

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-64(DRS)

Docket No. 50-454

License No. CPPR-130

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

Facility Name: Byron Station, Unit 1

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: August 29 through October 4, 1984

Inspectors: *Roger D. Walker for*
M. Ring

10-16-84
Date

L. A. Reyes for
A. Dunlop

10/16/84
Date

L. A. Reyes for
M. McCormick-Banger

10/16/84
Date

L. A. Reyes for
D. Williams

10/16/84
Date

L. A. Reyes for
P. Eng

10/16/84
Date

L. A. Reyes for
C. VanDenburgh

10/16/84
Date

L. A. Reyes for
R. Ferrell

10/16/84
Date

Approved By: *L. A. Reyes*
L. A. Reyes, Chief
Test Programs Section

10/16/84
Date

Inspection Summary

Inspection on August 29 through October 4, 1984 (Report No. 50-454/84-64(DRS))

Areas Inspected: Routine, announced inspection to review licensee action on previous inspection findings; Integrated Design Inspection followup; preoperational test procedures; evaluations of preoperational test results; preoperational test results verification and the startup program. The inspection involved 296 inspector-hours onsite and 73 inspector-hours in office by seven inspectors including 53 inspector-hours onsite during off-shifts.

Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

- *R. Querio, Station Superintendent
- *R. Pleniewicz, Assistant Superintendent, Operations
- **G. Klopp, Project Engineering Department
- *W. Burkamper, QA Supervisor, Operating
- *D. St. Clair, Technical Staff Supervisor
- *D. Sible, QA Engineer
- *F. Hornbeak, Unit-2 Testing Supervisor
- *R. Poche, Licensing Engineer
- *G. Stauffer, Station Nuclear Engineer - Technical Staff
- *S. Dresser, Licensing - Staff Assistant

*Denotes personnel present at the exit interview.

**Present via telephone for part of the exit interview.

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

2. Licensees Action on Previous Inspection Items

- a. (Closed) Open Item (454/83-12-04): This item involved the development of preoperational tests to verify the ability to "manually transfer power to the essential motor-driven Auxiliary Feedwater (AFW) pump from the corresponding emergency diesel-generator power supply in the opposite unit" as required by the SER. The item has been partially discussed in previous inspection reports 50-454/83-24, 50-454/84-07 and 50-454/84-24. The licensee has now written and performed test procedures DG 22.60, "Diesel Generator-2A", and R-200 (a DG retest performed to verify the capability of the Unit 2 125 VDC system to support the operation of the Unit 2A Diesel Generator). The inspector has reviewed these procedures and their results against an advance copy of the proposed Technical Specification regarding the Unit 2A Diesel Generator supporting Unit 1 Auxiliary Feedwater. The inspector has no further questions in this area.
- b. (Closed) Open Item (454/83-40-01): This item involved NRR's response to the licensee's request for exemption from the venting and draining and Type C leak testing requirements of 10 CFR 50 Appendix J for certain valves and systems. The inspectors received an advance copy of Supplement 5 to the Byron SER from NRR wherein the exemption request is approved.
- c. (Open) Unresolved Item (454/83-47-06(DE)): Item previously concerned whether sufficient testing was performed in VE 128.10 to confirm the design basis described in Table 14 and paragraph 9.4.5.3 of the Byron FSAR. The design basis requires that the Miscellaneous Electric Equipment Room exhaust fans operate to maintain the differential pressure with respect to the control room to greater than 1/8 inch water gage pressure (1/8" wg). Similar requirements exist for the

Switchgear Heat Removal (VX); Auxiliary Building Ventilation (VA) and Control Room Ventilation (VC) systems. Testing to confirm this design basis for the VE system was not accomplished in VE 128.10, rather it was incorporated into the testing of VC 85.10. Deficiencies 11751 (JE) and 12179 (KM) were written during the performance of VC 85.10 based upon the inability of the VC system to maintain the required differential pressures with the associated ventilation systems in operation. Retests 249 and 250 were written to resolve these deficiencies with VC ventilation. However, the procedures of R-249 and R-250 and the results of R-249 were reviewed and approved without the VE, VA and VX ventilation fans operational based upon the resolution of a separate concern identified in deficiency 12458. Action Item Record (AIR) 6-84-487 exists to test the ability by Mode 4 of the Train A VC system to maintain the control room pressure greater than 0.05" w.g. and AIR 6-84-488 requires both trains of the VC system to be tested to ensure they can maintain the 1/8" w.g. differential pressure prior to ten effective full power days at 25% power or less. Although these AIRs ensure sufficient testing has been performed to ensure the VC system can meet its functional requirements before a substantial fission product inventory is developed, similar to the retests, they do not explicitly require the associated ventilation systems to be operational. The licensee indicated during the exit meeting of September 28, 1984 that it is their intent to retest the VC system in AIR 6-84-488 with the VE, VX and VC systems operational. Based upon the inspector's concern that this method of testing was not specifically required by the AIR, the licensee has committed to modify the testing requirements of AIR 6-84-488 to require that the adjacent systems of VE, VX and VC be operational. Based on the inspector's original concern on the testing of the VE and VX systems, the licensee has also developed Component Demonstration Procedure, C-160, to test the ability of the VC system operating in conjunction with the VE and VX systems in their worst case mode (full outside air), to maintain the control room differential pressures. This item will remain open pending the satisfactory testing required by the AIR 6-84-488 and C-160.

- d. (Open) Unresolved Item (454/84-07-07(DRS)): This item involved a possible unmonitored failure related to a blown fuse in the control circuitry of the RHR suction isolation valves. Subsequent investigation revealed that this circuit configuration existed for all Westinghouse 7300 cards which were used for many applications in control and protection circuitry. The condition in question occurred when a short from the output terminals to ground existed and caused the fuse to blow. For most protection circuitry this was determined to not be an undetectable failure in accordance with IEEE 379 in that most protection circuitry is normally energized and deenergizes to actuate the protective feature. This failure condition would deenergize the circuit, actuate the protective feature and thus be self revealing. Some protection circuits such as Containment spray and RHR suction isolation need to energize to actuate the protective feature. For each of these circuits, the licensee has verified that there is a light connected across the output of each 7300 card external to the card itself. The routine

card calibration procedure at Byron contains a requirement to monitor this light for a change of state when an actuation signal is fed to the card. If a short from the output to ground existed at the card, no change of state for the light would occur. This failure is not considered undetectable per IEEE 379. The Westinghouse site representative informed the inspector that the 7300 cards and circuitry are the same for all plants using 7300 cards. The surveillance procedure described above is routinely performed every 18 months. The inspector informed the Generic Issues Branch (J. Stewart) of I&E of the above situation and requested assistance in determining whether 18 months was an adequate surveillance interval. The item remains open pending further discussion with I&E.

- e. (Closed) Open Item (454/84-38-07(DRS)): This item addressed the incorporation of vibration data acquisition requirements into BVP-200-1, "ISI Requirements for Pumps". The inspector reviewed revision 2a of the Byron Station Unit 1 Preservice/Inservice Testing Program Plan for Pumps and noted that vibration data acquisition requirements have been incorporated. In order to insure the repeatability of vibration measurements, the licensee has agreed to physically mark the points for vibration measurement on all pumps in the inservice test program by October 15, 1984.
- f. (Closed) Open Item (454/84-38-08(DRS)): This item addressed the instrument range requirements for ultrasonic flowmeters as specified in the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code, Section XI, Subsection IWP-4120. The licensee has prepared relief request number PR-5 for their Inservice Testing Program Plan requesting relief from the range requirements as stated by the Code. The Inservice Testing Program Plan will be submitted to the Commission for review six months after initial fuel load.
- g. (Closed) Unresolved Item (454/84-49-04): This item dealt with a failure to sign and date Section 10.0, "Restoration", and Appendix C, "Operating Procedures", in preoperational test CV 18.11, "Chemical and Volume Control-Charging, Letdown and RCP Seal Injection Logic". The licensee has concluded an investigation of the test performance and determined that in fact these two Sections of the test were not signed as required by administrative controls. The licensee also determined, however, that the restoration steps called out in the test were accomplished and that the operating procedure verification required by the test has been completed. The operating procedure verification has been an ongoing process accomplished by the Operating Department independent of test procedure performance and has included observations through the latest Hot Operations period conducted in August of 1984. The inspector noted that this instance of failure to follow administrative controls actually occurred in approximately the same time frame (late 1982 to early 1983) as a previously noted failure in the same area for which the licensee was cited for an item of noncompliance (454/83-58-01b). In response to that noncompliance, the licensee instituted corrective actions to prevent further occurrences. The inspector reviewed 13 preoperational tests performed or reviewed subsequent to the implementation

of corrective actions and noted no similar occurrences. Since instances of this nature were known to have been occurring at the time CV-11 was performed, apparently successful corrective action was implemented.

3. Integrated Design Inspection (IDI) Follow-up

Finding 6-12, "Equipment Status Display System", of the IDI report for Byron was identified as closed in a letter dated July 26, 1984 from D. Norkin, Byron IDI Team Leader, to J. Milhoan, Section Chief, Quality Assurance Branch. The closeout paragraph for item 6-12 indicated Region III should monitor the Equipment Status Display System during preoperational and startup tests to assure that it performs its intended function. The inspector reviewed the system technical manual and discussed its operation with the system test engineer. The system has been preoperationally tested but has not been turned over to operations for use. Monitoring of the system usage will continue through the startup program since it is not "in use" to date.

4. Preoperational Test Procedure Verification

The inspectors reviewed the following preoperational test procedures against the FSAR, SER, proposed Technical Specifications and Regulatory Guide 1.68.

- AR 6.11, "Area Radiation Monitoring - Loop 1"
- AR 6.15, "Area Radiation Monitoring - Loop 5"
- EM 28.11, "Environmental Monitoring"
- EM 28.12, "Pipe Vibration"
- RC 63.13, "Reactor Vessel Level Indication"

No items of noncompliance or deviations were identified.

5. Preoperational Test Results Evaluation

The inspectors reviewed the results of the below listed preoperational test procedures to verify all test changes were identified and approved in accordance with administrative procedures; all test deficiencies were appropriately resolved, reviewed by management and retested as required; test results were evaluated by appropriate engineering personnel and specifically compared with acceptance criteria; data was properly recorded, signed, dated and documented as test deficiencies if out of tolerance, test packages were reviewed by QA for adequacy of contents; and test results were approved by appropriate personnel.

- RP 68.10, "Reactor Protection - Time Response"
- DG 22-10, "Diesel Generator"
- EF 26.12, "Essential Safety Features - Logic and Time Response"
- FW 34.11, "Main Feedwater"
- PC 58.10, "Primary Containment-B and C Leak Rate"
- PC 58.11, "Primary Containment-A Leak Rate"

- a. With respect to the results of EF 26.12, PC 58.10 and PC 58.11, the inspectors had not completed the review at the time of the exit and this review will be documented in a later inspection report.
- b. With respect to the results of RP 68.10, the inspector had the following comments:
- (1) It was unclear where the licensee was verifying the requirements of FSAR Table 14.2-6 which states, "the individual protection channels will be tested to...demonstrate safe failure on loss of power". This issue will be followed as an unresolved item (454/84-64-01(DRS)) pending additional information from the licensee.
 - (2) It was unclear where the licensee was performing testing to verify proper load group assignments and independence between channels (absence of interactions with other redundant channels) such as discussed in Regulatory Guide 1.41 and IEEE Standard 338. This issue will be followed as an unresolved item (454/84-64-02(DRS)).
 - (3) During the RP 68.10 test, the licensee had a specific testing program performed by Analysis and Measurement Services to determine the RTD time constants. The program yielded time constants from 2.9 to 3.3 seconds \pm 10% error. In the data evaluation, Westinghouse, through a letter dated June 12, 1984, concluded these times were too long compared to the expected 2.0 seconds. Since Westinghouse felt the difference may be due to inconsistent RTD bypass loop flow during Hot Functional Testing, the letter directed CECO to use 2.0 seconds until the bypass flow and hence RTD time constants could be confirmed in the Startup Test. While the inspector disagrees with the usage of 2.0 seconds as a response time since it is nonconservative, the inspector does agree that the appropriate place to confirm the data is in the Startup Test. This item will be followed as an open item (454/84-64-03(DRS)).
- c. With respect to the review of DG 22.10, the inspector had the following concerns:
- (1) The test evaluation of DG 22.10 states that the fuel consumption rates obtained in the preoperational test correlate with the data obtained from the engine manufacturer and that, based on the manufacturer's consumption rates and the post-accident time-dependent generator loading sequence specified in Q40.106 of the Byron FSAR, approximately 37,000 gallons of diesel fuel oil will be used in seven days at an average load of 3500 KW. This statement is incorrect. The average load for the post-accident diesel generator loading is 3177 KW vice 3500 KW. Discussions with licensee personnel have confirmed this apparent error, however during these discussions it was also determined that a nonconservative method of analysis was used to reach the conclusions specified in the test evaluation.

During the station's evaluation of the test results, the fuel consumption rates obtained during the preoperational test were compared to those provided by the manufacturer. The manufacturer's consumption rates, considered confirmed because the data was within a 10% margin, were then used to calculate the oil storage requirement based upon the calculation method specified in ANSI N195/ANS 59.51. The station compared this value to the present proposed technical specification limit and concluded that sufficient fuel oil was available. This method is nonconservative because the data obtained during the preoperational test showed a 100% power fuel consumption rate in excess of the manufacturer's values. If the preoperational test data is extrapolated, the inspector calculates that 42349 gallons of fuel oil would be consumed by the diesel generator in seven days which is in excess of the technical specification limit for minimum fuel oil storage capacity of 42000 gallons. The data must be extrapolated because the fuel consumption rates required by the ANSI standard for the minimum fuel storage calculation were not determined by the preoperational test.

Following the exit meeting of September 28, 1984, the inspector met with the licensee's Project Engineering Department (PED) on October 4, 1984 at the licensee corporate offices to discuss the method and results of their evaluation of the preoperational test performance. During this meeting the licensee indicated that the technical specification limit in effect and the value used in their evaluation was 47000 vice 42000 gallons of fuel oil. The licensee indicated that based upon this limit, the preoperational data confirmed that sufficient fuel oil was available to provide for the seven day post-accident time-dependent diesel generator loading sequence as required by ANSI N195/ANS 50.51. The inspector has determined that although the evaluation performed by PED was also nonconservative due to the use of manufacturer's fuel consumption values vice the larger values obtained during preoperational testing, their conclusion that sufficient fuel oil was available based upon a technical specification minimum of 47000 gallons is valid. However, further investigation is required to determine the justification for subsequently lowering the technical specification limit to 42000 gallons which cannot be supported by preoperational test data. This item will be followed as an unresolved item (454/84-64-04(DRS)).

- (2) Paragraph 9.5.4.1 of the Byron FSAR requires that sufficient storage capacity be provided in the Diesel Oil Day Tank to allow the diesel generator to operate fully loaded for 72 minutes. DG 22.10 verifies this capacity by fully loading the diesel generator and ensuring that 72 minutes running time is available after the technical specification limit of 450 gallons in the day tank is reached. During the performance of DG 22.10, deficiency 1601 (AAA) was written based upon an

overflow fuel line inlet to the day tank not being installed. Based upon this, the licensee performed and approved retesting in the form of Component Demonstration C-46 to show that sufficient day tank storage capacity existed. However, the test method of C-46 does not require that the 72 minute timing interval begin at the low level alarm corresponding to the technical specification limit of 450 gallons. Because of this, actual testing was performed which began the 72 minute timing interval using fuel oil which is not required to be available. Therefore, the retesting of C-46 does not verify that sufficient fuel oil is available in the Diesel Oil Storage Tank to meet the design basis of the FSAR. This item will be followed as an unresolved item pending further inspector review and evaluation. (454/84-64-05(DRS))

No items of noncompliance or deviations were identified.

6. Preoperational Test Results Verification

The inspectors reviewed the following preoperational test procedures and verified that results were reviewed against approved acceptance criteria and an evaluation of the test results had been performed in accordance with Regulatory Guide 1.68 and the licensee's Startup Manual:

AR 6.11, "Area Radiation Monitoring - Loop 1"
AR 6.15, "Area Radiation Monitoring - Loop 5"
RM 69.10, "Reactor Coolant Pressurizer"
EM 28.12, "Pipe Vibration"
EM 28.11, "Environmental Monitoring"
PR 60.10, "Process Radiation Monitoring - Miscellaneous Monitors"
WO 115.10, "Control Room Chilled Water"
NR 52.10, "Neutron Monitoring - Excores"
RC 63.13, "Reactor Vessel Level Indication"

a. With regard to the results of EM 28.12, the inspectors noted the following items:

- (1) A contact report between the system test engineer and the Sargent and Lundy engineer discussed the need for monitoring for piping vibration when the Chemical and Volume Control system (CV) was operating in a 3 CV pump configuration. The engineers were concerned that pulsating action of the positive displacement pump (PDP) could have adverse effects on the other (centrifugal) pumps or otherwise degrade the system. Because this condition would only be expected to occur infrequently (when the PDP was running and a Safety Injection occurred), would only last for a short time, and because the engineers did not want to damage equipment, they concluded this configuration should not be tested. The inspector discussed this situation with the NRR vibration engineer who disagreed with the conclusion. The inspector informed the licensee of NRR's position. This issue will be followed as an open item (454/84-64-06(DRS)) pending licensee incorporation of the 3 CV pump configuration into the pipe vibration test program.

(2) Deficiency 8171 (AQ), written October 18, 1983 noted a hairline crack on the centrifugal charging pump's cold leg injection line 1S108JA-1.5". The deficiency corrective action described that the pipe was replaced. The removed section of pipe exhibited a flaw within the heat affected zone of the circumferential weld of the penetration can (pipe penetrates the missile barrier) to the pipe. The line has also exhibited excessive vibration during the EM test. Subsequently, this line and the three similar SI lines to the other loops had additional snubbers and pipe supports installed and then were found acceptable in further vibration testing. The inspectors questioned whether sufficient evaluation existed for the specific mechanism causing the crack in this SI line since the three other similar lines also would have heat affected zones of the welds and had exhibited similar vibration in the EM test. In response to the inspectors' concerns, the licensee performed visual inspections of the similar area in the three other lines. No similar flaws were noted, however, the area was described as difficult to perform a visual inspection due to access within the penetration can. The licensee subsequently decided to remove and replace the other three lines as a conservative measure. This item will be followed as an unresolved item (454/84-64-07(DRS)) pending examination of these three lines and failure mechanism analysis of the first line.

b. During the review of WO 115.10, the inspector identified the following items:

- (1) TCR No. 9 deleted requirements to verify the annunciator response to an alarm condition and used a recorder only. The annunciator was not retested later or listed as a deficiency in the procedure. This was not responded to in any phase of the test evaluation process. During the discussion with the STE, it was agreed that a Construction Work Request (CWR) would be generated to test the alarm. CWR WO-0076 was issued on September 25, 1984 and closed on September 27, 1984.
- (2) Retest R-80 listed the acceptance criterion for pump flow to be > 552 GPM, yet the original procedure listed the flow to be 555 GPM. The change in the acceptance criterion was not discussed in any phase of the test evaluation. The licensee stated this was a typographical error. Actual pump flow was considerably higher, hence the error did not affect the results. A letter to Project Engineering (PED) will be generated by the STE to cover this item.

Both of the above issues are considered minor, yet not strictly in accordance with the Byron Station Administrative procedures. Since they have no affect on safety, the inspector considers these items closed.

- c. With regard to the results of NR 52.10, deficiencies 4313 and (AD) documented a situation concerning the physical orientation of instrument cables where one source range drawer could not be pulled out to the full open position (does not affect operability). Design change NR-5 is in progress per discussions with the STE. This will be tracked as an open item (454/84-64-08(DRS)) pending receipt of the design change.
- d. With regard to the results of RC 63.13, the inspector noted that Quality Assurance did not observe the test being performed in the field as would be required by Quality Procedure 11-2 and the licensee's corrective action to noncompliance 454/84-09-05; 455/84-07-05. This fact was noted in Quality Assurance's post test audit, QAA 06-84-063.13. The inspectors determined from conversations with the involved personnel that lack of an "in process" surveillance was at least partially due to the fact that part of the test was not performed. Since this also represents the only preoperational test performed subsequent to the above noncompliance and reviewed by the inspectors that did not have an "in process" surveillance, the inspectors determined this to be an isolated occurrence. The inspectors have no further concerns in this area.

No items of noncompliance or deviations were identified.

7. Initial Startup Test Program

The inspectors reviewed administrative controls related to the initial startup program against the requirements of the FSAR, SER, applicable Regulatory Guides and Standards, and portions of 10 CFR 50 in order to verify that appropriate controls were in place in the areas of test organization, administration, document control, test and measuring equipment and performance.

The inspectors utilized the following documents in the review:

Byron Startup Manual

- FH 32.30, Revision 2, "Initial Core Load Sequence"
- FH 32.31, Revision 1, "Post Core Loading Precritical Test Sequence"
- FH 32.33, Revision 1, "Initial Criticality and Low Power Test Sequence"
- TG 80.33, Revision 1, "Test Sequence at 30% Power"
- TG 80.34, Revision 1, "Test Sequence at 50% Power"
- TG 80.30, Revision 1, "Test Sequence at 75% Power"
- TG 80.31, Revision 1, "Test Sequence at 90% Power"
- TG 80.32, Revision 1, "Test Sequence at 100% Power"

The inspector's review resulted in the following comment:

Chapter 14 of the FSAR identifies those tests that the licensee has committed to perform during initial startup testing. The licensee's sequencing procedures (listed above) provide the order in which these tests will be performed. Two of the tests committed to in the FSAR

("Effluent Radiation Monitors" and "Shutdown from Outside the Control Room") were not identified in any of the test sequencing procedures. This is an open item (454/84-64-09(DRS)) pending licensee revision of the test sequencing procedures and subsequent inspector review.

No items of noncompliance or deviation were noted.

8. Open Items

Open items are matters which have been discussed with the licensee which will be reviewed further by the inspectors, and which involved some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 5.b.(3), 6.a, 6.c and 7.

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. Unresolved items disclosed during the inspection are discussed in Paragraphs 5.b.(1), 5.b.(2), 5.c, 6.a.(2).

10. Exit Interview

The inspectors met with licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on September 28, 1984. The inspectors summarized the scope of the inspection and the findings. The licensee acknowledged the statements made by the inspectors with respect to the open and unresolved items. The inspectors also met with licensee representatives denoted in Paragraph 1 on October 4, 1984 at Project Engineering offices to further discuss the items.