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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 20, 1985

Docket Nos. 50-456
50-457

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
P.O. Box 767
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Gentlemen:

SUBJECT: CONSTRUCTION APPRAISAL TEAM INSPECTION 50-456/84-44, 50-457/84-40

Enclosed is the report of the Construction Appraisal Team (CAT) inspection conducted by the Office of Inspection and Enforcement (IE) on December 10-20, 1984 and January 7-18, 1985 at the Braidwood site. The Construction Appraisal Team was composed of members of IE, NRC Region III and a number of consultants. The inspection covered construction activities authorized by NRC Construction Permits CPPR-132 and CPPR-133.

This inspection is the tenth of a planned series of construction appraisal inspections by the Office Inspection and Enforcement. The results of these inspections are being used to evaluate the management control of construction activities and the quality of construction at nuclear plants.

The enclosed report identifies the areas examined during the inspection. Within these areas, the effort consisted primarily of detailed inspection of selected hardware subsequent to quality control inspections, a review of selected portions of your Quality Assurance Program, examination of procedures and records, observation of work activities, and an examination of your project management.

Appendix A to this letter is an Executive Summary of the results of this inspection and of conclusions reached by this office. The NRC CAT noted no pervasive breakdown in meeting construction requirements in the samples of installed hardware inspected by the team or in the applicant's project construction controls for managing the Braidwood project.

However, deficiencies noted by the NRC CAT in a number of hardware installations indicate a need for more management attention. The deficiencies included examples of inadequate hardware inspection and examples of inadequate quality assurance and engineering review of deficiencies for general application. The major areas of concern to the NRC CAT are: (1) the dependence on final walkdown inspections late in the construction program to identify and resolve problems; and (2) the ability to manage the large number (over 20) of ongoing major corrective action programs and ensure that current work is correctly performed.

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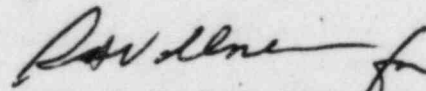
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The NRC team observed that CECO was implementing some good construction practices at the Braidwood site. These include active CECO management involvement in the construction of the project, the use of an independent test agency for inspection overview and unit concept review for construction adequacy, and the initiation of a Quality First Program.

Appendix B to this letter contains a list of potential enforcement actions based on the NRC CAT inspection observations. These are being reviewed by the Office of Inspection and Enforcement and the NRC Region III Office for appropriate action. In addition, Region III will be following your corrective action for deficiencies identified during this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room. No reply to this letter is required at this time. You will be required to respond to these findings after a decision is made regarding appropriate enforcement action.

Should you have any questions concerning this inspection, please contact us or the Region III Office.



James M. Taylor, Director
Office of Inspection and Enforcement

Enclosures:

1. Appendix A - Executive Summary
2. Appendix B - Potential Enforcement Actions
3. Inspection Report

cc w/enclosures:
See next page

February 20, 1985

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APPENDIX A

EXECUTIVE SUMMARY

An announced NRC Construction Appraisal Team (CAT) inspection was conducted at Commonwealth Edison Company's (CECo) Braidwood Station during the period December 10-20, 1984 and January 7-18, 1985.

Overall Conclusions

Hardware, Project Management and documentation for construction activities were generally in accordance with requirements and licensee commitments. However, the NRC CAT did identify a number of construction program weaknesses that require increased management attention. These are:

1. The effectiveness of first level quality control (QC) inspection activities needs to be improved, particularly in the pipe support/restraint and welding areas.
2. A large number of final inspection activities are being included in a final walkdown, when greater difficulty will be encountered in identifying deficiencies because of interferences, accessibility and the pressure of schedule.
3. The identification and resolution of cable tray and conduit electrical separation deficiencies is inadequate.
4. An excessive number of incidents of damage to installed equipment has been caused by current construction activities.

The foregoing identified weaknesses require additional management attention to assure that completed installations meet design requirements.

An effort was made by the NRC CAT to evaluate the ongoing Braidwood Construction Assessment Program (BCAP). The schedule for the BCAP inspection program was such that only limited hardware samples were available for NRC CAT overinspection. It was possible to overinspect a very small sample of hardware in the areas of supports/restraints, piping runs, HVAC supports and ducts for welding, HVAC ducts for configuration and conduit runs. In four of the six areas that were overinspected, there was general agreement between BCAP and NRC CAT findings; in two areas, supports/restraints and piping runs, deficiencies were identified by the NRC CAT that were not identified by the BCAP inspectors. On the basis of the limited sample overinspected, it appears that BCAP inspection effort needs to be improved in the areas of supports/restraints and piping runs.

AREAS INSPECTED AND RESULTS

Electrical and Instrumentation Construction

The electrical and instrumentation samples inspected generally met the applicable design and construction requirements. However, construction and inspection deficiencies were identified in several areas including several items which will require additional NRC review and analysis.

Site implementation of electrical separation criteria is not consistent with the FSAR commitment which, with several exceptions, endorses IEEE Standard 384-1974. Several items regarding the interpretation of separation criteria will require additional NRR review. The electrical contractor's quality control program was found deficient in that the inspection criteria was not sufficient to identify separation deficiencies. As a result, a number of installations of non-Class 1E to Class 1E raceway and cable were found that did not meet the IEEE requirements and the FSAR commitments for minimum separation.

The majority of bolts used with raceway supports are of indeterminate material as they do not contain the manufacturer's identification required by the ASTM standard.

Although the instrumentation sample was not sufficiently large because of an ongoing reinspection program to draw an overall conclusion, a number of instances were identified of items damaged during the erection of scaffolding.

Mechanical Construction

Contractor QC inspections and site QA programs have not been effective in assuring that installed pipe supports/restraints meet design requirements. The inspection and acceptance criteria provided for activities such as QC inspection and document review and control need to be strengthened and clarified.

Numerous examples of generally poor construction practices were observed. The need to protect and maintain installed and accepted hardware needs to be reemphasized.

Piping, HVAC, concrete expansion anchors and mechanical equipment were generally found to be installed in accordance with requirements or with deficiencies that had previously been identified. However, because of ongoing re-evaluations and reinspections, it was not possible to establish a complete and conclusive assessment of these areas.

The NRC CAT inspectors do not consider that the previously identified NRC concern regarding pipe to pipe and interdisciplinary clearances has been responded to in a timely or effective manner. System and area walkdown inspections performed late in the construction program must be recognized as only an additional level of assurance of proper installation and not a substitute for detailed, item specific first line QC inspections.

Welding and Nondestructive Examination

Welding and nondestructive examination activities were generally found to be conducted in accordance with the governing codes and specifications. However, a number of examples were identified where completed structural welds in pipe supports/restraints did not have the weld sizes specified by the design drawings. These undersized welds should have been identified during the weld inspection by QC. The licensee has performed an engineering evaluation concerning this problem and concluded that most of these welds are adequate for the intended application. In the area of vendor supplied ASME tanks and heat exchangers a number of tanks were found to have undersized weld reinforcement in nozzle to shell and manway to shell welded joints.

The NRC CAT inspectors also found radiographs which did not meet the specified acceptance criteria. The licensee's quality assurance procedures do not require that an independent interpretation of radiographs be performed prior to final storage in the vault. The NRC CAT believes that this lack of independent radiographic interpretation may have contributed to the Project's inability to detect deficient radiographs.

Civil and Structural Construction

Concrete quality was acceptable. Requirements for rebar around three of four inspected construction openings and cadweld testing frequency were not met.

Structural steel member sizes, configurations and connections had no major concerns identified. A few high strength steel bolts were found to be installed at below specified torque values.

In the area of masonry wall construction, a concern was identified regarding the need to assure proper rebar anchorage prior to replacement of masonry in the removed sections of masonry walls.

Material Traceability and Control

The measures presently established for material traceability and control for ongoing work appear to be adequate except for one area. During this inspection, it was determined that 10,500 feet of switchboard wire not qualified to IEEE 383-1974 was installed at Braidwood Station.

Corrective Action

The corrective action programs generally are being implemented in accordance with requirements. However, based on the results of this inspection, the controls for nonconformance reports issued by site contractors previous to 1983 need additional review. These include:

1. Some nonconformance reports were voided without documented justification.
2. Nonconformances dispositioned "Use-As-Is" or "Repair" were not routinely reviewed by the appropriate engineering personnel.
3. The specified corrective actions did not in some cases adequately resolve the nonconformances.

Design Change Control

Design change control was determined to be generally in conformance with applicable requirements. In the area of the most significant finding was the failure to annotate unincorporated design changes on controlled design documents. The most significant finding in the area of design change control was design change documents written against superseded revisions of the approved design drawings. In at least one instance, this deficiency resulted in a pipe support being installed and inspected to other than the latest approved design.

Project Management

The overall project management effort is evaluated to be satisfactory to construct the project in conformance with quality standards. Additional management attention is required to improve contractor performance in the areas of contractor deficiency trending, and craft and quality control inspector training.

APPENDIX B

POTENTIAL ENFORCEMENT ACTIONS

As a result of the NRC CAT inspection of December 10-20, 1984 and January 7-18, 1985 at the Braidwood site, the following items are being referred to Region III as Potential Enforcement Actions (section references are to the detailed portion of the inspection report).

1. Contrary to 10 CFR 50, Appendix B, Criterion VII and CECo Quality Assurance Manual, Quality Requirement No. 7.0, the measures to assure that equipment and services conform to the procurement documents were found to be ineffective in that vendor procured tanks and heat exchangers were accepted and installed with deficient welds. In addition, various vendors have supplied radiographs which did not have the required weld and film quality. (Section IV.B.1, 10)
2. Contrary to 10 CFR 50, Appendix B, Criterion VIII and CECo Quality Assurance Manual, Quality Requirement No. 8.0, the licensee failed to implement measures to prevent the following incidents:
 - a. 10,500 feet of General Electric "VULKENE" switchboard wire was received at Braidwood. Some of this wire has been installed without appropriate qualification to IEEE 383-1974. (Section VI.B.1)
 - b. Sargent & Lundy standard EB115.0 required the use of ASTM A307 bolting material for Class 1E seismic cable tray hangers. Hangers in the lower cable spreading room did not utilize ASTM 307 fasteners in some cases. Also, the generic qualification document for the Class 1E storage batteries specified ASTM A307 bolts for the battery racks. The battery racks were inspected and found to have bolting material that did not meet the requirements of ASTM A307. (Section VI.B.1)
3. Contrary to 10 CFR 50, Appendix B, Criterion X and CECo Quality Assurance Manual, Quality Requirements No. 10.0, the licensee's inspection programs have failed to identify areas where seismic category I pipe supports/restraints and other seismic pipe supports/restraints have not been constructed in accordance with design requirements. (Section III.B.2)
4. Contrary to 10 CFR 50, Appendix B, Criterion X, and CECo Quality Assurance Manual, Quality Requirement No. 10.0, the licensee failed to provide an adequate inspection program in that electrical separation criteria established in quality control procedures were not sufficient to identify installations of raceway and cables violating design requirements for separation. (Section II.B.1)

5. Contrary to 10 CFR 50, Appendix B, Criterion X and the CECo Quality Assurance Manual, Quality Requirement No. 10.0, the program for inspection of activities affecting quality was not effectively implemented in that the inspection programs have not identified that the specified weld sizes in structural pipe support/restraints have the required weld configuration. (Section IV.B.1)
6. Contrary to 10 CFR 50, Appendix B, Criterion XVI and CECo Quality Assurance Manual, Quality Requirement 16.0, the licensee's electrical contractor's corrective actions for the following NCRs were found to be inadequate:
 - a. NCR 39, issued in April 1979, identified weld deficiencies in electrical struts and hangers. The supporting documentation attached to the NCR identified that 90 percent of the welds were unacceptable. The corrective action block on the NCR was marked "N/A" and contained a statement identifying the welds as acceptable. There was no documentation supporting this corrective action statement on the NCR. (Section VIII.B.1)
 - b. NCR 293, issued in May 1981, identified weld deficiencies on back to back B-line strut and spaced back to back strut. The corrective action was to rework the deficient welds on the back to back strut and return the spaced back to back strut to the vendor. Inspection of installed spaced back to back strut identified numerous weld deficiencies. Based on the weld deficiencies noted in the installed strut, the corrective action for this NCR was ineffective. (Section VIII.B.1)