

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/82-16(DPRP); 50-265/82-18(DPRP)
50-237/82-20(DPRP); 50-249/82-21(DPRP)

Docket Nos. 50-254; 50-265
50-237; 50-249

Licenses No. DPR-29; DPR-30
DPR-19; DPR-25

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

Facility Name: Quad-Cities Nuclear Power Station, Units 1 and 2,
Dresden Nuclear Power Station, Units 2 and 3

Inspection At: Quad-Cities Site, Cordova, IL; Dresden Site, Morris, IL;
Commonwealth Edison Corporate Office, Chicago, IL

Inspection Conducted: August 16 through November 3, 1982 (Quad-Cities)
August 31 through November 3, 1982 (Dresden)

Inspectors: *J. J. Chrissotimos* 2-4-83
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Inspection on August 16 through November 3, 1982 (Quad-Cities) and August 31 through November 3, 1982 (Dresden) (Reports No. 50-254/82-16(DPRP); 50-265/82-18(DPRP); 50-237/82-20(DPRP); 50-249/82-21(DPRP))

Areas Inspected: Special unannounced inspection of Licensee Event Report Followup. The inspection involved a total of 177 inspector-hours onsite by three NRC inspectors including 50 inspector-hours onsite during off-shifts. Results: Two items of noncompliance were identified (Failure to control the distribution of supplemental safety classification lists - Paragraph 2; and Failure to control parts which do not conform to requirements - Paragraph 2).

DETAILS

1. Persons Contacted

Quad-Cities Station

- *N. Kalivianakis, Superintendent
- T. Tamlyn, Assistant Superintendent for Operations
- *D. Bax, Assistant Superintendent for Maintenance
- L. Gerner, Assistant Superintendent for Administration
- J. Heilman, Quality Assurance, Operations
- L. Williams, Quality Assurance Supervisor
- *G. Tietz, Technical Staff Supervisor
- C. Smith, Quality Control Supervisor
- J. Schnitzmeyer, Technical Staff
- J. Wunderlich, Technical Staff

Dresden Station

- *D. Scott, Superintendent
- *J. Eeningenberg, Assistant Superintendent for Maintenance
- R. Meadows, Master Mechanic
- D. Niswonger, Stores Manager
- E. Wilmer, Past Quality Assurance Supervisor
- R. Stobert, Quality Assurance Inspector

Corporate Office

- *C. Reed, Vice President
- *W. Stiede, Assistant Vice President
- *D. Galle, Nuclear Station Division, Vice President and General Manager
- *L. DelGeorge, Director of Nuclear Licensing
- *T. Rausch, Nuclear Licensing Administrator
- *J. Abel, Station Nuclear Engineering Department Manager
- F. Highland, Station Nuclear Engineering Department
- H. Bliss, Nuclear Fuel Services Department
- J. Silady, Nuclear Fuel Services Department
- R. Jortberg, Nuclear Safety Department Manager
- W. Kiefer, Nuclear Safety Department
- *W. Shewski, Quality Assurance Manager

The inspector also interviewed several other licensee employees including maintenance foremen, technical staff personnel and quality control personnel.

*Denotes those persons present at the Enforcement Conference on November 3, 1982.

2. Licensee Event Report Followup

LER 50-265/82-09: Failure of an Electromatic Relief Valve to Open During a Reactor Scram. The failure was caused by the main valve rings binding

in a groove formed in the main valve guide by vibration of the harder ring material against the softer guide material.

a. Quad Cities Nuclear Power Station

During a routine NRC inspection conducted in January and February 1978 (Inspection Report No. 50-265/78-04), the inspector reviewed the cause of two electromatic relief valve failures at Quad-Cities (LER Nos. 50-265/77-31 and 50-254/78-04). The cause of these failures was binding of the main valve piston rings in the main valve guide as a result of a groove worn in the guide by the rings. As a result of that inspection, the licensee committed to evaluate and modify the safety classifications for the relief valve parts and issued an Action Item Record (AIR 4-78-16) to track resolution of the issue. The licensee action resulted in the generation by the plant of a supplemental safety classification list for electromatic relief valve parts which was forwarded to the Station Nuclear Engineering Department (SNED) on May 12, 1978, for review and approval. In a letter to the station dated January 5, 1979, SNED approved the supplemental list with the exception that the main valve piston rings and main valve guide for the electromatic relief valves should be classified as safety-related. SNED stated that the basis for the reclassification of these two parts was a review of the two failures of the electromatic relief valves at Quad-Cities. SNED concluded that it was essential to have material control on these two parts to prevent future failures of this type. The approved supplemental list was incorporated into the Quad-Cities Technical Staff Supervisor's safety classification list. AIR 4-78-18 was closed on the basis of these actions. The supplemental list was not distributed to the appropriate corporate or site departments to ensure implementation of the reclassification of these parts. In addition, the inspectors identified that there were no station or corporate procedures which specify controls for the distribution of supplemental safety classification lists.

When the subcomponents and parts of a safety-related component are not specifically listed on the safety classification list, the Quality Assurance Department has a policy that those subcomponents and parts shall be treated as safety-related. Although this Quality Assurance Department policy required a classification of safety-related and the supplemental safety classification listing which was transmitted to the Quad-Cities Station in the January 5, 1979, letter specified a safety-related classification, the main valve guides for the electromatic relief valves continued to be treated as nonsafety-related. As a consequence, the main valve guides manufactured by Ardillo Corporation, a nonsafety-related vendor, were purchased, installed and used in the electromatic relief valves during the period 1979 to 1982. In accordance with the procurement procedures for non-safety related equipment, the valve guides were purchased from Ardillo Corporation instead of the Original Equipment Manufacturer (OEM) because of a substantial reduction in cost.

In early 1981 the Assistant Superintendent for Maintenance requested SNED to evaluate the Ardillo Corporation main valve guides and compare

them to the OEM parts. At that time the station Maintenance Department was not aware of the reclassification of the valve guides to safety-related status and was not aware of any quality problems associated with the parts manufactured by Ardillo Corporation. The Maintenance Department was aware of the failure history of these valves and was concerned that the non-OEM parts might increase the probability of valve failure if they were not equivalent to the OEM parts. The Maintenance Department attempted to use OEM parts over non-OEM parts and obtained available OEM parts from the Dresden Station for use during the 1980 Unit 2 outage. The Ardillo Corporation main valve guide which caused the failure of the "C" electromatic relief valve at Quad-Cities Station, Unit 2, on June 22, 1982, was installed after the 1980 Unit 2 outage.

SNED responded to the Maintenance Department request with a letter to the station dated April 10, 1981, stating that the main valve guides manufactured by Ardillo Corporation were not equivalent to the OEM main valve guides. SNED concluded that the main valve guides manufactured by Ardillo Corporation were not of sufficient quality to warrant their use in any of the electromatic relief valves. Testing performed on these non-OEM parts revealed that they did not meet minimum hardness, sealing surface finish and casting quality specifications and SNED stated that the deficiencies would lead to component failure which would prevent the valve from opening. SNED provided procurement specifications to be used in future procurements of these parts.

The inspector was not able to identify any licensee efforts made following receipt of the April 10, 1981, letter to identify the manufacturer of the parts which were installed in the electromatic relief valves and determine if Quad-Cities Station, Units 1 and 2, were operating in a potentially unsafe condition. In addition, the inspector found no evidence of licensee action to ensure that controls were established and implemented over the further procurement, storage, installation or use of the main valve guides manufactured by Ardillo Corporation.

As a result of the electromatic relief valve failure on June 22, 1982, the station once again requested SNED to reclassify the main valve guides and piston rings as safety-related to prevent the use of the lower quality Ardillo Corporation parts. On July 29, 1982, SNED sent a letter to the station which enclosed a copy of the January 5, 1979, letter and reaffirmed that the safety classification for the main valve guides and piston rings was safety-related.

In summary, the main valve guides and piston rings for the electromatic relief valves were designated by SNED as safety-related in a letter to the station dated January 5, 1979, and this position was reaffirmed in a letter to the station dated July 29, 1982. Measures were not established to distribute safety classifications to the appropriate corporate or site personnel to assure the procurement, installation and use of acceptable quality parts. This is a violation of 10 CFR 50, Appendix B, Criterion VI (50-254/82-16-01; 50-265/82-18-01). Additionally, it was determined that the main

valve guides manufactured by Ardillo Corporation did not meet appropriate engineering standards. SNED concluded that these parts were unacceptable for use in any of the electromatic relief valves and if used, would result in failure of those valves. Although these conclusions were contained in a letter to the station dated April 10, 1981, measures were not established to control the nonconforming parts in order to prevent their inadvertent installation or use. This is a violation of 10 CFR 50, Appendix B, Criterion XV (50-254/82-16-02; 50-265/82-18-02). These violations resulted in the procurement, installation and use of substandard parts in electromatic relief valves and subsequent failures of those valves to perform their intended safety function on two occasions (LER Nos. 50-265/81-17, dated September 28, 1981, and 50-265/82-09 dated July 19, 1982).

The inspector determined that the onsite Quality Assurance Department does not maintain an independent classification list for use in performing audits and that audits of activities which depend on safety-related classifications (i.e. review of purchase requisitions) are conducted by utilizing the onsite Quality Control Department's list. This compromises the independence of the Quality Assurance Department audits in that the Quality Control Department reviews and approves the safety classification on purchase requisitions. Errors resulting from use of an out-of-date safety classification list would not be detected by the audit. Also, it was determined that the Quality Assurance Department does not include the auditing of the safety-related classification list in their periodic audit program to assure that the classification lists utilized by other departments are valid.

This concern identified by the inspector indicates an apparent weakness in the Quality Assurance Audit Program. This is an Unresolved Item (50-254/82-16-03; 50-265/82-18-03).

b. Dresden Nuclear Power Station

As a result of the findings at Quad-Cities Station, an inspection was performed at Dresden Station to determine if any of the substandard parts were received and used, if station personnel were aware of the problem, and if any corrective action had been taken.

After the electromatic relief valve failure on June 22, 1982, at Quad-Cities Station, Dresden Station personnel conducted an extensive review of station records and found that since May 1979, 25 main valve guides had been received by the station of which five were manufactured by Ardillo Corporation. The receipt records were checked against unit outages and valve overhauls and revealed that the "C" electromatic relief valve on Unit 3 currently had an Ardillo Corporation main valve guide. A second Ardillo Corporation main valve guide had been installed, used and replaced by an OEM part and a third was used as a lapping guide. The remaining two Ardillo Corporation main valve guides had apparently been transferred to Quad-Cities Station as replacement spare parts. There

were no Ardillo guides in storage. There have been no failures of electromatic relief valves at Dresden which were attributed to the substandard main valve guides.

The Station Assistant Superintendent for Maintenance and Master Mechanic became aware of the quality differences between the two manufacturers' parts in March 1981 upon review of the results of tests conducted by the Operational Analysis Department (OAD) documented in reports dated February 19, 1981, and March 26, 1981. These test reports were part of the basis for the April 10, 1981, letter from SNED to Quad-Cities Station which stated that the Ardillo Corporation main valve guides were not of sufficient quality for use in any of the electromatic relief valves. These tests were performed to compare the material and manufacturing quality of main valve guides received from Ardillo Corporation and the OEM. The test results indicated that the Ardillo Corporation parts were not equivalent to the OEM parts. The inspector was not able to identify any licensee efforts made after receipt of these test reports to identify the manufacturer of the parts which were installed in the electromatic relief valves and determine if Dresden Station, Units 2 and 3, were operating in a potentially unsafe condition. In addition, the inspector found no evidence of licensee action too ensure that controls were established and implemented over storage, installation or use of the main valve guides manufactured by Ardillo Corporation. Measures were not established to control the nonconforming parts in order to prevent their inadvertent installation or use. This is a violation of 10 CFR 50, Appendix B, Criterion XV (50-237/82-20-01; 50-249/82-21-01). Efforts were made by station personnel to purchase OEM parts by use of the blanket order method, which specifies the supplier, in an effort to prevent the Ardillo Corporation main valve guides from arriving onsite. This was accomplished by cancelling a purchase request for spare parts from Ardillo Corporation and later resubmitting the request specifying the OEM.

A memorandum from SNED to Quad-Cities station dated January 5, 1979 reclassified these parts as safety-related. A second memorandum from SNED to Quad-Cities Station dated July 29, 1982, reaffirmed the position that the main valve guide was a safety-related part. Another memorandum from SNED to Quad-Cities Station dated April 10, 1981 concluded that the Ardillo valve guides did not meet applicable engineering standards to warrant further use in the electromatic relief valves. The distribution for all of these memoranda included the Dresden Station. Through review of an index of incoming memoranda and interviews with station personnel, the inspector found that none of these memoranda were received at the Dresden Station until September 1982. The supplemental listing approved by SNED on January 5, 1979 which classified the electromatic valve guides as safety-related was not in the station's safety classification list. The supplemental list was not distributed to the appropriate corporate or site departments to ensure implementation of the reclassification of these parts. In addition, the inspectors identified that there were no station or corporate

procedures which specify controls for the distribution of supplemental safety classification lists. In summary, measures were not established to distribute safety classifications to the appropriate corporate or site personnel to assure the procurement, installation and use of acceptable quality parts. This is a violation of 10 CFR 50, Appendix P, Criterion VI (50-237/82-20-02; 50-249/82-21-02).

3. Meeting with Commonwealth Edison Company on September 2, 1982

As a result of these inspections, Commonwealth Edison began to gather information concerning the quantity of Ardillo Corporation main valve guides in use at both Quad-Cities and Dresden Stations. Also, the licensee was asked to determine the safety significance of utilization of these valve guides, if installed.

Members of the Region III staff met with licensee representatives on September 2, 1982, to discuss continued safe operation of the Dresden and Quad-Cities Stations considering the use of substandard parts in electromatic relief valves at those stations. The licensee presented conclusions from their investigation to determine the quantity and quality of the Ardillo main valve guides which were in use. These conclusions and proposed remedial actions, as presented below, were documented in a letter dated September 8, 1982, from the licensee.

The licensee stated that this investigation of station records and Ardillo Corporation main valve guide operating performance has demonstrated that there is no concern regarding the continued safe operation of Dresden and Quad-Cities Stations. The licensee further stated that only one valve with a substandard main valve guide was in operation at Dresden Station, Unit 3, and there were none in Dresden Station, Unit 2. Quad-Cities Station, Unit 2, could have one valve with an Ardillo Corporation main valve guide, and Quad-Cities Station, Unit 1, is now shutdown for refueling. After dismantling the "B" and "E" valves at Quad-Cities Station, Unit 1, both valves were found to have substandard main valve guides. If both of these valves had failed, the safety function of the automatic pressure relief system would have been compromised.

An engineering review of electromatic relief valve performance with Ardillo Corporation main valve guides has been completed and the following summarizes the actions which have been or will be taken at Dresden and Quad-Cities Stations as a result of this review:

- a. Electromatic relief valves equipped with Ardillo Corporation main valve guides that are presently in service will be removed from service after a period of no longer than one fuel cycle.
- b. If at all possible, electromatic relief valves so equipped will be removed from service at the first available off critical path unit outage opportunity, should such an opportunity present itself within the current fuel cycle.
- c. Should it become apparent that electromatic relief valves either known or suspected of having the substandard parts cannot be replaced off the critical path of unit outages within the current

fuel cycle, the operability status of the valves involved should be determined at intervals of six months ($\pm 25\%$) of unit operation. If the results of this check indicates that an operational failure exists, any involved valves will be declared inoperable and the limiting conditions for operation in accordance with the unit technical specifications will be observed.

Because the electromatic relief valves with Ardillo Corporation main valve guides at Dresden Station, Unit 3, and Quad-Cities Station, Unit 2, do have a slightly greater probability of failure than the other valves, the stations have implemented administrative guidelines which will require reduction of the Maximum Average Planner Linear Heat Generation Rate allowable limits on these units in the event that either the High Pressure Coolant Injection System (HPCI) is out of service or an electromatic relief valve which does not have substandard parts is out of service. These guidelines will ensure that substantial safety margins are maintained for the seven day period allowed by the technical specifications with either HPCI or a single relief valve out of service. When the substandard parts have been replaced, these guidelines will be removed. The licensee has also committed that all electromatic relief valve guides at Quad-Cities Unit 1 will be replaced with OEM parts prior to startup.

Considering this information provided by the licensee and the proposed and in-place remedial actions, the Region III staff concurred with the licensee's conclusion that there is no concern regarding the continued safe operation of Dresden and Quad-Cities Stations.

4. Enforcement Conference

The Region III staff met with licensee representatives (denoted in Paragraph 1) for an Enforcement Conference on November 3, 1982. The purpose of the conference was to verify that the inspection findings are correct and determine what corrective actions have been planned or are completed.

The staff provided a discussion of the chronology of events beginning in 1978 which lead to the installation and use of substandard parts in and the subsequent failures of an electromatic relief valve at Quad-Cities Station, Unit 2, on June 22, 1982, and categorized these events as violations of Appendix B to 10 CFR 50. The staff informed the licensee that Region III considered these violations as indicative of a breakdown in the managerial control system designed to assure quality and operability of safety-related equipment.

The licensee responded by stating that the facts were correct as presented by Region III. The licensee provided further information concerning control over the procurement of nonsafety-related parts.

The licensee stated that the service period for similar substandard parts which are currently installed in the Quad-Cities and Dresden Stations has not been long enough to warrant concern over the continued safe operation of those units. The licensee further stated that a review of other activities had been performed and that the circumstances surrounding the use of these substandard parts appeared to be an isolated breakdown of the quality assurance program.