items. The CAL is attached to this report.
- Instrumentation for measuring MS snubber forces and movements during relief valve actuation at rated temperature and pressure and the amount of component thermal expansion was selected by S&L and installed by site and Wyle personnel.
- Procedures for (1) snubber strain gauge calibration, (2) thermal displacement tests, (3) dynamic tests, (4) a contingency action plan if snubber test loads exceeded rated capacities, and (5) the quick initial evaluation of data were issued by the responsible CECo site, engineering, QA/QC, and S&L personnel. The procedures were reviewed and concurred in by RIII staff prior to their actual implementation.

## Section II

This section documents: (1) the licensee's presentation of Dresden Unit 2 MS piping system and snubber test data and engineering evaluations held at RIII office on May 5, 1983, and (2) the RIII review of the licensee's plans, testing data, and conclusions provided during the meeting, and included in two subsequent transmittals, dated May 13, 1983, and May 24, 1983. The RIII staff concurred with the licensee proposed plan of action covering the 62-day period of operation prior to cold shutdown of Dresden 2 for further MS system snubber inspection.

## Section III

This section documents the RIII staff review of the licensee's site inspection/testing of structures, the MS piping system, and the piping and component suspension systems.

In discussion with the licensee's staff on July 7, 1983, the inspector was informed that the 62-day re-inspection performed in June 1983 identified no inoperable snubbers. All snubbers installed on the MS system were stroke tested to ensure no internal defects. During this re-inspection the pipe clamp for snubber No. 42 (not one of the previously failed snubbers) was

observed to be loose, however, there was no observed binding with the attachment structural components. This deficiency was reported through normal site procedures. The snubber hot and cold position settings were remeasured. No inconsistencies were found.

Conclusions

The licensee's program did not conclusively determine the cause of the snubber failures. RIII has concluded that the licensee's efforts relative to (1) inspection of the MS system and component structural attachments, (2) investigation of the causes of the reported events, and (3) evaluation of test data to ensure plant operation would not endanger public health and safety, were substantial and effective. All items contained in the RIII CAL, dated March 17, 1983 have been implemented by the licensee. Although none of the tests or analytical measures could simulate or duplicate the type(s) of loading that caused the five mechanical snubber to fail, there are, however, sufficient facts to provide the RIII staff the necessary confidence to permit continued plant operation. These facts include: (1) the failures appeared to result from limited cyclic dynamic overloads that had little effect in terms of reducing system fatique life span; (2) the failure could have been caused by misalignment although no conclusive evidence was found to indicate this; (3) no failures had occurred at Dresden 3, Quad-Cities 1, and Quad-Cities 2, the actual dynamic test results from the safety relief valve lift thrust loads showed the force magnitudes to be far below the analytical predictions; and (5) large design safety margins in piping stress analyses in the areas of Code conservatism, loading combinations, assumed valve actuation times, and demonstrated test versus calculated snubber reactive load levels.

Exit Interview

The inspector met with licensee representatives at the conclusions of the inspections. The inspector summarized the scope and findings of the inspections. The licensee acknowledged the findings reported herein.

Section I

1. Inspection at Site on March 1, 1983

In discussions with the licensee staff and in review of documents the inspector noted the following facts:

a. Percent of Snubber Failure

| MS Lines | Snubber | Failure | Percentage |
|---|---|---|---|
| A | 4 (PSA-10)<br>4 (PSA-35) | 0 | 0 |
| B | 3 (PSA-10) | 1 | 33 |
| C | 3 (PSA-10) | 3 | 100 |
| D | 3 (PSA-10) | 1 | 33 |

| MS Safety Relief Valve | Snubbers | Failure |
|---|---|---|
| A | 1 (PSA-10) | 0 |
| B | 2 (PSA-10) | 0 |
| C | 1 (PSA-10) | 0 |
| D | 1 (PSA-10) | 0 |

b. Load Capacity of the Snubbers

| | ASME Conditions | |
|---|---|---|
| | B (Kips) | C or D (Kips) |
| PSA-10 | 15 | 22.1 |
| PSA-35 | 50 | 72.45 |

c. Snubber Failure Conditions as Reported by the licensee

. Snubber #46
S/N 7686, MS-B

Failed to stroke or accelerate as designed during tension testing at Wyle Labs. During the compression test, the snubber moved about 1/2 inch and then locked rigid. When removed from the test machine, the snubber stroked freely. Upon disassembly, no damage was noted.

. Snubber #44
S/N 7395, MS-C

Dust cover dented. Inertia mass snap ring broken. Inertia mass stuck to shaft. Torque transfer drum snap ring broken. Inner capstan spring retainer out of place. Thrust bearing corn cobbed. Could rotate shaft to stroke snubber but could

not stroke by hand. Took out thrust bearing, inspected and reassembled; same indications as above. End piece could be unscrewed from the ball nut.

. Snubber #50
S/N 7403, Strokeable (MS-C)

Inertia mass snap ring broken, dust cover dented. Threads stripped out of thrust bearing. Key found on ball nut side of thrust bearing, as well as most of the balls. End piece could be unscrewed from ball nut.

. Snubber #51
Locked Up (MS-C)
S/N 7704

Dust cover dented. End of ball screw shaft broken at snap ring groove. Inertia mass stuck to the shaft. Thrust bearing inner race stripped out. Shaft stripped in thrust bearing area. Ball screw shaft bent. Balls frozen in thrust bearing.

. Snubber #53
Locked Up (MS-D)
S/N 6989

Dust cover dented. Broken pieces of snap rings, washers and stripped out threads stuck between the inertia mass and the housing. When these pieces were removed, the snubber could be stroked. Inertia mass snap ring broken. Inertia mass stuck to the shaft. Torque transfer drum snap ring broken. Tnrust bearing inner race stripped out.

d. Extended Licensee Inspection Action

As a result of the snubber failure problem, the licensee further inspected and tested, per Technical Specification requirements, all 33 safety related snubbers in Unit 2. No additional snubber damage and failure was identified. In addition to the above inspections, Dresden Unit 3 was shut down three days later during the first weekend of March 1983. No MS snubber damage was found. The Dresden 3 inspection and testing were witnessed by the RIII Senior Resident Inspector.

2. Inspection at the Site on March 9-10, 1983

The inspector discussed the probable cause of the snubber failure and stressed the need for system testing. Issues discussed and actions initiated include:

a. Restraining Effects Due to Snubber Failure

The following data was obtained for the frozen snubber units:

| Snubber No. | Design, Cold Position (in) | Design, Hot Position (in) | As Found (in) |
|---|---|---|---|
| 51 | 2 3/4 | 4 | 4 1/2 |
| 53 | 2 9/16 | 3 9/16 | 2 1/4 |

The effects of the above conditions were subsequently evaluated by S&L and found to be within ASME Code stress allowables.

b. Issuance of RIII Confirmatory Action Letter (CAL)

In view of the significance of the Dresden Unit 2 MS system snubber failures, the inspector discussed with site personnel the actions required to aid in determining the extent of future NRC actions and the need for long term system engineering evaluations to ensure safe operation during the remaining plant life. These actions included mechanical and structural inspections, non-destructive examination, thermal tests, and dynamic tests. These actions were documented in a CAL dated March 17, 1983 (attached).

3. Inspection at the Site on March 24-25, 1983

The inspector reviewed the Linear Variable Differential Transformer (LVDT) and Strain Gauge (SG) installation locations, and had no adverse comments. The 11 LVDTs and 7 SGs were installed at the following locations:

MS Line B

a. LVDT

On snubber No. 46.

b. SG

On snubbers Nos. 45 and No. 46.

MS Line C

a. LVDT

(1) On snubbers No. 44, No. 50, and No. 51.

(2) One horizontal and one vertical LVDT were installed at a location 64" upstream of the SRV, on the header (shown on S&L stress isometric drawing, between Nodes 40 and 45).

(3) One axial LVDT was installed downstream of the $RV_2$ (shown on S&L isometric drawing Node 60).

b. SG

On snubbers No. 44, No. 50, and No. 51.

MS Line D

a. LVDT

(1) On snubber No. 53

(2) One axial and one vertical LVDT were to be installed at a location 27" upstream of the RV on the header (shown on S&L isometric drawing, in between Nodes 45 and 50).

(3) One axial LVDT was to be installed on the pipe riser downstream of the SRV (shown on S&L isometric drawing Node 75).

b. SG

On snubbers No. 52, and No. 53.

NOTES:

[1] SRV means electromatic relief valve with discharge line connecting to the torus.

[2] RV means spring loaded relief valve. It releases steam into the drywell atmosphere.

In review of the documentation, the inspector observed that necessary controls were present for installing instrumentation and wiring for remote monitoring of snubber operation and pipe movements. The provisions were included in Dresden Unit 2 Work Request (WR) No. 26335, dated March 11, 1983. However, there were deficiencies in the following areas:

a. Since the site engineering staff determined that the mounting of LVDTs and the testing of MS system were not safety related activities, there had not been WRs issued requiring approved work procedures, drawings, and specifications for carrying out CAL Items 7 and 8, thermal and dynamic testing requirements.

b. Qualification or certification requirements had not been established to ensure that the LVDTs would maintain their functionability and accuracy in the reactor operating environment.

c. There had not been any provisions established to test the snubbers with SGs installed to ensure that instrument read-outs correspond with the load inputs, and correction factors between test and reactor operating enviornmental conditions had not been obtained.

4. Inspection at Site on April 4, 1983

In discussion with the responsible site staff and in review of the documentation, the inspector determined that issues stated in Paragraph 3 had not been addressed or formulated by the CECo staff. Subsequently, on April 5, 1983, a telephone conference was held between RIII and Site management and working staff. RIII stated the following positions:

a. Implementation of the CAL, dated March 17, 1983, is considered a safety related activity and should be carried out in accordance with 10 CFR 50, Appendix B requirements. Any exceptions to the safety related classification should be delinated in the program. All instrumentation should be certified or qualified to be functional at reactor operating environmental conditions.

b. Procedures for (1) installation of the measuring devices, (2) performance of thermal and dynamic line tests, and (3) evaluation of the testing data should be issued, reviewed, and approved by responsible organizations.

c. QA/QC hold point inspection signoff should be established within the procedures. QC participation in the test data collection process should be required.

d. Plant operation procedures should be modified to include provision to initiate appropriate actions if (1) any or all the instruments, piping components, or snubbers fail during testing, and (2) no conclusion can be reached on what caused the snubber damage.

5. Inspection at the Site on April 20, 1983

a. The inspector reviewed site procedure SP 83-4-50, "Dresden 2 MS Piping System Monitoring - Phase I", Revision 0, and had the following comments:

(1) S&L File No. EMO 043073, "Quick Look Evaluation Procedure for MS Monitoring", Revision 0, dated April 12, 1983 was not available at the site.

(2) QC participation in the data measurements including thermal, LVDT, and SG readings was not included in the procedures.

(3) There was a lack of specific instructions on how to perform spring support thermal displacement measurements, including a lack of acceptance criteria.

b. The inspector reviewed Wyle Laboratories procedure, "Procedures for the Loading Calibration of Mechanical Snubbers for Commonwealth Edison", dated March 16, 1983, and had the following comments:

(1) The procedure was not formally issued, reviewed, and approved for use.

(2) The snubber bending moment strain gauges measurement calibrations were unacceptable.
(3) There was a lack of correlation between the as-performed bottom up tension and compression strain gauge calibration and the actual mid-stroke snubber lock-up reactions.

c. The inspector determined that the Item stated in Paragraph 4.d above had not been addressed in the licensee's program.

Subsequent to the inspection, a telephone conference was held on April 21, 1983 between the RIII Deputy Regional Administrator and a CECo Vice President, and their supporting staffs. RIII management raised a concern relative to timely implementation of the above issues, and requested a meeting to be held in RIII the following day.

6. Meeting at RIII on April 22, 1983

CECo management, led by its Director of Nuclear Licensing and Director of Station Nuclear Engineering Department, presented to the RIII management and responsible staff their program for resolving the MS snubber failure problem. The presentation included: (1) background information, (2) a failure analysis program (3) out-plant snubber testing, (4) in-plant system testing, (5) proposed further actions, and (6) safety evaluations.

Disposition of the specific deficiencies a discussed in Paragraph 5 above, were as follows:

a. Relative to the concern in 5.a.(1), the inspector considered the "Quick Look" procedures acceptable, except that the snubber upper bounding loads should be specified. During the meeting, the licensee agreed to revise the procedure to require RIII be informed within 48 hours should snubber strain gauge readings exceed 22.5 Kips.

b. Relative to the concern in 5.a.(2), QC participation still had not been specified.

c. Relative to the concern in 5.a.(3), spring can thermal measurements still had not been clarified.

d. Relative to the concern in 5.b.(1), the Wyle "Procedure for Load Calibration and Stroke Position Comparison of Mechanical Snubbers", dated April 21, 1983 was considered acceptable.

e. Relative to the concern in 5.b.(2), the snubber bending moment measurements were deleted from the test program.

f. Relative to the concern in 5.b.(3), the correlation between bottom up and mid-stroke snubber loadings was conducted for one snubber at the Wyle Laboratories. The results showed that (1) there was no difference for tension loads, and (2) there was a 20% increase at mid-stroke dynamic lock-up for loads at 5, 10, and 15 Kips.

The inspector questioned the validity of all snubbers being instrumented for the MS system tests, and requested additional calibration correlations be conducted at Wyle for at least 2 more snubbers. Subsequent followup inspection by the inspector at Wyle Laboratories on April 27, 1983 resolved the questionable areas. Acceptable calibration data was obtained.

g. Relative to the concern in 5.c., the licensee's contingency plans had still not been established.

7. Inspection at Site on April 23, 1983

The inspector reviewed site procedure SP 83-4-55, "MS Piping System Monitoring Procedure - Phase I", Revision 0, dated April 23, 1983, and considered that the matters stated in paragraph 6.a., 6.b., and 6.g. had been incorporated. The inspector concluded that the licensee's procedure provisions were adequate to initiate plant startup and testing.

The licensee agreed to meet with Region III management and responsible staff approximately seven days subsequent to the relief valve tests at rated pressure and temperature. This meeting would be to present the test results and to discuss further actions if meaningful conclusions could not be drawn from the tests.

Section II

1. Meeting at RIII on May 5, 1983

Shortly after the Dresden Unit 2 MS thermal and dynamic tests, a meeting was held at the Region III office on May 5, 1983. The purpose of the meeting was for the licenseee to provide an update on their snubber failure assessment resulting from in-plant and out-plant testing, and to discuss any further action that should be undertaken. During the meeting, the licensee presented the following program action items:

a. Failure modes studied included: (1) overload, (2) installation interference, and (3) snubber capacity.

b. In-plant test results showed: (1) no immediate safety concern, (2) snubbers and spring hangers were observed to be within expected limits, (3) anomalies within line thermal tests were analyzed to be within code limits, (4) for the 3 out of 7 snubbers with test loads exceeding the design loads, the system was checked to be within code limits.

c. Out-plant testing to simulate a possible incorrect snubber installation that could create a bending moment at the snubber was conducted at Nutech. The amount of applied moment (3,000 ft-lbs) that resulted in an end deflection of 0.20 inches at a PSA-10 mechanical snubber with a 9,900 lb peak dynamic load, had caused permanent destruction of the unit. However, it was the licensee's

evaluation that this condition could not have existed in Dresden 2. To ensure further safety, the affected pipe clamps were modified to alleviate possible binding. RIII requested that the licensee investigate other possible snubber/pipe clamp situations where binding could be a problem.

These situations were subsequently evaluated in a S&L report, "Procedure for Determining Snubber Binding in the Five Failed MS Snubbers." The report was transmitted to Region III through a CECo letter, dated May 27, 1983.

d. The licensee concluded, based on test program results, that: (1) SRV loads alone are not of sufficient magnitude to cause snubber failure, (2) no known transient that occurred during unit operation could produce the loads needed to fail the snubbers, and (3) bending in a snubber can result in snubber lock-up and permanent degradation.

At the end of the presentation, the licensee proposed future action plans including: (1) re-inspection of all MS snubbers per Technical Specification requirements at the end of 62-day plant operation (by June 26, 1983), (2) installation of measures to detect high snubber loads, (3) sending failed snubbers to the snubber manufacturer (Pacific Scientific Co.) for further failure analysis, and (4) development of an action plan prior to the 62-day outage to insure that snubber binding between pipe clamp and the unit would be eliminated.

The RIII staff reviewed the preliminary data, test results, and evaluation reports and had no adverse comments. Formal reports were sent to Region III on May 13 and 24, 1983. In discussions with the licensee representatives RIII concurred with the proposed future action plans.

2. Region III Review of Licensee Reports

The inspector performed detailed reviews of the following correspondence submitted by the licensee:

a. CECo letter, "Dresden Station Unit 2 Main Steam Line Snubber Failure", dated May 13, 1983, which contains:

(1) Dresden Station Unit 2 Snubber Action Plan as discussed during the May 5, 1983 meeting held in the RIII office.
(2) S&L Calculation No. EMD-043449 "Dresden 2 - Main Steam Monitoring Procedure, Seven-Day Data Evaluation", Revision 0, dated May 9, 1983.
(3) Nutech Testing Corporation, File No. COM058.0011.0007, "Preliminary Test Report on Dynamic Testing of Dresden 2 Mechanical Pipe Snubbers", dated May 11, 1983.

b. CECo letter, "Dresden Station Unit 2 Main Steam Snubber Failure", dated May 24, 1983, which contains:

(1) S&L Study, "Comparison Between SRV Discharge and MSIV Closure Loads".
(2) S&L File No. EMD-043781, "Dresden 2 - Main Steam Monitoring Test, Test-Analysis Correlation", dated May 19, 1983.

No items of noncompliance or deviations were identified as a result of the review.

## Section III

Review of Licensee Actions on CAL Items at the Site on June 30, and July 1, 1983 and at the RIII office on July 7, 1983

Item 1. Functionally test all snubbers installed on the MS and the Safety Relief Valve (SRV) discharge lines inside the drywell.

The 13 Main Steam mechanical snubbers (Nos. 41 through 53) were stroke tested between March 2, 1983 and April 16, 1983. The 3 SRV discharge line mechanical snubbers (Nos. 32 through 24) were stroke tested on March 2, 1983. The functional tests prescribed in the technical specifications to: (1) verify that the force that initiates free movement of the snubber in either tension or compression is less than the specified maximum breakway friction force, and (2) verify that the activation is achieved within the specified range of acceleration in both tension and compression had not been performed. The licensee's basis for not performing snubber functional tests is the NRC-NRR acceptance of the latest facility Technical Specification (TS), Amendment No. 70, contained in the USAEC (NRC), CECo Docket No. 50-237, Provisional Operating License (No. DPR-19), dated April 28, 1982. This document specifies that functional tests are not required until competitive marketable test fixtures are available, but will be required no later than December 31, 1983. Since the functional tests are not presently required, the maximum breakaway friction force and the activation acceleration range for both the tension and compression strokes for the mechanical snubbers, and the activation velocity and release bleed rate ranges for both the tension and compression strokes for the hydraulic snubbers have not yet been determined. As of the date of this inspection, no "competitive marketable test fixtures" have been ordered by the licensee. The inspector noted that the 38 TS mechanical snubbers inside the drywell, and the 15 TS hydraulic snubbers installed on the torus ECCS suction rig header and on the isolation condenser lines, have never been tested to ensure operability. These snubbers will not be functional tested, except for manual stroking of the mechanical snubbers when they are considered questionable, until the later part of 1983. The inspector determined that the licensee was operating within the conditions prescribed in the provisional operating license and had no further questions in this area.

Item 2. Non-destructively examine the portions of the MS and SRV discharge lines that are: (1) in the vicinity of the snubber failures, and (2) in high stress areas determined by analysis.

The inspector reviewed the following Nuclear Work Requests:

- No. D-25924, "Snubber Supporting Attachment", issued on February 16, 1983, and completed on February 28, 1983.
- No. D-26527, "B-C-D Main Steam Lines" for removal and replacement of pipe insolation prior and subsequent to the NDE. The request was issued on March 18, 1983, and signed on April 8, 1983.

The inspector also reviewed the MT and UT packages for the high stress points determined by S&L: (1) at the welds near the failed snubbers, (2) at the reactor vessel connections, and (3) at the electromatic SRV branch connections to the MS lines. The review included:

- CECo NDT-B, "Magnetic Particle Examination", Revision 5, dated February 1, 1981.
- CECo NDT-C-2, "Preservice and Inservice Ultrasonic Inspection of Similar and Dissimilar Metal Pipe Welds at Nuclear Stations", Revision 13, dated August, 1982.
- Master Inservice Inspection Checklist, Supplement due to snubber failure. January 1983 ISI
- UT Calibration sheets C-133, 134, 140, 141, 144, 145, 146, 148, and 102 for straight beam and angle beam. The calibrations were conducted from March 22, 1983 to March 27, 1983.
- UT data sheets D-413, 423, 425, 431, and 436 for MS-B, including evaluations of indications.
- UT data sheets D-414, 422, 424, 432, and 437 for MS-C, including evaluations of indications.
- UT data sheets D-415, 428, 429, 430, 433, and 438 for MS-D, including evaluation of indications.
- MT data sheets for weld locations N3B, 20-3, and 8X-3 in MS-B.
- MT data sheets for weld locations N3C, 20-3, 8X-1, and 20-K10 in MS-C.
- MT data sheets for weld locations N3D, and 8X-3 in MS-D.

No items of noncompliance or deviations were identified.

Item 3. Visually inspect, inside the drywell and torus, the structural attachments, auxiliary steel members, main structure, and all fasteners, including concrete expansion-type anchor bolts, where all MS and SRV discharge line snubbers, rigid strut restraints, and pipe whip restraints are connected.

The component structural attachments including auxiliary steel members were inspected by two site inspection teams consisting of the plant Technical Staff and QC personnel on April 23, 1983, and April 26, 1983. There was no evidence of (1) structural steel

failure, (2) local warpage, (3) weld failure, (4) unusually large deflections, and (5) attachment component failure.

Item 4. Visually inspect the entire MS and SRV discharge piping suspension system components within the containment boundary. Those that are submerged in the suppression pool water are to be excluded.

In conjunction with item 3 above, the MS system spring supports, snubbers and the sliding supports downstream of the out-board isolation valve located inside the steam tunnel were inspected. No damage was found. The spring hanger and snubber setting measurements were a part of the thermal testing required in item 7 below.

Item 5. Repair, replace, readjust and modify as necessary, all defective structures and piping suspension system components.

No defective structures or piping suspension system components were identified during site inspections.

Items 6, 7 & 8. Perform system tests based on testing outlined in items 7 and 8 below. Upon completion, have test procedures, measurements data, and your evaluation of the results available for Region III review within 7 days after completion of testing. Item 7 described thermal expansion piping displacement test. Item 8 described piping dynamic tests.

The inspector reviewed S&L Calculation No. EMD-043449, "Dresden 2, Main Steam Monitoring Procedures, Seven-Day Data Evaluation", Revision 00, dated May 9, 1983, forwarded to Region III in a CECo letter dated May 13, 1983. The review included procedural implementation, loading levels recorded from actual SRV lift testing, piping thermal expansion movements, and justification for test data deviations from design.

The inspector also reviewed S&L Calculation No. EMD-043781, "Dresden 2, Main Steam Monitoring Test, Test-Analysis Correlation", dated May 19, 1983, forwarded to Region III in a CECo letter dated May 24, 1983.

The inspector had no adverse comments subsequent to the review of these documents.

Item 9. Report to Region III within 24 hours after identification, all (1) damaged structures and components identified in Items 1 through 4, and (2) test results identified in Items 7 and 8 that deviate from existing conditions specified in ASME Code Stress Reports.

There was no damage identified per the Item 1 through 4 requirements. The deviations resulting from the Item 7 and 8 thermal and dynamic tests did not exceed ASME code stress allowables.

The inspector concluded that all items contained in the CAL, dated March 17, 1983 have been effectively implemented by the licensee.

ATTACHMENT

CONFIRMATORY ACTION LETTER

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAR 17 1983

Docket No. 50-237

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the telephone discussion between Messrs. R. Rybak and J. Wujciga and others of your staff and Mr. W. S. Little and members of the Region III staff on March 14, 1983, regarding mechanical snubber damage inside the drywell, on the Dresden Station, Unit 2 Main Steam (MS) Lines B, C, and D. With regard to the matters discussed, we understand that you will complete Items 1 through 5 prior to returning Unit 2 to power operation, notify Region III within 48 hours after completion of Items 7 and 8, and provide data and inspection results to Region III as discussed in Items 6 and 9.

1. Functionally test all snubbers installed on the MS and the Safety Relief Valve (SRV) discharge lines inside the drywell.

2. Non-destructively examine the portions of the MS and SRV discharge lines that are: (1) in the vicinity of the snubber failures, and (2) in high stress areas determined by analysis.

3. Visually inspect, inside the drywell and torus, the structural attachments, auxiliary steel members, main structure, and all fasteners, including concrete expansion-type anchor bolts, where all MS and SRV discharge line snubbers, rigid strut restraints, and pipe whip restraints are connected.

4. Visually inspect the entire MS and SRV discharge piping suspension system components within the containment boundary. Those that are submerged in the suppression pool water are to be excluded.

5. Repair, replace, readjust and modify as necessary, all defective structures and piping suspension system components.

6. Perform system tests based on testing outlined in Items 7 and 8 below. Upon completion, have test procedures, measurement data, and your evaluation of the results available for Region III review within 7 days after completion of testing.

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7. Thermal expansion piping displacement test data is to be taken at all piping suspension system component locations on all four MS lines, and on the SRV discharge piping for MS lines C and D. The measurements should be taken at (1) line temperature less than 120°F, and (2) MS operating temperature between 450°F to 550°F.

8. Piping dynamic test data is to be taken and should include instrumented measurements to provide a means to directly obtain or to calculate piping maximum dynamic forces and movements at the concerned locations. The snubber reaction loads should be continuously monitored at all previously failed snubber locations. The dynamic piping movements should be measured in terms of the piping axial, the horizontally lateral, and the vertically lateral directions for MS lines C and D where maximum displacements are expected based on engineering evaluations. The testing should be conducted (1) at normal system operating temperature and pressure, and (2) for SRV lift and closure.

9. Report to Region III within 24 hours after identification, all (1) damaged structures and components identified in Items 1 through 4, and (2) test results identified in Items 7 and 8 that deviate from existing conditions specified in ASME Code Stress Reports.

Please inform us immediately if your understanding of these actions is different from that stated above.

"Original Signed by James G. Keppler"

James G. Keppler
Regional Administrator

cc: D. L. Farrar, Director
of Nuclear Licensing
D. J. Scott, Station
Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
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