Docket Nos. 50-438
50-439

JAN 13 1983

Tennessee Valley Authority
ATTN: Mr. H. G. Parris
Manager of Power
500A Chestnut Street, Tower II
Chattanooga, Tennessee 37401

Gentlemen:

SUBJECT: Construction Appraisal Inspection 50-438/82-32, 50-439/82-32

This refers to the construction appraisal inspection conducted by the Office of Inspection and Enforcement (IE) on September 20 - October 1, 1982 and October 12 - 22, 1982 at the Bellefonte Nuclear Plant and your Knoxville corporate office. The Construction Appraisal Team (CAT) was composed of members of IE and a number of consultants. This inspection covered construction activities authorized by NRC Construction Permit CPPR-123/124.

This inspection is the first of a series of construction appraisal inspections being planned by the Office of Inspection and Enforcement. The results of these inspections will be used to evaluate implementation of 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 of detailed inspection of selected hardware subsequent to TVA Quality Control inspections, a comprehensive review of your Quality Assurance Program, examination of procedures and records, observation of work activities and interviews with management and other personnel.

Appendix A to this letter is an Executive Summary of the results of the inspection and of the conclusions reached by this Office. No pervasive breakdown of TVA management control was noted in any area inspected. Also, deficiencies noted in installed hardware did not indicate pervasive failures to meet construction installation requirements. It is the position of the Construction Appraisal Team inspectors that the results of this inspection are typical of those found at large nuclear construction sites where pervasive failures are not encountered and do not require stopping work in any area. However, prompt TVA management attention to the resolution of the detailed deficiencies identified during the inspection is needed.

Appendix B to this letter contains a list of potential enforcement actions based on CAT inspector observations. These have been referred to the Region II Office for review and necessary action.

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Appendix C to this letter contains a list of CAT inspector observations relating to matters which, while not specific regulatory requirements, are considered to be of sufficient importance to quality construction to warrant TVA management attention and appropriate action.

In accordance with 10 CFR 2.79(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room unless you notify this office, by telephone, within 10 days of the date of this letter and submit written application to withhold information contained herein within 30 days of the date of this letter. Such applications must be consistent with the requirements of 10 CFR 2.790(b)(1).

No reply to this letter is required at this time. Region II will address the potential enforcement findings at a later date and any required reponse will be addressed at that time.

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

Sincerely,

original signed by
R.C. DeYoung

Richard C. DeYoung, Director
Office of Inspection and Enforcement

Enclosures:
1. Appendix A- Executive Summary
2. Appendix B- Potential Enforcement Findings
3. Appendix C- Inspector Observations
4. Inspection Report 50-438/82-32, 50-439/82-32

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APPENDIX A

EXECUTIVE SUMMARY

An announced Construction Appraisal Team (CAT) inspection was performed at the Tennesee Valley Authority's (TVA) Bellefonte Nuclear Plant site and the Knoxville office during the period September 20 - October 1, 1982 and October 12 - 22, 1982.

OVERALL CONCLUSIONS

It is the position of the Construction Appraisal Team that the results of this inspection are typical of those found at large construction sites without a major QA/QC breakdown or pervasive failures and do not require immediate NRC actions. However, prompt management attention to the deficiencies identified during the inspection is needed.

A number of deficiencies were identified by the NRC CAT inspectors after TVA construction quality control (QC) inspections were completed. While it is recognized that additional inspections such as those associated with "construction-operations turnover" and IE Bulletin 79-14 (piping support systems) will be performed at later times, TVA construction QC inspections completed prior to the CAT inspection should have identified most of the deficiencies found by the CAT inspectors.

The hardware deficiencies may be related to the general CAT finding that QC inspector effectiveness is reduced by the organizational structure whereby discipline QC and site engineering personnel report to the same supervisor. (Note: The current organizational structure is being changed as a result of efforts by Region II and other inputs including the CAT inspection and the INPO-sponsored self-evaluation.)

TVA management has not effectively used immediate corrective action measures to provide solutions to identified problems. In several cases (i.e., fillet welds, instrument tubing problems) it allowed work to continue without complete definition of adequate solutions to the identified problems.

AREAS INSPECTED AND RESULTS

Quality Assurance: The licensee's quality organization is not completely effective in preventing, identifying, and recommending solutions to problems in safety-related activities. This is confirmed by the hardware problems found during this inspection after inspection by the TVA QC organization.

Project Management: The project management organization appears adequate in structure, numbers, and competence. A concerted effort needs to be made by all levels of management to reduce the number of hardware discrepancies found subsequent to QC inspections.

Design Changes and Nonconformances: Several program weaknesses were identified. These include problems in the control of design changes and in the disposition of quality control investigation reports (QCIRs) and nonconforming condition reports (NCRs). Also, there is a need for improvement in the design interface between the site and the design organizations.

Electrical and Instrumentation Construction: Several weaknesses were identified including problems in cable color coding practices, improper mounting/installation of electrical equipment, and unclear inspection and acceptance criteria. The continuing installation of instrument tubing without resolution of problems with the design, installation, and inspection criteria is of concern to the NRC CAT inspectors.

Welding-NDE: A number of hardware deficiencies were identified in this area. However, deficiencies were for the most part isolated cases and do not constitute any major breakdown in this area.

Undersize fillet welds were identified by NRC CAT inspectors which confirm earlier findings by TVA and Region II. This problem was identified more than 2 years ago, and while progress has been made toward resolution, a major effort is still required to satisfactorily resolve the issue.

Mechanical Construction: Deviations from requirements were observed in QC-accepted hardware in instances of valve orientation, equipment foundation bolting, pipe supports/restraints, and heating, ventilation, and air conditioning (HVAC) installation. There was indication of a lack of adequate inspection and acceptance criteria. Despite the deficiencies, the condition of the installed hardware was found to be generally satisfactory. Pervasive technical problems were not evident.

Civil, Structural and Concrete Construction: Activities in the civil construction area appear to be adequate. Minor procedural problems were identified in certain areas of cadwelds, concrete placement, and structural steel. Because of the large number of areas where existing concrete structures are being removed for the installation of penetration sleeves or anchors, there is concern for adequate restoration of the concrete structure after the repair work is completed. There is a need for tighter controls over concrete chipping, drilling, cutting, and repair activities.

QC Inspector Effectiveness: Sixty-five quality control inspectors were interviewed. No instances of harassment or intimidation were identified. Interviews and document reviews revealed that some inspectors were being certified without complete training and the TVA commitments made to ANSI-N45.2.6-1978 were not being completely implemented. Of 25 inspectors interviewed, 9 had been certified 4 weeks after start of employment, with no evidence of prior experience to establish qualification.

Material Traceability: Samples of structural members, piping, and welding filler material were satisfactorily traced from the installed condition or from the issue station through the contract and Certified Material Test Reports (CMTRs) and Certificates of Conformance. No deficiencies were noted in this area.

Procurement, Receipt and Storage: The onsite procurement, receiving inspection, and warehousing activities were examined and found to be acceptable. Samples of in-place storage of safety-related equipment revealed several deviations from NRC requirements. In addition, action is needed regarding the accurate identification of equipment requiring maintenance and the specifying of maintenance schedules for safety-related equipment both in storage and installed at the site.

APPENDIX B

POTENTIAL ENFORCEMENT FINDINGS

As a result of the Construction Appraisal Team (CAT) inspection of September 20 - October 1, 1982 and October 12 - 22, 1982 the following items have been referred to Region II as potential enforcement findings: (Section references are to the detailed portion of the Inspection Report)

QUALITY ASSURANCE

1. Contrary to 10 CFR 50, Appendix B, Criterion XII and Quality Control Procedure 10.11, Rev. 9, several items of measuring and test equipment which were beyond the date of required calibration or needing repair were found not to be properly controlled. (Section II.B.4)

2. Contrary to 10 CFR 50, Appendix B, Criterion VI and Quality Control Procedure 10.2, Rev. 8, a sample of drawings located in the field were found not to be properly controlled. Examples of this problem had previously been identified by Region II inspectors. (Section II.B.6)

3. Contrary to 10 CFR 50, Appendix B, Criterion XVIII and Quality Assurance Staff Procedure 7.1 Rev. 10, several site construction audits were not conducted annually as required. (Section II.B.7)

4. Contrary to 10 CFR 50, Appendix B, Criterion XVIII and Quality Assurance Staff Procedure 7.1, Rev. 10, site engineering services by ITT-Grinnel were not audited within the past four years as required by procedure. (Section II.B.7)

DESIGN CHANGE CONTROLS AND CORRECTIVE ACTION SYSTEMS

1. Contrary to 10 CFR 50, Appendix B, Criteria III and V, several Design Information Requests were used to process design changes, establish procedural requirements, define repair procedures, and establish accept/reject criteria for the installation of equipment. (Section IV.B.3.a.(2))

2. Contrary to 10 CFR 50, Appendix B, Criteria III and XVI, a sample of engineering dispositions for identified nonconformances were found to be without sufficient technical justification, and in several instances, failure to take adequate corrective actions has resulted in repetitive non-compliance. Other examples of this problem had previously been identified by Region II inspectors. (Section IV.B.3.b)

3. Contrary to 10 CFR 50, Appendix B, Criteria III and XV, various rework systems were used to accomplish permanent plant work prior to engineering approval. Also several instances were found where nonconforming conditions were identified and repaired, but adequate inspection and engineering reviews were not incorporated to satisfy the original installation requirement. A separate but similar problem was previously identified by Region II inspectors. (Section IV.B.3.c)

4. Contrary to 10 CFR 50, Appendix B, Criterion V, procedures are not sufficient to ensure adequate engineering reviews are provided for design changes performed as a result of a verbal notification of nonconforming conditions. (Section IV.B.3.d)

5. Contrary to 10 CFR 50, Appendix B, Criterion V and the FSAR:

   (a) Site testing procedures do not incorporate adequate criteria to ensure the minimum density for shield walls satisfies 144#/FT 3 as specified in FSAR Section 12.3.2.2.

   (b) Contractor tests for chemical properties of cement in accordance with ASTM C-150 are not being performed as prescribed in FSAR Section 3.8.1.6.1.

   (c) Aggregates have not been properly qualified to the requirements for potential reactivity as required by ASTM C-33 as specified in FSAR Section 3.8.1.6.1. (Section IV.B.3.g)

ELECTRICAL AND INSTRUMENTATION CONSTRUCTION

1. Contrary to 10 CFR 50, Appendix B, Criterion X, certain inspection activities were not executed to verify installation conformance with procedures: cable spacing in trays, cable fill, cable bend radii, cable termination, tray installation hardware, and electrical equipment installation hardware. Problems in exceeding minimum cable bend radii had previously been identified by Region II inspectors. (Section V.B.1)

2. Contrary to 10 CFR 50, Appendix B, Criterion X, inspection activities were not executed to verify conformance with procedures relative to color coding of cable. (Section V.B.1.e)

3. Contrary to 10 CFR 50, Appendix B, Criterion V, battery maintenance was not performed in accordance with applicable procedures. (Section V.B.4.f)

4. Contrary to 10 CFR 50, Appendix B, Criterion XVII, some inspection records do not adequately include results of inspections (i.e., electrical cable installation cards, cable tray installation cards, and electrical equipment installation cards. (Section V.B.7)

WELDING, NONDESTRUCTIVE EXAMINATION

1. Contrary to 10 CFR 50, Appendix B, Criterion V, several matters relating to the performance of welding and nondestructive testing were found not to be properly controlled (Sections VI.B.1 undersize welds, VI.B.3 HVAC isolation valve weld joints, VI.B.6 weld joint mismatch, and VI.B.10 out-of-specification radiograph film). A TVA nonconformance report had previously identified the undersize weld problem.

2. Contrary to 10 CFR 50, Appendix B, Criterion XVII and Section III-2 of the TVA QA Training Program Plan, record packages for five QC inspectors were found to be incomplete. (Section VI.B.13)

MECHANICAL CONSTRUCTION

1. Contrary to 10 CFR 50, Appendix B, Criterion V and QCP-6.9, Rev. 3, two installed valves were found that were not in the proper orientation. (Section VII.B.1.a)

2. Contrary to 10 CFR 50, Appendix B, Criterion V and QCP-6.3, Rev. 3, several embedded anchor bolts had loose or missing anchor bolt nuts or missing/improper anchor bolt washers. (Section VII.B.3.a)

3. Contrary to 10 CFR 50, Appendix B, Criterion V, QCPs and detail drawings applicable to HVAC do not provide appropriate inspection acceptance criteria. (Section VII.B.4.b)

4. Contrary to 10 CFR 50, Appendix B, Criterion V, and QCP-2.8, Rev. 9, boxes containing mixed brands of self-drilling expansion anchors were observed at work locations. (Section VII.B.5)

CIVIL AND STRUCTURAL

1. Contrary to 10 CFR 50, Appendix B, Criterion XVI, TVA has not established adequate actions to prevent and/or monitor containment tendon grease leakage. (Section VIII.B.1)

2. Contrary to 10 CFR 50, Appendix B, Criterion V, QC inspection procedures do not call for the identification of reinforcing steel damaged or cut during concrete chipping operations. Region II inspectors had previously called attention to this problem. (Section VIII.B.3)

3. Contrary to 10 CFR 50, Appendix B, Criterion X, an aluminum can was observed in a repaired concrete area and embedded reinforcing steel was exposed in a dry-pack mortar area. This was a result of TVA not having formal provisions for post-placement inspection of newly placed or repaired concrete areas to ensure adequate workmanship. (Section VIII.B.3.d)

4. Contrary to 10 CFR 50, Appendix B, Criterion X, a QC inspector was observed to be assisting in the operation of batch plant control(s), the operation for which he had inspection responsibility. (Section VIII.B.4.c)

5. Contrary to 10 CFR 50, Appendix B. Criterion V, QCP-2.15 for structural steel installation does not adequately define the dimensional tolerances to be met nor ensure as part of the final inspection that fabrication inspection has been performed. (Section VIII.B.5.b and c)

QC INSPECTOR EFFECTIVENESS

1. Contrary to 10 CFR 50, Appendix B, Criterion II, QC inspectors were trained and certified to specific inspection procedures. It was found that the procedures did not contain all of the inspection criteria for inspections in the electrical and hanger engineering units. (Section IX.B.4)

2. Contrary to 10 CFR 50, Appendix B, Criterion II and ANSI N45.2.6, TVA procedures do not define the education and experience requirements necessary for QC inspector certification. (Section IX.B.5)

PROCUREMENT, RECEIPT AND STORAGE

1. Contrary to 10 CFR 50, Appendix B, Criterion XIII and QCP-10.27, Rev. 6, in-place storage of certain safety related equipment was found not to be properly controlled. (Section XI.B.1)

APPENDIX C

INSPECTOR OBSERVATIONS

As a result of the Construction Appraisal Team (CAT) inspection of September 20 - October 1, 1982 and October 12 - 22, 1982, the following items, while not relating to specific regulatory requirements, are provided for TVA management attention and disposition: (Section references are to the detailed portion of the Inspection Report.)

PROJECT MANAGEMENT

Although trend analysis is being conducted in the area of electrical construction and hanger inspections, it does not appear that field construction has significantly reduced inspection deficiencies in these areas. (Section III.B.4)

DESIGN CHANGE CONTROLS AND CORRECTIVE ACTION SYSTEMS

A number of methods exist to process design changes, to control rework activities, and to identify nonconforming conditions. The multiplicity of systems results in a number of occurrences where engineering review and associated quality activities are not properly performed. (Section IV.B.3.e)

ELECTRICAL AND INSTRUMENTATION CONSTRUCTION

The inspectors observed pipe supports which extended into cable trays and construction materials and scaffolding placed inside cable trays. These items are considered to be poor construction practices. (Section V.B.3)

The inspectors observed a number of instances where relatively long lengths of cable were not supported or protected by raceway. This condition was usually found between conduit and tray and between raceway and electrical equipment cabinets. Unsupported and unprotected cable runs (those not in a raceway) are considered to be poor construction practice and a cable system installation weakness. (Section V.B.I)

The present inspection status and condition of the installed instrument tubing are of concern to the NRC CAT inspectors. Installation and rework in this area is continuing. Installation and inspection procedures continue to be revised. TVA site personnel informed the NRC CAT inspectors that acceptance criteria for final inspection are not yet available. (Section V.B.5)

WELDING NONDESTRUCTIVE TESTING

Field and Shop Weld-o-lets. With respect to the weld-o-lets installed in "completed" piping systems at Bellefonte that do not have the required weld reinforcement, two NCRs (1471 and 1740) have been issued on this problem. At the time of the CAT inspection it was evident that TVA had not fully scoped the situation nor did it appear that a resolution to the problem was close at hand. (Section VI.B.7)

CIVIL AND STRUCTURAL

The findings and observations in the concrete chipping and other rework areas indicate the need for tighter control over concrete chipping, drilling, cutting, and repair activities.

Generic acceptance criteria have not yet been developed by TVA's engineering and design organization for damaged or nicked reinforcing steel. The extensive concrete chipping activities now going on indicate a need for the availability of acceptance criteria in a timely manner. In addition, no tracking system to control rework was noted during the inspection. (Sections IV.B.3 and VIII.B.3)

PROCUREMENT, RECEIPT AND STORAGE

There is a lack of accurate identification of some safety-related equipment requiring maintenance at the site (while in storage and in place). In addition, a lack of specifying and initiating maintenance to be performed in a timely manner requires management attention. (Section XI.B.3)