

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/85048(DRS)

Docket No. 50-454

License No. NPF-37

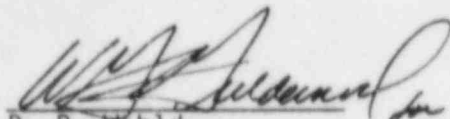
Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Byron Station, Unit 1

Inspection At: Byron Site, Byron, IL


Inspection Conducted: October 28 through November 7, 1985

Inspector:


P. R. Wohld

12-14-85
Date

Approved By:


W. G. Guldemon, Chief
Operational Programs Section

12-14-85
Date

Inspection Summary

Inspection on October 28 through November 7, 1985 (Report No. 50-454/85048(DRS))

Areas Inspected: Special, announced inspection of the licensee's programs for motor-operated valve setup, maintenance, and testing. The inspection involved a total of 49 inspector-hours onsite and 12 inspector-hours offsite by one NRC inspector.

Results: In the area inspected, one violation was identified (failure to control motor-operated valve setup, maintenance, and testing per design requirements - Paragraph 2.A).

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DETAILS

1. Persons Contacted

*K. L. Graesser, Division Vice President, Nuclear Division
*R. E. Querio, Station Manager
*L. E. Bihlman, Construction Quality Assurance
*M. V. DellaBetta, Construction Quality Assurance
#*R. J. Dorsey, Electrical Maintenance Staff
#*R. Dralle, Assistant Supervisor, POAD
#*J. J. Glowinski, Supervisor, POAD
#*T. P. Joyce, Assistant Superintendent, Technical Services
*J. Juna, Engineer, POAD
#*G. K. Schwartz, Assistant Superintendent, Maintenance
*R. Tuetkin, Startup Superintendent
#*R. C. Ward, Services Superintendent
#R. Branson, Master Electrician, Maintenance
#A. D. Britton, Quality Assurance Inspector
#W. Burkamper, Quality Assurance Supervisor, Operations
#J. J. Garrey, Nuclear Safety Staff
*J. Langan, Compliance Engineer
#L. A. Sues, Assistant Superintendent, Operations
#K. E. Yates, Nuclear Safety Staff

*Denotes those attending the exit interview held on October 31, 1985.

#Denotes those attending the exit interview held on November 7, 1985.

Additional plant technical and administrative personnel were contacted by the inspector during the course of the inspection.

2. Motor-Operated Valve Setup, Maintenance, and Testing

A special inspection was conducted of the licensee's programs for setup, maintenance, and testing of motor-operated valves. Inspection findings were as follows:

a. Design Control (10 CFR 50, Appendix B, Criterion III)

The control of torque switch settings appeared adequate as evident from the Sargent and Lundy and Westinghouse memoranda onsite prescribing setpoints. The maintenance department had incorporated these setpoints into maintenance procedures to assure that the setpoints were available to maintenance mechanics. Also, the licensee had documented the verification of all torque switch settings. Additional design controls are necessary, however, to address other important aspects of valve setup, maintenance, and testing:

- (1) Only very general guidance for Limitorque valve operator geared limit switch settings is provided on valve schematic drawings. More specific guidance, with the normal design controls, is needed for field use to assure that the valves will operate per the design intent.
- (2) Initial setup of the valves is done without procedures, adequate instructions, or formal qualification of those performing the work. These areas need to be addressed such that valve setup can be done with all the controls necessary to assure quality, including assurance that valve setup is in accordance with the design intent.
- (3) Maintenance procedures refer the mechanic to the electrical maintenance foreman for valve operator geared limit switch setting details. Critical limit switch settings controlling valve operation should be specified as part of the design control process, as are the torque switches, in properly reviewed and controlled documents.
- (4) Since preoperational testing is done on some valves to assure their operation under design basis conditions, subsequent maintenance procedures should not defeat the validity of this testing by setting the valves up differently from that done for preoperational testing. Additional control and coordination of initial valve setup with subsequent maintenance activities is needed to assure that this does not happen.
- (5) The inspector was assured that initial field setup of the motor-operated valves properly accounted for all torque and geared limit switch setting concerns, regardless of the lack of a procedure; however, on observing a valve setup in Unit 2, the inspector noted that the setting technique for the open torque switch bypass switch did not properly address the intended function of the switch. The technique did not account for particular valve and valve operator characteristics and the need for the bypass switch to be closed until some point after valve disc motion begins.
- (6) The licensee cited vendor manuals as a viable source of information for valve setup; however, the Limitorque manuals available are not adequately detailed to address specific valve applications. The inspector noted also that the maintenance procedures reviewed onsite do not require or suggest using vendor manuals for valve setup. If these manuals are to be used for actual field work, they need to be reviewed for the appropriate application and controlled as are other quality documents for safety-related equipment.

Item 6 is noted for information only. Items 1 through 5, together, constitute a failure by the licensee to establish measures to assure that the design bases for motor-operated valves are correctly

translated into specifications, drawings, procedures, and instructions; and, to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. This is a violation of Criterion III, Design Control, in 10 CFR 50, Appendix B (454/85048-01(DRS)).

b. Test Control (10 CFR 50, Appendix B, Criterion XI)

Testing subsequent to torque or geared limit switch setting is not specified (except for certain valves during the preoperational test phase) to assure that valve operator settings are proper and adequate for operation under design basis conditions.

Maintenance procedures were reviewed for post maintenance test requirements. No testing or test criteria were identified within the maintenance procedures or other plant procedures that appeared adequate to reasonably assure valve post-maintenance operability under design basis conditions. Valve motor current values are required to be taken by a few of the procedures, but no criteria are assigned to determine operability or to highlight a need for further evaluation.

The licensee currently depends on valve stroke timing per Section XI of the ASME Code for surveillance testing; however, while meeting specific ASME requirements in this area, there are serious weaknesses in the test techniques and stroke time criteria currently applied. The stroke timing is not normally done at design differential pressures, and test techniques are not adequate to allow an extrapolation of test data to account for the difference between actual test and design basis conditions. Also, stroke time increase limits allowed by the Code are not seen in actual practice prior to total valve failure to stroke.

The inspector suggested that the licensee consider the following if not already being done:

- (1) Safety-related motor-operated valves should be periodically stroke timed both open and closed without initial "prestroking," by measuring the motor "on time" for a full stroke. Times should be measured and compared to a baseline. The allowed variation of stroke time may be increased or reduced based on experience and knowledge.
- (2) Valve motor current traces during valve stroking in both open and closed directions should be periodically recorded and evaluated for abnormalities. During this stroking, the valve and operator should be observed for proper operation and inspected externally for general condition.

- (3) In depth testing and test results evaluation for proper operation (including evaluation of valve packing loads, torque switch operation at proper stem thrust loads, and limit switch settings) should be done periodically.
- (4) During the conduct of Item 3, perform a general internal and external inspection of valve operator mechanical condition (electrical connections, oil leaks, bolting, rust, packing leaks, etc.)

The inspector emphasized that this was a suggestion only, and that the licensee should begin a program and improve it based on their experience.

Overall, it appears that the licensee's programs for testing motor-operated valves do not meet the intent of Criterion XI, Test Control, in Appendix B of 10 CFR 50, which states, "A test program shall be established to assure that all testing required to demonstrate that . . . components will perform satisfactorily in service is identified and performed. . . . The test program shall include operational tests during nuclear power plant operation." Resolution of this item is pending further consideration by the licensee and evaluation by the inspector. This is an unresolved item (454/85048-02(DRS)).

c. Field Instructions and Procedures (10 CFR 50, Appendix B, Criterion V)

The inspector reviewed the following Byron maintenance procedures and torque switch setting list:

BHP 4200-37, Revision 1, Setting Geared Limit Switches on Limitorque Valve Operators

BHP 4200-38, Revision 0, Removing and Installing Geared Limit Switches on Limitorque Valve Operators

BHP 4200-39, Revision 3, Setting Torque Switches on Limitorque Valve Operators

BHP 4200-40, Revision 2, Removing and Installing Torque Switches on Limitorque Valves

BHP 4200-41, Revision 2, Limitorque Operator Electrical Checkout

BHP 4200-A4, Revision 2, Torque Switch Settings of Motor Operated Valves

The procedures, overall, appeared generally well written. The major comments on the procedures relate to design control and test control, and are not repeated here. Below are additional comments which were discussed with the licensee's staff.

- (1) The procedures for setting valve operator torque and geared limit switches are weak on techniques that would detect improperly set switches. The inspector suggested that the licensee consider mandatory QC checks or diverse verification by other means such as by meaningful test or observation different from the initial procedural steps and techniques to be checked.
- (2) The information and precautions in Step 7 of BHP 4200-39 are needed in BHP 4200-39 and 40 as well, or, the setting of torque switches should not be specified in BHP 4200-39 or 40.
- (3) The procedures involving setting or checking geared limit switches should include an appropriate test for inadvertent valve back seating.
- (4) The torque switch setting document used by maintenance, BHP 4200-A4, should reference the design documents used as the controlling source of the setpoints.

Items 1 through 4 above are considered an open item pending further evaluation and action by the licensee's staff (454/85048-03(DRS)).

d. Valve Operator Geared Limit Switch Inspection

Ten valves were visually inspected, five in Unit 1 and five in Unit 2, to observe geared limit switch development during manual operation of the motor operator handwheel. No problems were identified that were the result of improper limit switch setting. Hence, there did not appear to be any obvious, immediate concern for valve setup.

During the inspection, the inspector noted that a number of motor-operators were mounted with the limit switch compartment directed downward where no physical interferences appeared to prevent a horizontal monitoring. Oil was noted running down the limit switch rotors on one valve. Limitorque recommends a horizontal mounting position for the limit switch and motor compartment to prevent this problem. The licensee noted the inspector's comment on this item and that better valve operator mounting orientation appeared reasonably available.

e. Valve Operability Assurance After Valve Repacking or Valve Packing/Tightening

The inspector reviewed Byron maintenance procedure BMP 3100-12, "Repacking Valves with Graphite Type Packing," and questioned the final operability testing which depends primarily on motor current readings and ASME Section XI stroke timing (done normally at zero differential pressure conditions). The concern is that for either repacking or simple packing tightening, the potential increase in thrust requirements for the valve stem may go up to an unacceptably high level such that there is not enough margin left in the torque switch to handle higher load conditions when there is a differential pressure across the valve. Valve stroke times are fairly insensitive to this increased loading on the stem and the valve current criteria are not adequately developed by the licensee to sense significant stem load changes either.

This is a specific example of a concern for adequate post maintenance testing discussed in Paragraph 2.b. In this case, increased control on the packing tightening might be considered to reduce the depth of post maintenance testing that appears needed. Resolution of the above will be considered an open item pending further evaluation by the licensee and subsequent review by the inspector (454/85048-04(DRS)).

f. Development of Valve Vibration, Motor Current, and Limit Switch Testing

The electrical maintenance department has been considering valve vibration test techniques to be used simultaneously with motor current and geared limit switch development recordings in monitoring and evaluating valve performance. The inspector observed the field use of this equipment on two Unit 1 auxiliary feedwater gate valves during monitoring of open and close valve cycles. The vibration recording resulted in an excellent demonstration (on the open stroke) of the difference between stem movement and the onset of valve disc motion. The current trace showed that a transient current increase occurred at the beginning of stem motion but no variation was noticed at unseating of the valve disc, thereby indicating that valve current signatures would not be a good indicator for determining the point of valve unseating for these valves under the existing test conditions (no differential pressure). The open torque switch bypass switch actuation was recorded simultaneously with the vibration signature, from which it was easy to determine the proper setting of the bypass switch to cover initial unseating of the valve disc.

The inspector commented favorably on the professional capability and positive attitude demonstrated by the maintenance department in developing the test techniques observed. Whether or not the techniques become generally applicable, they are certainly a part

of an important learning process in testing and developing new ideas for ultimate use in maintaining and assuring the reliability of motor-operated valves.

3. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraph 2.c and 2.e.

4. 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. An unresolved item disclosed during the inspection is discussed in Paragraph 2.b.

5. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on October 31 and November 7, 1985, to discuss the scope and findings of the inspection. The licensee acknowledged the statements made by the inspector with respect to items discussed in the report. The inspector also discussed the likely informational content 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.