

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/85055(DRS); 50-455/85045(DRS)

Docket Nos. 50-454; 50-455

Licenses No. NPF-37; CPPR-131

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

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: December 2-6, 1985

Inspectors: *M. Ring*  
M. Ring

12/27/85  
Date

*W. Forney*  
W. Forney

12/27/85  
Date

*J. Malloy*  
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12/27/85  
Date

Approved By: *J. J. Harrison*  
J. J. Harrison, Chief  
Engineering Branch

12/27/85  
Date

Inspection Summary

Inspection on December 2-6, 1985 (Reports No. 50-454/85055(DRS);  
50-455/85045(DRS))

Areas Inspected: Routine, announced inspection to review licensee's test procedures, administrative procedures and practices, and personnel qualifications and staffing for the Unit 2 test program for the purposes of determining whether appropriate mechanisms are in place to provide a transfer of experience from the Unit 1 test program and to perform a complete, accurate, and successful test program on Unit 2. The inspection involved 95 inspector-hours onsite by three inspectors.

Results: Of the three areas inspected, one violation was identified in one of the areas (failure to specify appropriate acceptance criteria - Paragraph 4.b.(2)).

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## DETAILS

### 1. Persons Contacted

- \*R. Querio, Byron Station Manager
- \*J. Langen, Byron Compliance Staff
- #C. Tomashek, Braidwood Startup Manager
- \*R. Tuetken, Byron Startup Superintendent
- \*A. Chernick, Byron Compliance Supervisor
- \*P. Boyle, Project Engineering
- \*W. Burkamper, Byron QA Supervisor
- \*P. Devine, Byron Unit 2 Startup
- \*F. Hornbeak, Byron Technical Staff Supervisor
- \*T. Joyce, Byron Assistant Superintendent, Technical Services
- \*E. Falb, Byron Unit 2 Testing Supervisor
- \*A. Britton, Byron QA Inspector

\*Denotes personnel present at the exit interview.

#Present at the exit interview via telephone.

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

### 2. Administrative Control Procedures

The inspectors reviewed several of the licensee's administrative control procedures including selected Byron Operating Procedures (BOPs), Byron Administrative Procedures (BAPs), the Startup Manual, the Unit 2 Lessons Learned Program and QA Audit Checklists. The major inspection effort was directed toward the following specific areas:

- a. Unit 2 Lessons Learned Program - Following completion of preoperational testing and while still involved in startup testing on Unit 1, the licensee performed a review of the testing experience from Unit 1 and prepared a Unit 2 Lessons Learned Program to specify methods for improving the Unit 2 test program based on Unit 1 experience. The inspectors reviewed this program and noted licensee plans to utilize the completed Unit 1 test procedures as the basic source documents for the development of the Unit 2 test procedures. Since Unit 1 and 2 are virtually identical, this approach should yield a procedure at least equal to that used for Unit 1. Unit 1 retests, component demonstrations, test changes and correspondence are also expected to be factored into the development of the Unit 2 test. In order to avoid a repetition of problems or findings encountered during Unit 1 testing, the Lessons Learned Program for Unit 2 requires the test engineer to review QA items, NRC items, contact reports, Deviation Reports (DVRs), Event Reports (LERs), Change Notices (ECNs, FCNs), Action Items (AIRs) and the Programmed Action List (PAL) for problems which may affect the Unit 2 test. Checklists have been developed to implement these reviews.

This program also contains provisions for an exchange of testing information with the Braidwood Unit 1 testing organization. With regard to Braidwood issues, the adequacy of containment recirc sump testing to demonstrate no vortex formation has been raised as an unresolved item at Braidwood. The recirc sump tests at Braidwood and Byron are very similar as are the physical configurations. This issue is currently being reviewed by Commonwealth Edison's Project Engineering Department and will be followed as an open item (454/85055-01; 455/85045-01) for the Byron Units. It is expected that resolution of this issue at Braidwood would be applicable to Byron, also.

- b. The inspectors also reviewed the Byron Startup Manual in order to evaluate the licensee's administrative control provisions for conducting preoperational testing on Unit 2 while Unit 1 is in an operating mode. This condition demands good communications and careful interfacing to ensure the operating unit is not adversely affected by activities occurring in the preoperational unit. The inspectors noted that the Startup Manual contains requirements for the Unit 2 test engineer to inform Unit 1 Operations for any tests which have the potential of affecting Unit 1. The Startup Manual also requires certain Unit 2 preoperational tests to be treated as startup tests. This means these tests would require interfacing with Operations and changes would require SRO concurrence because they have already been determined to have the potential of affecting Unit 1. The inspectors reviewed the licensee's current list of procedures which may impact Unit 1. This list is in the process of being expanded to account for potential retesting and to factor in additional potential impacts resulting from a review of the listing by licensed SROs. The inspectors had identified several comments on the first listing and were pleased to note these comments were also identified by the SRO review which indicates the licensee's own process is working adequately. The inspectors also reviewed the QA audit checklist for audits of the Unit 2 preoperational test procedures and noted the checklist did not contain an item to determine if a particular test had been reviewed for potential impact on Unit 1. Following discussions with the inspectors, the QA Supervisor agreed to add an item to the audit checklist to fulfill this function.

No violations or deviations were identified. One issue requires further review and is considered an open item.

### 3. Personnel and Staffing

The licensee has chosen a different method of staffing to conduct the Unit 2 preoperational test program than was used for Unit 1. On Unit 1, the preoperational test program was performed by the engineers of the licensee's Technical Staff. Following licensing of Unit 1, these individuals continued through the startup (or post fuel load) testing and assumed their normal duties of an operating plant technical staff. To perform the preoperational testing of Unit 2, the licensee has formed an

additional Unit 2 Startup Organization which reports through the station organization to the Services Superintendent in parallel with the Technical Staff. This change allows the Technical Staff to perform its normal functions relative to the operating unit without diluting its capability by also trying to conduct testing on Unit 2. Further, many of the engineers who performed the Unit 1 test program remain accessible to the Unit 2 test group as members of the Technical Staff.

In order to staff the Unit 2 Startup Organization, the licensee has transferred a few key individuals from the Unit 1 testing organization and then attempted to hire new individuals (largely on a contract basis) who have previous testing and nuclear experience. The inspectors reviewed the new Unit 2 startup organization and the personnel qualifications of its members. The qualifications and training records of over half (30) of the Unit 2 test group were examined. The inspectors also interviewed several of the members of the Unit 2 test group in the course of the remainder of the inspection. The inspectors concluded that the average experience level of the Unit 2 Startup staff was strong and exceeded that of the organization which tested Unit 1.

No violations or deviations were identified.

#### 4. Test Procedures

In order to support the licensing of Unit 1, NRC inspectors had previously reviewed portions of five Unit 2 preoperational tests; the A train emergency diesel generator, DC power, diesel fuel oil and two auxiliary power tests. The results of these reviews are documented in Inspection Reports No. 50-455/84-56, No. 50-455/84-54 and No. 50-455/84-32. In this inspection, the inspectors chose three preoperational tests to review as a sample indicative of the remaining tests. The tests chosen were:

- RH 67.60, "Residual Heat Removal"
- AP 5.61, "Auxiliary Power - Bus Loading and Independence"
- SI 73.62, "Safety Injection - Flow Balance"

No problems were noted with respect to AP 5.61. With respect to the remaining two tests the following items were identified:

##### a. RH 67.60

- (1) The inspectors observed that the Unit 2 test, RH 67.60, had been developed from the Unit 1 test, RH 67.10. In developing the Unit 1 test, the Byron Operating Procedures (BOPs) were utilized. At the time of the issuance of the Unit 1 test, most of the BOPs were in draft or Revision 0 and there have been several subsequent revisions. The inspectors expressed concern that since the Unit 2 test was developed from the Unit 1 test, the Unit 2 test would be based on drafts or Revision 0 of the BOPs. The licensee does not believe that this will be a significant problem area in that many of the subsequent BOP revisions were based on the results of the Unit 1 tests and the development of the Unit 2 tests also utilized the results of

the Unit 1 test. While not considered a significant regulatory issue, the inspectors noted to the licensee that deliberate usage of the latest revisions of the BOPs in test procedure development may allow the test program to proceed in a smoother fashion.

- (2) Typically, in the test procedure development process, the licensee utilizes a Revision 0 of the test procedure to circulate to all of the reviewing organizations for comment. Prior to issuance for use the comments are incorporated and then Revision 1 is issued for performance. In reviewing the RH 67.60 test, the inspectors noted that one of Project Engineering's comments (No. 12) was not incorporated in Revision 1 of the test. On the basis of this admittedly small sample, the inspectors recommended the development of a better method of tracking changes between Revision 0 and Revision 1. Since all of the procedures have already been issued in Revision 0 form, the issue may be moot, however, the licensee is reviewing the process for possible improvements.
- (3) In the RH 67.10 (Unit 1) and the RH 67.60 (Unit 2) tests the inspectors noted a difference in the expected values for the 1500 gpm flow data point. In RH 67.10, the tolerance for this value was listed as  $1500 + 500 - 0$  gpm. In RH 67.60, the value was listed as  $1500 \pm 150$  gpm. The action step in both procedures utilized  $1500 \pm 150$  gpm. The inspectors requested an explanation of the difference and a justification for the derivation of the tolerance values. The licensee explained that the  $\pm 150$  values were from a standard  $\pm 10\%$  criteria provided by Project Engineering to be used in lieu of other criteria. The licensee was still investigating the source of the  $+500-0$  value at the time of the exit. There is no technical concern regarding the values actually obtained during Unit 1 testing since they would have met either criteria. The issue of the differing tolerance values is being followed as an open item pending additional information from the licensee (454/85055-02; 455/85045-02).
- (4) At the time of the inspection, RH 67.10 was already in the process of being performed. The inspectors noted that in the first two days of performance the test had already required eight Test Change Requests (TCRs). The number of TCRs was considered excessive by the inspectors for only two days of performance and should be examined to determine if a procedure re-review was in order. The licensee agreed to examine this particular test and monitor subsequent testing for situations where excessive TCRs are needed and to evaluate whether a procedure re-review is required.

b. SI 73.62

- (1) During the review of SI 73.62, the inspectors examined an issue noted in the Braidwood test program regarding the testing of the runout protection orifices. The issue involves the situation that specific testing does not appear to have been done to

demonstrate that the orifices, by themselves, can prevent the pump from going into a runout condition and potentially causing damage to itself. At Byron, the Unit 1 testing utilized a combination of throttle valves and orifices and therefore did not verify the orifices, by themselves, would prevent runout. The Unit 1 test did not appear to record the orifice sizes and therefore the inspectors requested the licensee to verify orifice sizes and provide the justification/calculations for those sizes. The Unit 2 procedure was written to test in the same manner as Unit 1, but the Unit 2 procedure added a requirement to verify orifice sizes as a prerequisite to the test. The issue of testing and/or sizing of the runout protection orifices is considered an unresolved item (454/85055-03; 455/85045-03).

- (2) In Acceptance Criteria Paragraph 4.1, the SI 73.62 test states, "Each centrifugal charging (CV) pump must equal or exceed the head versus flow performance as shown on attached Figures 1A and 1B in Appendix D-1." In Acceptance Criteria 4.2, the SI 73.62 test states, "Each safety injection (SI) pump must equal or exceed the head versus flow performance as shown on attached Figures 2A and 2B in Appendix D-2." In Acceptance Criteria 4.3, the SI 73.12 test states, "After correcting test data for instrument accuracy, each Residual Heat Removal (RH) pump must equal or exceed the head versus flow performance as shown on attached Figures 1A and 1B in Appendix D-3. . . ." The RH acceptance criteria contains additional provisions for specific flow conditions. In each of the three acceptance criteria cases above, the figures specified by the criteria appear to be vendor curves of actual pump performance in a test loop. In the inspector's opinion, it is unreasonable to expect a pump to "equal or exceed" the shop curves after installation in the field. If the pump did exceed the shop curves, an analysis would be warranted to explain what caused the perceived improvement. The inspector's believe the licensee intended for the figures to be minimum acceptable curves as opposed to vendor's actual performance curves. The work sheets associated with these curves bear out this belief in that they refer to minimum acceptable curves. Failure to specify appropriate acceptance criteria in the SI 73.62 test is considered to be in violation of 10 CFR 50, Appendix B, Criterion XI (455/85045-04). This violation is disturbing to the inspectors in that Unit 1 had considerable difficulties with the SI 73.12 test in this area and, in fact, the centrifugal charging pumps for Unit 1 were initially believed to have failed their acceptance criteria. In view of the Unit 1 problems, the inspectors expected extra care would have been devoted to this test for Unit 2. The significance is somewhat lessened in that the inadequacies in the acceptance criteria would have been self revealing when the pumps did not meet them. Further, the inspectors noted that this test was primarily developed and signed by the Station in November of 1984 while the Lessons Learned Program was not implemented until March-April of 1985. It is believed the nominal 30 day prior to performance review required for each

test may have picked up these acceptance criteria problems in that for tests issued before the Lessons Learned Program was implemented, the requirements of that program are instituted at the 30 day review point.

One violation was identified in this area. Two items requiring further review were also identified; one is being followed as an open item and one as an unresolved item.

5. Conclusions

The inspectors concluded from the review of administrative controls, personnel and staffing, and test procedures that the licensee had implemented actions which should utilize the experience learned from Unit 1 such that the positive aspects of the Unit 1 test program would be retained and difficulties would not be repeated. While the violation identified in Paragraph 4.b.(2) would appear to cast doubt on this conclusion, the inspectors believe it is at least in part due to the test being reviewed prior to the Lessons Learned Program being implemented. Accordingly, the inspectors believe that the Byron Unit 2 Test Program should not require the same level of inspection as would a first unit type nuclear plant. The inspectors intend to recommend that the test procedure review phase of the NRC inspection process be deleted for Byron Unit 2. The test procedure performance and results review phases would be expected to be performed in their entirety.

6. Open Items

Open items are matters which have been discussed with the licensee which will be reviewed further by the inspectors, 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 2.a. and 4.a.(3).

7. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. An unresolved item disclosed in the inspection is discussed in Paragraph 4.b.(1).

8. Exit Interview

The inspectors met with the licensee representatives denoted in Paragraph 1 on December 6, 1985. The inspectors summarized the scope of the inspection and the findings regarding the inspection program including the conclusion noted in Paragraph 5. The licensee acknowledged the statements made by the inspectors with respect to the open and unresolved items and the violation denoted in Paragraph 4.b.(2). The inspectors also discussed the likely informational context of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents/processes as proprietary.