U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-254/91005(DRS)

Docket No. 50-254 License No. DPR-29

Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Quad-Cities Nuclear Power Station - Unit 1

Inspection At: Quad-Cities Sites, Cordova, Illinois
Nuclear Engineering Offices
Downers Grove, Illinois

Inspection Conducted: January 28 through February 14 and
March 21, 1991

Inspector: I. Yin 3/21/91
Isa T. Yin Date

Approved By: Mark L Vanderniet 3/23/91
Clark Vanderniet, Chief Date
Operational Programs Section

Inspection Summary
Inspection on January 28 through February 14, 1991
(Report No. 50-254/91005(DRS)
Areas Inspected: Routine announced safety inspection of modifications and design changes implemented during the Unit 1 refueling outage (IP 37700).
Results: Of the three modifications, one minor design change, and one temporary alteration reviewed and observed by the inspector, all contained at least one deficiency. The number of problems observed through the sample review indicated that licensee management overview and engineering and technical support to the station for conducting the design changes and system modifications could be improved. As a result of the inspection, two violations were identified for inadequate design control and not conducting adequate post modification testing.

REPORT DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*R. L. Bax, Station Manager
*D. Kanakares, Regulatory Assurance (RA) Engineer
*D. Gibson, RA Engineer
*R. Rober, Technical Superintendent
*C. Smith, NQP Superintendent
*C. Iben, Assistant Technical Staff Supervisor
*D. Craddick, Assistant Superintendent, Maintenance
*K. Startecky, Technical Staff (TS) Engineer
*J. Wethington, Assistant TS Supervisor
*M. Steiner, Maintenance Staff
*C. A. Moerke, NED (ON-SITE) BWRSD
D. C. Bucknell, Assistant TS Supervisor
C. C. Baldwin, TS Engineer
S. H. Stapp, NQP Inspector
C. M. Smith, Nuclear Quality Program Superintendent
J. Matrisotto, TS Engineer
T. Rushing, TS Engineer
J. Arnold, Maintenance Staff
J. Huizenga, Electrical Maintenance Staff
S. Javidan, Principle Mechanical Engineer
L. Wright, NED Principle Engineer
D. Luebbe, TS Systems Engineer

Sargent and Lundy Engineers (S&L)

W. Dingler, Senior Mechanical Engineer
K. Adlor, CQD Engineer

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*J. Shine, Resident Inspector

*Indicates those attending the exit meeting at the site on February 14, 1991.

2. Modifications

The inspector reviewed the following modifications:

a. M-4-88-019

This modification included the installation of a 3 gpm oil circulating pump which supplied lube oil to the emergency diesel generator (EDG) turbo charger bearings. It also included the modification of an existing 6 gpm pump which supplied lube oil to the EDG

internals and accessories. These pumps were designed to provide continuous pre-lubrication when the EDG was not running. The 10 CFR 50.59 reviews and safety evaluations appeared extensive and detailed ensuring that an unreviewed safety question did not exist. The evaluation of pump performance characteristics, necessary procedure revisions and the inclusion of the modification into operator training and lesson plan development were also satisfactory. The inspector observed the modification in the field and had no adverse comments.

During record reviews of this modification in the field the following three concerns were identified:

(1) The Commonwealth Edison Company (CECo) Final Project Plan stated that Sargent & Lundy (S&L) was responsible to review component seismic qualification (SQ) reports including seismic mounting details. The Power Systems SQ Test Report No. 11019, dated January 8, 1982, was reviewed by S&L and addressed component structural integrity after the shake table test. However, a supplement to the report, dated February 10, 1982, had not been reviewed by S&L. The failure to complete a design review of the supplement is considered to be an example of a violation of 10 CFR Part 50, Appendix B, Criterion III (254/91006-01a(DRS)). The supplement which was subsequently obtained by the inspector, showed satisfactory testing of pressure gauges, temperature indication instruments, and pressure switches which deviated much less than the 10% acceptance criterion of pre-test calibration.

(2) Construction testing criteria, dated December 20, 1989, required that temperature gauge accuracy be tested to within ± 1% of full scale from 0 to 300oF. The documented test performed on December 7, 1990, showed an accuracy of approximately 1.5%. This test failure was not documented in the test report and CECo engineering subsequently changed the acceptance criterion ± 1.5% without proper evaluation. The failure to document justification for changing the test acceptance criteria after the test failure is considered to be an example of a violation 10 CFR Part 50, Appendix B, Criterion XI (254/910050-2a(DRS)).

(3) During modification testing, a small leak was observed at the threaded fitting downstream of the

3 gpm turbo oil pump. CECo engineering issued an addendum to the test specification on January 15, 1991, requiring the checking and monitoring of the leak. This addendum was not incorporated into the test procedure and no record was kept to document its implementation. This is considered to be an additional example of a violation of 10 CFR Part 50, Appendix B, Criterion XI (254/91005-02b(DRS)).

b. M-4-0-89-066

This modification replaced the existing swing instrument air (IA) compressor and accessories with a higher capacity, better performing, compressor and dryer system. The inspector selected the new dryer components for an equipment compatibility review, and found flow capacity, temperature, and pressure ratings to be suitable for IA operations. During the course of the review, however, the following deficiencies were identified:

(1) The modification was site initiated, and received minimal support from licensee corporate staff. As a result, the engineering efforts were weak. The S&L instrument air demand tabulation for Quad-Cities 1 and 2, dated October 4, 1982, used as the design basis for the modification had the following deficiencies:

- The tabulation failed to take into consideration air capacity loss during dryer purging operations.
- The demand calculation did not include compressor efficiency, which decreases after continuous operation for extended periods of time.
- Peak load demand variation under different plant operating and transient conditions was not identified.
- The use of an air leakage factor of 1.1 was non-conservative, and differed from the factor of 1.3 specified in the CECo Service of Instrument Air Systems Design Guide, dated December 16, 1982.

(2) The control room IA low pressure alarm setpoint was 80 psig, as measured at the compressor discharge header. At 80 psig, the service air system (less purified, therefore,

lower quality air system) backs up the IA system and continues to do so until the IA header pressure reaches 85 psig. This 80 psig setting is not in accordance with the containment isolation, purging, and vacuum relief valve manufacturer's recommendation that valve pressure begin excess of 80 psig at the valve. Present containment valves were set to actuate at 65 psig, which was below the valve design actuation pressure of 80 psig. When system pressure drops below 80 psig, a valve accumulator provided an air supply reserve for valve actuation. However, due to observed system leakage from past testing, the accumulator could not maintain 80 psig for very long. When system pressure reaches 65 psig, it was possible that there would not be sufficient pressure to move the containment valves. The present IA alarm and containment valve actuation settings were inconsistent and could potentially result in valve inoperability. The licensee performed two worst case valve tests during the inspection where valve actuation was observed at 30 psig. The result showed no system operability problem for the types of valves tested; however, the remainder of the valves and alarm setpoint issues will need further evaluation by the licensee. The verification that all associated valves would remain operable at low air system pressure is an Open Item (254/91005-03(DRS)).

(3) As a part of the modification design basis review, the inspector evaluated the licensee's response to NRC Generic Letter (GL) 88-14. The leak test for containment valves in response to GL 88-14 was considered unacceptable. Test acceptance criteria stated that air pressure shall be maintained at 65 psig for a 15-minute holding period. The inspector reviewed several valve test results and noted that depending on the initial IA system pressure, the same leakage rate would fail a valve in one test, but allow it to pass in another test. For example, suppression Chamber Isolation valve A01601-60 failed with a leak rate of 0.53 psig/min., but the reactor building vent exhaust valve 5642B passed at a higher initial IA system pressure with a leak rate of 0.787 psig/min. The licensee agreed that the test acceptance criterion was unacceptable, and initiated new procedures to retest these valves. This is considered to be a further example of a violation of 10 CFR Part 50, Appendix B, Criterion XI (254/91005-02c(DRS)).

c. M-4-1-88-016

This modification replaced a number of motor operator valve (MOV) two-rotor limit switches with four-rotor limit switches. These new switches provided better indication of valve full closed and full open positions, independent of torque switch bypass settings. The modification included the bypassing of a number of MOV open torque switches and provided for adjustments of other two-rotor limit switches to enhance valve position indication.

The inspector reviewed the 10 CFR 50.59 review and safety evaluation as well as the following MOV performance computer plots using the VOTES methodology and had no adverse comments:

- 1-1001-23A in RHR system, MOV with a two-rotor limit switch.

- 1-2024B in recirculation system, MOV with a four-rotor limit switch.

The above tests showed that the bypass switch settings and the close limit switch/open indication met the project plan test acceptance criteria. For open limit switch/close indication, the project acceptance criteria specified that the limit switch should be set 1/2 inch from the full open position for valves over 10 inches in diameter, and 1/4 inch from the full open position for valves under 10 inches in diameter. The settings were done in accordance with a site maintenance procedure which specified a setting within 1/2 inch or 1/4 inch from the full open position, respectively. This acceptance criteria in the maintenance procedure appeared to be unacceptable, because the possibility of the limit switch being set too close to the full open position (set at 0) was not precluded. This could cause valve damage during fast opening of the MOV if the valve was backseated. Furthermore, there was no requirement in this procedure to document the final limit switch position settings. An individual from the licensee's technical staff stated that he had witnessed the settings and that they were close to what had been specified; however, this was not verified by the inspector. The licensee has committed to upgrade the maintenance procedure to include the correct limit switch settings. The test procedural deficiency is an additional example of violation of 10 CFR Part 50, Appendix B, Criterion III (254/91005-01b(DRS)).

3. Minor Design Change (MDC)

The inspector selected one MDC, P04-1-91-009, for review. This MDC was to replace reactor core isolation cooling (RCIC) system MOVs 1-1301-22 and 26 spring packs. The spring packs had been too stiff to meet the licensee engineering MOV thrust window requirements. A review of the 10 CFR 50.59 design change evaluation and systems interaction studies was completed and no deficiencies were identified. However, during the inspection the following concerns were identified:

a. The MDC work package specified that functional verification testing would use the VOTES method, but failed to specify the acceptance criteria (thrust windows). Test acceptance criteria had previously been determined by licensee engineering in a December 7, 1990, letter to the station. The licensee stated that this appeared to be a generic problem within the MDC system and initiated measures to correct it during the inspection. This is considered to be an additional example of a violation of 10 CFR 50, Appendix B, Criterion XI (254/91005-02d(DRS)).

b. The inspector selected RCIC valve 101301-26 for review. The present thrust window was to be set between 1987-3286 lbs (currently set at 2600 lbs). A review of recent records showed:

- On September 30, 1989, the valve operator was overhauled, and a light weight grease (said to be similar to motor oil) was used to replace the previously-used heavy grease in an effort to improve MOV performance.

- On October 4, 1989, measured thrust at the closed switch trip was 3,266 lbs.

- On November 16, 1990, thrust was measured at 6,920 lbs. This exceeded the acceptable thrust window, and was apparently due to spring pack hydraulic locking. The MOV was repaired, adjusted, and the thrust was lowered to 2,763 lbs. However, no grease relief was installed.

  At the time of the inspection, the licensee was unable to determine the extent of the MOV hydraulic lock problem. This problem could be evaluated through a periodic surveillance program

testing those MOVs containing light weight grease and with no grease relief in the spring pack housing. The licensee acknowledged the problem and was evaluating options to deal with the issue.

4. Temporary Alteration (TA)

a. The inspector selected TA 90-1-036 for review. This TA removed the valve internals from a 2" manual service water shutoff valve upstream of the residual heat removal (RHR) pump room cooler after the valve had failed to close completely. The alteration was performed in July 1990. A 10 CFR 50.59 safety evaluation completed on July 27, 1990, was considered to be inadequate because some of the safety evaluation determinations were without technical discussion or justification. The evaluation also failed to consider the use of the valves during emergency conditions. This included the inability to isolate cooler leaks, thereby permitting possible area flooding and equipment spray down. The valve could also be utilized to adjust the flow rate should the throttling valve downstream of the cooler fail. A detailed safety evaluation was also performed on October 5, 1990, as required by the licensee administrative procedure governing TAs. The October 1990 evaluation was reviewed by the inspector and found to be acceptable.

b. During followup of the licensee's corrective action, regarding the above valve, the inspector was informed that the licensee had decided to replace the valve internals during the next refueling outage. However, the licensee has since decided to fix the problem by cutting the valve from the piping, and replacing it with an equivalent valve. The licensee stated that they planned to utilize the site Spare Replacement Parts Program (SRPP), described in procedure ENC-QE-70, developed in January 1990. The inspector noted that the task appeared to be a minor design change as defined in the CECo Quality Assurance (QA) manual procedure, QP-3-51, Attachment A, Section 3.5.

5. 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. An Open Item disclosed during this inspection is described in Paragraph 2.b.(2).

6. Exit Meeting

The inspector met with the licensee representatives denoted in Paragraph 1 on February 14, 1991. The inspector summarized the scope and findings of the inspection. A followup telephone conference was conducted on March 21, 1991, to discussion some changes in the inspection findings. The licensee acknowledged the statements made by the inspector with respect to the violations and other concerns. The inspector also discussed the informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection and the licensee did not identify any such documents/processes as proprietary.