

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-454/79-06; 50-455/79-06

Docket No. 50-454; 50-455

License No. CPPR-130; CPPR-131

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

Facility Name: Byron Nuclear Generating Station, Unit 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: April 4-11, 1979

Inspectors: *B. J. Knop for*  
J. E. Konklin (April 4-5, 1979)

4-10-79

*E. J. Gallagher*  
E. J. Gallagher (April 9-11, 1979)

4-18-79

Approved By: *B. J. Knop for*  
R. C. Knop, Chief  
Projects Section

4-18-79

Inspection Summary

Inspection on April 4-11, 1979 (Report No. 50-454/79-06; 50-455/79-06)  
Areas Inspected: Ongoing site construction activities (Units 1 and 2); licensee actions relative to previous unresolved and open items (Units 1 and 2); implementing procedures, work activities and quality records relative to containment prestressing (Unit 1). The inspection involved a total of 35 inspector-hours onsite by two NRC inspectors.  
Results: Of the areas inspected, one item of noncompliance was identified in one area (infraction - inadequate storage of piping penetrations - Section I, Paragraph 3).

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## DETAILS

### Persons Contacted

#### Principal Licensee Employees

- \*+G. Sorensen, Project Superintendent
- \*+J. T. McIntire, Quality Assurance
- \*+J. Mihovilovich, Lead Structural Engineer
- \*G. E. Smith, Lead Electrical Engineer
- +M. Pendleton, Field Engineer
- \*R. Byers, Field Engineer
- +M. A. Stanish, QA Mechanical Engineer
- +J. A. Klink, QA Inspector
- +S. T. Forsha, Structural QA Coordinator

#### Hunter Corporation

L. Hill, Auxiliary Building Supervisor

#### Inryco

- G. Johnston, Field Representative
- G. Goestch, QC Inspector

The inspector also contacted other licensee and contractor personnel, including craftsmen, QA/QC, technical, and engineering staff.

- \*Attended the exit meeting on April 5, 1979.
- +Attended the exit meeting on April 11, 1979.

#### Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (454/78-07-02; 455/78-07-02): Documentation on Velan valve in the Component Cooling System. The previous RIII Report (78-07) noted that the licensee agreed to verify the existence of documentation confirming the seismic qualifications of the valve. During this inspection, the inspector reviewed and discussed with licensee personnel the CECo QA Department report, dated February 15, 1979, of an annual audit of Westinghouse NSSS. During the CECo audit of Westinghouse, the adequacy of seismic design considerations and documentation for safety-related components was evaluated. The Velan valve discussed above was among the specific components for which a detailed review of seismic documentation was made during the CECo audit. The CECo audit concluded that the Westinghouse seismic evaluation of the safety related components is adequate. The above unresolved item is considered to be resolved.

(Closed) Open Item (454/79-01-01; 455/79-01-01): Verification of corrective action on HVAC ductwork. Previous RIII Report (454/79-01; 455/79-01) had closed a 10 CFR 50.55(e) item regarding HVAC ductwork deficiencies, but designated a new open item regarding verification that the corrective action was completed. During this inspection, the inspector observed the corrective actions which have been taken relative to the HVAC ductwork installed and being installed in the Auxiliary Building and concluded that adequate corrective action has been implemented. The open item is considered to be closed.

(Closed) Unresolved Item (454/78-09-01; 455/78-09-01): Essential service water makeup pumps control cable splice box. Previous RIII Report (454/79-01; 455/79-01) left this item open on the basis that documentation provided by the licensee was not clear as to whether the test data also included the splice design, or whether the tests qualified the cable and splice for the submerged condition in addition to the 100% humidity condition. During this inspection, the inspector reviewed a letter with attachment, dated February 16, 1979, from the Okonite Company to S&L, which clarified the two areas in question. This item is considered to be resolved.

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## Section I

Prepared by J. E. Konklin

Reviewed by R. C. Knop, Chief  
Projects Section

### 1. Review of Licensee Actions on Previous Inspection Findings

The RIII inspector reviewed the licensee's actions relative to the resolution of specific open items which were identified in previous RIII inspection reports and which were still in an open status prior to this inspection. The items reviewed and the licensee actions relative to the resolution of the items are discussed in the foregoing section of this report.

### 2. Observation of Ongoing Construction Activities

An extensive site tour was conducted to monitor the progress of site construction activities and included observation of work activities and equipment status in the Units 1 and 2 reactor containments, the fuel handling building, the auxiliary building, the piping storage yards and field storage, and the prestressing tendon inspection area.

Work is proceeding on the inspection and rebuttonheading, where required, of the prestressing tendons for the Unit 1 containment dome. The licensee informed the inspector that installation of the Unit 1 dome tendons was scheduled to start during the week of April 8, 1979. Section II of this report includes a discussion of the RIII followup inspection in that area.

Work is still proceeding on the reactor coolant hot legs and cold legs in Containment No. 1. In approximately two months, one loop should be completed, and the primary coolant pump internals will then be installed in that loop. Reliance Trucking is scheduled to arrive on-site at the end of July 1979, and installation of the Unit 2 reactor pressure vessel will follow in August and early September. The Unit 2 steam generators are scheduled to arrive on-site in October 1979.

The significant safety related concrete placement work during the next three months involves the concreting around the refueling water storage tanks and on the Unit 2 containment dome. Concreting on the RWST's should be completed in mid-May. Reinforcing

steel is now being installed on the Unit 2 containment dome; concreting of the dome should be completed by the end of July. The construction opening in the Unit 1 containment will be closed about August 1, 1979.

The fuel transfer canal liner is about 90% complete. The reactor pool for Unit 1, which is 95% complete, will remain at that completion level for approximately two more months. Work is proceeding on the fitup and welding of the Unit 2 reactor cavity liner.

With regard to electrical work activities, installation of cable trays and hangers is approximately 50% complete in the Auxiliary Building, about 40% complete in Containment No. 1, and 0% in Containment No. 2. Pulling of cables has just started in the Auxiliary Building, but has not yet started in Containment No. 2. The licensee plans to live a Motor Control Center in the screen house within one month. The Category 1 substations should begin arriving at the Site by the end of April 1979, and installation of the substations will start immediately upon receipt.

3. Improper Storage of Mechanical Penetration Assemblies

On April 4, 1979, at Level 365 near coordinates M-11 in the Auxiliary Building, the inspector observed twelve mechanical (piping) penetration assemblies which were improperly stored. The twelve assemblies were not on dunnage. On the three largest assemblies, the flued head weld prep areas (for the pressure retaining welds to the containment liner) were not protected, and the assemblies were supported on the concrete floor by the edges of the weld prep areas. The improper storage conditions and the specific assemblies involved were brought to the attention of the licensee, who requested the piping contractor to take corrective action.

The inspector returned to the areas on April 5, 1979, and noted that the subject penetration assemblies had been placed on dunnage, but that the flued head weld prep areas on the three largest assemblies were still unprotected. The inspector notified the licensee that the improper storage conditions would be cited as an item of noncompliance with Criterion XIII of 10 CFR 50, Appendix B. (454/79-06-01; 455/79-06-01)

4. Epoxy Grouting of Emergency Diesel Generator Sole Plates

The inspector observed the as-placed epoxy grouting for the emergency diesel generator sole plates and discussed the placement methods used with the involved Blount Brothers personnel. The inspector also reviewed the following documents:

- a. Cooper Energy Services Specification SC-28-12, Rev. 0, dated June 7, 1976, "Pregrouting Instructions for Sole Plates, KSV Units," which contains instructions for the use of a high strength epoxy resin type grout.
- b. S&L Structural Standard Form 1707, dated August 8, 1977, which approves the use of Sikadus Hi-Mod for high-strength epoxy resin grouting.
- c. Blount Brothers QA/QC Work Procedure No. 18, "Grouting Machine, Base or Sole Plates," Issue 2, Rev. 1, dated January 21, 1977.
- d. The applicable grout release form (Release No. 5), signed off by the appropriate CECO and Blount Brothers personnel.

The inspector noted that although the diesel generator sole plant grouting was done in accordance with the manufacturer's instructions, as evidenced by the inspection checklist and the statements of the Blount Brothers personnel involved, written directions provided in the future to those doing the grouting should clarify whether the mixing and placing should be done in accordance with the manufacturer's instructions or in accordance with the steps in Work Procedure No. 18. The licensee agreed that clarification is needed and that it will be made. The inspector had no further questions.

Except as noted in Paragraph 3 above, no items of noncompliance or deviations were identified.

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## Section II

Prepared by E. J. Gallagher

Reviewed by D. W. Hayes, Chief  
Engineer Support  
Section I

### 1. Containment Prestressing Procedures (Units 1 and 2)

The inspector reviewed the following Byron Station procedures relative to the containment prestressing system:

- a. S&L specification F-2722, Division 13, including Engineering Change Notice (ECN) No. 1096, dated March 26, 1979. Section 13-202.1 requires the prestressing system design, fabrication and installation to conform to the requirements of ASME Section III, Division 2, Article CC-4000 (April 1973 Edition) and ACI 318-71, Chapter 18.
- b. Blount Brothers QA/QC procedures:
  - (1) No. 31 - Receiving, Storing and Inspection of Tendons, Rev. 0.
  - (2) No. 44 - Installation of Post-Tensioning Tendons, Rev. 3.
  - (3) No. 46 - Stressing Post-Tensioning Tendons, Rev. 2.
  - (4) No. 48 - Greasing of Post-Tensioning Tendons, Rev. 0.
  - (5) No. 45 - Installation of Field Anchors and Field Buttonheading, Rev. 2.
  - (6) Drawing 308 - Dome stressing sequence.
  - (7) Drawing 309 - Vertical stressing sequence.
  - (8) Drawing 310 - Horizontal stressing sequence.

The stressing sequence conforms to the requirements of S&L specification F-2722, Section 13-304.2.

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c. Revised criteria for inspection of buttonheads:

<u>Inspection Item</u>	<u>Inryco 1610 Criteria</u>	<u>Revised Criteria</u>
(1) <u>Splits</u> (fissures within $\pm 30^\circ$ of wire axis)		
Maximum Split	0.060"	0.120"
Splits Over $45^\circ$	reject	reject
Sum of Splits	> 0.06" reject	No requirement
(2) <u>Slips</u> (fissures between $30^\circ$ and $45^\circ$ )		
Maximum Slip	0.01"	0.002
Slip Over $45^\circ$	reject	reject
(3) <u>Eccentricity:</u>	0.017"	0.010"
(4) <u>Size of Buttonhead:</u>	< 0.366" reject	Same as Inryco
	> 0.395" reject	1610 Criteria

The revised buttonhead criteria was developed as a resolution to a reportable deficiency identified by CECO pursuant to 10 CFR 50.55(e). The acceptability of the revised criteria is subject to review pending receipt of the final 50.55(e) report.

d. Inspection frequency of shop and field buttonheads:

(1) Shop fabricated buttonheads:

10% using Go-No-Go guage  
 10% using eccentricity guage  
 100% visual

If any of the 10% inspection fails to meet requirements the inspection is increased to 100% for the inspection checkpoint.

(2) Field fabricated buttonheads:

10% Go-No-Go guage; if any fail another 10% are inspected and if any failures occur in this lot, 100% are inspected.  
 100% visual for eccentricity and fissures.

Details of field inspection are included in Blount Procedure No. 45.

No items of noncompliance or deviations were identified.

2. Observation of Containment Prestressing Work Activities (Unit 1)

The Unit 1 Containment Prestressing system consists of a total of 483 tendons including 120 dome, 162 vertical and 201 horizontal tendons. Each tendon assembly consists of 170 one-quarter inch diameter high-strength steel wires and associated hardware. The inspector observed work activities on the following specific tendons:

- a. Installation: Dome tendons D3-36B, D3-32, D3-23B, D3-20C and D3-24 were inspected during installation. The tendons had the required corrosion-protective grease intact and no signs of oxidation, kinks or nicks. The tendons were successfully pulled through the appropriate tendon sheathing; ends projecting were adequately protected from the elements until buttonheading and greasing can proceed.
- b. Repairs of shop fabricated buttonheads: Inryco was in the process of performing repairs on tendons which failed to meet the revised buttonhead criteria. Tendon V149, D1-14 and D2-7 were observed being repaired and tested according to repair procedures.
- c. Storage of tendons and prestressing hardware: The onsite tendons are currently being stored inside to prevent any corrosive effects. Blount Procedure No. 31 requires daily surveillance to verify storage conditions are maintained. Tendons in storage were in satisfactory condition.

No items of noncompliance or deviations were identified.

3. Containment Prestressing: Review of Quality Records (Units 1 and 2)

The inspector reviewed selected quality records relative to the containment prestressing system. A review of the records were performed in the following specific areas:

a. Material Certifications

- (1) Tendon Material: A review of the physical and chemical test results was performed for the following dome tendons including traceability to corresponding heat numbers:

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<u>Tendon ID</u>	<u>Heat Numbers</u>
D3-32B	60744 and 42899
D3-20C	50776
D3-24C	50776
D3-36B	50776 and 60744
D3-28B	50776
D2-29T	50776, 18803 and 60744

The certified mill test reports for the above indicated that material met the requirements of ASTM A421, "Uncoated Stress - Relieved Wire for Prestressed Concrete." The results indicated the wire to be in excess of the minimum diameter of 0.25 inches, type BA wire with tensile strength in excess of 240,000 psi with elongation exceeding minimum 4.0% required by S&L specification 2722, Section 13-404.1.

- (2) Anchor Heads: Material test reports for anchor heads NX379, NX052, NX051 and NX054 were reviewed. Test results indicated material to conform to AISC 4142 steel with Rockwell hardness of C42 in accordance with S&L specification 2721, Section 2-305.1.
- (3) Corrosion Protective Grease: The chemical test reports supplied by Visconorust Oil Company for batch numbers 2889 (Visconorust 1601) and 2489 (Visconorust 1702) were reviewed and indicated the chlorides, nitrates and sulfides to be less than the maximum permitted by S&L specification 2721, Section 2-607.
- (4) Bearing Plates: Heat Numbers 802B80170 and 801A03900 were reviewed. Test results meet the requirements of ASTM A36 steel in accordance with S&L specification 2722, Section 13-403.1.
- (5) Tendon Bearing Plate Trumpets: S&L specification required trumpets to be fabricated according to ASTM A513. ECN No. 781-3 permitted the use of A570 Grade B as an alternate. Heat numbers 60841, 41312 and 40289 were reviewed and met the requirements of A570 Grade B material.

b. Tendon Performance Tests

S&L specification 2722, Section 2-605.1 requires prestressing system supplier to perform tensile tests on 1% of completely

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fabricated tendon assembly including anchorage hardware. The tensile force during the test is required to exceed the minimum guaranteed ultimate strength of the tendon. The inspector reviewed test tendon No. 1 performed on October 26, 1977. The results meet the requirements of the tensile test. Five tests for each containment are required. Only one test result was available onsite at the time of the inspection. The licensee indicated the remaining tests had been performed and the test results would be made available during a subsequent inspection. This item is considered unresolved pending review of test results (454/79-07-02; 455/79-07-02).

c. Nonconformance Reports Identified

Blount Brothers has identified the following nonconformance reports during initial receipt inspection of the prestressing material:

- Q3-275 - identified tendon 65 BA and 66 BA to be exceedingly dirty.
- Q3-275 - same conditions as Q3-275 for tendons 63 BA and 64 BA.
- Q3-309 - identified D1-28, 28 and 27 to have protective grease coating worn off.

The above tendons were rejected and returned to the supplier for corrective action and returned to the site for use.

4. Review of FSAR Commitments for Prestressing System

The inspector reviewed the Byron Station FSAR, Section 3.8.2.2.4 (Prestressing System), 3.8.2.4.7 (Prestress Losses), 3.8.2.5.8 (Creep and Shrinkage effects) and 3.8.2.6.1 (Applicable Codes and Standards) to verify commitments were translated in specification requirements and implemented.

a. Section 3.8.2.2.4 (Prestressing System)

- (1) Prestressing wire is to be 0.250 inch diameter conforming to ASTM A421, type BA and develop 100% of minimum ultimate strength. (ref: specification 2722, Section 13-404.1)
- (2) Tendon Conduits are required to be 26 gauge, cold rolled interlaced steel (ref: specification 2722, Section 13-403.3 requires minimum 22 gauge wall thickness). Tendon conduits are non-structural members to form void for tendons and considered satisfactory.

- (3) Tendon Conduit Grease is required to meet the chemical tests of D512, D992 and D1255 (ref: specification 2721 Section 2-607.1).
- b. Section 3.8.2.4.7 (Prestress Losses): Section 3.8.2.4.7 requires in accordance with ACI 318-71, that prestress losses be accounted for in the design for seating of anchorage, creep in the concrete, relaxation of prestressing steel and friction loss due to intended or unintended curvature in the tendons. The FSAR indicates that predicted values based on past experience would be used, however, these predictions will be verified by test during construction. Specification 2721, Section 2-204.2, requires the prestressing supplier to supply predicted data for slip at tendon anchorages, relaxation of steel stress and frictional losses due to curvature in tendons. However, specification 2722 does not require these values to be verified by tests during construction. The licensee discussed this item with Sargent and Lundy who indicated that these tests would be incorporated during construction with the exception of slip at tendon anchorage which is not applicable to this system.
- c. Section 3.8.2.5.8 (Creep and Shrinkage Effects): Section 3.8.2.5.8 requires laboratory tests to be performed to verify design data for prestress losses due to creep and shrinkage. The licensee indicated that the tests are in the process of being performed and that the results will be made available when completed.
- d. Section 3.8.2.6.1 (Codes and Standards): Section 3.8.2.6.1 requires conformance to ACI 318-71 and ASME Code Section III (ref: specification 2722 includes Chapter 18 of ACI 318-71 and ASME Section III, Div. II Article CC-4000 as applicable).

No items of noncompliance or deviations were identified.

#### Unresolved Items

Unresolved items are matters about which more information is required in order to determine whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Section II, Paragraph 3.b.

#### Exit Interview

The individual inspectors met with licensee representatives (denoted under Persons Contacted) at the conclusion of each part of the inspection on April 5 and April 11, 1979. The inspectors summarized the purpose and findings of the inspection. The licensee acknowledged the findings reported herein.