

AUG 20 1984

Docket No. 50-454  
Docket No. 50-455

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

Gentlemen:

This refers to the routine safety inspection conducted by Mr. I. T. Yin of this office on June 8, 27-28, and July 27, 1984, of activities at Byron Station, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131, and to the discussion of our findings with Mr. E. D. Swartz of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

Based on discussions during the July 27, 1984, meeting discussed in Paragraph 2.e of the enclosed report and our evaluation of the matter, we request that you provide this office (1) sufficient notification to allow us to observe selected snubber modification work in progress at Miller Fluid Power Company, and (2) the snubber re-qualification testing procedures for our review prior to conducting the tests.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

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We will gladly discuss any questions you have concerning this inspection.

Sincerely,

*"Original Signed by R. L. Spessard"*

R. L. Spessard, Director  
Division of Reactor Safety

Enclosure: Inspection Report  
No. 50-454/84-39(DRS);  
No. 50-455/84-28(DRS)

- cc w/encl:
- D. L. Farrar, Director  
of Nuclear Licensing
- V. I. Schlosser, Project Manager
- Gunner Sorensen, Site Project  
Superintendent
- R. E. Querio, Station  
Superintendent
- DMB/Document Control Desk (RIDS)
- Resident Inspector, RIII Byron
- Resident Inspector, RIII  
Braidwood
- Phyllis Dunton, Attorney  
General's Office, Environmental  
Control Division
- Ms. Jane M. Whicher
- Diane Chavez, DAARE/SAFE
- W. Paton, ELD
- L. Olsan, NRR LPM

8/16/84

RIII

Yin/bl  
08/15/84

RIII

Danielson  
8/17

RIII

Little  
8/17/84

RIII

Hayes

RIII

Streeter  
8/17

RIII

Spessard  
8/17

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-39; 50-455/84-28

Docket No. 50-454; 50-455

License No. CPPR-130; CPPR-131

Licensee: Commonwealth Edison Company  
Post Office Box 767  
Chicago, IL 60690

Facility Name: Byron Station, Units 1 & 2

Inspection At: ITT-Grinnell Corporation, Warren, OH  
ITT-Grinnell Corporation, Providence, RI

Inspection Conducted: June 8, 27-28, and July 27, 1984

Inspector: I. T. Yin

*I. T. Yin*

8/16/84

Date

Approved By:

*D. H. Danielson*

D. H. Danielson, Chief  
Materials and Processes Section

8/17/84

Date

Inspection Summary

Inspection on June 8, 27-28, and July 27, 1984 (Report No. 50-454/84-39(DRS); 50-455/84-28(DRS))

Areas Inspected: Special announced followup inspection of testing of the large bore Boeing steam generator snubbers. The inspection involved a total of 24 inspector-hours at the ITT-Grinnell test facility and design engineering office.  
Results: No items of noncompliance or deviations were identified.

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## DETAILS

### 1. Persons Contacted

#### Commonwealth Edison Company (CECO)

- \*E. D. Swartz, Nuclear Licensing Administrator
- \*P. R. Donavin, Field Engineering Coordinator
- \*H. M. Jensen, Consultant
- B. Koehler, Engineer - Technical Staff

#### Sargent and Lundy Engineers (S&L)

- \*S. Putman, Supervising Structural Engineering Specialist
- \*R. A. Salisbury, Mechanical Engineer

#### ITT-Grinnell Corporation (ITT-G)

- \*R. B. Mulcahey, Vice President and Director of Engineering
- \*D. M. Sewell, Vice President and Director of QA
- \*E. R. Eramian, Engineering Manager - Field Service
- \*A. M. Guglielmo, Assistant Engineering Manager - Field Services
- \*R. K. Taylor, Project Manager - Contract Administration
- \*D. W. Mills, Senior Project Engineer
- \*D. L. Jew, Analysis Section Leader

\*Denotes those attending the management exit meeting on July 27, 1984.

### 2. Functional or Program Areas Inspected

#### a. Historical Information

- (1) RIII's Byron inspection (Inspection Report No. 50-454/83-20; 50-455/83-17) conducted in May 1983 identified steam generator snubber (SGS) leakage, CECO's lack of protective measures and surveillance of snubber conditions, and deficiencies in Boeing qualification test reports.
- (2) RIII's Byron inspection (Inspection Report No. 50-454/84-08; 50-455/84-06) conducted in January 1984 documented a special meeting held with CECO and S&L Engineers. CECO concurred with RIII on January 27, 1984, that tests would be conducted to re-qualify the Boeing SGSs.
- (3) CECO's letter to RIII dated February 23, 1984, provided S&L Consultant Specification No. 120, "Testing Services for SGSs," issued on February 22, 1984.
- (4) RIII's letter dated March 7, 1984, requested (a) an opportunity to review the testing procedures, and (b) sufficient notification be provided to allow RIII an opportunity to observe the facility and testing.

- (5) Various telephone conferences were held in April and May 1984. RIII commented on preliminary test procedures. Revisions to the procedures were made to accommodate the RIII comments.
- (6) ITT-G Test Procedure SPS-8416-1-2, "Functional and Spring Rate Testing of SGSs," Rev. 1, dated May 18, 1984, was reviewed and concurred in by RIII on May 31, 1984.
- (7) ITT-G SPS-8416-1-2, Rev. 2, dated June 4, 1984, was reviewed and concurred in by RIII on June 6, 1984.
- (8) RIII inspected the ITT-G test facility at Warren, Ohio, on June 8, 1984, and requested that: (a) all tests including equipment shake down and instrument calibration be witnessed by a third party inspector, such as an ANI, (b) test data and inspection records be forwarded to RIII upon completion of the testing of the first SGS, and (c) RIII be informed of any schedule deviation and difficulties.
- (9) SGS No. 23 failed the test on June 19, 1984.
- (10) SGS No. 14 failed an investigative test on June 21, 1984.
- (11) SGS No. 14 failed the test on June 25, 1984.
- (12) RIII inquired of test status on June 25, 1984. CECO informed RIII of the testing problems.
- (13) SGS No. 10 failed the test on June 28, 1984. A 10 CFR 50.55(e) report was submitted to the NRC by CECO.
- (14) A design meeting was held at ITT-G, Providence, RI, on July 27, 1984, to discuss proposed SGS design and hardware modifications.

b. Tests Performed

The steam generator snubbers that were tested were units furnished for the Braidwood Station. The Braidwood snubbers are identical to the Byron snubbers and they were also furnished by Boeing. As the steam generator snubbers for Byron are installed in place, Region III agreed testing of Braidwood snubbers was acceptable.

Various SGS lock-up and bleed-rate tests were performed.

- (1) During the test conducted on June 19, 1984, for Snubber No. 23, the following conditions were observed by the licensee's technical representatives:

- (a) Compression Test

Not done.

(b) Tension Test

- 1 Lock-up Velocity (LV) was measured at 6.5 in./min. This is within Specification range of 5 to 7 in./min.
- 2 Bleed Rate (BR) measurements exceeded Specification. Mechanical defects identified. The Specification range is for 260 Kips the BR = 0.25 in./min; 770 Kips the BR = 0.30 in./min; 1,950 Kips the BR = 0.37 in./min.
  - a At 298.4 Kips (12.4% of Rated Capacity (RC)), BR = 0.48 in./min. No leaks observed.
  - b At 734.2 Kips (30.6% RC), BR = 1.84 in./min. One of the eight retainer ring bolts popped out. Fluid bursted out. Subsequent examination found that the retainer ring was bent, and the remaining seven bolts were bent.

(c) Torquing of the Gland Nut

Torquing record at Braidwood showed 1,200 ft-lb.

- (2) During the investigative test conducted on June 21, 1984, for Snubber No. 14, the following conditions were observed:
  - (a) No LV & BR tests were performed.
  - (b) Gland seal nut was torqued to 2,400 ft. lbs.
  - (c) At 100 Kips (4.2% RC) on the tension side. Steady stream of fluid was observed at the gland nut thread location.
  - (d) At 200 Kips (8.4% RC). Fluid was bursting out at the chevron wiper location.
- (3) During the test conducted on June 25, 1984, for Snubber No. 14, the following conditions were observed:
  - (a) Compression Test
    - 1 LV was measured at 5 in./min. This is within specification.
    - 2 At 72.4 Kips (3% RC), BR = 0.01 in./min. No leaks observed.
    - 3 At 325.7 Kips (13.6% RC), BR = 0.09 in./min. No leaks observed.

- 4 At 778.1 Kip (32.4% RC), BR = 0.12 in./min. Fluid containing black substance was forced from the cylinder compression end. It was estimated to be 10 to 20 drops. The condition did not persist when loading was held at the same level.

(b) Tension Test

- 1 LV was measured at 6.2 in./min. This is within the specification.
- 2 At 79.1 Kips (3.8% RC), BR = 0.14 in./min. Steady stream of fluid flow was observed at piston rod area.
- 3 At 235.8 Kip (9.8% RC), BR = 0.84 in./min. Fluid was bursting out at the chevron wiper area.
- 4 Subsequent examination found the retaining rings, bolts, chevron seals, and the pressure seal ring set in working condition.

(c) Torquing of the Gland Seal Nut

Gland seal nut was torqued to 1,600 ft. lb. originally. It was torqued to 2,400 ft. lb. prior to the test.

- (4) Snubber No. 10, was tested on June 28, 1984. The test data confirmed the SGS design problem.

(a) Tension Test

- 1 LV = 7.2 in./min. Small leakage was identified.
- 2 At 248 Kips (10.3% RC), BR = 1.35 in./min. Fluid started to burst out of the gland nut area.
- 3 At 603 Kips (25.1% RC), BR 5.2 in./min. Large quantity of fluid continued to burst out.

(b) Compression Test

- 1 LV = 6.5 in./min. No leaks observed.
- 2 At 316 Kips (13.2% RC), BR = 0.16 in./min. Did not check for leaks.
- 3 At 751 Kips (31.3% RC), BR = 0.7 in./min. Fluid was bursting out of compression cylinder seal.

c. Timely Reporting of the Snubber Problems

Since June 19, 1984, the licensee has stopped using normal testing procedures. The June 21 and 25, 1984, tests were conducted to try and determine the cause of the problem and seek ways to improve the situation.

The problem observed on June 19, 1984, was not communicated to RIII in a timely manner. It was not until the inspector's telephone call to the CECO Licensing Administrator on June 25, 1984, inquiring about the testing status that the problem was brought to RIII's attention. CECO management policy on reporting safety significant problems will be reviewed by the staff. This is an unresolved item (454/84-39-01; 455/84-28-01).

d. Technical Evaluation

As of June 27, 1984, the review to determine the cause of the identified problem revealed the following issues related to the SGS design:

- (1) The brass type seal ring working with the pair of steel compression rings could not seal the fluid under pressure. The fluid could pass through the seal ring and piston rod, seal ring and compression rings, or compression rings and snubber cylinder block.
- (2) The combination of the metallic "C" ring and the application of sealant on the gland nut threads to stop the low pressure fluid leak appears to be unworkable for the following reasons:
  - (a) Metallic "C" ring is of no value in sealing fluid at low pressure.
  - (b) The uniform application of sealant on threads cannot be assured due to the large diameter (10") piston rod threading surface area.
- (3) The use of all metal seals in the tension cylinder, compression cylinder, and piston area appear to be questionable. Fluid leakage during the compression test and bursting of the fluid during the tension test loading conditions were observed.
- (4) Material compatibility between Dow Corning DC200-50 Silicone fluid and the new gland nut thread sealant, Dow Corning Silastic No. 732 RTV, needs review.
- (5) Per Boeing Drawing D275-N0201, Rev. E, dated September 7, 1979, the torquing of the gland seal nut should be 1,100 to 1,200 ft. lb. The Boeing Installation and Maintenance Instructions dated August 10, 1978, stated that it should be torqued to maximum of 2,400 ft. lb. if leaking is identified. Tests showed that neither 1,600 ft. lb. nor 2,400 ft. lb. could prevent fluid from bursting out of the snubber.



- (6) The absence of snubber fluid filtering devices installed internally and externally appears to be a potential long range problem. Past experience with ITT-G snubbers indicates fluid contamination can affect the functioning of the snubber. This finding caused ITT-G to re-design SGSs to include filters at the fluid reservoir and at the bleed nozzle.

e. Design Meeting

A meeting was held by the licensee on July 27, 1984, at the ITT-G corporate design engineering headquarters to discuss the ITT-G proposed SGS modifications. The inspector concurred with the ITT-G and S&L presentations with the condition that the following items will require RIII review and observation in the future and will be considered an unresolved item (454/84-39-02; 455/84-28-02):

- (1) Structural test to be performed to verify cylinder end cap flange assembly modification design calculations.
- (2) Seal leak test to be conducted for the piston seal assembly to determine the existing Boeing design adequacy.
- (3) Documentation of material compatibility between the Dow Corning fluid and Viton or Ethylene Propylene seal. (replacement of metallic seals).
- (4) S&L ECN 22221, "Consultant Specification No. 120, Amendment 1".
- (5) SGS re-qualification program.
  - (a) Technical provisions.
  - (b) QA measures.
  - (c) Third party inspection.

3. 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. Unresolved items disclosed during this inspection are discussed in Paragraphs 2.c and 2.e.

4. Exit Interview

The inspector met with those licensee representatives denoted in Paragraph 1 at the conclusion of the inspection. The inspector summarized the scope and findings of the inspection. The licensee acknowledged the findings reported herein.